Climate Change

Climate Change

04/05

ISSN 1611-8855

CTI Capacity Building Seminar for CEE/FSU Countries: Climate Technology and Energy Efficiency - Challenges and Changes for Climate Technology

- Seminar Proceedings -

Umwelt Bundes Amt

Für Mensch und Umwelt

Climate Change
04
05
ISSN
1611-8855

CTI Capacity Building Seminar for CEE/FSU Countries: Climate Technology and Energy Efficiency – Challenges and Changes for Climate Technology

- Seminar Proceedings -

Tutzing, Germany, 20 - 24 September 2003

Preparation and Organization by

PD Dr. Lutz Mez, Sybille Tempel, Michael Krug,
Environmental Policy Research Centre (FFU)
Free University of Berlin

Technical Organzation by

Claudia Domel, Heiko Ebeling

ITUT, Verein zur Förderung des internationalen Transfers von Umwelttechnologie e.V., Leipzig

Editing of the Proceedings

Sybille Tempel, Harald Mönch

Environmental Policy Research Centre (FFU)
Free University of Berlin

This Publication is only available as Download at
http://www.umweltbundesamt.de

Publisher: Federal Environmental Agency (Umweltbundesamt)
Postfach 33 00 22
14191 Berlin
Tel.: +49/30/8903-0
Telex: 183 756
Telefax: +49/30/8903 2285
Internet: http://www.umweltbundesamt.de

Edited by: Section I 4.2
Dr. Peter Pichl

Berlin, January 2005

Opening Remarks by the Chairman of the CTI Executive Committee

Good afternoon. On behalf of the Climate Technology Initiative I wish to welcome you to this capacity seminar in beautiful Tutzing. We are indeed fortunate to be here today in this picturesque spot. As a matter of fact, I personally feel quite lucky to be here today. A few days ago a large hurricane hit the east coast of the United States where I live, causing significant damage. I had expected to arrive a day earlier, but my flight was canceled due to the severity of the storm. Although various members of my family, neighbors, and friends sustained substantial property losses, we all survived. Actually, we even grew in numbers. One of our daughters-in-law had a baby while the hurricane was in process at a hospital functioning on a back-up electricity generator. So, when I say I feel quite fortunate to be here today, I really mean it!

Speaking of being fortunate, in reviewing the list of participants, I am extremely pleased to see so many old friends. I particularly struck by the broad range of countries represented and the impressive credentials and wealth of experience that you individually and collectively bring to this seminar. Until being invited to this or one of our previous seminars held annually in Germany, many of you may not have been aware of the Climate Technology Initiative, known as CTI.

CTI was formed in 1995 to support the objective of United Nations Framework Convention on Climate Change, commonly referred to as the Climate Convention. CTI supports the Climate Convention by engaging in a variety of capacity building and technology enhancing activities that facilitate the more rapid development, adoption, and diffusion of climate-friendly technologies and practices. This seminar is an example of one of those activities undertaken to facilitate technology transfer under the Climate Convention. Other activities currently being pursued by the CTI include providing technical assistance to countries conducting their technology needs assessments. This is an area in which CTI has made a significant contribution by developing a methodological document to guide countries in the performance of technology needs assessments. This widely acclaimed handbook was developed from significant hands-on experience and in collaboration with the UN Development Program. Further, the CTI holds regional workshops on how to apply these methodologies along with efficient and effective ways to gain access to relevant technology information. Additionally, as most of us here are well aware, CTI also feels that engagement of the private sector is essential to effective and lasting technology transfer. As such CTI has conducted numerous regional joint industry seminars on technology diffusion at least once in every region of the world.

To find out more about the CTI, I encourage you to visit our website at http://www.ClimateTech.Net.

There are eight countries currently participating in CTI. These are Austria, Canada, Denmark, Germany, Japan, Norway, the UK, and the US. I especially want to thank the German Government for its unwavering support of the CTI since the beginning and most recently providing the resources necessary to make this seminar possible. Germany and the other CTI countries take their commitment under the Climate Convention seriously and feel that working together on a multilateral basis provides for synergism.

CTI believes that sharing information and experiences on the application of climate-friendly technologies and practices has been demonstrated to be an effective capacity building tool. This seminar reflects just that. My compliments to those who have clearly labored long and hard to organize such an exciting set of sessions over the next few days. You have already had a site visit that I would have attended if I had not been for my bad weather experience back home. The range of topics at this seminar is truly impressive – emissions trading, project-based emissions reductions, international carbon trading, prospects for increasing the role of renewables in regional energy markets, and more. I and many of my CTI colleagues will be here in Tutzing for the next few days conducting a meeting of the CTI Executive Committee. Unfortunately, attendance at this meeting will prevent us from being able to participate full time in the seminar. However, I do look forward to having the opportunity to meet with you on the margins of both our gatherings since we will all be here within this beautiful Evangelische Akademie.

I encourage you to take full advantage of this opportunity and actively engage in the discussions. And, of equal importance, when you return home, please share your experiences and new knowledge with others so that this process has had even more far reaching and lasting impacts.

So, on behalf of the Climate Technology Initiative, I wish you a successful seminar. Thanks you for your attention.

Elmer Holt,
Chairman of the CTI Executive Committee

Table of Contents

Seminar Program I

List of Participants V

List of Abbreviations XV

Welcome Note 1

Excursion to Fuel Cell Pilot Project 2

Peter Fleischmann
Deutsche Telekom Immobilien und Service GmbH, Munich

How to Construct a Climate Change Program – Some Basics 4

Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

The EU Emissions Trading Directive 5

Dr. Felix Christian Matthes
Institute for Applied Ecology (Öko-Institut), Berlin

Emissions Trading - The Implementation of the EU-Directive in Germany 7

Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

Emissions Trading from a Buyer's Perspective 13

Albrecht von Ruffer
Natsource Tullett, Europe, London

Emissions Trading from a Seller's Perspective: Czech Republic 17

Tomaš Chmelík
Ministry of Environment of the Czech Republic

Discussant Notes: Emissions Trading 20

Sonja Butzengeiger
Hamburg Institute of International Economics (HWWA)

Carbon Finance and the World Bank: Chances, Experiences, Lessons Learned 22

Dr. Charlotte Streck
The World Bank Legal Department

Joint Implementation:
Relationship to and Compatibility with the Emission Trading Scheme 30

Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

Clean Development Mechanism in Central Asia 33

Dr. Liliya V. Zavyalova
Technology Transfer Agency, Uzbekistan

Creating a National CDM System in Georgia 43

Paata Janelidze
National Agency on Climate Change, Tbilisi

Experiences from the Certification of JI/CDM Projects 50

Michael Rumberg
TÜV Süddeutschland, Carbon Management Service

Discussant Notes Session JI and CDM 55

Dr. Tiit Kallaste
Estonian Institute for Sustainable Development, SEI-Tallin

The EU Directive on Electricity from Renewable Energy Sources 2001/77/EC 57

Prof. Dr. Volkmar Lauber
University of Salzburg

Amending the Renewable Energy Sources Act 66

Thorsten Müller
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

The New Renewables Support Scheme in the Czech Republic 71

Dr. Martin Bursík
Ecoconsulting s.r.o., Prague

Replacing Nuclear Energy by Renewables. The Case of Lithuania 74

Dr. Kęstutis Buinevičius
Kaunas University of Technology

Renewables in the New Energy Acts of Estonia 84

Dr. Villu Vares
Estonian Energy Research Institute at Tallinn Technical University

Discussant Notes: Session Incentive Schemes for Renewables 87

Dr. Hans-Joachim Ziesing
German Institute for Economic Research (DIW), Berlin

Bankable Energy Efficiency Projects - How to Get Energy Efficiency Investment Financed 90

Dr. Petra Opitz
German Energy Agency (dena), Berlin

Clear Contract - Clearinghouse for Contracting 91

Ralf Goldmann
Berlin Energy Agency

CHP as an Important Element of a Sustainable Energy Use in Germany 96

Dr. Jürgen Landgrebe
Federal Environmental Agency, Berlin

The European CHP Directive – a Step towards the Smarter Use of Energy 103

Peter Löffler
COGEN Europe

The Interaction between the EU CHP Directive & the New Danish Regulation 106

Ture Hammar
Danish Energy Authority

The Future of CHP in Russia 109

Dr. Igor Bashmakov
Center for Energy Efficiency CENEf, Moscow

**The CHP Competence Centres in the Slovak Republic:
Developed Strategies and Work Program** 119

Vladimir Hecl
Energy Centre Bratislava, Slovakia

Discussant Notes: Session Building Renovation and Employment Effects 120

Prof. Dr. Mihael G. Tomšič
Institute "Jožef Stefan", Ljubljana

Initiative for Climate Protection & Job Creation in Berlin-Brandenburg 122

PD Dr. Lutz Mez
Environmental Policy Research Centre, Berlin

**Analysis of Building Renovation Projects in Latvia:
Energy, Climate and Socioeconomic Aspect** 124

Prof. Dr. Dagnija Blumberga
Riga Technical University

Dr. Andra Blumberga • Marika Blumberga
Ekodoma, Ltd

Employment Effects of Building Renovation Projects 129

Prof. Dr. Adam Guła
Faculty of Fuels and Energy, AGH University of Science and Technology, Cracow
Polish Foundation for Energy Efficiency, Centre in Cracow

Maciej Surówka • Mariusz Filipowicz
Faculty of Fuels and Energy, AGH University of Science and Technology, Cracow

Developing and Implementing a Uniform German Certificate for Buildings 139

Felicitas Kraus
Deutsche Energie Agentur GmbH (dena)

Discussant Notes: Session Building Renovation and Employment Effects 143

Valia Peeva
Center for Energy Efficiency (EnEffect), Sofia

Country Reports

Country Report: Albania 147

Ermira Fida
Ministry of Environment of Albania • Climate Change Unit
Edmond Hido, PhD
Albania-EU Energy Efficiency Centre

Country Report: Armenia 158

A. H. Gabrielyan • D. L. Harutyunyan
UNDP/GEF "Armenia – country study on climate change" project
A. V. Pasoyan
Armenian Branch of Alliance to Save Energy
S. Shatvoryan • M. K. Vermishev
OPET-Armenia

Country Report: Azerbaijan 167

Elmir Akhmedov • Issa Aliyev
Center of Climate Change and Ozone

Country Report: Belarus 173

Sergei Prokazov
Committee for Energy Efficiency

Country Report: Bulgaria 178

Nikolay Nikolov
Energy Efficiency Agency (EEA)

Country Report: Croatia 181

Hrvoje Petrić
Energy Institute Hrvoje Požar, Zagreb

Country Report: Czech Republic 191

Tomáš Chmelík
Ministry of Environment of the Czech Republic

Country Report: Estonia 199

Dr. Tiit Kallaste
Estonian Institute for Sustainable Development, SEI-Tallinn
Dr. Villu Vares
Estonian Energy Research Institute at Tallinn Technical University

Country Report: Georgia 207

Paata Janelidze
National Agency on Climate Change with the Ministry of Environment and Natural Resources Protection

Country Report: Hungary 213

Gábor Takács
Energy Club Hungary, Budapest

Country Report: Republic of Kazakhstan 219

Dr. Kanat Baigarin
Climate Change Coordination Centre

Country Report: Latvia 228

Prof. Dr. Dagnija Blumberga • Dr. Marika Blumberga
Riga Technical University

Country Report: Lithuania 234

Vytautas Krušinskas
Ministry of Environment

Dr. Kęstutis Buinevičius
Kaunas University of Technology

Country Report: Republic of Macedonia 241

Prof. Dr. Konstantin Dimitrov
University of Sts. Cyril and Methodius, Faculty of Mechanical Engineering, Skopje

Tech. Ass. Ognen Dimitrov, dipl. mech. eng.
MACEF Macedonian Centre on Energy Efficiency

Country Report: Moldova 248

Ruslan Surugiu
Alliance to Save Energy

Lucia Lavric
Consultant

Country Report: Poland 253

Prof. Dr. Adam Guła
AGH, University of Science and Technology, Faculty of Fuels and Energy, Cracow
and the Polish Foundation for Energy Efficiency

Artur Wyrwa
AGH, University of Science and Technology, Faculty of Fuels and Energy, Cracow
and the Krakow Institute for Sustainable Energy

Country Report: Romania 262

Cristian Tantareanu
ENERO • Center for Promotion of Clean and Efficient Energy in Romania

Country Report: Russia 270

Dr. Igor Bashmakov
Center for Energy Efficiency, CENEf, Moscow

Country Report: Slovakia 277

Vladimír Hecl
Energy Centre, Bratislava

Country Report: Slovenia 288

Prof. Dr. Mihael Gabrijel Tomšič
"Jožef Stefan" Institute, Energy Efficiency Centre

Country Report: Ukraine 295

Dr. Georgiy Geletukha

Scientific Engineering Centre “Biomass”, Ukraine

Country Report: Uzbekistan 307

Dr. Liliya V. Zavyalova • Gulnara Sh. Rashidova

Technology Transfer Agency

CTI Capacity Building Seminar for CEE/FSU Countries

Climate Technology and Energy Efficiency – Challenges and Chances for Climate Technology

Organized by

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit

Umwelt Bundes Amt für Mensch und Umwelt

ffu Environmental Policy Research Centre

ITUT Verein zur Förderung des internationalen Transfers von Umwelttechnologie - ITUT e.V

September 20 – 24, 2003

Evangelische Akademie Tutzing

Germany

Seminar Program

Saturday, September 20, 2003

		Arrival in Munich
Evening	20.00	*Bavarian dinner at Erdinger Weißbierbräu, Erding*
		Overnight stay in Best Western Hotel, Erding

Sunday, September 21, 2003

Morning	09.15	*Excursion to fuel cell pilot project (hot module type)* Deutsche Telekom Immobilien und Service GmbH (DeTe Immobilien), Munich
	12.00	*Lunch*
	13.00	*Transfer to Tutzing by bus*
Afternoon	15.00 – 15.30	***Opening Addresses*** CTI: Mr. Elmer Holt, Chairman of the CTI Executive Committee Evangelische Akademie Tutzing: Dr. Martin Held Federal Ministry for the Environment: Mr. Franzjosef Schafhausen
Afternoon Session		***Emission trading*** **Chair: Franzjosef Schafhausen, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin**
	15.30 – 16.00	*The German approach to emission trading* Franzjosef Schafhausen, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin
	16.00 – 16.30	*The EU Emission Trading Directive* Dr. Felix Christian Matthes, Institute for Applied Ecology, Berlin
	16.30 – 17.00	*Emission trading from a buyer's perspective* Albrecht von Ruffer, Natsource Tullett Europe, London
	17.00 – 17.30	*Emission trading from a seller's perspective* Tomáš Chmelík, Ministry of Environment of Czech Republic, Prague
	17.30 – 18.00	*Discussant* Sonja Butzengeiger, Hamburg Institute of International Economics
	18.00	*Dinner*
Evening Session		***Business game: Emission trading***
	19.30 – 21.00	Nils Steinbrecher, ERM Lahmeyer International, Neu-Isenburg

Monday, September 22, 2003

Morning Session		***Joint Implementation and Clean Development Mechanism*** **Chair: Dr. Hans-Joachim Ziesing, German Institute for Economic Research, Berlin**
	09.00 – 09.30	*Carbon finance and the World Bank – Chances, experiences and lessons learned* Dr. Charlotte Streck, The World Bank, Washington
	09.30 – 10.00	*Joint Implementation – relationship to and compatibility with the EU Emission trading scheme* Franzjosef Schafhausen, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin
	10.00 – 10.30	*Clean Development Mechanism in Central Asia* Dr. Liliya Zavyalova, Ministry of Macro-Economics of Uzbekistan, Tashkent
	10.30 – 11.00	*Coffee Break*
	11.00 – 11.30	*Creating a national CDM system in Georgia* Paata Janelidze, National Agency on Climate Change, Tbilisi
	11.30 – 12.00	*Experiences from the certification of JI/CDM projects* Michael Rumberg, TÜV Süddeutschland, Munich
	12.00 – 12.30	*Discussant:* Dr. Tiit Kallaste, Estonian Institute for Sustainable Development, Tallinn
	12.30 - 13.45	*Lunch*
Afternoon Session		***Incentive schemes for renewables*** **Chair: Dr. Georgiy Geletukha, Scientific Engineering Centre "Biomass", Kiev**
	14.00 – 14.30	*The EU Directive on Electricity from Renewable Energy Sources* Prof. Volkmar Lauber, University of Salzburg
	14.30 – 15.00	*Amending the Renewable Energy Sources Act in Germany* Thorsten Müller, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin
	15.00 – 15.30	*Legislation supporting the use of renewables in the Czech Republic* Dr. Martin Bursík, EcoConsult, Prague
	15.30 – 16.00	*Coffee Break*
	16.00 – 17.00	*Replacing nuclear energy by renewables – the case of Lithuania* Dr. Kęstutis Buinevičius, Kaunas University of Technology
	17.00 – 17.30	*Renewables in the New Energy Acts of Estonia* Dr. Villu Vares, Estonian Energy Research Institute, Tallinn
	17.30 – 18.00	*Discussant* Dr. Hans-Joachim Ziesing, German Institute for Economic Research, Berlin
	18.00 – 19.15	*Dinner*
Evening Session		***Best practice examples***
	19.30 – 21.00	*Clear Contract – Clearinghouse for Contracting* Ralf Goldmann, Berlin Energy Agency

Tuesday, September 23, 2003

Morning Session		***Combined heat and power generation*** **Chair: PD Dr. Lutz, Mez,** **Environmental Policy Research Centre, Berlin**
	09.00 – 09.30	*CHP as an important element of a sustainable energy use in Germany* Dr. Jürgen Landgrebe, Federal Environmental Agency, Berlin
	09.30 – 10.00	*The European CHP Directive – a step towards the smarter use of energy* Peter Löffler, COGEN Europe, Brussels
	10.00 – 10.30	*The interaction between the EU CHP Directive and the new Danish regulation* Ture Hammar, Danish Energy Authority, Copenhagen
	10.30 – 11.00	*Coffee Break*
	11.00 – 11.30	*The future for CHP in Russia* Dr. Igor A. Bashmakov, CENEf, Moscow
	11.30 – 12.00	*The CHP Competence Centre in Slovakia* Vladimir Hecl, Energy Centre Bratislava
	12.00 – 12.30	*Discussant* Prof. Miha Tomšič, Institute Jozef Stefan, Ljubljana
	12.30 – 13.45	*Lunch*
Afternoon Session		***Building renovation and employment effects*** **Chair: Siegfried Rehberg**, **Association of Housing Companies in Berlin-Brandenburg**
	14.00 – 14.30	*CO_2 reduction – best practice examples in the building craft sector* Ulrich Plein, SaarLorLux Umweltzentrum, Saarbrücken
	14.30 – 15.00	*Analysis of building renovation projects in Latvia – Energy, climate and socio-economic aspects* Prof. Dagnija Blumberga, Riga Technical University
	15.00 – 15.30	*Employment effects of building renovation projects in Poland* Prof. Adam Guła, Polish Foundation for Energy Efficiency (FEWE), Cracow
	15.30 – 16.00	*Coffee Break*
	16.00 – 16.30	*Initiatives for development and implementation of a uniform German certificate for buildings* Felicitas Kraus, Deutsche Energieagentur (dena), Berlin
	16.30 – 17.00	*Discussant* Valia Peeva, Center for Energy Efficiency (EnEffect), Sofia
Evening	18.00	*Bus transfer to Munich*
	20.00	*Farewell dinner at Restaurant Lenbach*
		Overnight stay in Best Western Hotel Erding

Wednesday, September 24, 2003

Morning	*Departure*

List of Participants

Mr. Elmir Akhmedov

Lead Specialist

Center of Climate Change and Ozone
Ministry of Ecology and Natural Resources

Address: Moscow Avenue 50
370 154 Baku
Azerbaijan

Phone: +99 412 98 2795
Fax: +99 412 41 4685
E-mail: ell2ell@yahoo.com
ell2ell@iglim.baku.az

Dr. Kanat Baigarin

Director

Climate Change Coordination Centre

Address: 48 Abai Street, Room 102
473000 Astana
Republic of Kazakhstan

Phone: +7 3172 7171 70/69/73
Fax: +7 3172 3247 38
E-mail: kbaigarin@climate.kz

Dr. Igor A. Bashmakov

Executive Director

CENEf Centre for Energy Efficiency

Address: 61, Novocheremushkinskaya St.
117418 Moscow, P. Box 30
Russian Federation

Phone: +7-095 128 8491, 120 92 09
Fax: +7-095 128 9353
E-mail: cenef@online.ru
cenef-mailbox@mtu-net.ru

Prof. Dr. Dagnija Blumberga

Head of Department of Environmental Protection and Energy Systems

Riga Technical University
OPET Latvia

Address: Kronvalda bulvaris 1
1010 Riga
Latvia

Phone: +371 7089923
Fax: +371-7089923
E-mail: dagnija@btv.lv

Dr. Kęstutis Buinevičius

Associate Professor

Kaunas University of Technology
Dept. of Thermal and Nuclear Energy

Address: K. Donelaičio g. 20
3000 Kaunas
Lithuania

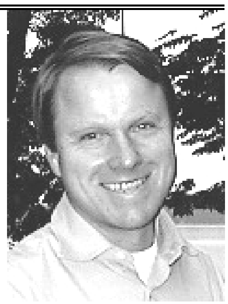
Phone: +370 37 300 441
Fax: +370 37 323 865
E-mail: termot@mf.ktu.lt

RNDr. Martin Bursík

ecoconsulting s.r.o.

Address: Snemovní 174/7
118 00 Prague 1, Malá Strana
Czech Republic

Phone: +420 2 57 53 1655
Fax: +420 2 57 53 2643
E-mail: martinbursik@mbox.vol.cz



Ms. Sonja Butzengeiger

Research Programme on International Climate Policy

HWWA – Hamburg Institute of International Economics

Address: Neuer Jungfernstieg 21
20347 Hamburg
Germany

Phone: +49 40 42834 370
Fax: +49 40 42834 451
E-mail: sonja.butzengeiger@hwwa.de

Mr. Tomáš Chmelík

Head of Climate Change Unit

Ministry of the Environment

Address: Vršovicka 65
100 10 Praha 10
Czech Republic

Phone: +420 2 67 122 328
Fax: +420 2 67 310 307
E-mail: tomas_chmelik@env.cz

Mr. Dirk Christophel

DeTe Immobilien

Address: Marsplatz 4
80335 München
Germany

Phone: +49 89 55004 658
Fax:
E-mail: dirk.christophel@telekom.de

Ms. Tatiana Dereviago

Chairperson/Project Manager

Ecoproject Minsk

Address: Zhukovskogo 27 – 10
220007 Minsk
Belarus

Phone: +375 17 205 4070
Fax:
E-mail: tatiana@ecoharmony.org

Prof. Dr. Konstantin Dimitrov

Univerzity "Sv. Kiril i Metodij"
Faculty of Mechanical Engineering Macedonian Center on Energy Efficiency

Address: Karpos II, bb. P.B.464
1000 Skopje
Macedonia

Phone: +389 2 3099 219
Fax: +389 2 3062 298
E-mail: kokan@ukim.edu.mk

Ms. Claudia Domel

Project Manager CEE

ITUT e.V.

Address: Euro-Asia Business Center
Messeallee 2
04356 Leipzig
Germany

Phone: +49 341 60 87-248
Fax: +49 341 60 87-210
E-mail: domel@itut-ev.org

Mr. Heiko Ebeling Project Manager SEE ITUT e.V.	Address: Phone: Fax: E-mail:	Euro-Asia Business Center Messeallee 2 04356 Leipzig Germany +49 341 60 87-204 +49 341 60 87-210 ebeling@itut-ev.org	
Dr. Christian Epp Project Manager WIP, Energy and Environment	Address: Phone: Fax: E-mail:	Sylvensteinstr. 2 81369 München Germany +49 89 720 12 712 +49 89 720 12 791 christian.epp@wip-munich.de	
Mr. Peter Fleischmann Head of Energy Management DeTe Immobilien	Address: Phone: Fax: E-mail:	Kaier-Wilhelm-Ring 4-6 48145 Münster Germany +49 251 7770 2310 +49 251 7770 2309 fleischmannp@telekom.de	
Dr. Georgiy Geletukha Director, Head of Biomass Laboratory Institute of Engineering Thermophysics of National Academy of Sciences of Ukraine Scientific Engineering Centre "BIOMASS“	Address: Phone: Fax: E-mail:	P.O. Box 964 03067 Kyiv-67 Ukraine +380 44 456 94 62 +380 44 456 94 62 geletukha@biomass.kiev.ua	
Mr. Ralf Goldmann Division Manager Berliner Energieagentur GmbH	Address: Phone: Fax: E-mail:	Rudolfstr. 9 10245 Berlin Germany +49 30 2933 3031 +49 30 2933 3099 goldmann@berliner-e-agentur.de	
Ms. Katherina Grashof FFU Environmental Policy Research Cen-tre, Free University of Berlin	Address: Phone: Fax: E-mail:	Ihnestr. 22 14195 Berlin Germany +49 30 8385 44 90 +49 30 8385 66 85 k.grashof@web.de	

Mrs. Elżbieta Guła

Project Manager Renewables

Polish Foundation for Energy Efficiency Centre in Kraków (FEWE)

Address: Al. Mickiewicza 30
30-059 Kraków
Poland

Phone: +48 12 617 4174
Fax: +48 12 617 4175
E-mail: egula@uci.agh.edu.pl

Prof. Dr. Adam Guła

Director

AGH, University of Science and Technology, Faculty of Fuels and Energy

Address: al. Mickiewicza 30
30-059 Kraków
Poland

Phone: +48 12 617 3428
Fax: +48 12 617 4274
E-mail: gula@agh.edu.pl

Mr. Ture Hammar

Danish Energy Authority

Address: Amaliegade 44
1256 Copenhagen
Denmark

Phone: +45 33 92 6700
Fax: +45 33 11 4743
E-mail: tha@ens.dk

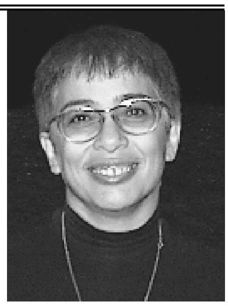
Dr. Diana Harutyunyan

Project Coordinator

Ministry of Nature Protection of the Republic of Armenia

Address: Moscovian str. 35
375002 Yerevan
Armenia

Phone: +3741 5660 73
Fax: +3741 5381 87
E-mail: diana@undp.am



Mr. Vladimír Hecl

Managing Director

Energy Centre Bratislava
OPET Slovakia

Address: Ambrova 35
831 01 Bratislava 37
Slovakia

Phone: +421 2 5465 1654/55/56
Fax: +421 2 5465 3637
E-mail: office@ecbratislava.sk

Dr. Martin Held

Evangelische Akademie Tutzing

Address: Schlossstr. 2+4
82327 Tutzing
Germany

Phone: +49 81 58 51-0
Fax: +49 81 58 51-134
E-mail: held@ev-akademie-tutzing.de

Mr. Gunder Herbst

Executive Director

DNV Germany
Zertifizierung und Umweltgutachter GmbH

Address: Schnieringshof 14
45329 Essen
Germany

Phone: +49 201 7296 391
Fax: +49 201 7296 333
E-mail: gunder.herbst@dnv.com

Dr. Edmond M. Hido

Director

Albania EU Energy Efficiency Centre

Address: Blvd. "Zhan DÁrk" No. 2
P.O. Box 2426
Tirana
Albania

Phone: +355 4 233 835
Fax: +355 4 233 834
E-mail: ehido@eec.org.al

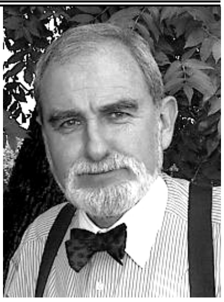
Mr. Elmer C. Holt

Senior Economist

Office of Policy and International Affairs
US Department of Energy

Address: 1000 Independence Ave., SW, PI-44
Washington, D.C. 20585
USA

Phone: +1 202 586 0714
Fax: +1 202 586 5391
E-Mail: elmer.holt@hq.doe.gov



Mr. Paata Janelidze

Head of Division

National Agency on Climate Change

Address: 150 David Agmashenebeli Ave.
380012 Tbilisi
Georgia

Phone: +995 32 940 226
Fax: +995 32 941 536
E-Mail: janelidze@caucasus.net

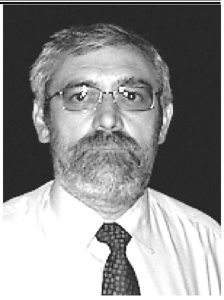
Mr. Zoltán Janklovics

R&D Manager

Matáv PKI Telecommunications Development Institute

Address: Pf. 520
1502 Budapest
Hungary

Phone: +36 1 481 7741
Fax: +36 1 481 7705
E-Mail: janklovics.zoltan@ln.matav.hu



Ms.Judith Jurkowski

Consultant

Environmental Resources Management
(ERM) Lahmeyer GmbH

Address: Konrad-Adenauer-Str. 3
63263 Neu-Isenburg
Germany

Phone: +49 6102 206 242
Fax: +49 6102 206 204
E-Mail: judith.jurkowski@erm.com

Dr. Tiit Kallaste

Program Director

Estonian Institute for Sustainable Development SEI Tallinn

Address: Box 160
10502 Tallinn
Estonia

Phone: +372 6 276 103
Fax: +372 6 276 101
E-Mail: tiit@seit.ee

Ms. Felicitas Kraus

Deutsche Energie Agentur
(dena)

Address: Chausseestr. 128a
10115 Berlin
Germany

Phone: +49 30 726 16 56 61
Fax: +49 30 726 16 56 99
E-mail: kraus@deutsche-energie-agentur.de

Mr. Michael Krug

Research Associate

FFU Environmental Policy Research Centre, Free University of Berlin

Address: Ihnestr. 22
14195 Berlin
Germany

Phone: +49 30 8385-4491
Fax: +49 30 8385-6685
E-mail: mikrug@t-online.de

Dr. Jürgen Landgrebe

Federal Environmental Agency
Environment and Energy

Address: Bismarckplatz 1
14193 Berlin
Germany

Phone: +49 30 8903 21 42
Fax: +49 30 8903 29 06
E-mail: juergen.landgrebe@uba.de

Prof. Dr. Volkmar Lauber

Head of Department of Political Science

University of Salzburg

Address: Rudolfskai 42
5020 Salzburg
Austria

Phone: +43 662 8044 6601
Fax: +43 662 8044 6601
E-mail volkmar.lauber@sbg.ac.at

Mr. Peter Löffler

Research Executive

COGEN Europe

Address: Rue Gulledelle 98
1200 Brussels
Belgium

Phone: +32 2 772 8290
Fax: +32 2 772 5044
E-mail: peter.loeffler@cogen.org

Dr. Felix Chr. Matthes

Institute for Applied Ecology

Address: Novalisstr. 10
10115 Berlin
Germany

Phone: +49 30 2840 8681
Fax: +49 30 2840 8688
E-mail: matthes@oeko.de

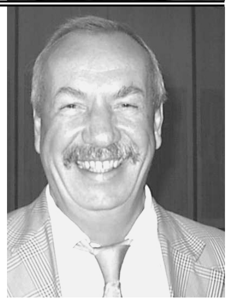
PD Dr. Lutz Mez

Managing Director

FFU Environmental Policy Research Centre, Free University of Berlin

Address: Ihnestr. 22
14195 Berlin
Germany

Phone: +49 30 8385 5585
Fax: +49 30 8385 6685
E-mail: umwelt1@zedat.fu-berlin.de



Mr. Nikolai Nikolov

Head Expert

Energy Efficiency Agency

Address: 37, Ekzarh Josif Str., 4 Floor
1000 Sofia
Bulgaria

Phone: +359 2 915 4046
Fax: +359 2 981 5802
E-mail: nnikolov@seea.government.bg

Ms. Valia Peeva

Chief Program Coordinator,
Project Manager

EnEffect – Center for Energy Efficiency

Address: P.O. Box 85
1606 Sofia
Bulgaria

Phone: +359-2-963 21 69 / +359-2-963 17 14
Fax: +359-2-963 25 74
E-mail: vpeeva@eneffect.bg

Mr. Hrvoje Petrić

KOGEN Program Coordinator

Energy Institute "Hrvoje Požar"

Address: Savska cesta 163
PB 141
10001 Zagreb
Croatia

Phone: +385 1 6326 137
Fax: +385 1 6040 599
E-mail: hpetric@eihp.hr

Dr. Peter Pichl

Federal Environmental Agency

Address: Bismarckplatz 1
14193 Berlin
Germany

Phone: +49 30 8903 2668
Fax: +49 30 8903 2906
E-mail: peter.pichl@uba.de

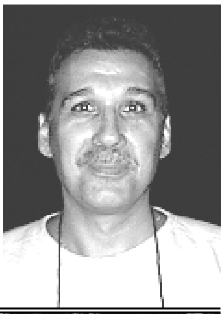
Mr. Corneliu Radulescu

Vice President

ARCE Romanian Agency for Energy Conservation

Address: 16, Avenue Nicolae Balcescu
sector 1
010052 Bucharest 37
Romania

Phone: +40 2131 459 29
Fax: +40 2131 231 97
E-mail: cradulescu@arce.digicom.ro

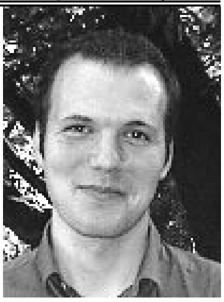


Mr. Marek Reetz

WIP, Energy and Environment

Address: Sylvensteinstr. 2
81369 Munich
Germany

Phone: +49 89 720 12 712
Fax: +49 89 720 12 791
E-mail: marek.reetz@wip-munich.de

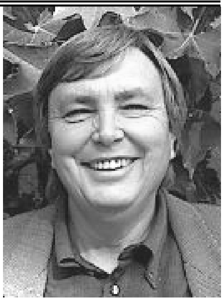


Mr. Siegfried Rehberg

Verband Berlin-Brandenburgischer Wohnungsunternehmen (BBU)

Address: Lentzeallee 107
14195 Berlin
Germany

Phone: +49 30 89 781 150
Fax: +49 30 7814 151
E-mail: siegfried.rehberg@bbu.de



Mr. Albrecht von Ruffer

Head of Emissions Markets, Europe

Natsource Tullett (Europe) Ltd.

Address: Cable House
54-62 New Broad Street
London, EC2M 1ST, England
Great Britain

Phone: +44 20 7827 2942
Fax: +44 20 7827 2569
E-mail: avruffer@natsource.com

Mr. Michael Rumberg

Head of Division of CDM/JI

Carbon Management Service
TÜV Süddeutschland

Address: Westendstr. 199
80686 München
Germany

Phone: +49 89 5791 2179
Fax: +49 89 5791 2756
E-mail: michael.rumberg@tuev-sued.de

Mr. Franzjosef Schafhausen

Head of Division Z II 6 Climate Protection Programme of the Federal Government, Environment and Energy Division

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Address: Alexanderplatz 6
10178 Berlin
Germany

Phone: +49 30 28 550 3660
Fax: +49 30 28 550 2349
E-mail: franzjosef.schafhausenj@bmu.bund.de

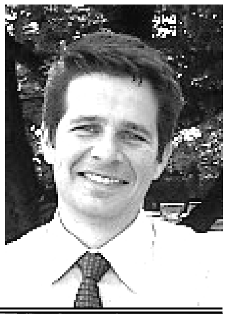
Mr. Nils Steinbrecher

Head of the Energy & Climate Change Unit

Environmental Resources Management (ERM) Lahmeyer GmbH

Address: Konrad-Adenauer-Str. 3
63263 Neu-Isenburg
Germany

Phone: +49 6102 206 129
Fax: +49 6102 206 204
E-mail: nils.steinbrecher@erm.com



Dr. Charlotte Streck

Counsel on Environment and International Law, Prototype Carbon Fund

The World Bank Legal Department

Address: 1818, H Street, NW
Washington, DC 20433
USA

Phone: +1 202 473 7331
Fax: +1 202 522 1573
E-mail: cstreck@worldbank.org

Mr. Ruslan Surugiu

Project Manager

Alliance to Save Energy, Municipal Network for Energy Efficiency

Address: str. V. Alexandri, 78
Office 330
2012 Chisinau
Moldowa

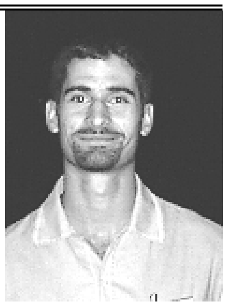
Phone: +3732 21 40 08/21 40 07
Fax: +3732 21 4 0 08
E-mail: alliance1@moldovacc.md
rsurugiu@ase.org

Mr. Gábor Takács

Energia Klub

Address: PO Box 735
1462 Budapest
Hungary

Phone: +36 1 411 35 20/22
Fax: +36 1 411 35 29
E-mail: tgabor@energiaklub.hu



Mr. Cristian Mihai Tantareanu

OPET Romania ENERO

Address: 8, Energeticienilor Blvd.
3 Bucharest 79619
Romania

Phone: +401 3464598
Fax: +401 3464598
E-mail: crit@icemenerg.ro

Mrs. Sybille Tempel

Research Fellow

FFU Environmental Policy Research Centre, Free University of Berlin

Address: Ihnestr.22
14195 Berlin
Germany

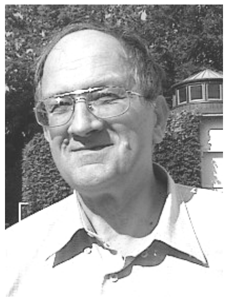
Phone: +49 30 8385 49 90
Fax: +49 30 8385 66 85
E-mail: sytempel@zedat.fu-berlin.de

Prof. Dr. Miha Tomšič

Institute "Jožef Stefan"
Energy Efficiency Centre

Address: Jamova 39
1001 Lubljana
Slovenija

Phone: +386 1 588 52 09, 588 54 50
Fax: +386 1 561 23 35
E-mail: miha.tomsic@ijs.si



Dr. Villu Vares

Head of the Laboratory of Energy Economy and Planning

Estonian Energy Research Institute
OPET Estonia

Address: Kopli 116
11712 Tallinn
Estonia

Phone: +372 620 3915 / +372 662 1612
Fax: +372 661 3653
E-mail: villu@eeri.ee

Mr. Artur Wyrwa

AGH University of Science and Technology
Faculty of Fuels and Energy
Dept of Energy Uitlization

Address: al. Mickiewicza 30
30-059 Cracow
Poland

Phone: +48 12 617 3428
Fax: +48 12 617 2066
E-mail: awyrwa@uci.agh.edu.pl

Dr. Liliya V. Zavyalova

Leader Expert

Asian Development Bank, Prega Project

Address: 45-a, Uzbekistanskay str.
700003 Tashkent
Uzbekistan

Phone: +99871 132 6382
Fax: +99871 132 6337
E-mail: lilyazav@bcc.com.uz

Mrs. Odeta Prifti Zheku

Program Information & Assistant
UNDP/GEF Program for Climate Change

Ministry of Environment

Address: Rruga "Durresit", No. 27
Tirana
Albania

Phone: +355 4225 101
Fax: +355 4225 101
E-mail: ccalb@icc-al.org, priftid@icc-al.org

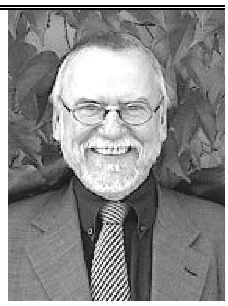
Dr. Hans-Joachim Ziesing

Head of Dept. of Energy and Environment

German Institute for Economic Research (DIW)

Address: Königin-Luise-Str. 5
14195 Berlin
Germany

Phone: +49 30 897 89 683
Fax: +49 30 897 89 200
E-mail hziesing@diw.de



List of Abbreviations

AIJ	Activities Implemented Jointly
ALTENER	EU Program Promoting the Use of Renewable Energy Sources
APER	Romanian Energy Policy Asociation
ARCE	Romanian Agency for Energy Conservation
ARENA-Eco	Agency for Rational Energy Use and Ecology (Ukraine)
AURE	Agency for Energy Efficiency (Slovenia)
Baltic CHAIN	Baltic Clearing House And Information Network
BAPE	Baltic Energy Conservation Agency
BelVIEC	Belorussian Scientific and Industrial Information Centre for Energy Saving
BMU	German Federal Ministry of Environment, Nature Conservation and Reactor Security
BOM	Board Of Management
BSR	Baltic Sea Region
CC-CHP	Combined Cycle – CHP
CDM	Clean Development Mechanism
CEA	Czech Energy Agency
CEE	Central and Eastern Europe
CEEC	Central and Eastern European Countries
CENEf	Center for Energy Efficiency, Moscow
CH_4	Methane
CHP	Combined Heat and Power Generation
CIS	Commonwealth of Independent States
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conference of the Parties of UNFCCC
CR	Czech Republic
CTI	Climate Technology Initiative
CTIP	Cooperative Technology Implementation Plan
CZK	Czech Crown
DCA	Development Credit Authority
DEA	Danish Energy Authority
dena	Deutsche Energie Agentur
DH	District Heating
DHC	District Heating Company
DHP	District Heating Plant
DIW	German Institute for Economic Research
DSM	Demand Side Management
EAES	Environmentally Adapted Energy System in the Baltic Region and Europe
EBRD	European Bank for Reconstruction and Development
EC	European Community
EC BREC	EC Baltic Renewable Energy Center
ECCJ	Energy Conservation Center, Japan
EE	Energy Efficiency
EEC	Energy Efficiency Center

EEF	EBRD Energy Efficiency Fund
EEHPP	Energy Efficiency Housing Pilot Project in Lithuania
EEK	Estonian Crown
EERI	Estonian Energy Research Institute
EIA	US Energy Information Agency
EIT	Economies in Transition
ELI	Efficient Lighting Initiative
EMA	Emissions Marketing Association
ENERO	Center for the Promotion of Clean and Efficient Energy in Romania
ENSVET	Energy Advisory Network in Slovenia
EPC	Energy Performance Contracting
ESCO	Energy Service Company
ESF	Energy Saving Fund
ESI	Electricity Supply Industry
ET	Emissions Trading
EU	European Union
FFU	Environmental Policy Research Unit
FSU	Former Soviet Union
Gcal	Giga calory
GDP	Gross Domestic Product
GEF	Global Environmental Facility
Gg	Gigagramm
GHG	Greenhouse Gas
GHGM	Greenhouse Gas Mitigation
GJ	Giga Joule
GNP	Gross National Product
GPO	Gross Production Output
GT-CHP	Gas Turbine CHP
GWh	Giga Watt hour
GWP	Global Warming Potential
GWth	Gigawatt thermal
HFC	Hydrofluorocarbons
HOB	Heat Out Boilers
HPP	Hydro Power Plant
HUF	Hungarian Forint
ICECC	Intergovernmental Commission of Experts on Climate Change
ICEU	International Center for Energy and Environmental Technology
IEA	International Energy Agency
IEEN	Lithuanian Energy Efficiency Network
IFC	International Finance Corporation
IISD	International Institute for Sustainable Development
IJS	Institute Jožef Stefan, Ljubljana
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
ISO	International Organization for Standardization
JI	Joint Implementation

JICA	Japanese International Cooperation Agency
KAPE	Polish Energy Conservation Agency
KfW	Kreditanstalt für Wiederaufbau
LDA	Latvian Development Agency
LFO	Light Fuel Oil
LPG	Loan Portfolio Guarantee
LVL	Latvian Lat
MAOP	Maximum Allowable Operation Pressure
MAPPM	Romanian Ministry of Waters, Forests and Environmental Protection
Masut	Heavy Oil
MEA	Ministry of Economic Affairs
MEEN	Municipal Energy Efficiency Network
MW	Mega Watt
Mwe	Megawatt electric
MWth	Megawatt thermal
N_2O	Nitrous Oxide
NCRC	National Climate Research Center
NEDO	New Energy and Industrial Technology Development Organization
NEFCO	Nordic Environment Finance Corporation
NGO	Non Governmental Organization
NIB	Nordic Investment Bank
No_x	Nitrogen Oxide
NPP	Nuclear Power Plant
NUTEK	National Board of Industry and Technology of the Swedish Kingdom
OECD	Organisation for Economic Cooperation and Development
OPET	Organisation for Promotion of Energy Technologies
PC	Performance Contracting
PFC	Perfluorocarbons
PHARE	Poland and Hungary: Assistance for Reconstruction of the Economy
PJ	Peta Joule
PLN	New Polish Zloty
PNNL	Pacific Northwest National Laboratory, USA
PPC	Project Preparation Committee
ppm	parts per million
PPP	Purchasing Price Parity
PR	Public Relations
QP	Qualified Producer
R&D	Research and Development
RD & D	Research, Development and Demonstration
RE	Renewable Energy
REC	Regional Energy Center
REEF	Renewable Energy and Energy Efficiency Fund of the World Bank
Ref.	References
RENEUER	Regional Network for Efficient Use of Energy Resources
RES	Renewable Energy Sources
RF	Russian Federation

SAVE	Special Actions for Vigorous Energy Efficiency
SECI	South East European Cooperative Initiative
SEF	State Environmental Fund
SEI	Stockholm Environment Institute
SEVEn	The Energy Efficiency Center, Prague
SHPP	Small Hydro Power Plant
SIDA	Swedish Development Agency
SIT	Slovenian Tolar
SME	Small and Medium-sized Enterprises
SO_2	Sulfur Dioxide
SOCER	Society for the Optimization of Energy Consumption in Romania
SYNERGY	Energy Framework Program 1998-2002 of the EU
TACIS	Technical Assistance for CIS
TFC	Total Final Consumption
tfe	tons of fuel equivalent
THERMIE	Technologies Européennes pour la Maîtrise de L'Énergie
toe	tons of oil equivalent
TPES	Total Primary Energy Supply
TPF	Third Party Financing
TPP	Thermal Power Plant
TWh	Tera Watt hour
UBA	Federal Environmental Agency, Germany
UCPTE	Union for the Coordination of Production and Transmission of Electricity
UN	United Nations
UNCED	UN Conference on Environment and Development
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
US DOE	US Department of Energy
US EPA	US Environmental Protection Agency
US AID	US Agency for International Development
VAT	Value Added Tax
WB	World Bank

Welcome Note

Dear seminar participants,

On behalf of the German Federal Ministry of the Environment and the German Federal Environment Agency, the Environmental Policy Research Centre jointly with its cooperation partner ITUT Leipzig warmly welcomes you to Tutzing and the Forth CTI Capacity Building Seminar **Climate Technology and Energy Efficiency – Challenges and Chances for Climate Technology**. It is a special honor for us to welcome those of you who are not yet affiliated to our network established at three previous seminars held in Ostritz/Germany in December 1999 and 2001 and in Tutzing/Germany in November 2002.

The Climate Technology Initiative (CTI) is a multilateral endeavor founded to promote the objectives of the United Nations Framework Convention on Climate Change (UNFCCC). It was launched at the First Conference of Parties in 1995. 23 OECD countries and the European Commission created it to help meet their commitment to technology transfer under Article 4.5 of the Convention. CTI helps to meet this commitment through information dissemination, training, capacity building exercises, technology needs assessments and research and development. One of the priorities is to strengthen the indigenous capacities of developing countries and economies in transition to employ climate-friendly technologies and practices.

Within the framework of CTI, the German Government committed itself to foster capacity building activities in the transition countries of Central and Eastern Europe and the Former Soviet Union. It supported the dissemination of best practice projects and technologies by a series of three former capacity building seminars which took place in the energy-ecological model town of Ostritz/Germany and in Tutzing at Lake of Starnberg.

This seminar is already the fourth one. As the previous ones, it is designed "to train the trainers" whereby the participants return to their home organizations and disseminate information and techniques. It contributes to set up and strengthen networks among energy efficiency agencies, centers and other institutions in Eastern and Central Europe actively promoting the rational use of energy from generation to end-use.

During the discussion of the last seminar in Tutzing, it was suggested to shift the attention from technologies and best practice projects to the policy dimension of technology transfer, towards policy tools and frameworks facilitating the replication and diffusion of success stories. Thus more policy related issues shall be highlighted this time considering the fact that active energy efficiency policies and policy intermediation are required to remove the numerous market barriers present in all countries. Especially, the Kyoto mechanism and its instruments i.e. joint implementation, emission trading and clean development mechanism are becoming more and more important.

We would like to express our sincere appreciation to all the seminar speakers and contributors for helping to realize this event.

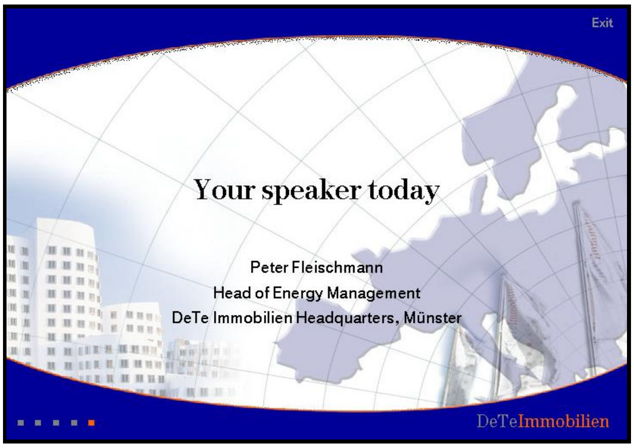
Wishing everybody a fruitful seminar,
the organizing institutions

- Environmental Policy Research Centre,
  Free University of Berlin
- ITUT - Centre for the International Transfer
  of Environmental Technologies, Leipzig

Excursion to Fuel Cell Pilot Project

Peter Fleischmann
Deutsche Telekom Immobilien und Service GmbH, Munich

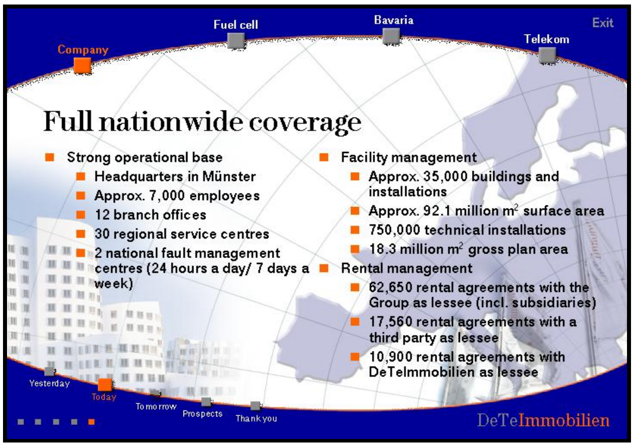
Slide 1



Slide 2

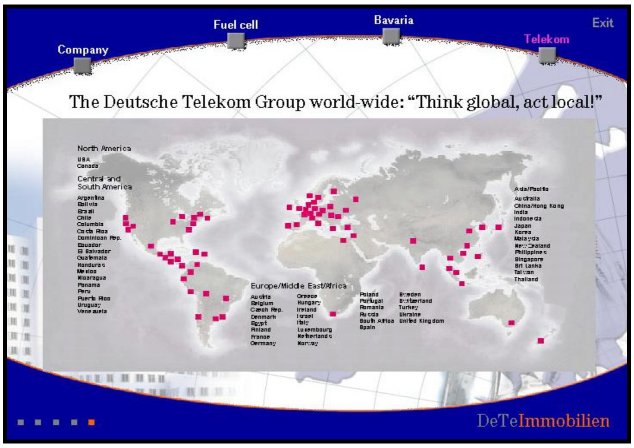
Slide 3

Slide 4

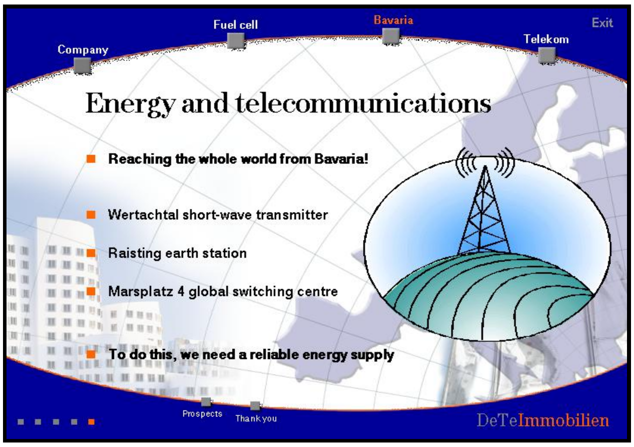


Slide 5

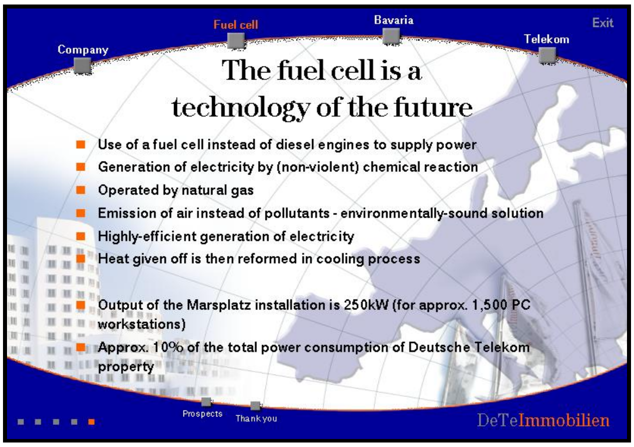
Slide 6



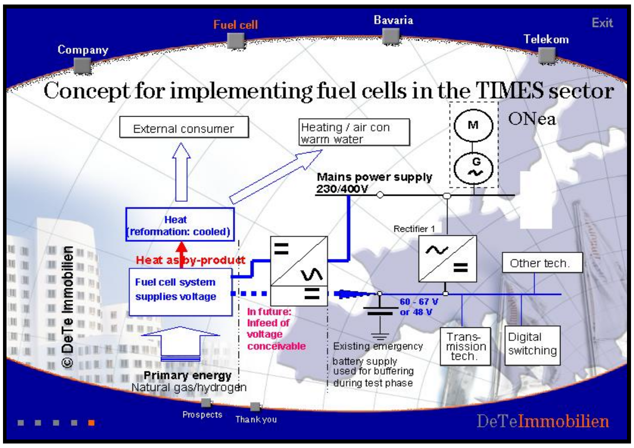
Slide 7



Slide 8

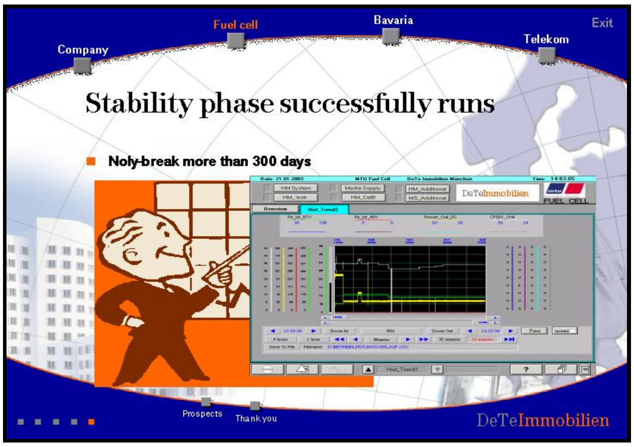


Slide 9

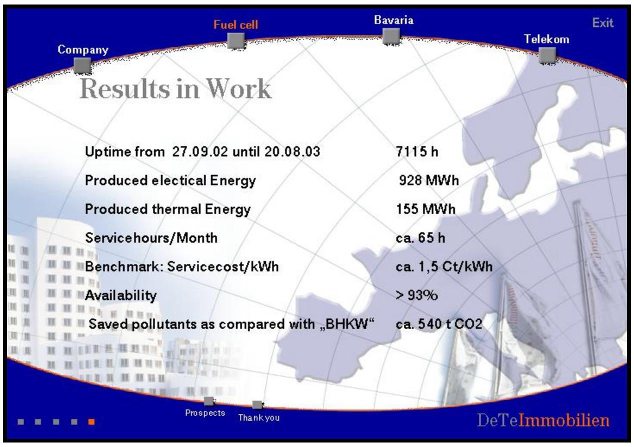


Slide 10

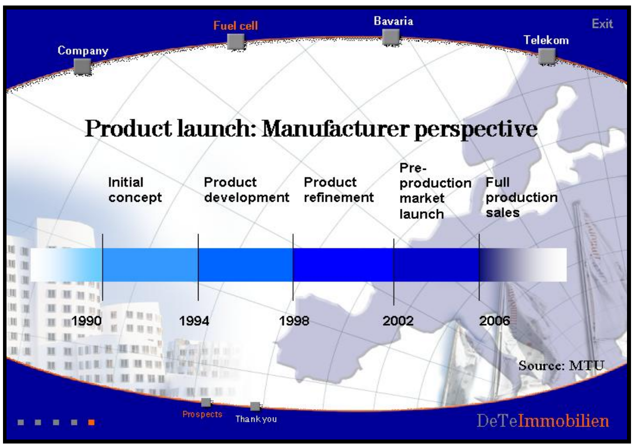
Slide 11



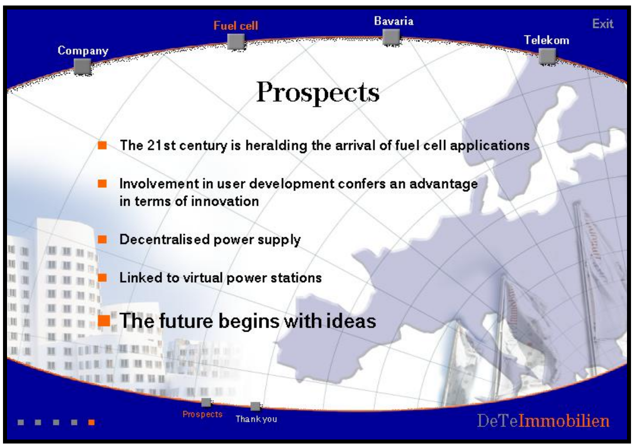
Slide 12



Slide 13



Slide 14



Slide 15

How to Construct a Climate Change Program – Some Basics

Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

Need for action – evidence that we have long been making our own climate

- The concentration of greenhouse gases in the atmosphere has risen since the onset of industrialisation due to the apparently inexorable rise of emissions
- The tropospheric temperatures are rising with increasing speed
- Glaciers are melting – seal levels rising
- The world's precipitation zones are shifting
- The regional climates are changing
- Meteorological shocks occur more frequently
- **The need to act is ever more urgent!**

Slide 1

The factors determining action

- Decisive is not **where** reductions are made, but **that** reduction happens!
- Precautionary approach demands early action
  Acting too late can lead to irreversible developments
  Acting too late causes wastage through friction and sudden destruction of capital
- Unlike traditional environmental problems, an "end-of-the-pipe" approach does not help here
- Energy saving also means cost saving - cross-cutting solutions help cover cost of measures
- **This was the starting point for designing the climate protection programme in Germany, in Europe and world-wide!**

Slide 2

The German Approach: There is a need for clear and ambitious targets

1. **Reduction of the six Kyoto gases (CO_2, CH_4, N_2O, HFCs, PFCs and SF_6) by 21 % in the period 2008 – 2012 compared to 1990 and 1995 resp. as Germany's contribution to EU burden-sharing to fulfil Kyoto Protocol.**
2. **Reduction of greenhouse gas emissions by 40 % by 2020 on the condition that the EU agrees to a GHG reduction of 30 % by 2020 (base year 1990).**
3. **Doubling of the contribution by renewable energy sources by 2010 to primary energy consumption from 2.4 to 5 % and to electricity generation from 5 % to 10 %.**
4. **Maintaining, modernising and expanding cogeneration (combined heat and power) with the aim of reducing CO_2 by an additional 10 million tonnes by 2005 and 23 m t by 2010 (base year 1998).**
5. **Major improvement in energy productivity.**

Slide 3

The process cycle

- **Inventory, review of status quo**
- **Determining physical, technical and economic potentials and options**
- **Identifying obstacles and barriers**
- **Defining alternative policies and measures to remove the identified obstacles**
- **Selecting policies and measures – decision by the Federal Cabinet**
- **Step-by-step implementation of measures adopted**
- **Review and start of a new process cycle**

Slide 4

Policies and measures

1. **No single solution – rather, a package of measures carefully designed for each situation**
2. **Regulatory requirements**
   Economic instruments and mechanisms
   Supporting measures
3. **Cross-cutting instruments as well as specific e.g. sectoral approaches**
4. **National as well as trans-boundary measures**

Slide 5

All Actors and actor levels should be involved

Actors and actor levels

Regional or local authorities → **Federation**, **Länder**, **Local authorities**

Industry → **Voluntary commitments on climate**

Other socially relevant groups → **Employment Alliance**, **Trade unions**, **Environmentalist groups**

Slide 6

Conclusion

A consistent, internationally integrated and in general sensibly designed climate protection policy (showing national responsibility while making use of international opportunities)

- **gives incentives for developing know-how and innovation**
- **promotes growth and employment,**
- **lowers import dependency on oil and gas producers and thus improves the balances of payments,**
- **removes environmental pressures and contributes to resource conservation,**
- **steers an economically efficient path towards climate policy targets and thus helps to relieve cost burdens (the use of emissions trading being an excellent example).**

Slide 7

The EU Emissions Trading Directive

Dr. Felix Christian Matthes
Institute for Applied Ecology (Öko-Institut), Berlin

Notice

- This presentation describes *interim* results of a research project commissioned by the German Ministry of the Environment Nature Protection & Reactor Safety to build scientific background for die German national allocation plan
- The contents of this presentation does not necessarily reflect any official German position.

Slide 1

The EU ETS - Milestones

- late 1990ies: some empirical evidence that EU could fail to meet the Kyoto target (-8%)
- March 2000: Green Paper on greenhouse gas emissions trading within the European Union (COM(2000) 87 final)
- intensive debate
- October 2001: Commission proposal for a “Directive … establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC”
- blockade & intensive bargaining
- October 2002: First Reading in the European Parliament
- December 2002: Political Agreement
- March 2003: Formal adoptation of the Common Position
- July 2003: Second Reading the European Parliament & agreement with the Council
- September 2003: Formal adoptation
- January 2005: Take off

Slide 2

The Scheme

- Installations covered by the directive (specified in Annex I) must hold a permit
- Allowances are allocated to the installations based on a National Allocation Plan
- Allowances can be transfered between all persons within the EU or all persons in countries which signed agreements on mutual recognition of allowances between EU and other ETS
- Operators of installations must surrender an number of allowances equal to the total emissions
- If an operator does not, he must be held liable for the payment of an excess penalty (2005/07: 40 €/t CO_2; beyond 2008: 100 €/t CO_2)
- JI/CDM credits shall be integrated into the EU ETS
- Beyond 2008 cross border transfers of allowances will involve corresponding adjustments of assigned amount units under the Kyoto Protocol

Slide 3

Installations Covered by the Scheme I

- Carbon dioxide, extension to other greenhouse gases possible
- No installations or parts of installations used for research, development and testing of new products and processes
- Where one operator carries out several activities falling under the same subheading in the same installation or on the same site, the capacities of such activities are added together
- Energy activities
  - Combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations)
  - Mineral oil refineries
  - Coke ovens
- Production and processing of ferrous metals
  - Metal ore (including sulphide ore) roasting or sintering installations
  - production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2,5 tonnes per hour

Slide 4

Installations Covered by the Scheme II

- Mineral industry
  - cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or lime in rotary kilns with a production capacity exceeding 50 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day
  - manufacture of glass including glass fibre with a melting capacity exceeding 20 tonnes per day
  - manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tonnes per day, and/or with a kiln capacity exceeding 4 m³ and with a setting density per kiln exceeding 300 kg/m³
- Other activities
  - production of pulp from timber or other fibrous materials
  - Production of paper and board with a production capacity exceeding 20 tonnes per day

Slide 5

Procedures I

- First (Pilot) period: 1 January 2005 - 31 December 2007
- until 31 March 2004: publication and notification of the National Allocation Plan to the Commission
- within 3 months period the Commission may reject the NAP or aspects thereof
- 3 months before the beginning of 2005/07 periode: allocation of allowances to the installations
- 28 February each year: issue of a proportion of the total quantity of allowances to the installation
- 31 March each year: if emission reports have not been verified as satisfactory no further transfers allowed
- 30 April each year: surrender and cancellation of allowances equal to the emissions during the preceding calendar year (if not: excess penalty plus allowances)
- ⇨ within a period full flexibility (banking & borrowing)

Slide 6

Procedures II

Öko-Institut

- Second period: 1 January 2008 - 31 December 2012
- 18 months before start of period: publication and notification of the National Allocation Plan to the Commission
- 12 months before start of period: Allocation of allowances to the installations based on NAP
- 30 April 2008: surrender and cancellation of allowances equal to the emissions during the preceding period (if not: excess penalty plus allowances)
- 30 April 2008: cancellation of all 2005/07 period allowances which were not surrendered and cancelled, Member States may issue allowances for the current period to replace such allowances
- 28 February/31 March/30 April each year ...
- Third period: 1 January 2013 – 31 December 2018
- etc, etc

www.oeko.de

Slide 7

Challenges to Member States

Öko-Institut

- legal implementation
  - implementation of the general provisions of the directive
  - legal nature of the allowances (commodity, financial instrument)
  - Monitoring/verification
  - banking
- National Allocation Plans
  - total number of allowances
  - allocation to installations (with mayor distributional effects): general procedures, special provisions (early action, CHP, energy policies, etc)
  - definitions, definitions, definitions
  - data, data, data
- institutional design
- public participation

www.oeko.de

Slide 8

National Allocation Plans

Öko-Institut

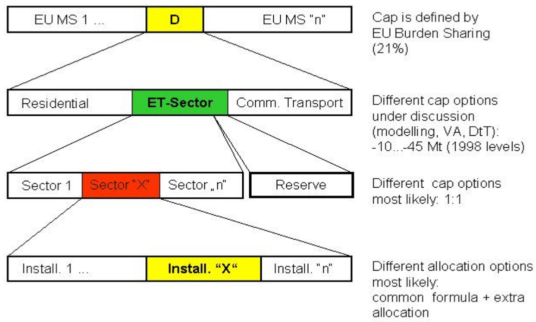
- total amount of allowances, reduction targets for non ET sectors
- full list if installations
- allocation 95% free of charge 2005/07, allocation 90% free of charge 2008/2012
- allocation approaches:
  - grandfathering
  - benchmarking
  - auctioning
  - updating (2008 and beyond)
- special provisions
  - early action
  - process emissions
  - CHP
  - other policies (e.g. nuclear phase out)
- opt out/opt in
- pooling

www.oeko.de

Slide 9

Öko-Institut

ETS in Germany: The Four Level Approach



www.oeko.de

Slide 10

Germany: Allocation Formula I

Öko-Institut

- Option 1: Grandfathering

$$A_{P,gesamt} = HE_{Basis} \cdot CF\ [+A_{extra}][-A_{P-1}]$$

HE_{Basis} – Emissions base period

A_{extra} – Additional allowances
- Early action
- Process emissions (iron/steel, cement, lime)*
- CHP*
- (Nuclear phase out*)
- Others

* Ex post procedures necessary

\- / +

CF – Compliance factor (unique for all installations!?) derived from top down analysis considering A_{extra} total volume

ER_{P-1} – Adjustment for allowances from previous commitment period

www.oeko.de

Slide 11

Germany: Allocation Formula II

Öko-Institut

- Option 2: Benchmarking

$$A_{P,gesamt} = HA_{Basis} \cdot BM \cdot CF\ [+A_{extra}][-A_{P-1}]$$

HA_{Basis} – Activities base period

BM – Benchmark (base period!)

A_{extra} – Additional allowances
- Early action
- Process emissions (iron/steel, cement, lime)*
- CHP*
- (Nuclear phase out*)
- Others

* Ex post procedures necessary

\- / +

CF – Compliance factor (unique for all installations!?) derived from top down analysis considering A_{extra} total volume

ER_{P-1} – Adjustment for allowances from previous commitment period

www.oeko.de

Slide 12

Challenges to EU

Öko-Institut

- guidelines
  - monitoring
- guidance
  - definitions
  - formats
  - etc
- notification
- informal harmonization
  - plant closure
  - new entrants/capacity extensions
  - set asides/reserve
- accession countries
- JI/CDM linking

www.oeko.de

Slide 13

Öko-Institut

That's all, folks.

Thank you very much

Dr. Felix Chr. Matthes
Energy & Climate Division
Berlin Office
Novalisstrasse 10
D-10115 Berlin
matthes@oeko.de
www.oeko.de

www.oeko.de

Slide 14

Emissions Trading - The Implementation of the EU-Directive in Germany

Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

Emissions Trading – The Implementation of the EU-Directive in Germany

by
Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

on the occasion of the

CTI Capacity Building Seminar „Climate Technology and Energy Efficiency – Challenges and Chances for Climate Technology.

September, 21th 2003
Tutzing

Slide 1

Emissions Trading – How Does It Work?

- **Laying down a total volume of permissible emissions ("cap")**
- **Distributing these total emission volumes among the individual emission sources (initial allocation of emission rights, allowances or AAU's etc.)**
- **Formulating framework conditions for a transparent and liquid market and to prevent barriers to competition**
- **Creating a monitoring system („ecological accounting" - registry)**
- **The market decides whether, where, when, who and how many emissions are avoided**

Result: emissions trading allows cost differences between the emission sources to be exploited.
This leads to optimal allocation of scarce resources.

Slide 2

Breaking new Ground?

- **Emissions trading– the chance to change the environmental paradigm!**
- **The new philosophy: opening up to flexible structures – getting away from state regulatory interference!**
- **The global greenhouse effect permits decentralised decisions on questions of where, when, how and by whom and offers the opportunity to take leave of the sweeping 'lawn mower' method according to best available technology**
- **Optimisation of the market economy versus costly bureacratic regulatory law**

Slide 3

Requirements for Implementation

- **Giving up tradional regulatory structures – reducing bureaucracy**
- **Seamless implementation**
- **Coordination at a European level vital – harmonisation and guidelines are an ecological and economic must**
- **Compatability between the international, European and national levels**
- **Only scarcities create a market**
- **Emissions trading is a climate protection instrument and cannot solve all other problems at the same time**
- **Cooperation between all stakeholders necessary**

Slide 4

The objectives of Kyoto

Belgium, Bulgaria, Denmark, Germany, Estonia, European Community, Finland, France, Greece, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, Monaco, Netherlands, Austria, Portugal, Rumania, Sweden, Switzerland, Slovakia, Slovenia, Spain, Czech Republic, United Kingdom	minus 8 per cent
USA	minus 7 per cent
Japan, Canada, Poland, Hungary	minus 6 per cent
Croatia	minus 5 per cent
Russian Federation, Ukraine, New Zealand	plus/minus 0 per cent
Norway	plus 1 per cent
Australia	plus 8 per cent
Iceland	plus 10 per cent

Slide 5

The EU burden sharing (Art. 4 KP)

Member State	emissions per capita in 1990 in t	burden sharing 2008 – 2012	development 1990 - 2000	Difference burden sharing – status
Belgium	13.6	- 7.5 %	+ 6.2 %	- 13.7 %
Denmark	13.5	- 21.0 %	- 1.2 %	- 19.8 %
Germany	15.1	- 21.0 %	- 18.9 %	- 2.1 %
France	9.5	0.0 %	- 1.7 %	+ 1.7 %
Great Britain	12.6	- 12.5 %	- 12.6 %	+ 0.1 %
Greece	10.2	+ 25.0 %	+ 23.8 %	+ 1.2 %
Ireland	15.2	+ 13.0 %	+ 24.0 %	- 11.0 %
Italy	9.1	- 6.5 %	+ 4.1 %	- 10.6 %
Luxemburg	36.9	- 28.0 %	- 45.1 %	+ 17.1 %
Netherlands	14.0	- 6.0 %	+ 3.1 %	- 9.1 %
Austria		- 13.0 %	+ 3.1 %	- 16.1 %
Portugal	6.3	+ 27.0 %	+ 30.1 %	- 3.1 %
Sweden	8.1	+ 4.0 %	+ 1.7 %	+ 2.3 %
Spain	7.8	+ 15.0 %	+ 34.8 %	- 19.8 %
EU total	11.4	- 8.0 %	- 3.5 %	- 4.5 %

Slide 6

Potential Buyers – Potential Sellers ?

EU-Member State	GHG emissions 1990	GHG emissions 2000	Target	Deviation from target
Belgium	143.1	151.9	132.4	- 19.5
Denmark	69.4	68.5	54.8	- 13.7
Germany	1222.8	991.4	966.0	- 25.4
Finland	77.1	74.0	77.1	+ 3.1
France	551.8	542.3	551.8	+ 9.5
Greece	104.8	129.7	131.0	+ 1.3
Ireland	53.4	66.3	60.4	- 5.9
Italy	522.1	543.5	488.2	- 55.3
Luxemburg	10.8	5.9	7.8	+ 1.9
Austria	77.4	79.8	67.3	- 12.5
Portugal	65.1	84.7	82.7	- 2.0
Sweden	70.6	69.4	73.4	+ 4.0
Spain	286.4	386.0	329.4	- 56.6
United Kingdom	742.5	649.1	649.7	+ 0.6
Netherlands	210.3	216.9	197.7	-19.2

Slide 7

Absolute "caps" exist – The Climate Protection Agreement with German Industry

- Voluntary Climate Protection Agreement of 9 November 2000
  Reduction of the specific CO_2 emissions by 28 % by the year 2005 (base year 1990) and reduction of the specific greenhouse gas emissions by 35 % by the year 2012 (base year 1990)
  Reduction of CO_2 emissions by an additional 10 milion t by 2005 (base year 1998)
- Reduction of greenhouse gas emissions by an additional 10 million t by 2012 (base year 1998)
- Voluntary CHP agreement of September 2003
  Reduction of CO_2 emissions by a total of 45 million t by 2010 (base year 1998)

Slide 8

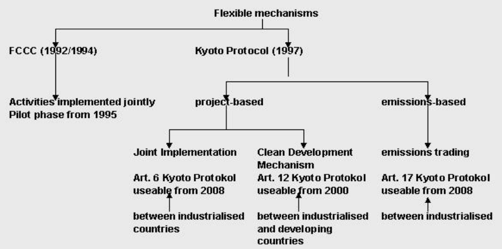
The Range of Instruments

- Regulatory law – Command and Control
- Taxes and charges – price control
- Allowance concepts – volume control ("emissions trading")
- Other economic incentives (government support measures such as the market incentive programme renewable energies, Programme of the Reconstruction Bank KfW, Renewable Energy Sources Act, Combined Heat & Power Act)
- Other accompanying measures (R&D activities, training and further training, information and consultation)

- Not use of instruments for the sake of it!
- The goal is to create as far as possible a non-contradictory parcel of measures.
- Emissions trading is not a cure all, but one instrument among others.

Slide 9

Flexible Mechanisms



Slide 10

The Situation in Brussels

Slide 11

The Trigger

- Findings of analyses from early 2000: In the "business as usual" scenario the EU will miss its Kyoto targets by far: instead of achieving minus 8 % the EU will end up with + 1 % *
- There will be a shortfall of round 400 Million t CO_2 equivalents (corresponding to the total emission volumes of Spain + Greece in 1990)
- Start for the ECCP – bundle of measures selected according to cost efficiency
- Emissions trading is no cure-all but is an important instrument (covering 46 % of the EU's CO_2 emissions in 2010)

** current decline of greenhouse gas reduction already achieved (1999 minus 4 % - 2000 minus 3.5 %)*

Slide 12

The Attitude of the Commission

- "ex ante principle" – the constitutive approach
- JI and CDM – welcomed in principle but reservations and discussions regarding the details
- Guidelines on monitoring and the NAP are being developed – the assistance is nevertheless late in coming
- The accounting system is being developed, but is also late in coming
- Reserve is a possibility but not vital
- "Early action" – yes in principle, but possible relevance for state aid

Slide 13

Schedule at EU level

- 2003 Development and coordination of NAP
- 2003 Creation of legal and institutional conditions for transposing the directive into national law
- 30.9.2003 EU Guidelines Monitoring and Reporting
- 31 12.2003 Transposition of directive into national law (EU15 and EU25)
- 31.12.2003 Guidelines on allocation rules and allocation criteria
- 31.3.2004 Notification and publication of the NAP
  Possibly veto by Commission
  Revision and re-submission
  Agreement and implementation
- 1.1.2005 Start of emissions trading
  "opt out" – "opt in" – JI/CDM – IET
- 2006 – 2007 Review and where necessary modification (review clause)

Slide 14

The Compromise

Slide 15

Results of the trilog between Commission, Council and Parliament

- Binding concept as of 2008
- Two phases: 2005 – 2007 and 2008 – 2012 (binding introduction)
- Allocation „free of charge“ possible up to 2012 ("grandfathering„ 2005 – 2007 „at least 95 %“; 2008 - 2012 "at least 90 %")
- "Opt out" of installations and branches 2005 – 2007
- "Opt in" of installations and other greenhouse gases as of 2008
- "Early action" with 1990 as earliest base year
- JI and CDM will be incorporated – further directive proposal on 23. July 2003
- "Banking" possible (Art. 13)
- No "unit pool" and no "compulsory pooling" – but voluntary bundling permitted
- Commission's right of veto for the "national allocation plan"

Slide 16

Results of the trilog between Commission, Council and Parliament

- JI and CDM in accordance with KP and the Marrakech Accords without sinks or nuclear energy
- Subject of a review process: Inclusion of other sectors including chemicals, aluminium and transport
- No disincentive for combined heat and power (CHP)
- Prevention of over-allocation through qualitative requirements
- Adoption of the Council position („Common View“) on New entrants, closures, banking & borrowing, F-Gases, pooling, cumulation of activities, opt in and opt out

Slide 17

Activities under the EU Directive

Slide 18

The Development of the EU Trading System

Whoever
- carries out an activity which is listed in Annex I of the draft directive (pursuant to Art. 2 para. 1; Art. 3, Art. 4, Art. 14 para. 1 and Art 26 of the draft directive)

requires
- A permit for the emission of greenhouse gases (pursuant to Art. 4 – 8 of the draft directive)

and
- Must hold emissions allowances for the greenhouse gases listed in Annex II (first step only CO_2) (Art. 12 para. 3 of the draft directive)

Slide 19

Installations Refered to

- Installations covered:
  Combustion installations with a thermal output > 20 MW
  roasting and sintering installations for metal ore, plants for production of pig iron and steel, including continuous casting
  installations for the production of cement clinker or lime
  installations for the production of glass, including glass fibre
  installations for the production of ceramic products
  installations for the production of pulp, paper and cardboard

  Ambiguity: several smaller installations of a single operator in one location are added together. If the limit according to Annex I is exceeded, these installations are also subject to the EU directive

  Not covered: R&D installations, incineration plants for household waste and hazardous wastes
  Covered: Industrial wastes such as waste tyres, plastics and similar

Slide 20

The route to emissions allowances

Permits (registration)	Allowances
• Location specific • Non-transferable • Basis for monitoring and reporting obligations • Prescribes requirements for holding allowances so that the annual emissions are covered • Permit non-transferable and non-tradeable	• Allocation according to the national allocation plans by Member States • Right to emit one tonne of CO_2 equivalents • Tradeable throughout EU • Verfication in framework of a national accounting system

Slide 21

Compatability with Other Instruments

- Continuation of German industry's voluntary commitment declaration in emissions trading. Basis for the first allocation derived from the 45 million t CO_2 reduction by 2010 (base year 1998) offered by industry itself in the Climate Protection Agreement.
- Emissions trading and ecological tax reform – differentiation between stakeholders and non-stakeholders –"joint position" of the Council on EU CO_2 tax and energy tax allows differentiation.
- Emissions trading and Renewable Energy Sources Act
- Emissions trading and Combined Heat and Power Act
- Emissions trading and IPCC – extent of regulatory requirements for greenhouse gas emissions and energy efficiency

Slide 22

Implementation of the EU emissions trading scheme in Germany

- Between 4.500 and 5.000 installations covered by Annex I of the ET - Directive
  - 99% of CO_2 from public power generation
  - 96% of CO_2 from industrial power generation
  - 87% of non-energy related CO_2 (industrial processes)
  - >60% of CO_2 from other industrial installations
- ET Sectors: 500 Mt CO_2
  - of this >250 Mt at 3 - 4 public electricity suppliers

Slide 23

The National Allocation Plan – the Strategic Challenge

- Numerous installations in energy intensive branches of production affected
- High level of heterogeneity (activities and installations)
- Early action existing in many different forms; but: EU state aid regulations
- Very different branch trends
- Phase out of nuclear energy taken into consideration
- East-West related problems (renewal of capital stock)
- Varying investment cycles
- No disadvantage to CHP

Slide 24

Process and critical points

1st level — *National Emissions Budget*

top

Commitments by Industry, political scenarios III, IKARUS, studies by Ministry for Economics and Employment, Federation of German Industries and Ministry for the Environment

down

2nd level — *Sectoral Emissions Budgets (energy – industry – GHD – households – traffic and transport – consider a reserve)*

bottom

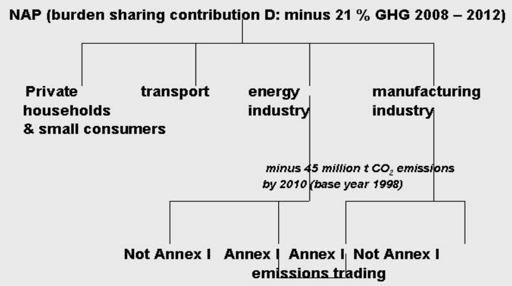
up

3rd level — *Installation-based Emissions Budgets*

historical values, specific parameters(Grösse), benchmarking, general approaches, pools, decommissioning, New entrants, CHP, compliance factors – system of "communicating tubes"

Slide 25

Systematic Development of the NAP



Slide 26

Main Issues

Slide 27

Individual issues I

Problem	Questions to be clarified
Installation definition - coverage	definition, delimitation point, opt in, opt out, pooling, connected installations, several installation operators – clarification of the EU Commission questions on the transposition of the IPPC Directive
Mixed fuel furnaces	Separation of fossil and renewable fuels, treatment of industrial wastes, emissions factors to be applied – general or random sample
Decommissioning	Withdrawal and transfer of allowances, partial and temporary decommissioning, replacement and expansion investments, capacity fluctuations

Slide 28

Individual issues II

Problem	Questions to be clarified
Process-related emissions	definition, evaluation, securing innovations, allocation of allowances
Combined heat and power	Allocation of allowances – general or individual - small CHP installations und block type thermal power stations, cross-sectoral emissions transfer, bundling of emissions reduction
National reserve	New entrants, missed targets, CHP, banking, cross-sectoral emissions transfers
Issues of supervision law	'Security document' feature, low administrative cost versus necessary control

Slide 29

National Need for Action

Slide 30

Tasks I

- Permit under Art. 4 (permit obligation, opt in / opt out, procedures, obligations)
- Verification of emissions reports pursuant to Art. 15 (emissions report obligation, authorisations for the implementation of Directives, emissions monitoring, reporting, verification, storing of data)
- Receipt of reports, review options (random sampling), forwarding
- Reporting to the EU Commission
- Authorisation of verifiers
- Drawing up of national allocation plan pursuant to Art. 9
- Decision on formation of reserve (to be used for what? Developed from what? Static or dynamic structure?)
- Allocation of emission rights pursuant to Art. 11
- Accounting/register pursuant to Art. 19

Slide 31

Tasks II

- Monitoring of return/cancellation of emissions rights pursuant to Art. 12 (verification obligation, decommissioning)
- Establishing "non compliance"
- Imposing penalties
- Establishing the ban on selling in cases of non-compliance with the reporting obligations pusuant to Art. 15
- JI and CDM – incorporation
- Setting up a trading platform
- Transition provisions
- Ordinances (area of application, allocation criteria and rules, emissions monitoring and reporting verification and accreditation)

Slide 32

Structure of the legal implementation

TEHG - GHGETA

Ordinances

34.BImSchV update of the 9.BImschV

TEHG GHGETA and BImSchG Clean Air Act

NAP
Registry
Verification and Certification
ZEHSt

Slide 33

Institutional Structure

Task	Actor
supervision (permit and control)	Government
administration – competent authority (register – transaction log – inventaries)	Government or transfer to private firms
trade - trading platform (electronic, like electricity exchange)	Private (exchange(s), trade intermediaries, brokers, OTC trade)
Monitoring / verification	Government/private (accredited verifiers)

Slide 34

Drawing up the Quantity Framework for Initial Allocation – the "Five Step Plan"

- Länder provide the BMU installation-specific data from the Emissions Declaration 2000 after it is checked for plausibility *(step 1)*
- BMU checks for plausibility
- Länder send a letter to each of the 4500 - 5000 installation operators, inform them of the CO_2 emissions calculated and request a review and if necessary corrections with justification and supplementary details from the years 2001 and 2002 *(step 2)*
- Installation operators report to the Länder with the data
- Länder Immissions Control Authorities check the data for plausibility *(step 3)*
- Länder give the checked emissions data to the BMU *(step 4)*
- After checked for plausibility, the data are used by the BMU as a basis for calculating the allocation quantity *(step 5)*
- NAP results from the aggregation of the bottom up data – Once confirmed by the Commission it can no longer be changed!

Slide 35

Need for Harmonisation within Europe

Slide 36

Need for Harmonisation within Europe

- Definition of installations in relation to IPPC Directive (Art. 3, Annex I)
- Information basis for initial allocation
- Emission factors for purposes of allocation and monitoring
- Treatment of combined heat and power generation
- Treatment of early action
- Definition and treatment of decommissioning and permanent reduction in capacity
- Definition and treatment of new installations and installation extension – creation of reserves
- Consideration of economic growth and structural changes
- Interpretation of the allocation rules ("technical potential", "discrimination")
- "Banking" at 2007/2008 interface
- Monitoring guidelines and WBCSD-/ISO procedures
- Harmonised requirements for verification (accreditation of the verifier)
- Annual distribution of emissions allowances within one allocation period

Slide 37

Economic Advantages

Slide 38

Economic Advantages

- **European Commission**

Energy industry	1,084 million euros or 33 % cheaper*
Other energy producers	599 million euros or 29 % cheaper*
Industrial CHP	485 million euros or 38 % cheaper*
Iron and steel	209 million euros or 50 % cheaper*
Cement, glass, ceramics	31 million euros or 38 % cheaper*
Paper and pulp	2 million euros or 36 % cheaper*

- **British Petrol**
  Savings in the period 1998 – 2001 total of 500 Mio. $

* Savings compared to the alternative use of regulatory law or taxes and charges, assuming the same CO_2 reduction effects

Slide 39

Costs of Alternative Instruments

- Enforcement of the German industry's Climate Protection Agreement of 9 November 2000 gives rise to investment expenditures amounting to 35 – 50 billion € in the period 2000 – 2012 (source: letter from BMF to the EU Commission)
- Based on the reduction of greenhouse gas emissions of 45 million t. by 2010 (base year 1998) agreed by the industry, this results in specific investment expenditures of 1.750 – 2.500 € /t CO_{2equiv}
- Taking account of operational and maintenance costs and a write-off duration of 15 – 20 years, this leads to GHG reduction costs of 170 - 250 €/t CO_{2equiv}
- The maximum allowance price within an EU-wide emissions trading (i.e. without opening for JI or CDM) is estimated to be 20 – 33 €/t CO_{2equiv}– other estimates assume far lower allowance prices

Slide 40

Fair Competition between Instruments
What does the IGBCE study say?

- Interim result of spring 2002: predicts impairments to growth and job losses
  Reason: Poor selection of premises. Sensitivity test with more favourable premises was not undertaken: no "grandfathering" and an emissions price of 30 euros/t CO_{2equiv}
- Final result substantially more positive for emissions trading:
  - Anticipated allowance price not 30 euros/t CO_{2equiv}, but only 5 – 15 euros/t CO_{2equiv}
  - Costs of German Industries Voluntary Agreements: 100 euros/t CO_{2equiv}
- Conclusion: Emissions trading need not be afraid of fair competition. On the contrary: emissions trading is a 'least cost measure'!

Slide 41

The Opportunities

- Reliability by fixing caps in a legally binding NAP for the period 2005 - 2012
- Allocation of clear responsibilities
- Cost capping through allowance price
- Incentive for a systematic process of search and innovation

Slide 42

Up-to-date Information

In order to make available to the general public the results of the work of the national emissions trading group (Working group "Emissions Trading as a Means to Combat the Impact of the Greenhouse Gas Effect"– AGE), the Federal Environment Ministry gives the latest information on its website under climate change/greenhouse gases. This can be found in German under "Emissionshandel zur Bekämpfung des Treibhauseffekts". The documents already agreed by the Working Group can also be found here (German only).
This aims to provoke a broad discussion process.

http://www.bmu.de

Slide 43

Thank you for your attention!

Slide 44

Emissions Trading from a Buyer's Perspective

Albrecht von Ruffer
Natsource Tullett, Europe, London

Introduction

Up until mid-2002, the prevailing commodity in the global GHG markets was a Verified Emission Reduction, an ill-defined unit based on voluntary procedures and measures.

As a result of the experience with these new environmental markets, the recent changes in policies and certainties regarding emissions caps in general and Kyoto in particular, demand structures are changing. Market participants to date are looking for valid compliance tools that can be used in their jurisdiction. While the number of active participants is increasing steadily, many potential buyers are waiting for Russia's decision before entering the market.

But already the expectation of the Kyoto framework entering into force more and more market players are looking for ways to hedge their emissions exposure.

A number of different trading schemes have been and will be set up under which companies' greenhouse gas emissions will be capped. The UK ETS is already in existence and is linked to Kyoto by the option to bank credits into the 2008–2012 period. The EU ETS is firmly based on the EU's Kyoto commitment. EU Allowances will be backed by AAUs, Kyoto compliance tools, and direct links with the Kyoto mechanisms are proposed. Canadian and Japanese companies are also likely to be capped under national trading schemes, although they would most likely use Kyoto compliance tools for trading in these schemes.

Demand for emission reductions currently exists mainly in countries that have already ratified the Kyoto Protocol, in particular the EU, Japan and Canada. However, there may also be demand from regional schemes outside the Kyoto area (US and Australia), and by speculative traders.

In a recent study, Natsoure estimates the global demand for reductions from JI and CDM to amount to up to 700–800 mio $CO_{2\ eq}$ annually during the first Kyoto commitment period – based on projections submitted to the UNFCCC. Probably less than half of that amount should be expected to come from private sector actors. But sources for supply of such reductions are in competition, with the lowest cost reductions progressing. CDM projects may be low cost, but joint implementation projects in economies in transition, domestic action, and international emissions trading may turn out to be no more expensive, and both price and politics will dictate where reductions are sourced. In essence, buyers will seek the lowest cost compliance tools available.

1 Criteria and method of acquisitions

The section below is based on Natsource's market intelligence derived from its daily participation in the market, as well as from market surveys carried out.
Offers for GHG compliance tools must ideally carry the following attributes in order to satisfy buyers' demand:

- Well formulated, easily accessible
- Clear title
- Clearly additional (if ERUs or CERs)
- Low credit risk
- Acceptable delivery / performance risk
- Independently verified
- Government (and CDM EB) approval
- Price

Criteria for acquisitions of emission reduction and allowances to date are diverse. Acquisitions for voluntary commitments are much less sensitive than those for expected compliance needs in the 2008–2012 period. Without actual compliance tools sitting in a registry account somewhere, companies wanting to acquire emission reductions are looking for the 'next best thing'. They are therefore looking for project attributes such as host government approval, CDM Executive Board approval (of project or methodology), well presented and formulated reductions that are independently verified.

Price is another very important attribute on the current emissions market. With uncertainties still surrounding this whole market, and any compliance date still some five years away, prices are bound to be low – more like an insurance premium against default than actual compliance tools.

Price estimates have ranged anywhere from below \$1 to \$100 per ton of CO_2E. More realistically, many believe the pricing in the first EU trading period to stay below €10 and the global GHG market not to exceed the $20 price level during the first Kyoto commitment period. Interestingly, pricing in the pre-compliance EU market has almost reached that level with the latest trade reported at above €9 in early August. However, given its very low liquidity and low number of players involved to date, this pricing lacks the underlying fundamentals of the known scarcity of the good and a solid supply-demand-balance to determine price.

From the experience in initial trading with Kyoto compliance tools, buyers expect the seller to bear the following risks:

- Project risk
- Volume risk
- Kyoto/EU eligibility
- Country risk.

While buyer and seller usually share the general price risk (that the price agreed to in a forward transaction is in line with the yet-to-be-established forward curve) and the creditworthiness of the counter party. The buyer will want to apply a discount factor with regards to the overall risk and the time frame over which the transaction is bound to take place (sometimes up to 10 years). Overall, however, buyers are prepared to pay a significant premium for such risk improved offers, compared to the early VER transactions or compared to PCF transactions, where the buyer essentially carried all these risks. Actual prices may well be twice as high for the above described risk distribution!

Demand for voluntary commitments may request other attributes, such as a strong sustainable development component; demand may also be location and sector specific. However, such demand for voluntary commitments and VERs has diminished significantly over the past 12 months.

The methods of acquisition vary to some degree, depending strongly on the company in question. It is particularly important how much risk a company is willing to take, and its background in trading similar commodities. Additionally, project experience and developing country presence may influence a company's behavior in the market. Finally, emission reductions can still not be considered a real commodity, as too many variables are not yet standardized. As a consequence every acquisition is an individual one.

The most common trading structures include:

- Forward contracts on project output (flexible volume)
- Forward contracts on specific volume
- Spot market (only possible to date in UK, Danish and VER transactions)
- Options (locking in price)
- Buyers Pool & Carbon Funds

Given the diversity of companies involved in the emissions market, uncertainties that are still faced by market participants, and the time before any of these acquisitions become usable compliance tools, entry into this market is best looked at as risk management. Participants therefore are often using a combination of methods such as spot market, carbon funds, buyers pools and reductions in their own installations. The types of contracts utilized by market participants also varies according to company preference. Most contracts are based forward contracts with payment on delivery.

Options are extremely hard to price in this infant market, but are also traded regularly, mostly as part of a larger contract. Some projects require payments upfront in order to make the project happen which is problematic given the often poor creditworthiness of project developers compared to the credit demands of large corporate buyers.

2 Conclusions

As regulatory certainty in the Kyoto framework and the EU ETS is increasing, the size of the market and sophistication of players is increasing. This can be observed in the much more precise risk distribution of recent trading structures. Ideally, buyers can contract guaranteed compliance tools leaving all Kyoto and EU ETS related risks with the sellers and concentrating on the inherent counter party credit and price risk. This conflicts somewhat with the demand of obtaining the lowest price for compliance. Larger buyers will strive to establish a portfolio of different price and risk structures thus obtaining the optimal mix. For sellers this could mean that it is both practical and opportunistic to adopt a diversified trading approach as well in order to both keep risks reasonably low and average prices high.

Emissions Trading from a buyer's perspective

Albrecht von Ruffer
Head of Emissions Markets, Europe
CTI Capacity Building Seminar, 21. September 2003

NATSOURCE

Slide 1

Contents

1. Market developments to date
2. Different jurisdictions – different criteria
3. Risks & quality criteria in a GHG transaction
4. Price vs. Risk
5. Enhanced transaction structures

NATSOURCE

Slide 2

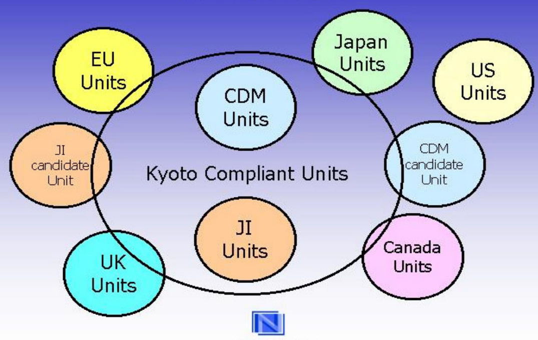
Natsource Intro

- World's larges broker for environmental commodities >40 staff in London, Hamburg, Oslo, New York, Washington, Toronto, Calgary, Tokyo
- Since 1994: Electricity, Gas, Coal, SO_2, NO_X, Greenhouse Gas, Renewable Energy
- Project Finance Advice & Structures
- Strategic Advisors to Companies & Governments (CAN, NL, EU, UK, PCF etc.)
- Asset & Value Management (Buyers Pool)

NATSOURCE

Slide 3

Commodities



NATSOURCE

Slide 4

Commodities

Credits
- CDM – CERs
- JI – ERUs
- National reduction projects

➔ *ex-post* allocation

Allowances
- AAUs
- EU Allowances
- (UK Allowances)
- Japanese & Canadian Allowances?

➔ *ex-ante* allocation

Fungibility??

NATSOURCE

Slide 5

Quality Differences in Jurisdictions

EU companies
- may only use CERs/ERUs as specified by the linking directive
- maybe quantitative restriction?

Canadian & Japanese companies
- Japanese companies may use AAUs and the whole range of CERs/ERUs, incl. LULUCF
- Canadian national projects

Linking of different national compliance systems?

NATSOURCE

Slide 6

Transaction Risks - Credits

1. Kyoto risk
   – Kyoto not entering into force
2. National regulatory risk
   – Host country not ratifying or not fulfilling eligibility criteria (JI) or withholding share of ERs
3. Performance risk – Carbon
   – Dynamic or changing baseline
4. Performance risk – Project
   – Building, operations and general technology
5. Counterparty Credit risk
6. Country risk

NATSOURCE

Slide 7

Transaction Risks - Allowances

1. Kyoto risk
   – only for AAUs
2. National regulatory risk
   – Probably not; Allowances shadowed by AAUs in EU ETS?
3. Performance risk – Carbon
   – No, automatically seller's risk
4. Performance risk – Project
   – No, automatically seller's risk
5. Counterparty Credit risk
   – yes
6. Country risk
   – probably not

NATSOURCE

Slide 8

Price vs. Risk

Buyers want optimal balance between risk and price:

- AAUs or EU Allowances offer best risk profile but also probably highest price
- CERs/ERUs/VERs offer a range of risk profiles at a range of prices
- CER/ERU sellers increasingly likely to accept risk distribution giving them better prices:
  - Sellers Risks: Kyoto, performance, volume, credit & price
  - Buyers Risks: credit & price

NATSOURCE

Slide 9

Current Pricing

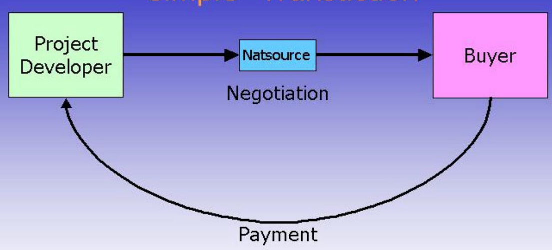
Risk

Commodity	Bid	Ask
VERs (non-candidate CERs)	\$0.40	\$0.40
VERs (candidate CERs)	\$2.00	\$3.00
VCERs	\$3.00	\$4.00
CERs	\$4.50	\$6.00
ERUs	\$4.50	\$6.00
AAUs	\$5.50	\$7.00
UK Allowances	\$3.40	\$3.40
EU Allowances	\$10.00	\$11.75

NATSOURCE

Slide 10

"Simple" Transaction

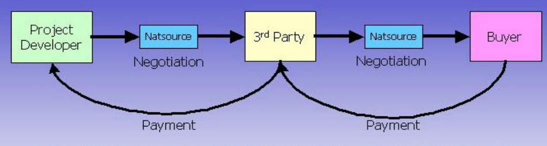


- Forward stream of reductions
- Cash on delivery

NATSOURCE

Slide 11

Enhanced Market Structure



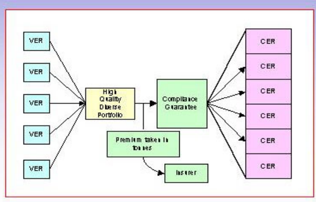
- Natsource arrange sale of forward stream of reductions to 3rd Party who enhance credit of Project Developer
- Up front part payment secured through enhanced credit from 3rd party
- Project developer receive part payment up front and part payment for forward stream

NATSOURCE

Slide 12

Advanced Market Structure

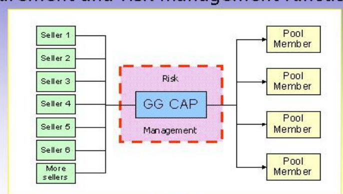
- Obtain membership of Emission Market Development Group
- Provide tonnes to a diversified portfolio and obtain marketable units in the portfolio in return



Slide 13

Advanced Structure: Buyers Pool (Greenhouse Gas Credit Aggregation Pool)

- GG-CAP buyers purchase tonnes collectively
- GG-CAP extensive risk management on the portfolio
- GG-CAP never takes ownership of tonnes it performs a procurement and risk management function



NATSOURCE

Slide 14

Price Risk

- Uncertainty of forward pricing
- As in any (imperfect) forward market, one of the counter parties is bound to get the pricing wrong!
- Still a valid hedge for part of the exposure

Not trading on a natural position is equally speculative & risky!

NATSOURCE

Slide 15

Electricity – Gas – Coal – Emissions – Renewables – Weather

+ 49 – 40 – 248 253 02
avruffer@natsource.com
www.natsource.com

Hamburg - Oslo - Toronto - Tokyo
Calgary - Ottawa - London - New York

NATSOURCE

Slide 16

Emissions Trading from a Seller's Perspective: Czech Republic

Tomaš Chmelík
Ministry of Environment of the Czech Republic

The basic starting point for discussion about climate change policy and instruments for reduction of greenhouse gases is naturally a description of the background situation and conditions.

The Czech Republic – similarly like other economies in transition – has a relatively good position regarding to development of absolute GHG emissions. The target of 8% reduction for the first commitment period (2008-2012) is already fulfilled and will not be threatened even in case of a high growth. However, this situation does not mean that our situation is good and that no measures need to be taken. It is necessary to take into account particularly the following key factors:

- Construction of the Kyoto target,
- Carbon and energy intensity of the economy,
- Limited experience with GHG regulation,
- Climate change being not the high priority of the government.

However, the flexible mechanisms of the Kyoto Protocol can play an important role even in the case of over-compliance with the Kyoto target. Czech Republic is in a position of a host country for JI projects, but practical experience shows that the implementation of this instrument is not without problems. Especially high transaction costs and complicated procedures reduce interest in this flexible mechanism, especially by small project operators. It is currently considered to use also a mechanism of trading under Article 17 of the Kyoto Protocol as a supportive instrument for projects on GHG reduction.

The EU scheme represents in our case a real challenge. It became a part of the EU legislation and constitutes a different framework for trading (other then Kyoto system). The main features are trading on the level of installations and the area of enlarged Europe (EU-25) to be covered by the scheme. The implementation of the scheme represents a very tough challenge, because aside of the technical and factual problems to be solved, a number of administrative procedures (such as parliamentary approval of new legislation) has to be taken which are putting the works under a constant time pressure.

Emissions Trading from a seller's perspective: Czech Republic

CTI Capacity Building Seminar, September 21, Tutzing

Tomas Chmelik

Climate Change Unit
Ministry of Environment of the Czech Republic

Slide 1

Climate Change Unit
Ministry of Environment of the Czech Republic

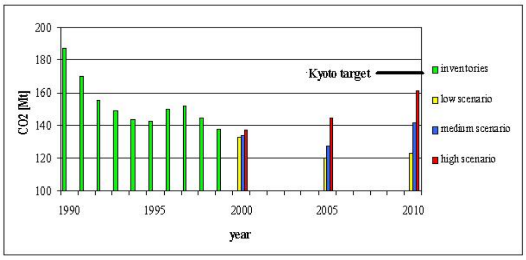
Introduction - background

- Good position of the country in the fulfillment of the Kyoto protocol target (-8 %, 1990 base year)
- National target (-20 % in 2005, base year 1990) also fulfilled without problems
- No serious problems expected even in case of a high growth

Slide 2

Climate Change Unit
Ministry of Environment of the Czech Republic

Inventories and projections



Slide 3

Climate Change Unit
Ministry of Environment of the Czech Republic

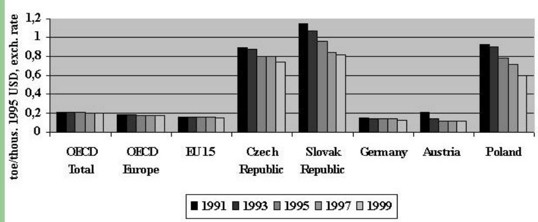
Good position = no problems ?

- Construction of the Kyoto target (transformation of the economy, future growth)
- Energy and carbon intensity (absolute versus relative emissions data)
- Experience with GHG regulation

Slide 4

Climate Change Unit
Ministry of Environment of the Czech Republic

Carbon intensity of the economy



Slide 5

Climate Change Unit
Ministry of Environment of the Czech Republic

Climate Change policy in Czech Republic

- Pro-active approach sometimes difficult (country in a good position)
- Some measures already applied (renewables, energy savings, better technologies)
- New Climate Change strategy under preparation
- Communication among various ministries (departments) needed, often not optimal
- EU accession ?

Slide 6

Climate Change Unit
Ministry of Environment of the Czech Republic

Joint Implementation

- Czech Republic a host country
- Some experience with AIJ phase (no crediting)
- JI phase started in January 2002
- Methodology prepared (includes administrative procedure for approval of projects)
- Preparation of necessary institutional structures started
- Interest from investor countries

Slide 7

Climate Change Unit
Ministry of Environment of the Czech Republic

JI experience – a slight confusion

- Methodology a big step forward, but considered as too complicated - now under revision
- Small scale projects difficult to pass JI procedure
- High administrative costs – especially when compared to revenue (low price for credits)
- International rules and requirements too complicated for project realisators
- Assessment of risks

⇒ Less projects available then expected

⇒ Good projects not available where would be most welcome

Slide 8

Climate Change Unit
Ministry of Environment of the Czech Republic

Art. 17 Emissions Trading

- Generally yes – more detailed rules under preparation
- Competition to JI?
- Willingness to recycle the revenue back to Climate Change (project-based ET)
- Various options considered (sale first, then recycling, collecting projects - sale afterwards etc.)
- Management of emissions surplus an issue?

Slide 9

Climate Change Unit
Ministry of Environment of the Czech Republic

EU emissions trading – to trade or not to trade ? That is a question…

- Question already solved – EU scheme covered by a directive – MS have to implement
- Trading on the level of installations – a real challenge for industry
- Emissions surplus – an issue for consideration ?
- Position of industry – somehow reserved, but quickly changing
- Governmental position - somehow reserved, not much changing

Slide 10

Climate Change Unit
Ministry of Environment of the Czech Republic

Implementation of the scheme

- Emissions trading generally a perspective economic instrument
- Short time available – number of activities has to be made in parallel
- Cooperation with industry will be initiated (working group)
- Some partial issues already under discussion
- EIT versus ITL, monitoring guidelines
- Legal issues problematic – treatment of allowance, VAT
- National allocation plan a key document
- Wider political and expert discussion to be initiated
- Some closer cooperation with other countries – sharing the experience

Slide 11

Climate Change Unit
Ministry of Environment of the Czech Republic

Problems to be solved

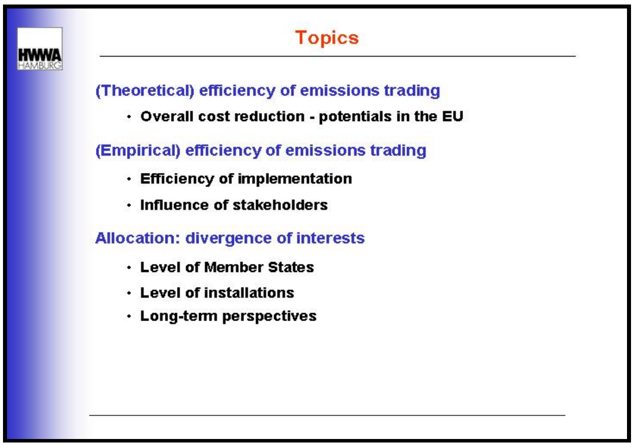
- Lack of human and financial resources at the moment (connected to question of priorities of the government)
- Pro active and strategic approach needed (is the Czech Republic a good place for GHG business ?)
- Future of JI – will the emissions trading limit the scope?
- Number of technical problems to solve (data quality and availability, legal issues, financial issues, organizational and institutional issues etc.)
- Organizing the GHG trade? Licenses for traders, stock exchanges?

Slide 12

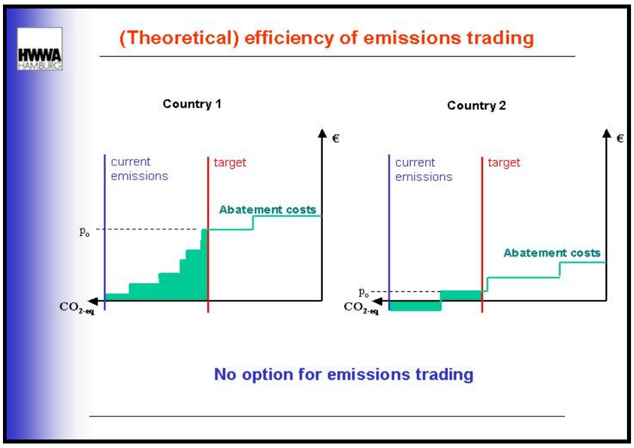
Discussant Notes: Emissions Trading

Emissions Trading in the extended EU: an efficient climate policy instrument?

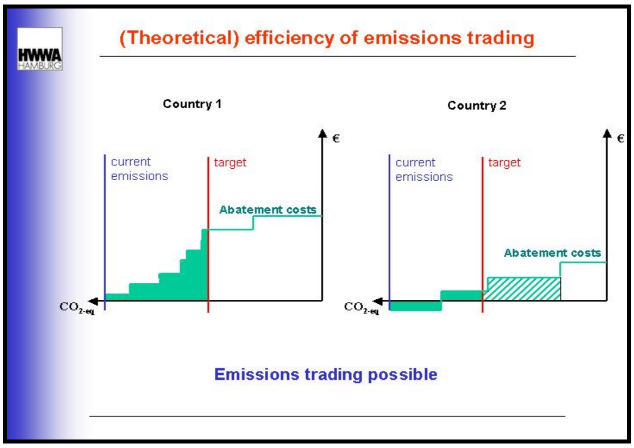
Sonja Butzengeiger
Hamburg Institute of International Economics (HWWA)



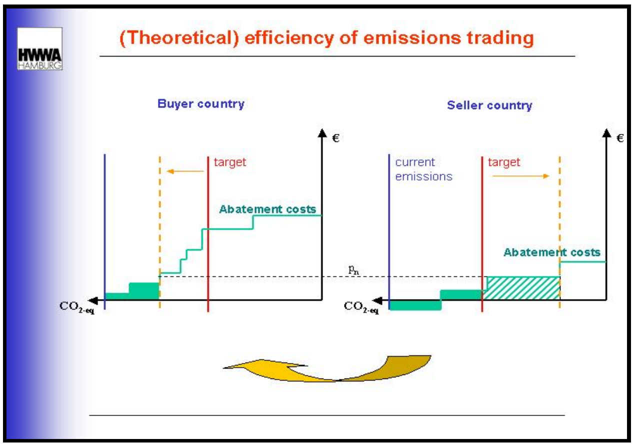
Slide 1



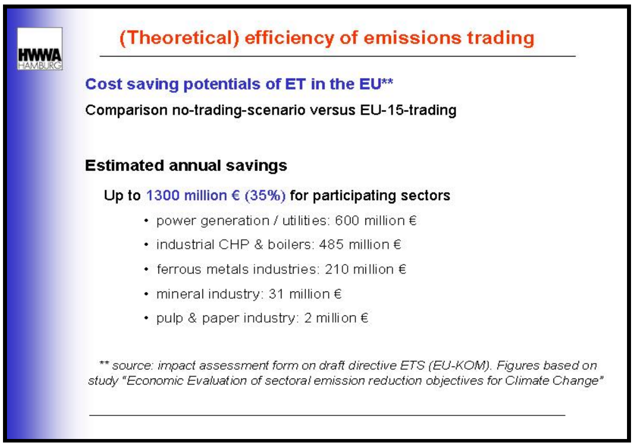
Slide 2



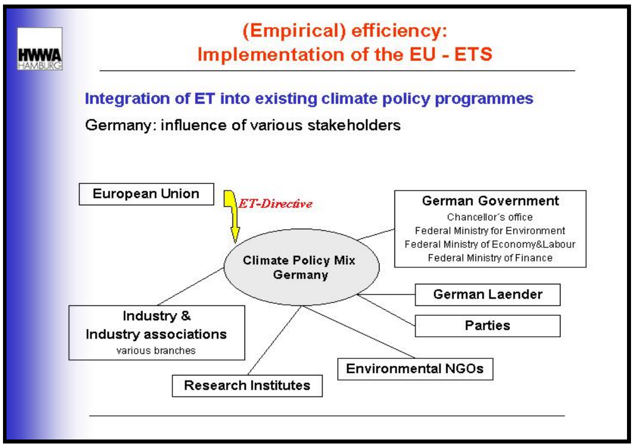
Slide 3



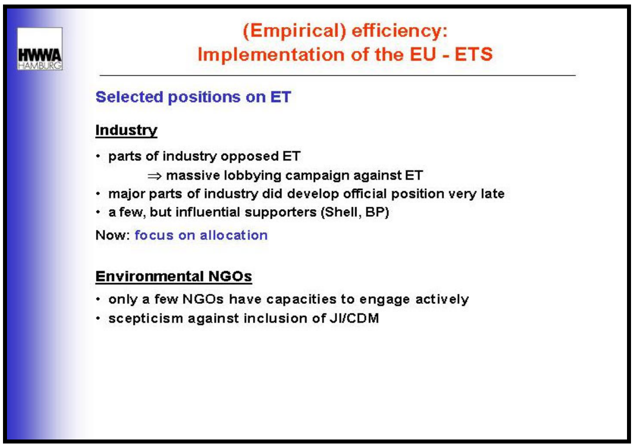
Slide 4



Slide 5



Slide 6



Slide 7

(Empirical) efficiency: Implementation of the EU - ETS

What are the reasons for divergence of industry-positions?

1. Opposition against concept of *absolute, binding emissions targets*

So far concept of *voluntary agreements* with industry
- relative targets
- no monetary sanctions in case of non-compliance
- no individual targets for installations/companies
- weak monitoring

Similar approaches in other MS (e.g. NL)

2. Money

Opponents
- Compliance with absolute caps implies costs
  ⇒ no comparison "cap: ET versus Non-ET", but "cap - no cap"
- Indirect cost increases (electricity)

Supporters:
- Assume additional income/economic benefits

Slide 8

(Empirical) efficiency: Implementation of the EU - ETS

⇒ **Implementation of ET is a very tricky process also in political terms**

- Similar trends in other MS: NL, Fin, France, UK
- EU as solid momentum

Slide 9

Topics

(Theoretical) efficiency of emissions trading
- Overall cost reduction - potentials in the EU

(Empirical) efficiency of emissions trading
- Efficiency of implementation
- Influence of stakeholders

Allocation: divergence of interests
- **Level of Member States**
- **Level of installations**
- **Long-term perspectives**

Slide 10

Allocation - Level of Member States

EU-15: Compliance with Kyoto commitments (based on national P&M) possible?
- emissions trends and forecasts show strong need for action

Accession / CEE countries: large surplus of AAUs

⇒ **good chance for a nice swap?**
- Transfer of AAUs (IET)
- Project based approaches (JI)

But: How will Accession Countries deal with EU-ETS?

Slide 11

Allocation: Divergence of Interests

Question is once again: "Who gets the money"?

Accession countries´ choice

a) Over-allocation to installations?
- Direct financial support for *some* entities, BUT
- Compatibility with EU-directive (Annex III) questionable
  - no over-allocation,
  - competition rules
- Re-investment scheme not possible

b) Alternative: government sells AAUs itself
- General household,
- Indirect financial support for national economy,
- Green Trading Scheme is possible

Lobbying process upcoming...?!

Slide 12

Allocation: Long-term perspectives

Allocation in EU-25 - ETS

Accession countries:
- Low absolute emissions (surplus AAUs), BUT
- Often high relative emissions

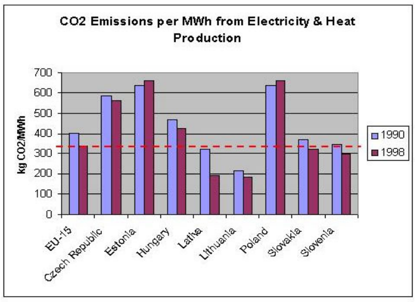
⇒ relevant for allocation *to installations* in long-term

Future method of allocation in EU-ETS?
- Grandfathering based on absolute emissions,
- Benchmarking,
- (Auctioning)

Slide 13

Allocation: Long-term perspectives

Example: EU-wide benchmarking in electricity & heat sector



Slide 14

Allocation: Long-term perspectives

Consequences for Benchmarking in future periods of the EU ETS?

Opposition by accession countries?
or
Incentive to reduce relative emissions rapidly (otherwise disadvantage in later periods)?

1st choice for accession countries:
- no over-allocation to entities in first EU-periods
- give incentive to increase energy efficiency
- sell AAUs via IET or JI

Slide 15

Carbon Finance and the World Bank: Chances, Experiences, Lessons Learned

Dr. Charlotte Streck
The World Bank Legal Department

Under the Kyoto Protocol to the United Nations Framework Convention on Climate Change, industrialized nations have agreed to cut their greenhouse gas emissions by an average of 5.2 percent below their 1990 levels in the period between 2008 and 2012. To do so they have to rely mainly on domestic action. However, among the most innovative features of the Kyoto Protocol are the so called 'flexible mechanisms' under which the Parties may achieve some portion of the required emission reductions beyond their own borders through the use of a variety of economic instruments. As the global climate system benefits from reductions in greenhouse gas emissions wherever they occur, making reductions in developing countries and countries with economies in transition ("EITs") as part of a national strategy of industrialized countries is a cost effective way of reaching emission reduction targets.

1 The World Bank and carbon finance

Climate change will effect everyone, but the Intergovernmental Panel on Climate Change has identified those countries that are least able to adapt to climate change, will tend to be the worst effected. This means that climate change is likely to have serious long term affects on the worlds poor, further hindering their development and keeping them locked into a cycle of poverty. This is of particular concern to the World Bank, whose mandate is to alleviate poverty.

The World Bank has therefore been taking an active role to address this problem. Since the establishment of the Prototype Carbon Fund ("PCF") in 2000, the World Bank has been active in promoting the use of the project based mechanisms as defined under the Kyoto Protocol, the Clean Development Mechanism ("CDM") and Joint Implementation ("JI"). The CDM focuses on the implementation of project activities in developing countries which generate emission reductions ("ERs") against a baseline which can be purchased by private entities and countries with quantified emission reduction obligations under the Kyoto Protocol (so called "Annex I countries"). JI defines a similar project based mechanism, which allows for the project to be implemented within an Annex I country. Another Annex I country or a private entity would act as ER purchaser. Most of JI projects are expected to be implemented in EITs.

Projects under these mechanisms help at the same time to reduce the concentration of greenhouse gases in the global atmosphere, and leverage financial resources for projects in developing countries and EITs. The mechanisms defined under the Kyoto Protocol are helping to catalyze the global carbon market by extending carbon finance to both developing countries and EITs – linking buyers of carbon credits with climate-friendly projects seeking financing. The World Bank is actively engaged in a dialogue exploring these opportunities in discussions with host countries and potential carbon buyers—both public and private. As the cost of reducing emissions is significantly cheaper in developing countries and EITs than in industrialized countries, the buyers also benefit by being able to cost effectively reduce their emissions through CDM and JI projects. In this way it is a win-win situation. The countries selling the ERs receive environmentally and socially responsible investment which is typically accompanied by a transfer of clean technology, and the countries or companies buying the ERs are able to cost effectively meet their emission obligations.

Prototype Carbon Fund

The Prototype Carbon Fund (PCF) was the first carbon trust fund established by the World Bank in 2000. The fund was created by contributions totaling US$180 million from 6 governments and 17 private corporations. The goal of the PCF is threefold. Firstly, the PCF aims to demonstrate how the project based flexible mechanisms work to produce ERs and promote sustainable development. Secondly, the Fund is designed to provide Parties to the UN Framework Convention on Climate Change and other interested parties with an opportunity to 'learn by doing' while the guidelines of the Kyoto Protocol and the modalities for JI and the CDM are being fully developed. Finally, the PCF intends to demonstrate how the World Bank can work in partnership with the public and private sector to mobilize new resources for its borrowing member countries while addressing global environmental concerns. These goals include a strong commitment to technical assistance and knowledge dissemination of how the mechanisms work, and capacity building in host countries and PCF Participants. The PCFplus is a separate program run through the World Bank Carbon Finance Unit that is involved in capacity building programs including research, outreach and training programs.

Netherlands Clean Development Mechanism Facility (NCDMF)

The NCDMF is a carbon trust fund operated by the World Bank Carbon Finance Unit on behalf of the Netherlands. The NCDMF purchases ERs only from CDM projects, to promote sustainable development in host countries whilst cost-effectively generating emission reductions for the Netherlands.

The Community Development Carbon Fund (CDCF)

The CDCF is a new trust fund operated by the World Bank that has recently become operational. The PCF has learnt that in many instances the transaction costs of carbon finance are too high for it to be commercially viable to small projects in poor communities, even though such projects are ideal for directly helping those groups likely to be worst affected by climate change. To overcome this problem, the CDCF was established to overcome the financial hurdles and actively promote ERs generated from small-scale CDM and JI projects which also reduce poverty and improve the quality of life of local communities in poorer countries. The CDCF will focus its activities in the least developed countries and poorer developing countries, but there may be some scope for JI projects in the poorest regions of countries with EIT.

The BioCarbon Fund (BioCF)

The BioCarbon Fund is the latest carbon fund the World Bank is in the process of establishing. On the 12 September 2003 the World Banks board approved the creation of the fund, which is now open for participation. The BioCarbon Fund will focus on carbon conservation and sequestration activities in the agriculture and forestry sectors whilst demonstrating that carbon finance can support the objectives of the UN Convention on Biological Diversity, the UN Convention to Combat Desertification and other relevant international initiatives and treaties.

Carbon Finance Assist

The sole purpose of the Carbon Finance Assist (CF-Assist) program is to address the host country's needs to actively implement the Kyoto Protocol flexible mechanisms. The CF-assist Program will represent the World Bank's integrated capacity building effort in carbon finance.

Projects to date

By august 2003, the projects under development amount to about US$275 million in potential ER purchases, which represents approximately US$2.6 billion in underlying finance which can be expected to be invested in CDM and JI projects. The greatest challenge prospective project participants have faced has been locating this underlying finance.For more information on the World Banks Carbon Finance activities see the website gateway www.carbonfinance.org.

2 Development of the carbon market

The global market for greenhouse gas emission reductions is estimated at 200 million tones CO_2 equivalent (tCO_2e, the standard metric for ERs) since its inception in 1996, of which nearly 70 million tCO_2e was originated in 2002 alone. Volumes are expected to continue to grow as countries that have already ratified the Kyoto Protocol work to meet their commitments, and as national and regional markets for ERs are put into place, notably in the UK and Denmark (2002), and the European Union (to start trading in 2005). Notably, Governments and private-sector parties are actively seeking to purchase project-based ERs under CDM and JI for compliance, as CDM/JI reductions enter the market replacing non-Kyoto compliant ERs generated for demonstration in the early years of the market. In addition, a class of high value, low volume 'retail' ERs, not intended for compliance at all, but rather to offset specific products, services or events has emerged.

Future prices in the market for ERs are very difficult to predict because of uncertainty about key supply and demand factors. Notably, Russia's ratification (and hence the Kyoto Protocol's entry into force) would affect both supply and demand. Demand would increase as industrialized countries would be required to abide by their Kyoto Protocol commitments to reduce emissions. Supply would also increase because Russia (and certain other economies in transition) has substantial surplus ER allowances—over its quota set in the Kyoto Protocol—that it can sell to other industrialized countries. However, the appetite for such allowances is unclear, as some prospective purchasers are considering requiring a major share of their quotas to be met by actual, measurable ERs such as those sourced under CDM and JI or domestically, rather than by surplus Assigned Amount Units. Another major consideration is the possibility that the US may at some point impose National GHG emission limits[1], within or outside the Kyoto context. Negotiations about a future commitment period beyond 2012, which are scheduled to begin in 2005, will also be a key driver of carbon prices.

More information on the current state and trends of the carbon market can be found in the executive summary of two studies commissioned by PCF*plus* and available on PCF website.[2]

3 Challenges for JI countries

Under the Kyoto Protocol, Joint Implementation and Emissions Trading is open only to countries included in Annex I of the UNFCCC or Annex B of the Kyoto Protocol. Thirteen EITs are included in the group of Annex I countries and are expected to become the main suppliers of ERUs and Assigned Amount Units (AAUs) under JI and international Emissions Trading.

Similar to the CDM, JI is a project based mechanism, which allows potential project participants to invest in a project activity that reduces emissions relative to a baseline. The difference between the baseline and the actual emissions can be verified as ERs and sold to potential carbon purchasers. Whereas Certified Emission Reductions (CERs) for CDM projects will be issued by the Executive Board of the CDM, the transfer of ERUs for a JI project requires not only country approval but also the transfer of ERUs from the national account of the host country to the project participants' accounts. The JI host country therefore has an important part in the ultimate success of the project. The JI country may promote project development by offering contracts which back the transfer of ERs by a sovereign guarantee to transfer AAUs or ERUs. The country may also enter into agreements which facilitate the trade of AAUs, whereby this trade may be linked to a climate friendly project activity or a green investment scheme.

Through a strategic management of their AAUs EITs may multiply the benefit that the Kyoto mechanism offer to them.

Track One JI

The 7th Conference of Parties to the UNFCCC (COP7) agreed on modalities and procedures for the implementation of Article 6 (JI) in decision 16/CP.7 (part of the so called Marrakech Accords).[3] Projects starting as of the year 2000 are eligible as JI projects and ERUs shall only be issued for a crediting period starting after the year 2008.[4]

General participation requirements for JI are that the countries involved have informed the UN Climate Convention Secretariat of their designated focal point for approving JI projects as well of their national guidelines and procedures for project approval, including consideration of stakeholder comments and procedures for monitoring and verification.

Marrakech Accords also provide for two possibilities for verifying ERUs, either:

- By the host Party if it meets the eligibility requirements (Track One)
  OR
- Through verification procedure under the Article 6 supervisory committee (Track Two; CDM like procedures).

The main difference between Track One and Track Two of JI is that under Track One the host Party may verify reductions from an Article 6 project as being additional. Upon such verification, the host Party may issue the appropriate quantity of ERUs. In other words, no independent verification of ERs is required.

Also, in contrast to Track Two JI, under Track One JI project participants justify their own choice of baseline and monitoring methodology and they do not need any approval by the Article 6 supervisory committee or independent validation. Furthermore, under Track One JI no independent Determination (equivalent to validation in CDM) is required. Instead,

[1] Individual States in both the US and Australia have implemented, or are planning on implementing State wide GHG caps.

[2] These studies will be available on the CF website at http://www.prototypecarbonfund.org document library.

[3] First Conference of Parties serving as a Meeting of the Parties (COP/MOP1), convened after the entry into force of the Kyoto Protocol, will formally adopt the Guidelines for the implementation of Article 6 (i.e. decision 16/CP.7). COP/MOP1 will also establish the Article 6 supervisory committee. Any revision of the Guidelines shall not affect ongoing JI projects.

[4] PCF agreements include the purchase of 'early credit' emission reductions, which, based on the host government's approval and guarantee, will eventually result in a transfer of AAUs in an amount equivalent to the emission reductions generated between the commencement of the project and January 1, 2008.

project approval, baseline setting and monitoring are governed by the National Guidelines of the host Party.

Track One JI is a hybrid between emissions trading under Article 17 of the Kyoto Protocol (the cap-and-trade-system) and a project based approach (Baseline-credit-system), where one party to the system determines the amount of the ERs generated. This is possible only because ERUs are issued through the conversion of AAUs into ERUs. The hosting party therefore remains liable for the ERUs it issues as it operates under the cap and trade system established by the allocation of assigned amounts under the Kyoto Protocol. Only the CDM, which is implemented in countries without emissions targets, follows a pure baseline-credit-system, where an independent party verifies the amount of emission reductions achieved. JI with its two different grades is a project based mechanism which operates under a cap, and where it is therefore tolerable that the host country, which is eventually liable for meeting its commitments under the international regime, assumes the responsibility to manage its Assigned Amounts and verifies possible emission reductions under the streamlined version of JI.

In fact, Track One JI and Emissions Trading follow a very similar set of rules. In general, the requirements formulated for transactions under Article 17 of the Kyoto Protocol apply also to Track One JI (commitment period reserve requirements). Yet, the main difference remains: The Project. Under Track One JI a concrete project activity is implemented which claims to reduce GHG emissions. The hosting party confirms this view by verifying the amount of emission reductions achieved. Those will be issued and transferred as ERUs. Emissions Trading is not linked to any achievement of emission reductions on the ground.

Greening AAUs

Of special relevance in this context, are different schemes that link the purchase of AAUs under Article 17 of the Kyoto Protocol to some green investment scheme. Some OECD countries have signaled that have little appetite to purchase "hot air". Instead they expressed strong preference for purchasing only greened AAUs, which is interpreted as linking AAU purchases in some transparent way with investments and activities which give rise to actual greenhouse gas emissions reductions. One solution to ensuring the environmental integrity of Article 17 transactions appears to lie in reaching agreement with EITs with a significant surplus of AAUs against their emission targets to sell some of these AAUs forward against a stream of anticipated ERs which will credibly be achieved after 2012. This concept of 'late crediting' would help realize significant investments in IETs without compromising the environmental credibility of the regime established by the UNFCCC and the Kyoto Protocol.

How to link to the EU ETS?

It is so far unclear what implications the EU Emissions Trading Directive will have on JI project activities that would also fall under the coverage of the Directive. Although JI projects can generate ERUs only after 2008, there has been considerable activity in developing and implementing activities that have obtained government approval and are recognized as activities under Article 6 of the Kyoto Protocol. Project agreements govern the acquiring of ERUs, and the governments have agreed to transfer ERUs for the emission reductions generated by these projects. A number of these project agreements also include the purchase of 'early credit' emission reductions, which, provided that the host government has declared its approval, will eventually result in a transfer of AAUs in an amount equivalent to the emission reductions generated between the commencement of the project and January 1, 2008.

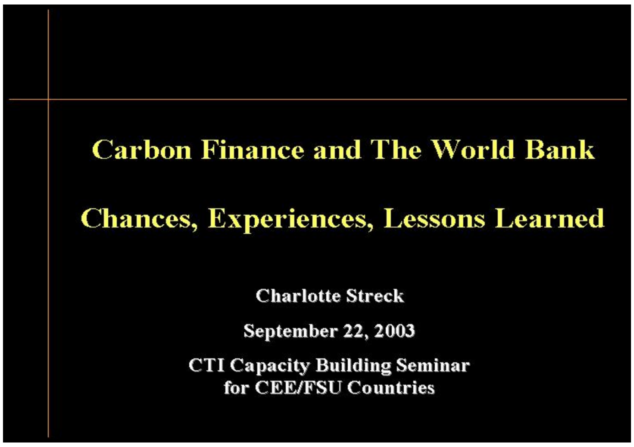
Some of these projects will also fall under the scope of the EU ETS. The proposed EU Linking Directive which links the EU Emissions Trading Scheme with the mechanisms established under the Kyoto Protocol will have to deal with this situation. It will have to regulate whether these projects will still be treated as JI projects which would involve a transfer of ERUs between states, or whether they will fall under the Directive and receive an allocation of allowances. Besides regulating the import and export of CERs and ERUs in the EU ETS, one of the objectives of the Linking Directive will be to avoid double counting of the reductions generated by one activity.[5] Different alternatives on how to treat JI projects are under discussion, and only the eventual text of the Linking Directive will provide us with a definitive answer on this question.

Conclusion

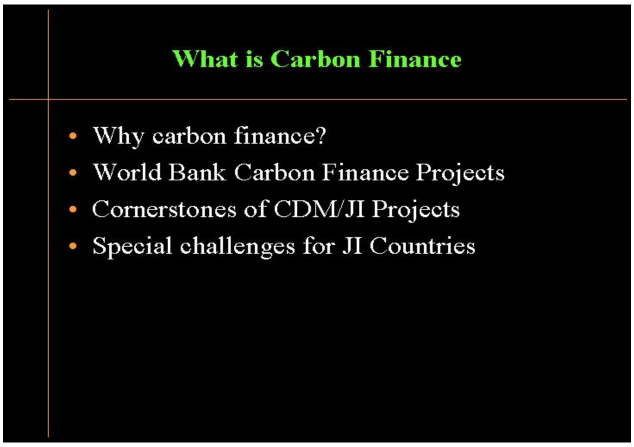
It is expected that EITs will have significant volumes of spare, or additional AAUs once actual emissions are calculated and AAUs issued into the National Registry. It is clear that EITs

5 Such a situation might occur, for example, if a significant renewable energy JI project that is not covered by the EU ETS, would displace coal generated electricity and thus reduce the activity level of a coal plant. This scenario would free up some EU Allowances from the coal plant for trading under the EU ETS as well as generate ERUs for the JI Project that could be imported to the EU trading system.

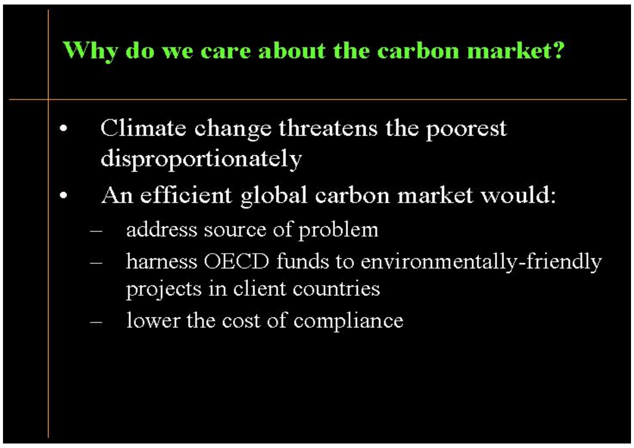
need to have a comprehensive strategy on how their manage their AAU asset and which mechanisms they want to use for the maximum benefit of the global climate and their domestic economies. The respective roles that Track Two and Track One JI, Article 17 International Emission Trading, as well as the EU Trading Scheme will play in their strategies will vary. Formulating such a strategy may not be easy however, especially given the blurred borderlines between the three mechanisms.



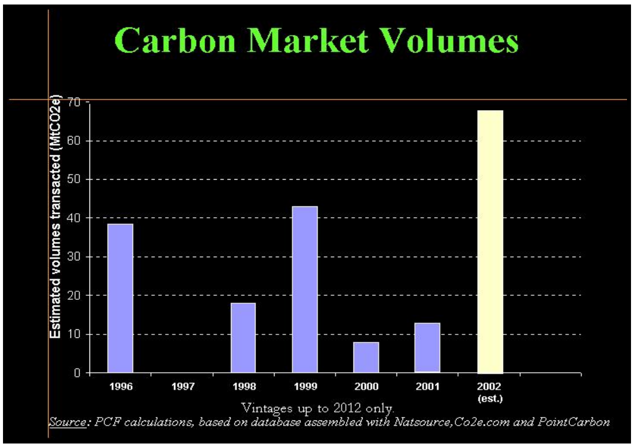
Slide 1



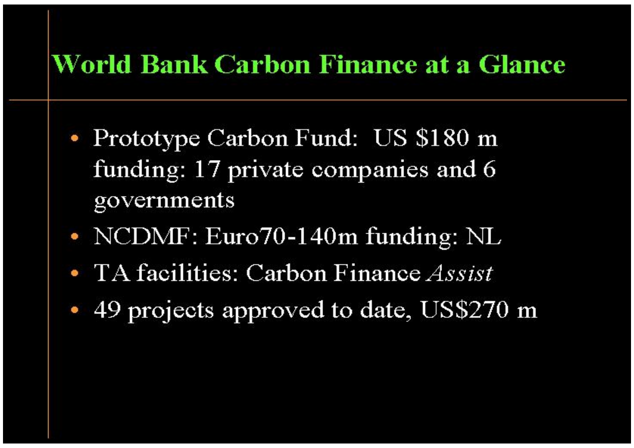
Slide 2



Slide 3

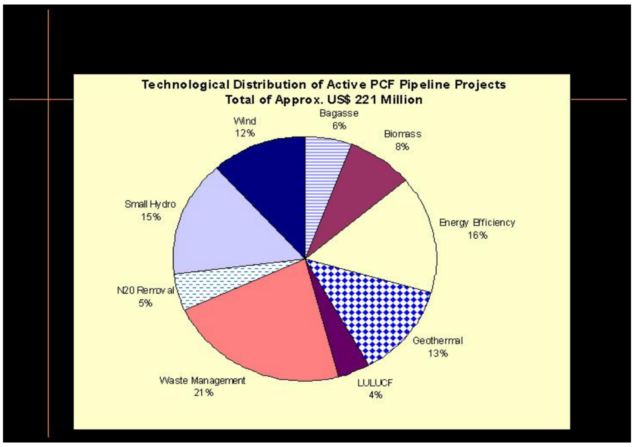


Slide 4

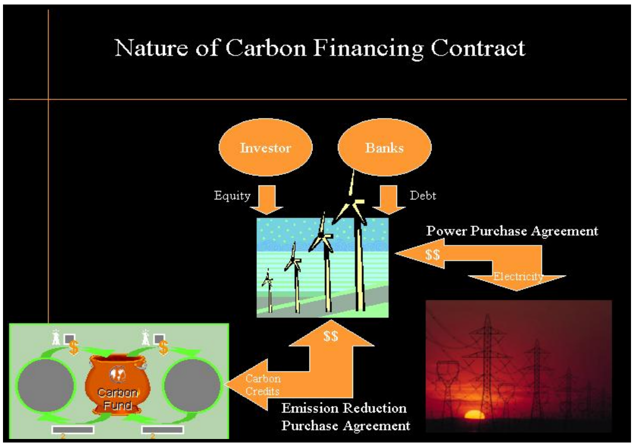


Slide 5

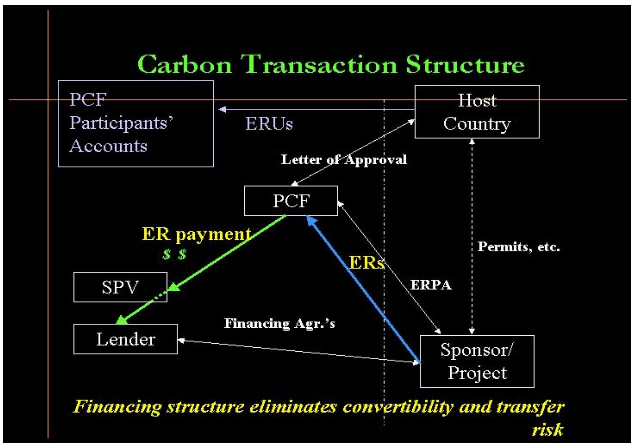
Slide 6



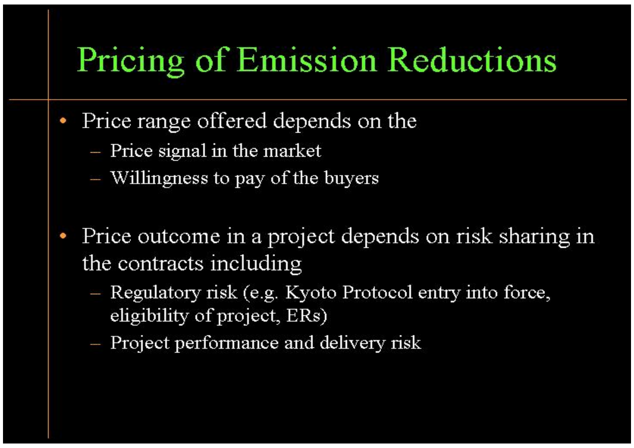
Slide 7



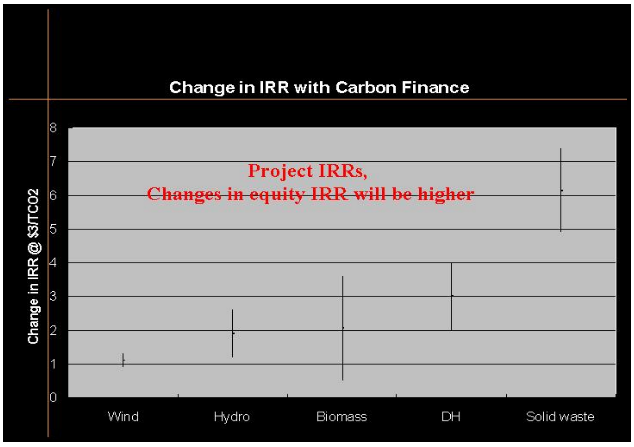
Slide 8



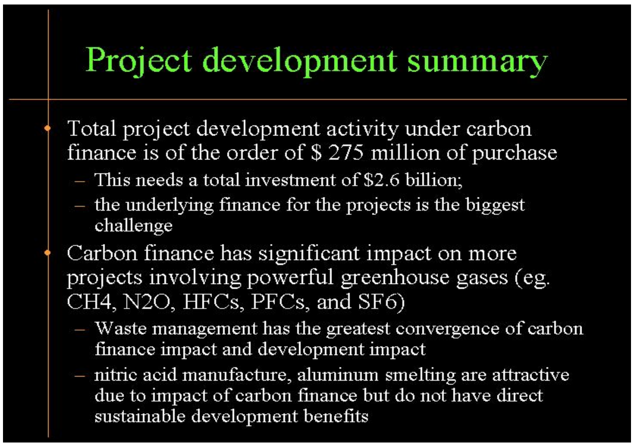
Slide 9



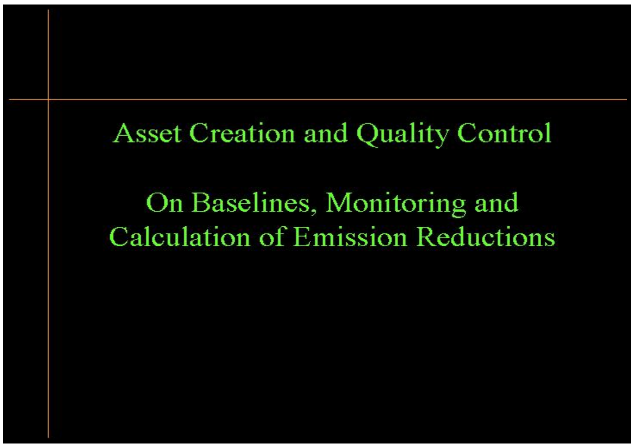
Slide 10



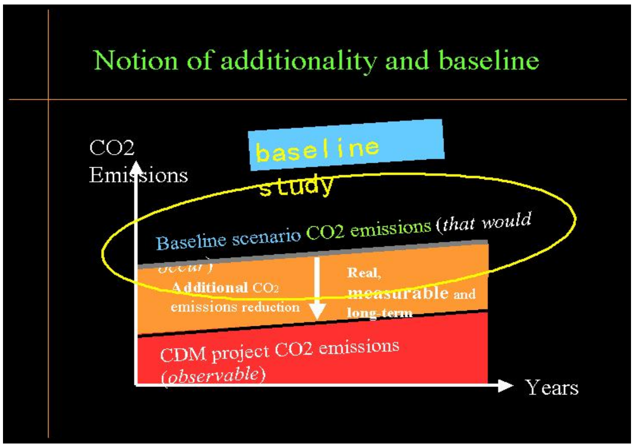
Slide 11



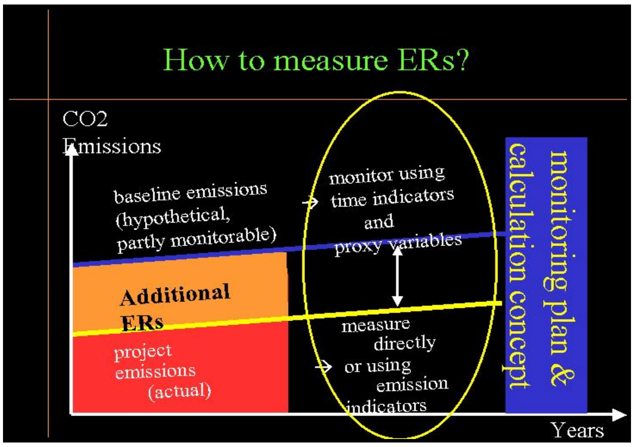
Slide 12



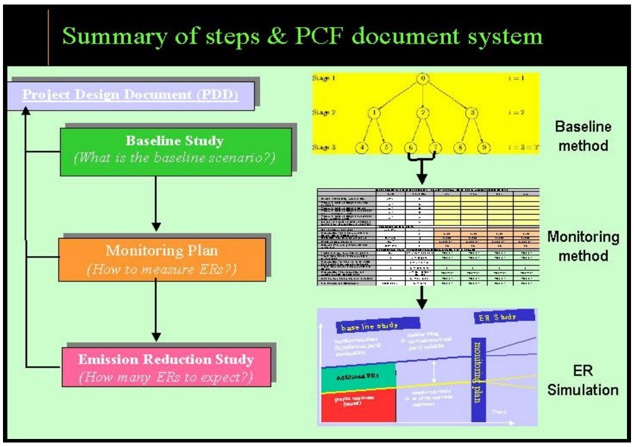
Slide 13



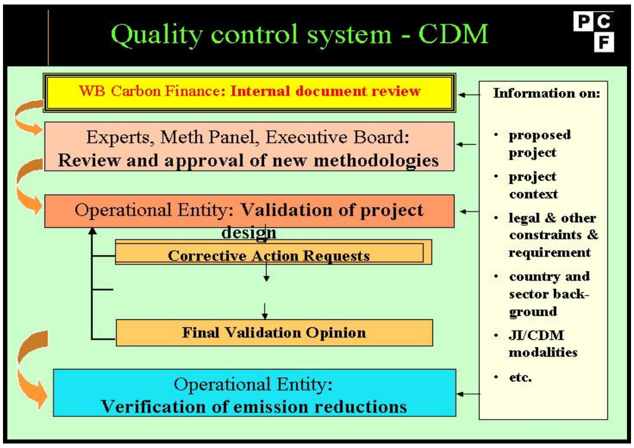
Slide 14



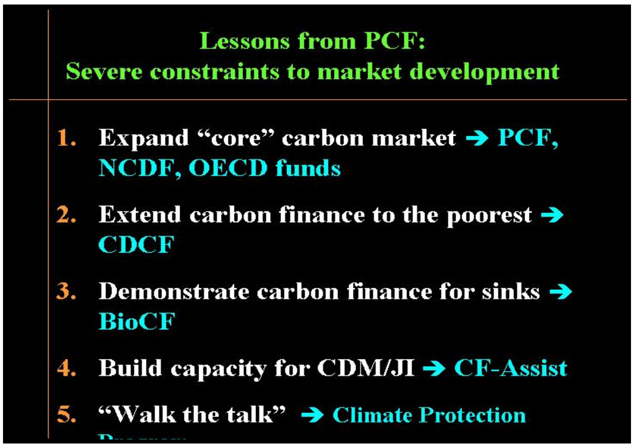
Slide 15



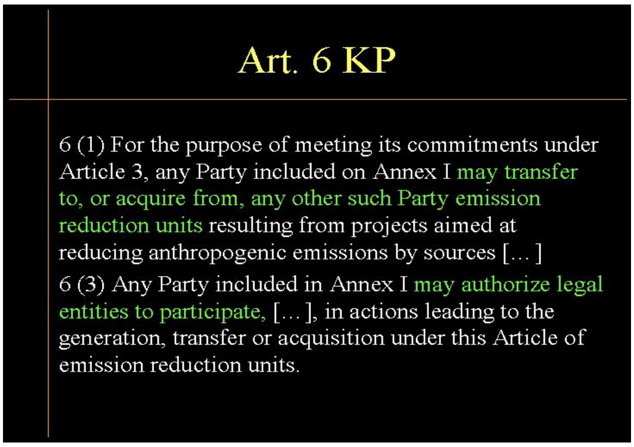
Slide 16



Slide 17



Slide 18



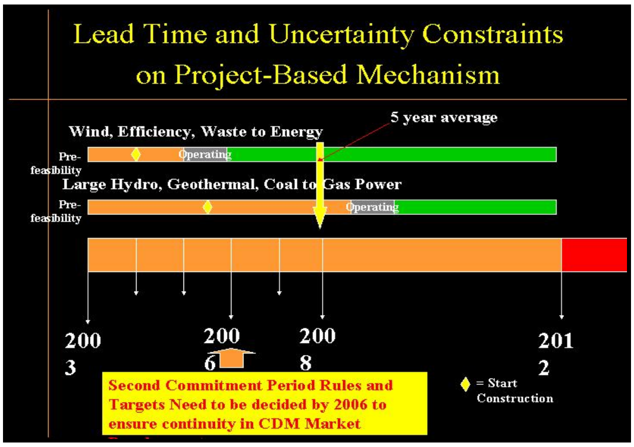
Slide 19

Slide 20

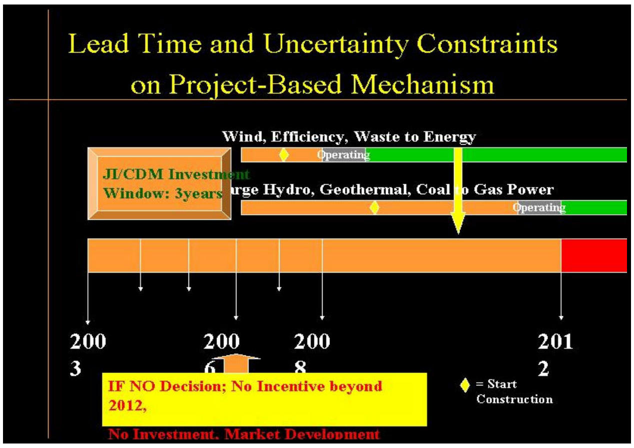
Slide 21

Slide 22

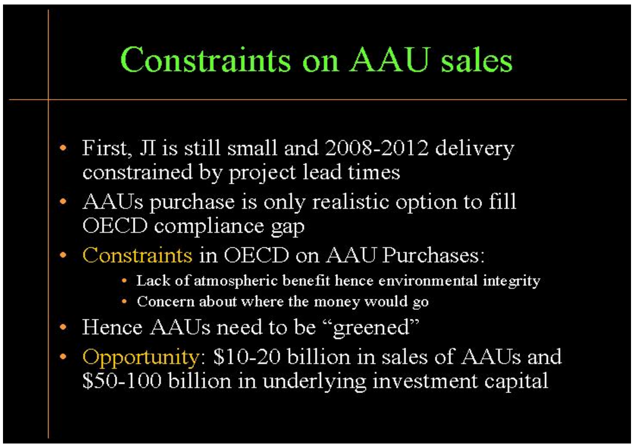
Slide 23



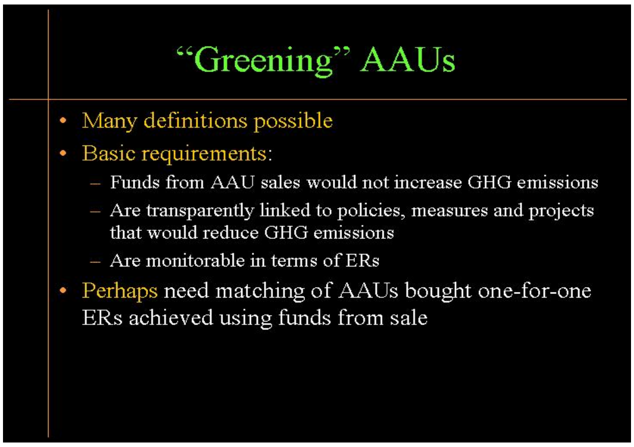
Slide 24



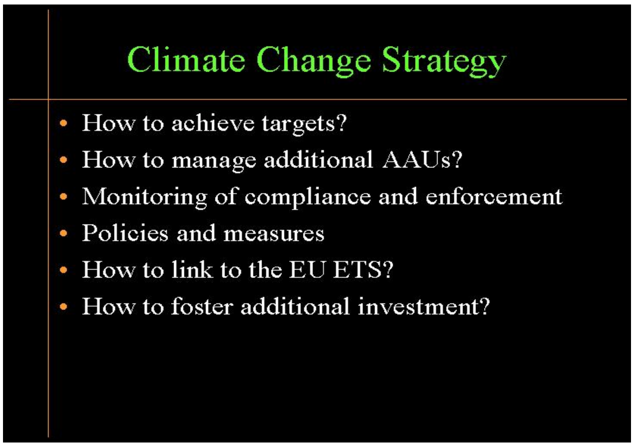
Slide 25



Slide 26



Slide 27



Slide 28

Slide 29

Joint Implementation: Relationship to and Compatibility with the Emission Trading Scheme

Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

Joint Implementation – relationship to and combatibility with the Emission trading scheme

by
Franzjosef Schafhausen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

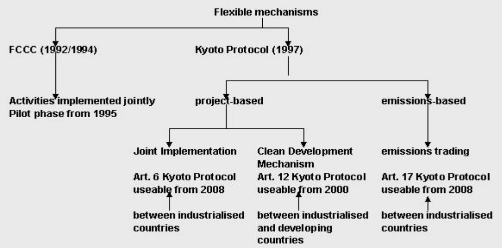
on the occasion of the workshop

CTI Capacity Building Seminar „Climate Technology and Energy Efficiency – Challenges and Chances for Climate Technology.

September, 22th 2003
Tutzing

Slide 1

Flexible Mechanisms



Slide 2

Different levels of action

- IET – emissions trading between Parties of the Kyoto – Protocol (Art. 17 KP)
  - NL ERUPT and NL CERUPT
  - activities by Austria, Denmark and France
  indirect effects on the NAP
- ET Directive and linking Directive – use of ERU's and CER's to fulfill the reqirements under the ET Directive

Slide 3

Reservations

- Reservations by the Commission
  - environmental integrity – lowering the incentives for domestic action
  - market distortions
- Reservations by the environmental NGO's
  - Linkage could undermine the incentive for domestic action
  - quality of ERU's and CER's („Golden Standard" based mainly on reneweables)

Slide 4

Support

- German industry is interested to use JI and CDM to fulfill ist requirements under the ET-Directive
- Experiences during the AIJ Phase
- Expectations that JI and CDM could lower the costs dramatically
- No additional conditions: Kyoto Protocol and Marrakesh Accords

Slide 5

Contents of the Linking Directive

- Making ERU's and CER's the European currency „allowance" – the conversion of JI and CDM into allowances
- Exclusion of credits: nuclear, sinks (LULUCF) – whats about „large hydro"?
- Quanitative ceiling? 6 % of the total quantity of allowances allocatedby the Member States under the ET-Directive – maximum level of for example 8 % ? – the supplementarity issue
- Commission: The linking Directive could lower the Compliance costs by annually 500 Mio. €

Slide 6

Global GHG Market

- By the end of 2002, approximately 150 million t CO_2 equivalents had been traded
- Since 2001, the market for GHG certificates has received a significant boost
- UK and DK allowances since October 2001
- The Marrakesh Accords have enabled countries to sell CERs, ERUs and AAUs
- Since December 2002 (Common Position of the Council) and July 2003 (Compromise between Council, Paliament and Commission), interest in EU allowances is incresing
- Ratification of the Kyoto Protocol by Russia will lead to a speedy development in the European market

Slide 7

The EU burden sharing (Art. 4 KP)

Member State	Per-capita emissions in 1990 (in t)	Burden sharing 2008 – 2012	Development 1990 - 2000	Distance to target
Belgium	13.6	- 7.5 %	+ 6.2 %	- 13.7 %
Denmark	13.5	- 21.0 %	- 1.2 %	- 19.8 %
Germany	15.1	- 21.0 %	- 18.9 %	- 2.1 %
France	9.5	0.0 %	- 1.7 %	+ 1.7 %
Great Britain	12.6	- 12.5 %	- 12.6 %	+ 0.1 %
Greece	10.2	+ 25.0 %	+ 23.8 %	+ 1.2 %
Ireland	15.2	+ 13.0 %	+ 24.0 %	- 11.0 %
Italy	9.1	- 6.5 %	+ 4.1 %	- 10.6 %
Luxembourg	36.9	- 28.0 %	- 45.1 %	+ 17.1 %
Netherlands	14.0	- 6.0 %	+ 3.1 %	- 9.1 %
Austria		- 13.0 %	+ 3.1 %	- 16.1 %
Portugal	6.3	+ 27.0 %	+ 30.1 %	- 3.1 %
Sweden	8.1	+ 4.0 %	+ 1.7 %	+ 2.3 %
Spain	7.8	+ 15.0 %	+ 34.8 %	- 19.8 %
EU total	11.4	- 8.0 %	- 3.5 %	- 4.5 %

Slide 8

Potential Buyers – Potential Sellers

EU-Member State	GHG emissions 1990	GHG emissions 2000	Target	Distance to target
Belgium	143.1	151.9	132.4	- 19.5
Denmark	69.4	68.5	54.8	- 13.7
Germany	1222.8	991.4	966.0	- 25.4
Finland	77.1	74.0	77.1	+ 3.1
France	551.8	542.3	551.8	+ 9.5
Greece	104.8	129.7	131.0	+ 1.3
Ireland	53.4	66.3	60.4	- 5.9
Italy	522.1	543.5	488.2	- 55.3
Luxembourg	10.8	5.9	7.8	+ 1.9
Austria	77.4	79.8	67.3	- 12.5
Portugal	65.1	84.7	82.7	- 2.0
Sweden	70.6	69.4	73.4	+ 4.0
Spain	286.4	386.0	329.4	- 56.6
United Kingdom	742.5	649.1	649.7	+ 0.6
Netherlands	210.3	216.9	197.7	- 19.2

Slide 9

Prices

Commodity Type	Vintage Year	Price per ton CO_{2equiv}.
Verified Emission Reductions („VERs“)		
Annex-I VERs	1991 - 2007	\$ 0.60 - \$ 1.50
Annex-I VERs (JI)	2008 - 2012	\$ 1.65 - \$ 3.00
Non-Annex-I VERs (CDM)	2000 - 2001	\$ 1.15 - \$ 4.83
NL ERUPT	2008 - 2012	\$ 4.40 - \$ 7.99
Compliance Tools		
CERs	2000 - 2012	\$ 2.00 - \$ 6.00
ERUs	2008 - 2012	€ 4.00 - € 5.00
AAUs	2008 - 2012	\$ 7.00
EU allowances	2005 - 2012	€ 4.50
DK allowances	2001 - 2002	\$ 0.40 - \$ 4.50
UK allowances	2002	\$ 12.80
UK allowances	2003	\$ 9.60

Slide 10

Market potential

- Forecasts for 2010: up to 200 billion $
- Liquidity depends on
  - fungibility between the various compliance tools or systems (EU, IET, national systems, e.g. in Japan)
  - overall conditions with regard to the emission trading systems (US, quality of emission limits for operators in the EU system, options for the use of ERUs and CERs)
- Potential investment volumes are enormous – in Russia alone, rehabilitation requirement over the next decade estimated at several hundred billion Euros

Slide 11

Present obstacles

- Poor information among potential market participants
- Lack of infrastructure
- Transaction costs still very high
- Uncertainty with regard to recognition by the EB
- Overall conditions are at the moment unfavourable
  - National Allocation Plans will not be submitted until 31 March 2004
  - National implementation underway – legal and institutional framework still largely unclear
- EU – framework for inclusion of ERUs and CERs still under discussion (Council and Parliament) – Question of restrictions (project-based and quantitative)

Slide 12

Germany‘s position

- Domestic action has priority
- Use of Kyoto Mechanisms is of supplementary nature
- Intensive participation in the AIJ pilot phase
- Great interest within the German business community in the use of JI and CDM, but no acceptance of any requirements that go beyond those adopted in Marrakesh – No acceptance of „Golden Standards“
- Federal Government is interested in ambitious projects, particularly in the areas of improving energy efficiency and use of renewable energies – The issue of sinks is viewed with a rather sceptical eye

Slide 13

Germany‘s position

- Transaction costs (still?) very high, particularly for small and medium-sized projects
- Potential investors caught between Skylla and Charybdis: On the one hand, early participation in a new market seems advisable; on the other, the overall framework and resulting opportunities are not yet fully recognisable
- Huge lacks of information
- Financial service providers (banking and insurance community) still reluctant to get involved
- Environmental NGOs are very hesitant
- Overall expectation is for slow development of the market!

Slide 14

Interest in the national system

- Current activities include

    Project-based mechanisms (JI, CDM, domestic offset projects)

    Quality assurance within the national system

    Verification of corporate measures to reduce greenhouse gas emissions

Slide 15

Possible demand in Germany

- Establishing buffers for various distances to target for the period 2008 – 2012
- Substitution for phase out of nuclear energy
- Use of ERUs and CERs for a national emission reserve within the German NAP
- Climate-neutral travel, including flights – Opportunities for developing new products and for product differentiation
- Support for foreign trade activities
- In the longer term: Contribution towards achieving long-term climate protection goals - D: 40 % reduction of greenhouse gas emissions by 2020 compared to 1990 levels

Slide 16

Enabling strategy – providing tools

Guidelines for the assessment of JI and CDM projects

- Introduction
- Volume I: Brief check for project ideas, including guidelines for brief documentation
- Volume II: Guidelines for creating project documentation (Project Design Document – PDD -)
- Volume III: Annex including aid (glossary, definitions, emission factors, methodical advice)
- Online version under www.bmu.de: brief check, PDD, Excel calculations of emission reductions in a dialogue format

Practical test sucessful – Instrument already in use

Slide 17

Thank you for your attention!

For more information see: www.bmu.de

Slide 18

Clean Development Mechanism in Central Asia

Dr. Liliya V. Zavyalova
Technology Transfer Agency, Uzbekistan

1 Briefly about Central Asia

The countries of Central Asia (CA) are situated in a basin of the Aral Sea. The region is sadly known due to ecological disaster caused by catastrophic drying up of the Aral Sea. The CA countries are distinguished by natural and climatic conditions, national traditions, population etc. (table 1). But, for all that, there is the Soviet past which united them in spite of existing differences in the chosen models of economical development. The countries encounter often the same problems, especially in energy sector. Modernization of the national energy systems inherited from the past requires investments on a scale that countries cannot afford. In this respect, there is need for transfer of technologies and funds from industrialized countries to the region and the CDM could catalyze such a development process. It is important to notice that the energy sector is the biggest domestic source of GHG emissions in the region with Kazakhstan and Uzbekistan emitting 83 % of total CO_2 emissions (46 and 37 % respectively).

Table 1: Selected indicators for 1997

	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Population, mio	15.80	4.64	6.02	4.66	23.67
Total square, thousand km^2	2719.40	198.50	143.00	488.10	447.70
CO_2 emissions, Mt*	126.65	6.44	5.73	31.39	102.12
CO_2/pop., tCO_2/capita	8.02	1.39	0.95	6.47	4.31
CO_2/GDP, $kgCO_2$/90 US$	5.23	3.81	3.11	6.69	5.02

*CO_2 emissions from fuel combustion only

2 Climate policy in the countries of Central Asia

All the countries of Central Asia are the parties of the UN Framework Convention on Climate Change (UNFCCC). Kyrgyzstan, Turkmenistan and Uzbekistan ratified the Kyoto Protocol (KP). The CA countries were not included in Annex 1 like Russia and Ukraine and have not the commitments under the Kyoto Protocol. Four of them are CDM countries. Kazakhstan has applied for inclusion in the Annex 1 list of the UNFCCC. It was decided at COP-7 that the Annex 1 status would become valid provided that the country ratifies the KP and that the Protocol will enter into force. Kazakhstan is preparing for hosting JI projects and has already confirmed some investments.

Table 2: Ratification of the UNFCCC and the Kyoto Protocol

Country	UNFCCC	Kyoto Protocol
Kazakhstan	17/05/95	12/03/99 (signing)
Kyrgyzstan	25/05/00	13/05/03 (ac)
Tajikistan	07/01/98	
Turkmenistan	05/09/95 (ac)	11/01/99
Uzbekistan	20/06/93 (ac)	12/10/99

3 Capacity building activity

The CA countries were successful in implementing the national communications under the UNFCCC. The national inventories of GHG emissions have been conducted and policy and measures for GHG emission reductions in the different economy sectors were estimated. The process of implementing the national communications can be considered an important exercise in the various governmental and non-governmental organizations.

Table 3: Climate projects implemented in CA countries

Donor	Projects	Country
GEF/UNDP GEF/UNEP	First National Communication (1998- 2003)	All countries
World Bank	UzNSS (1998) KazNSS (2003)	Uzbekistan, Kazakhstan
Switzerland	UzCDM (2000)	Uzbekistan
GEF/UNDP	Removing barriers in district heating sector (1999)	Uzbekistan

Uzbekistan is the only country that implemented the CDM studies. National CDM strategy study (UzNSS) and case-study (UzCDM) aimed at providing a better understanding of the CDM in Uzbekistan and its implication as a market-oriented instrument. The studies assessed the potential of Uzbekistan's portfolio in the global carbon market. Moreover, they are addressed to other questions, such as the function and tasks of the national CDM institution.

A considerable influence of promoting the UNFCCC ideas in Central Asia has been made by the USAID program "Environmental Policies and Institutions for Central Asia" (EPIC) that acted in 1998-2000. Among other things, the program was aimed at conducting training courses and developing a Manual for Project Development: GHG Emission Reduction.

Kazakhstan and Uzbekistan are included in Caspian Basin GHG Training Program (CTP) funded by Canadian International Development Agency (CEDA). The CTP has provided practical training in the setting of specific CDM projects. The program will include the actual preparation and implementation of small CDM projects and development of the substantive CDM projects for submission of IFI financing.

No doubt, capacity building activity in the region plays an increasingly important role in CDM progress. But, unfortunately, there is no good continuity among the programs. It concerns both training materials and a team of national experts. It is a rather typical case when activity of a new program duplicates partly its previous one. The other weak point of capacity building programs is the problem connected with a quality of translation. The great majority of local experts do not know English and inaccurate translation brings additional confusion in understanding of CDM training materials which are fairly complicated themselves. Every now and then, it is difficult to grasp the essence due to corruption of the text even for CDM specialists.

A general lack of awareness may cause in the countries to not fully exploit their potential for CDM projects. Latin America is making the biggest strides in CDM: the region has been gaining experience in actual projects and has raised awareness amongst local people. They are successful in attracting CDM investors. The countries has a huge potential seems to be lagging behind, suffering from a general lack of awareness by both government and business.

4 What could the CA countries offer at CDM carbon market?

National inventory of GHG emissions and sinks would help to estimate, for the first time, who and in what quantity releases GHG and what steps should be taken to reduce such emissions. Special assessments of potential on GHG emissions reduction have not yet been fulfilled by Kyrgyzstan, Tajikistan, and Turkmenistan. These calculations are supposed to be done within the development of national action plans in the near future.

Existing assessments show that energy efficiency and energy saving measures in the CIS countries allow to reduce total emissions of CO_2 by approximately 10 %. Then, it could be reduced by Kyrgyzstan – 640 thousands, Tajikistan – 573 thousands and Turkmenistan 3 millions of CO_2 from fuel combustion only.

In Uzbekistan, the assessments of a potential for CDM projects were carried out in the "Study of Uzbekistan Strategy for GHG Emission Reduction" (UzNSS) in 1998; Switzerland "Uzbekistan: Capacity Building on Clean Development Mechanism" in 2000; and GEF/UNDP "Initial National Communication of Uzbekistan under the UN Framework Convention on Climate Change, Phase 2" in 2001.

Despite discrepancies in assessments caused by differences in applied approaches, the main conclusion of all reports can be - Uzbekistan has a remarkable potential for GHG abatement. Implementation of proposed actions by 2010 can reduce CO_2 emissions to 16.4 million tons (pessimistic scenarios) or 33.5 million tons (optimistic scenarios). Specific cost per 1 ton of CO_2 abatement varies from 0.8 to 21 USD.

5 Favorable areas for CDM projects in the CA countries

According to the national communications, the Central Asia region has a promising potential of GHG emissions reduction in developing renewable resources and implementing energy efficiency measures. There are a lot of plans developed for different economy sectors which include energy efficiency measures but no finance to carry them out. Firstly, it concerns generation, transmission and consumption of electricity and heat. Introduction of a CDM component in conventional investment projects can make them more cost-effective and attractive to investors.

Central Asia having great resources of renewable energy is behind the most of developed countries in using it. Theoretically, the national governments are ready to back development of renewable energy but, in reality, the support is too small. The situation can be explained by both the financial problems of transition period and a weak institutional and legal base. Potential investors are not interested in putting money in RE projects either. But, in the case of a CDM project financial feasibility of the project can be increased by the carbon proceeds.

Taking into consideration, that small-scale CDM projects are favorable in early CDM period, renewable energy and energy efficiency is the best realm for the CDM projects in Central Asia. Suggested areas for CDM projects are:

Renewable energy:

- Solar energy for rural communities and remote areas
- Small hydropower
- Solid waste management

EE projects:

- District heating
- Energy efficiency at energy production side
- Energy efficiency at demand side
- Energy efficiency at fuel extraction and transportation side

In addition, above mentioned GHG abatement projects have tremendous social and environmental effects and that is an important condition for financing via international finance institutions (EBRD, UNDP, ADB, World Bank).

6 What is the driving force for CDM projects in Central Asia?

Firstly, the countries can receive additional income from GHG emissions selling. The expert assessments have indicated that five-year proceeds from selling CERUs (Euro 3-5 /ton CO_2-eq.) could cover investment costs from 10 % to 100 % depending on the CDM project type. The following figures were obtained in estimating the proceeds of the CDM projects in Uzbekistan. Table 4 shows that, in case of EE project, sufficient carbon income will be only received under US$ 10 per ton of CO_2. But none the less, the carbon income will increase economical benefits of these projects.

Table 4: Carbon income of implemented and proposed CDM projects in Uzbekistan

	In percentage to investment costs			Crediting
	US$ 3	US$ 5	US$ 10	time
Andijan District Heating Project	4	6	12	9 (*2004-2012*)
Andijan District Heating Project	6	10	20	10
Construction of Small Hydropower Stations in Samarkand Oblast	8	13	26	10
Reconstruction of Small Hydropower Station in Fergana Valley	14	23	46	10

Second, the CDM is a major incentive for stimulating technology transfer. Participation in CDM projects is a good chance of renovating out-of-date equipments and introducing new technologies for local enterprises in the CA countries. An appearance of new technologies will make domestic producers think of modernization of their capacities if they want to be competitive at market. Besides, CA countries will able to create opportunities to alleviate poverty through CDM projects that use sustainable technologies.

Finally, CDM investments will leverage private capital and direct carbon finance to projects that benefit local communities and enterprises. CDM will encourage investments in renewable energy to a greater extent than emissions trading will do. Besides direct benefits, a CDM project gives a number of secondary advantages for the CA countries. One of them is a grant and consultations provided by investor for developing FS. Moreover, the process of CDM project implementation can be considered as building local capacity to benefit from carbon finance and to attract investors. It is important to stress that all CDM projects should be aimed at advancing sustainable development while reducing GHG emissions.

7 Could the CA countries be competitive at a carbon market?

The main reason for a favorable view for host countries is their policy concerning CDM. In this regard, particularly important is to know how forthcoming a host country is in approving CDM projects. The overall investment climate of a CDM country comes as second considerable factor, and techno-economic potential as third. Other important criteria are whether host countries have adequate experience with and/or knowledge about CDM projects. According to Point Carbon research, the CER revenue is rarely the deciding factor for a project developer to invest in a CDM project. The overall economic and financial feasibility of the project is much more important.

Ranking of the potential CDM/JI countries is based on four main indicators used by Norwegian Point Carbon Institute under assessment of the potential for JI projects in Central and Eastern Europe – (1) potential CDM/JI project pipeline; (2) political and institutional environment for CDM/JI; (3) general investment climate, and (4) past experience with AIJ and CDM projects.

A portfolio of climate mitigation projects was elaborated in Kazakhstan and Uzbekistan. Tajikistan and Turkmenistan have a list of the measures for climate mitigation. National action plan will be worked out in Kyrgyzstan next year. Special climate body responsible for carrying out climate mitigation projects was only established in Kazakhstan. It is planned that national CDM center will be set up in Uzbekistan at the end of coming year. There are no special institutional arrangements in the other CA countries yet.

A share of direct foreign investments is not very big in national economies of the CA region. This is a clear indication of the high risks that potential investors face in these countries. Other measures of investment risks are the credit rating and other investment indicators by rating organizations. The CA countries are not included in the list of the countries rated by Moody's, Fitch and the world competitiveness yearbook of IMD in contrast e.g. Russia and the Baltic countries. These indicate that the potential investment risks are high.

A downside for the Central Asia's countries is the little experience with AIJ/CDM projects. Actually, only Kazakhstan and Uzbekistan have an experience with emission reduction projects.

Preliminary assessments point out that Kazakhstan is more attractive for JI projects and Uzbekistan for CDM projects. Kazakhstan scores high because of its large projects potential, especially in energy sector, its more favorable investment climate compared with other CA countries and their fast growing economy. Another advantage of Kazakhstan is its favorable institutional capacity. Uzbekistan has a big potential for CDM projects but lack of institutional arrangements and high investment risks make this country less attractive for CDM investors, especially private ones as yet.

8 Market for CDM in Central Asia

The current scenarios of global carbon market show that demand for CERs will be limited. But the same time among approved JI and CDM projects (planned and ongoing), the last consist of 70 % (8 and 18 respectively).

The existed average carbon price at US$ 3.5 (range from 2 to 5 US$) is not favorable for host countries yet. But, nevertheless, even in this case, the revenues from methane capture CDM project can cover investment costs during 10 years crediting time.

The potential investors for Central Asia could be carbon funds of the World Bank (PCF, CDCF); the Netherlands carbon funds; CDM/JI programs and carbon funds in Austria, Germany, Canada, Japan, Switzerland and etc.

9 What do the CA countries need for being partner in CDM project?

It should be emphasized that there are several conditions being obligatory for participating in the CDM. Parties are required to establish Designated Focal Point, develop guidelines and procedures for approving CDM projects. These first steps should be done as soon as possible if a country wanted to be successful in the CDM.

According to the Marrakech Accords, a party should set up national authority which must:

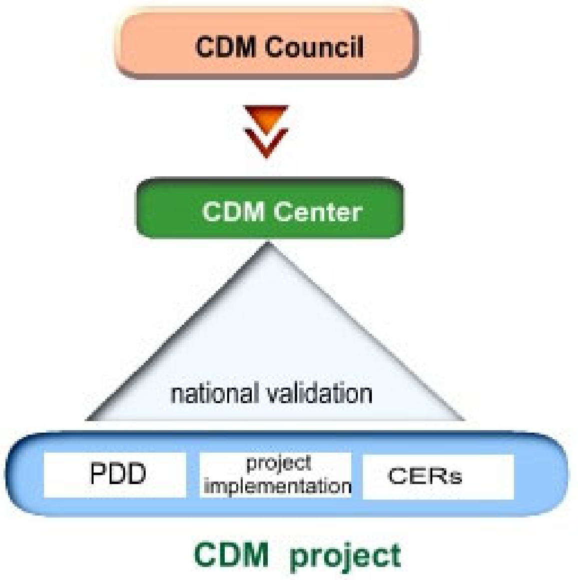
- confirm that the host country voluntarily participates in CDM through the project;
- state that the project promotes the host country's sustainable development;
- make sure that the environmental effects have been sufficiently taken into account.

9.1 Institutional capacity

A transparent and stable institutional set-up would generate international demand for CDM project implementations. It would be sensible if national authority consist of two bodies: a national CDM Council and a CDM Center (figure 1). The CDM Council will be build up to coordinate the whole work and deal with the development of national policies, strategies and guidelines regarding CDM activities. The CDM center being secretariat of the CDM Council would be a technical implementing agency.

The members of the CDM Council could be representatives from key ministries, industry, banks, regional government bodies, NGOs and individual experts.

Figure 1: Scheme of national authorities



The CDM Council should be responsible for:

- coordinating and monitoring CDM activity in the country
- approving national CDM strategy, guidelines and procedures
- issuing national CERUs
- cooperating with CDM Executive Board and other international CDM bodies and funds
- signing Memorandum of Understanding with potential investors

The CDM center makes publicity available information on proposed CDM projects, in need of funding and on investor seeking opportunity in order to assist in arranging funding of CDM project.

Besides, the CDM Center would fulfill the following:

- building up CDM projects pipeline
- developing national CDM guidelines, procedures including CDM legislation
- helping in seeking potential CDM investors for local partners
- being a broker between potential CDM project partners
- developing and maintaining CDM registry and CDM project database
- consulting national organizations and foreign investors
- helping in arranging agreements with individual investors
- designing standardized baselines
- outreaching the CDM inside the country
- monitoring of CDM project performances.

No regulation or institutions have been set up by the countries to accommodate CDM project investments in Central Asia. However, lack of regulation and institutions will hamper any CDM initiatives.

9.2 Human resources

In reality, local experts nominated by their organizations have a lot of official duties besides CDM extra work. In the issue, these people have insufficient knowledge on the CDM and related issues. Apparently, host country technical and climate experts should be involved in designing CDM projects. It includes preliminary technical and financial analyses, setting baseline, reporting, monitoring and verification. This will be the fastest way to build up an appropriate expert capacity in the countries.

10 What else do the CA countries need to do?

Regional or national CDM funds could be a good push for promoting CDM projects in the CA countries.

The CDM fund could encourage attraction of foreign investors due to reducing risks from failure of the project and lowering transaction costs.

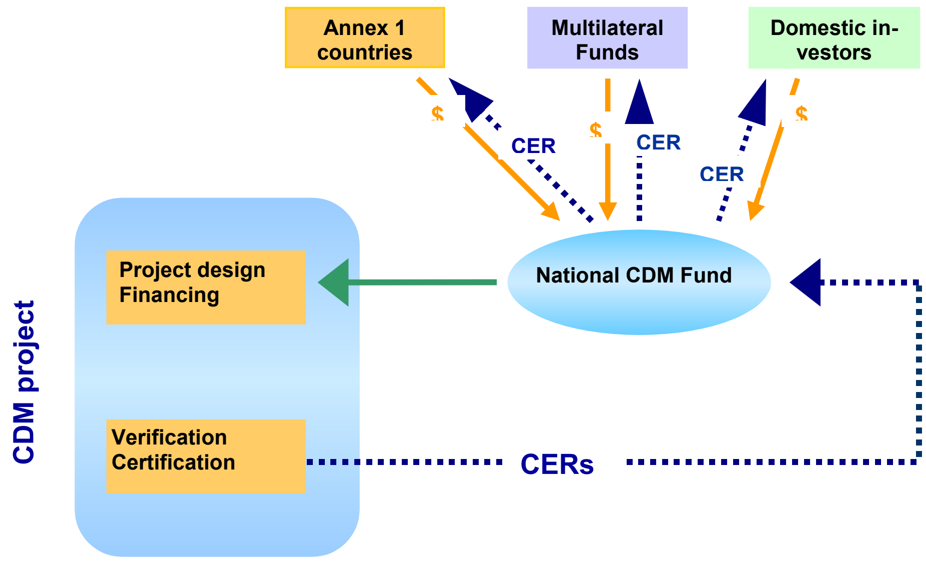
Participants of the CDM fund can be domestic and foreign banks, international financial institutes, foreign private companies, domestic both state and private companies and etc (see figure 2 below). The existence of the fund allows to involve a wide circle of participants in the CDM process. It would a real chance to invest profitably for big domestic private banks, companies and receive CDM loan in case of small and middle private companies.

There are some options of setting up this fund:

- to be established and administered by domestic private or state bank on behalf of a government
- to be set up by national environmental bodies or/and state energy fuel companies
- to be financed by one of international financial institutes, programs. This fund might be also administrated by domestic private bank.

It should be noticed that international financial institutes (ADB, EBRR, EBRD, UNDP) have a good experience in implementing programs on micro-crediting through local banks. In principal, these approaches could be applied in the case of national CDM fund.

Figure 2: Scheme of a national CDM fund



11 Barriers

A number of barriers for implementing CDM projects can be found in every CA country. One of the earnest barriers for promoting CDM projects is lack of local skilled specialists being familiarized with methodologies for preparing CDM project note and project design document (PDD). It is clear that elaborated claim has the most chance to win at market of CDM projects where supply exceeds demand. But, it requires special CDM knowledge from local experts no having access to methodological literature. In reality, they use only translations in which are not always reflected the point of the matter.

The CDM represents a new realm of business and in this first phase of implementing the CDM there is a lack of institutional and legal capacities in the CA countries. Apparently, it will take some times and efforts to set national CDM legislation and regulation

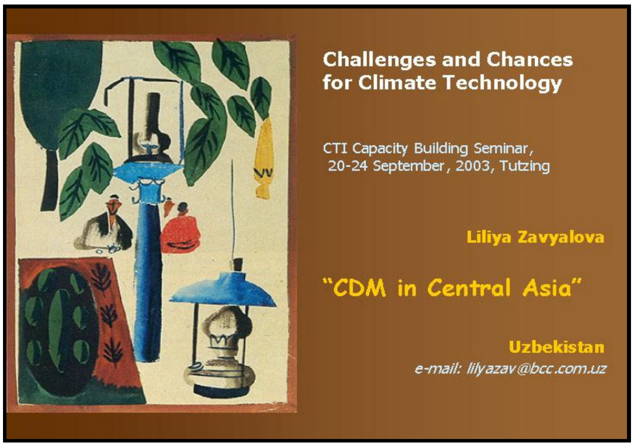
Investors will be more interested in implementing a CDM project in the country which has experience in carrying out AJI or CDM project. If a similar precedent had not been yet, investment risk would be considerably increased.

12 Recommendations

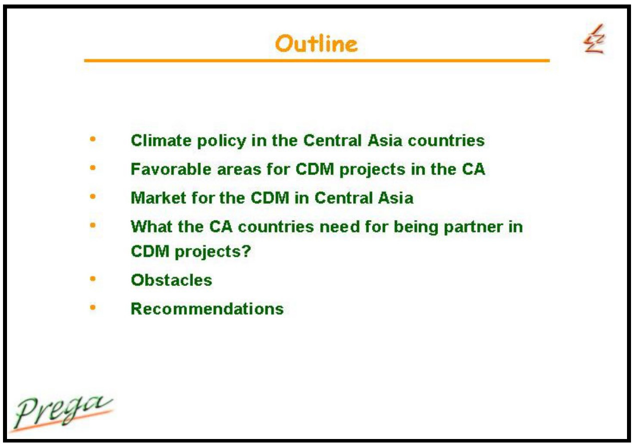
It is obvious that competition will be quite severe at an early stage of forming the CDM market. Judging by all forecasts, supply may outdistance demand. To be able compete in the rising market, the following steps should be done: to

- create a national authority backed at a governmental level
- form institutional and legal base for implementing CDM projects
- develop guidelines for designing CDM project note and PDD
- work out a pipeline of CDM projects in an advanced development stage
- create a team of national experts being be able to design and carry out appraisal of CDM projects;
- seek and develop contacts with potential partners (seminars, the Internet) for CDM projects
- set up national CDM fund with involving domestic private capital.

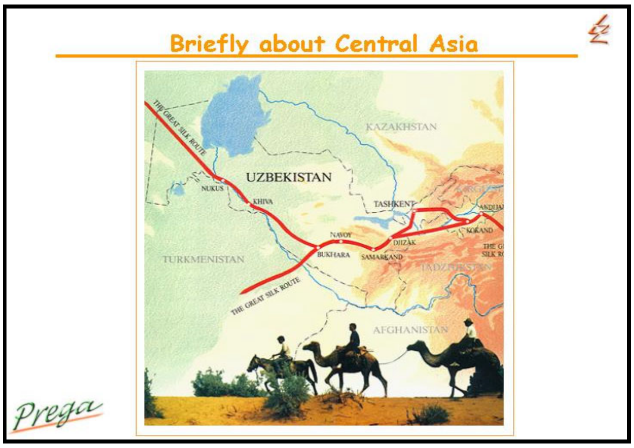
These recommendations can be used as a base for forming national CDM infrastructure. But, it should be stressed that only national CDM authorities having strong governmental support would be successful in implementing CDM projects.



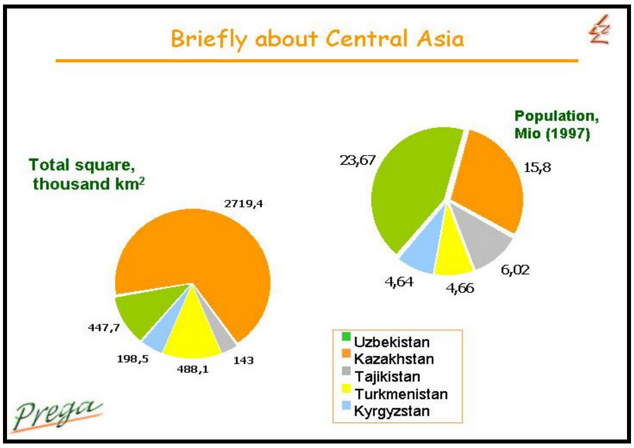
Slide 1



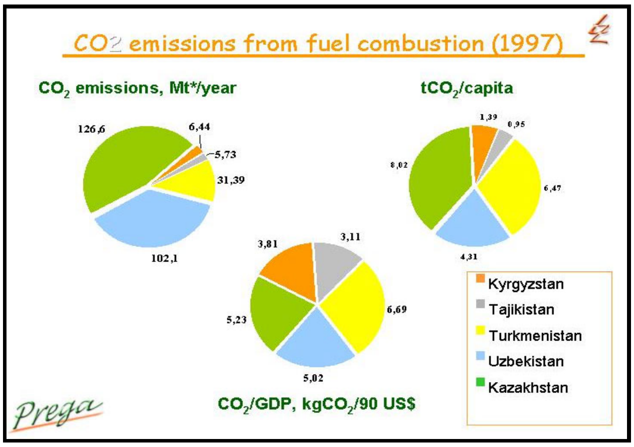
Slide 2



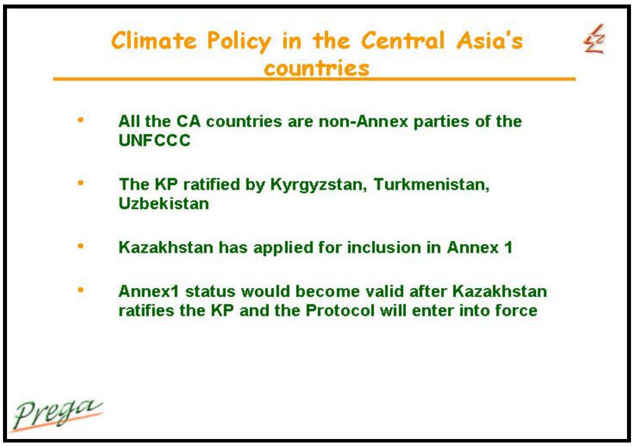
Slide 3



Slide 4

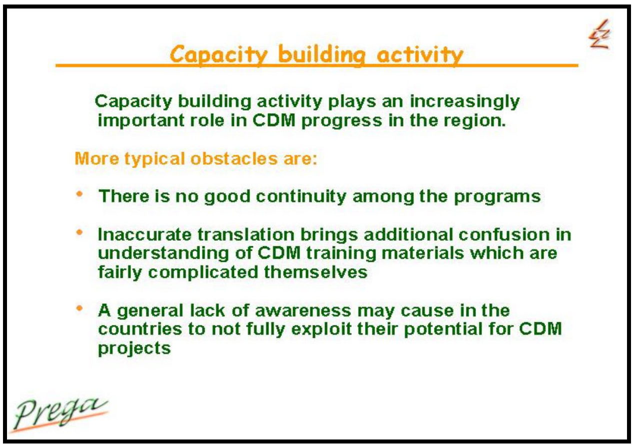


Slide 5

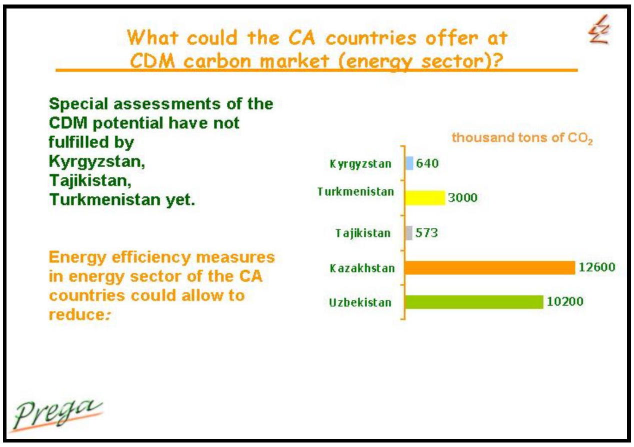


Slide 6

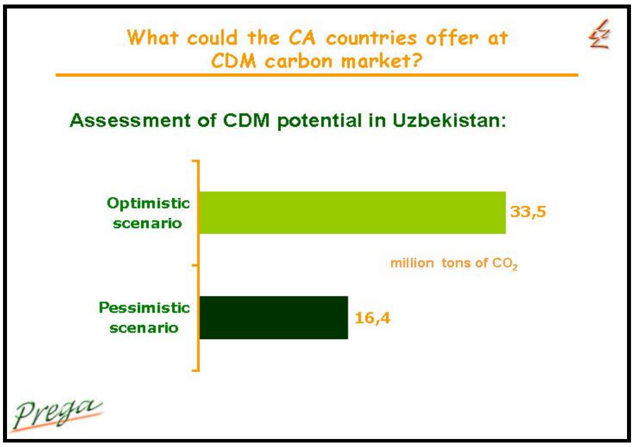
Slide 7



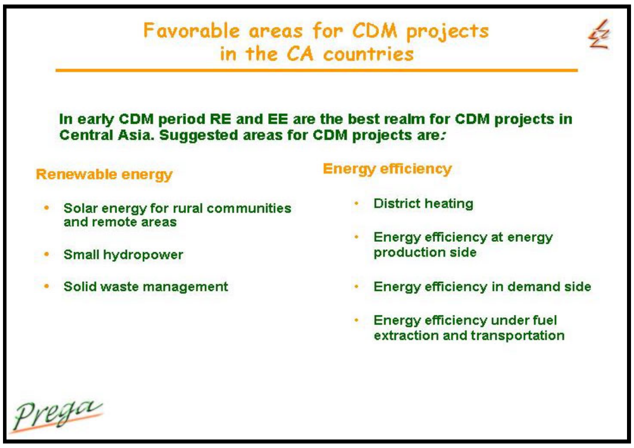
Slide 8



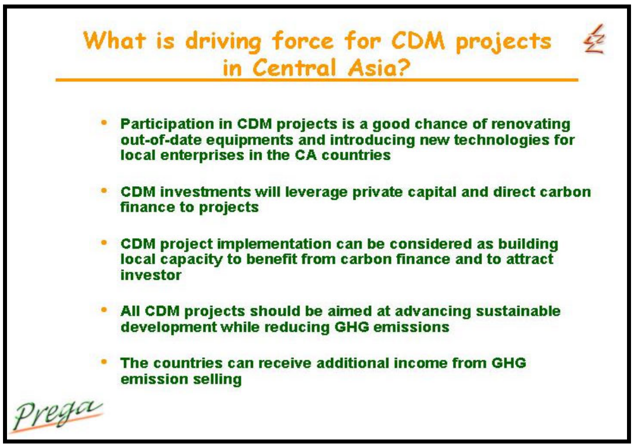
Slide 9



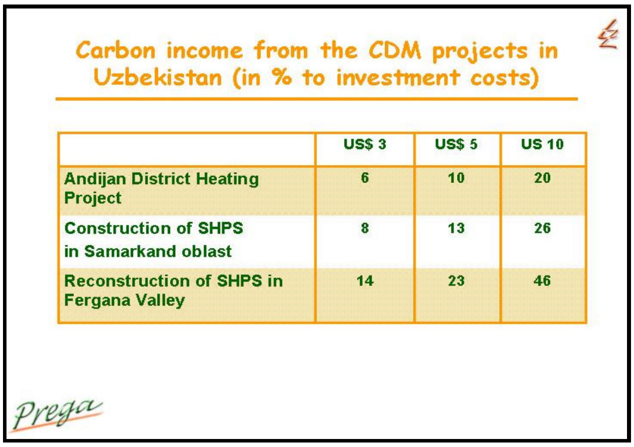
Slide 10



Slide 11

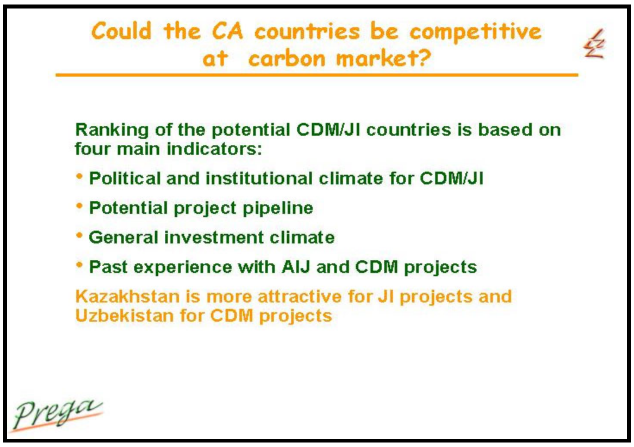


Slide 12

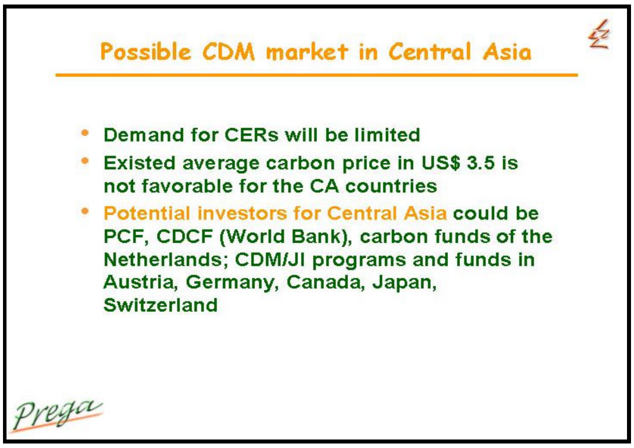


	US$ 3	US$ 5	US 10
Andijan District Heating Project	6	10	20
Construction of SHPS in Samarkand oblast	8	13	26
Reconstruction of SHPS in Fergana Valley	14	23	46

Slide 13



Slide 14



Slide 15

Slide 16

Scheme of national CDM authority

Slide 17

What the CA countries needs for being partner in CDM project? Institutional Capacity (I)

The CDM Council should be responsible for:

- coordinating and monitoring CDM activity in the country
- approving national CDM strategy, guidelines and procedures
- issuing national CERs
- cooperating with CDM Executive Board and others international CDM bodies and funds
- signing Memorandum of Understanding with potential investors

Slide 18

What the CA countries needs for being partner in CDM project? Institutional Capacity (II)

CDM Center being Secretariat for the CDM Council would fulfill the following:

- building up CDM project pipeline
- developing national CDM guidelines, procedures, including CDM legislation
- helping in seeking potential CDM investors for local partners
- being a broker between potential CDM project partners
- developing and maintaining CDM registry and CDM project database

Slide 19

What the CA countries needs for being partner in CDM project? Institutional Capacity (III)

- consulting service for national organizations and foreign investors
- helping in arranging agreements with individual investors
- designing standardized baselines
- outreaching CDM inside the country
- monitoring CDM performances

No regulation or institutions have been set up by the CA counties to accommodate CDM project investments yet.

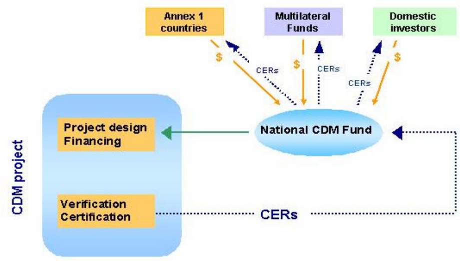
Slide 20

What the CA countries needs for being partner in CDM project? Human Resources

- Host country technical and climate experts should be involved in designing CDM projects.
- This will be the fastest way to build up an appropriate expert capacity in the countries.
- In reality, local experts nominated by their organizations have a lot of official duties besides CDM extra work.

Slide 21

What else the CA countries needs to do?



Slide 22

Obstacles under CDM project implementation

A number of barriers for implementing CDM projects can be found in every the CA countries.
The most important of them are:

- ✓ misunderstanding by policy makers that this direction is significance and promising
- ✓ lack of institutional and legal capacities for implementing CDM projects
- ✓ lack of local skilled specialists being familiarized with methodologies for preparing CDM projects
- ✓ high investment risk

Slide 23

Recommendations

To be able compete in the rising market following steps should be done:

- to create a national authority backed at a governmental level
- to form institutional and legal base for implementing CDM projects
- to develop guidelines for designing CDM project note and PDD

Slide 24

Slide 25

Slide 26

Slide 27

Creating a National CDM System in Georgia

Paata Janelidze
National Agency on Climate Change, Tbilisi

Climate change mitigation is one of the main priorities of environmental policy of Georgia. Implementation of GHG abatement policy through investment projects facilitate to sustainable development of the National Economy. CDM gives opportunity to achieve sustainable development goals.

Georgia is eligible for CDM because it has ratified Kyoto protocol and designated National Authority on CDM – National Agency on Climate Change (NACC) with the Ministry of Environment and Natural Resources Protection.

1 Role of Designated National Authority in creating a national CDM system

The Designated National Authority (DNA) will play a significant role in creating a national CDM system. Its duties and responsibilities according to the regulations, being at present under discussion, will include:

- Creation of legislative basis for launching of CDM;
- Development of a national policy and regulatory framework to promote CDM transactions;
- Building in-country capacity necessary for comprehensive participation of Georgia in CDM;
- Facilitating sustainable development of economy by means of launching of CDM in Georgia;
- CDM Project Approval and Registration;
- Assessment of Project Verification Reports;
- Together with relevant Governmental Entity (is to be established) participation in certification process at the national level;
- Governance and technical management of the sale and transfer of CERs;
- Creation of CERs and related databases;
- Project Development;
- Facilitating training of national experts for participation in Expert Groups and Panels;
- Information exchange, marketing and promotion.

As the DNA is responsible for regulation, it should interact with the other government agencies and project developers throughout the project identification, development and approval process. Key roles in relation to the project development process include (a) Preliminary advice on likely project suitability; (b) Develop clear, uncomplicated and transparent procedures for project approval; (c) Ensure that the CDM project goes through the relevant international processes and has audited baseline and verification arrangements; (d) Set clear and transparent sustainable development criteria for CDM projects; (e) Equitable distribution of projects in different regions of the country etc.

2 Capacity needs for creation of CDM system in Georgia

Since CDM activities at the international level have been launched recently (after COP-7), naturally Georgia has not established yet necessary institutional arrangements and capacity for CDM operation. Therefore at the initial stage focus has to be done on creation of National CDM System and capacity building for it, which will include:

- Interagency consultation process on CDM strategy, including a national awareness raising campaign targeting high-level decision makers and parliamentarians for the formulation of strategies and programs in climate change policy;
- Action plan on setting up the CDM institutional infrastructure including: (a) timetable, division of responsibilities of various sectoral ministries, (b) recommendations on the development of an internal infrastructure to handle CDM within sectoral ministries; (c) recommendations on main criteria for selecting and approving CDM projects; (d) recommendations on baselines issues etc.;
- Creation of a core group of local experts who will be able to identify CDM projects, prepare the project design document, develop and validate project baselines, and carry out verification and monitoring of projects.

3 Draft CDM project cycle in Georgia

3.1 Problems related to development CDM Projects

Georgia is very interested in participation in CDM. Importance of participation in CDM is emphasized in the recently adopted Economy Development and Poverty Reduction Program of Georgia. It is said in chapter Strategic Priorities that "in conformity with the requirements of the Kyoto Protocol, efforts will be made to establish the Clean Development Mechanism". However there are barriers in the country hampering implementation CDM projects. Among them:

- Absence of national plans and indicators for sustainable development of economy;
- Absence of assessments of the national CDM potential;
- Absence of strong and permanent system for national inventory.

Started in June 2003 UNDP/GEF financed a regional project "Capacity Building for Improving the Quality of Greenhouse Gas Inventories (Europe/CIS region)" which will help participating countries and Georgia among them, to reduce uncertainties and improve the quality of inventories for subsequent National Communications by strengthening institutional capacity to prepare inventories, improving Emission Factors in key source categories and establishing a trained, sustainable inventory team. This, in turn, will allow countries to improve national strategies for reducing greenhouse gas emissions.

Experience of CDM process shows that there are no Designated Operational Entities (DOE) in CEE region, number of high-level experts in CDM is limited. Development of CDM Project Design Document (PDD) with assistance of experts from developed countries, which are not necessarily familiar with the circumstances of specific countries and therefore need more time, will lead to increase of project costs. The same can be said regarding western DOE.

Another critical issue is determination and approval of baselines. Project developers can use approved (by Executive Board) baseline methodologies, but for the time being there is only 1 baseline methodology approved by the Meth Panel on baseline and monitoring methodologies of the EB out of 14 proposed (July 2003). Not approved baseline methodologies need changes or they are rejected. If the situation will not be changed, CDM project developers will face big problems regarding baselines.

3.2 Procedure for approval of CDM projects at national level

NACC as DNA has prepared draft of Procedure for Approval of CDM Projects at National level. This procedure in its turn consists of two stages. At the first stage, which is not obligatory but reduces risk of unnecessary spending, CDM criteria will be assessed at the Project Idea Note (PIN) level after that project owners can develop Project Design Document. At the second stage project will be discussed at the State Commission on Sustainable Development, which determines also the share of CERs to be transferred to the investor. After positive decision of the Commission project owners can apply for its approval at the International level. DNA is authorized by the Government to sign all the necessary documents (letter on voluntary participation in CDM, that project assists in achieving sustainable development) on the basis of Decision of the State Commission on Sustainable Development. CDM project approval charts are presented on figures 1-2.

Figure 1: Procedure for approval of CDM projects at National Level Stage I (consultative)

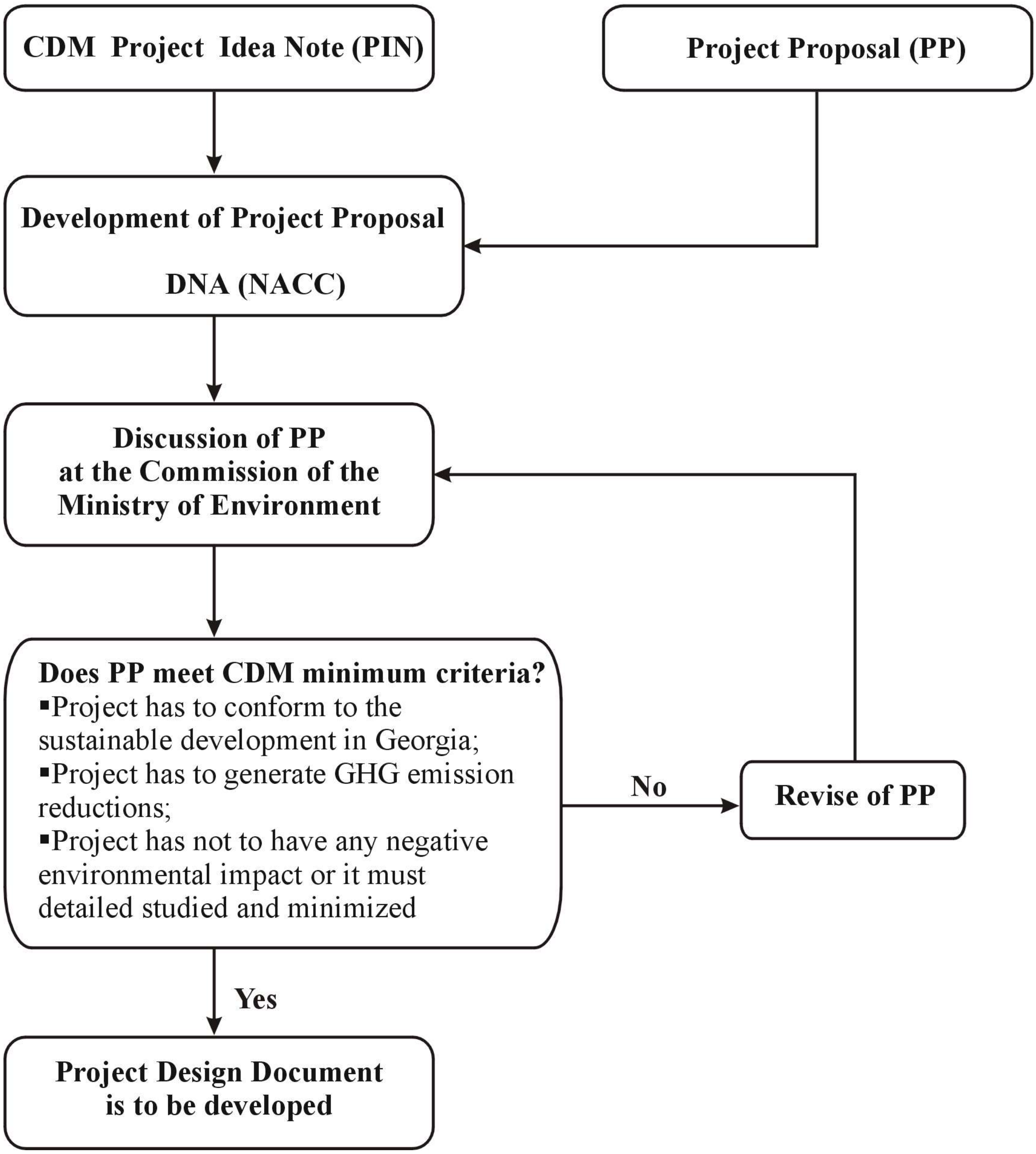
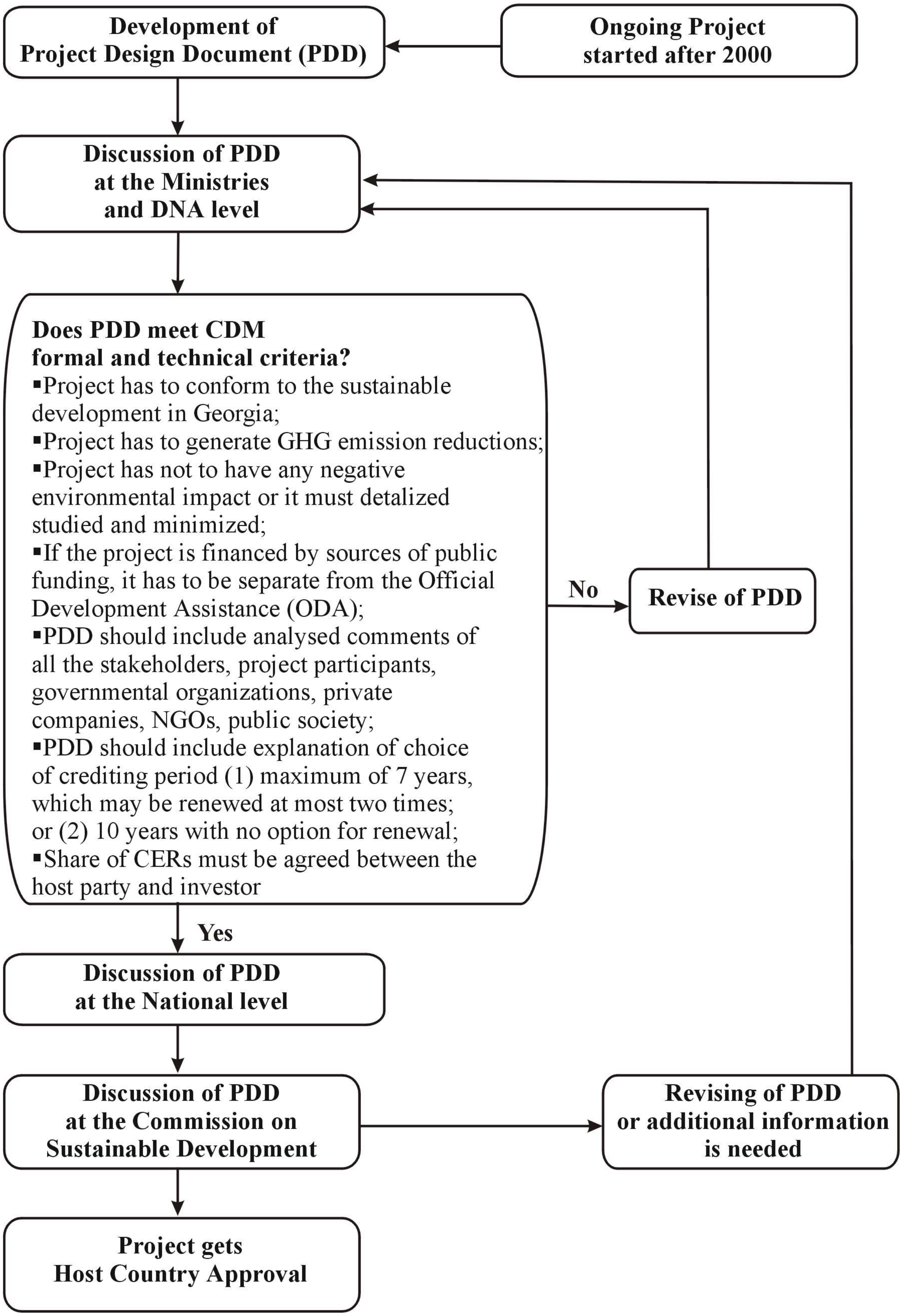


Figure 2: Procedure for approval of CDM projects at National Level Stage II (obligatory)



4 Georgia and the international CDM process

Georgia has a representative in the CDM Executive Board (alternate from CEE region), a Georgian expert is included in roster of experts for desk review of new baseline methodologies. However increased participation in CDM EB structures (corresponding panels, accreditation (assessment) teams, etc.) is desired.

Georgia is participating in the Project "Eastern Climate Change Network (ECCN)" supported under the European Commission's Synergy Program through the Energy Efficiency Centre Georgia (NGO). The main objectives of the ECCN are to:

- Increase energy supply security in the countries involved by improving the energy efficiency;
- Contribute to the implementation of the UNFCCC Kyoto Protocol in the participating countries;
- Establish the Eastern Climate Change Network on the basis of existing local Energy Centers and Agencies;
- Encourage the ECCN members' position in the fast growing market created by the Kyoto Protocol's flexibility mechanisms;
- Create and prepare a database of priority projects aimed at GHG abatements in CEE and CIS countries;
- Transfer of know-how, information exchange and training to ensure the necessary local capacity building;
- Disseminate and promote formats and procedures for GHG abatement certificates;
- Develop targeted twinning within the Network and with possible investors.

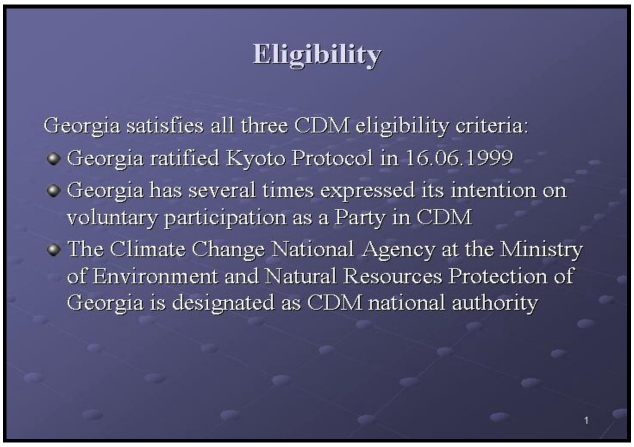
Some of the goals mentioned above can be achieved in the framework of recently announced TACIS project "*Technical assistance to* Armenia, Azerbaijan, Georgia and Moldova *with respect to their Global Climate Change commitments", which is expected to start in January 2004.* This project aims at assisting these countries with the development of the necessary institutional and technical capacity to comply with the UNFCCC and participate in the Kyoto Protocol and its Clean Development Mechanism. The governments of the beneficiary countries have identified several areas where additional assistance is needed: climate change awareness raising, technical and institutional assistance with the CDM infrastructure, adaptation and vulnerability issues, technology transfer, modeling of GHG emissions and evaluation of GHG mitigation options. All the identified areas require assistance with methodologies, training, and financial resources for implementation. Since the project cannot address all of the identified issues with the same level of effort, specific attention should be paid to the assistance with the CDM and public awareness.

NACC has identified a number of potential CDM projects mainly in the field of Renewable Energy and found partners. In particular in May 2003 NACC signed Memorandum Of Understanding with Sustainable Energy Projects GmbH, Germany to cooperate in development and implementation of renewable energy projects, especially wind and biomass projects in Georgia under Clean Development Mechanism, Prototype Carbon Fund, other GHG reduction oriented funds/mechanisms. For development of PDD at the necessary level parties are looking for support from available programs.

Georgia is looking for multilateral, bilateral cooperation to build necessary capacity and participate as a host country in CDM. Ministry of Environment and Natural Resources Protection applied to the World Bank's Prototype Carbon Fund to participate in its program, Government of Japan - to become the partner of the program to facilitate the CDM capacity building process in host countries, World Bank's NSS program for forecasting the future trends of GHGs and assessment of potential CDM project pipelines.

For building in-country capacity for CDM, Climate Protection Program (Capp) of the German Corporation for International Technical Cooperation (GTZ) could play significant role.

Taking into account the above mentioned, Georgia expects to be successful in creation of the National CDM System and implementation of project pipelines in different fields of economy.

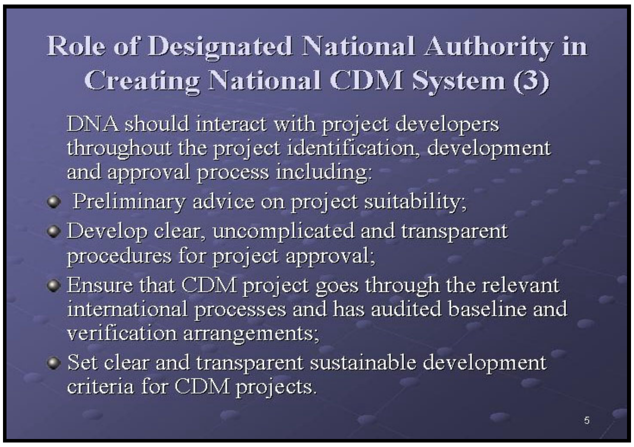


Slide 1

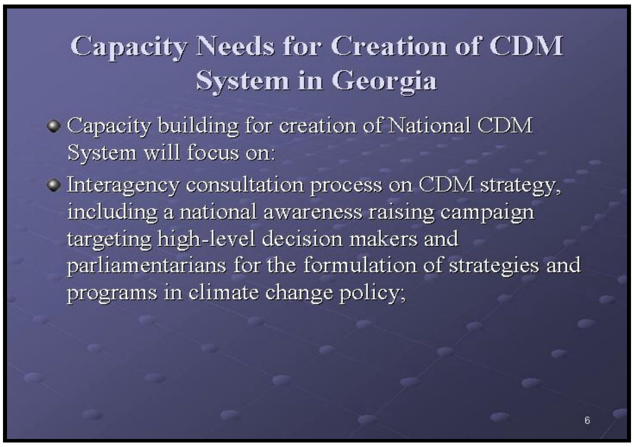
Slide 2

Slide 3

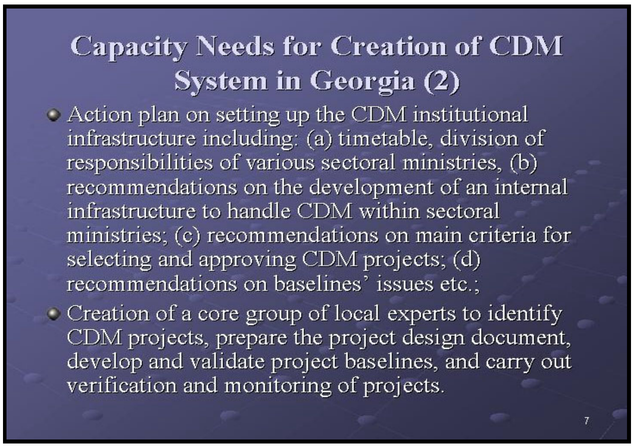
Slide 4



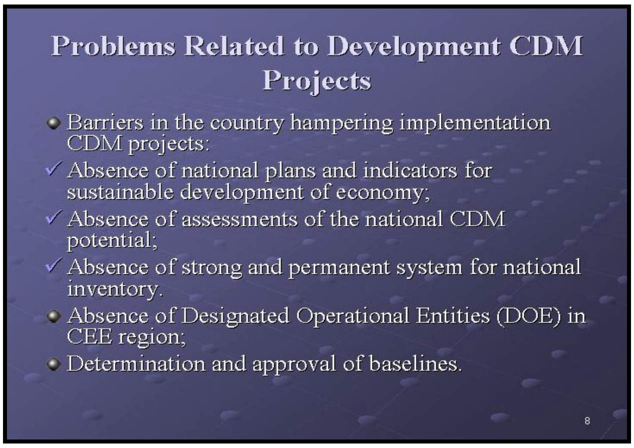
Slide 5



Slide 6

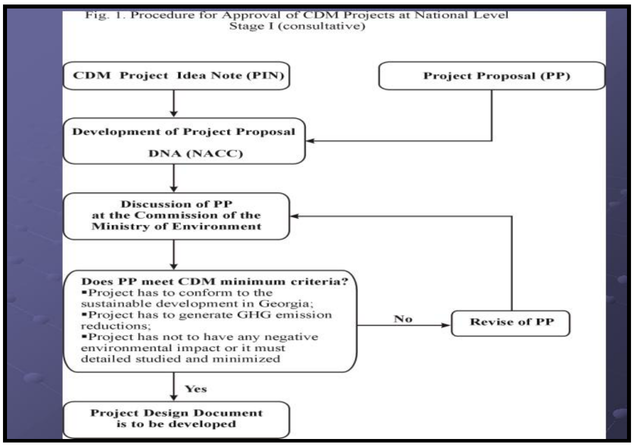


Slide 7

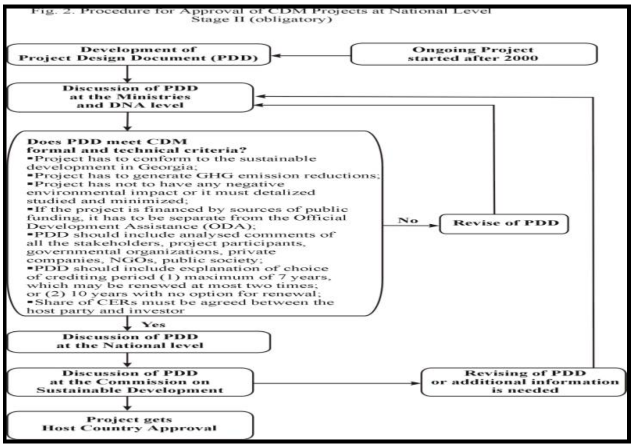


Slide 8

Slide 9

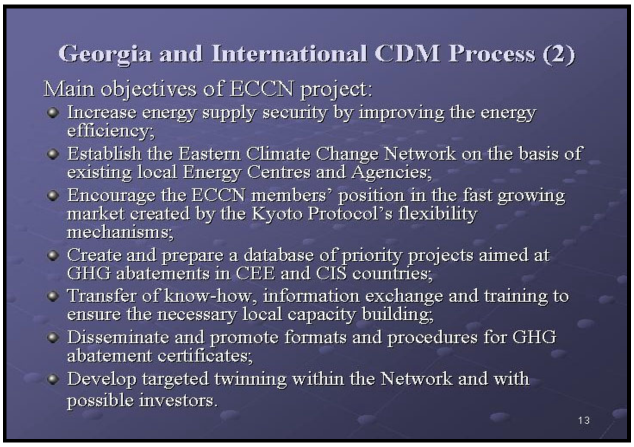


Slide 10

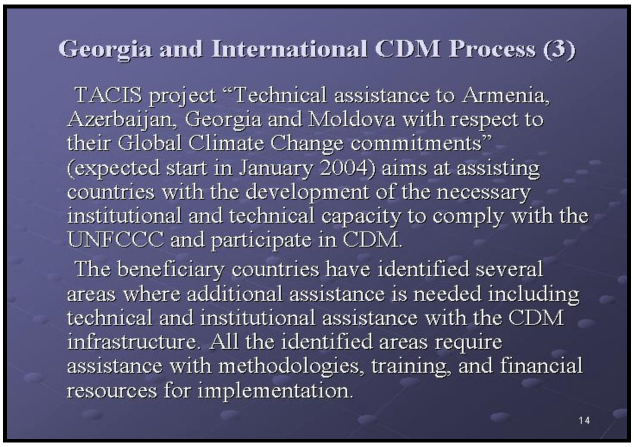


Slide 11

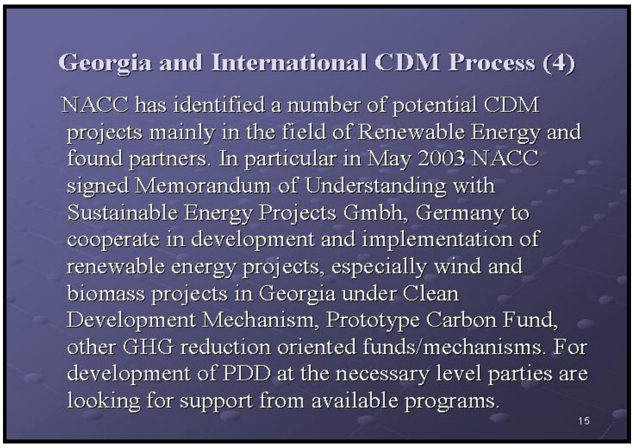
Slide 12



Slide 13



Slide 14



Slide 15

Slide 16

Experiences from the Certification of JI/CDM Projects

Michael Rumberg
TÜV Süddeutschland, Carbon Management Service

1 Introducing TÜV Süddeutschland

TÜV Süddeutschland is a group of companies active world wide in the field of inspection and auditing. The department "carbon management service" is an interdisciplinary team (economists, natural sciences, engineers) offering the following services:

- Validation, verification and certification of GHG projects (national/JI/CDM)
- Verification and certification of emission inventories
- Certification of energy from renewable sources
- Knowledge management (www.netinform.net).

TÜV Süddeutschland has experiences with the assessment of greenhouse gas emissions mitigation projects in the following countries: Rumania, Bulgaria, South Africa, Morocco, Brazil, Chile, Japan, Panama, Trinidad & Tobago, Russian Federation, Czech Republic and India. Projects assessed so far include the following project types: renewable energy, energy efficiency, fuel switch, landfill gas and afforestation.

2 Current status of CDM/JI

In general, the CDM procedures are lengthy and complicated. They have to become more efficient as the number of approved methodologies increases.

Nevertheless, companies have applied with projects and methodologies. As a first result it can be stated that soon the project cycle will be completed. Already now, the first two methodologies have been approved. The methodologies approved are a HFC and a methane project. It has to be expected that in the future companies will apply mostly with projects that contain methodologies which already have been approved. This means that single project types will be duplicated in the same and other regions and only bigger projects may start new approval processes. Moreover, project developers will specialize to certain methodologies. With respect to JI, the following project types have been contracted by the World Bank (PCF) and the Dutch Governmental Agency SENTER International (ERUPT) so far:

- Renewable energy (5 projects)
- Landfill gas (2 projects)
- Energy efficiency (2 projects).

Thus, renewable energy is currently the "most important" project type. JI-project locations are Romania with four projects as well as the Czech Republic, Poland, Hungary, Slovakia and Latvia with one project in each country.

3 Project examples and resulting experiences

The assessment of CDM and JI projects by an independent third party is a prerequisite for the implementation of the Flexible Mechanisms of the Kyoto Protocol. The objective is to ensure that projects are planned, described and implemented in a proper manner resulting in a measurable reduction of greenhouse gas emissions.

The assessment process consists of two steps: a) Validation and b) Verification and Certification. Whereas the validation is carried out before the project start and assesses mandatory requirements for the participation in the flexible mechanism, the proposed baseline scenario, environmental impacts, the stakeholder process and the monitoring plan, the objective of the verification is to assess and confirm the amount of emission reduction achieved by the project after its implementation. This amount is documented in the certificate issued to the project owner.

The first example is the Svilosa biomass cogeneration project in Bulgaria. The project has been submitted to the Prototype Carbon Fund of the World Bank and has been validated in 2003 by TÜV Süddeutschland. The objective of the project is to substitute coal with biomass by building a biomass cogeneration plant. The biomass fuel is wood waste from a nearby industrial site. The project moreover aims at reducing methane emissions by reducing the current and avoiding the future landfill of wood waste at a landfill area.

Main experiences with the baseline have been as follows:

- The continuation of the current status must be discussed as an option for the baseline setting.
- Legal aspects can be demonstrated via a “trigger function”
- By using of calculation models based on empiric figures, the uncertainty of data is decisive for the resulting amount of carbon credits.

Issues to be verified and clarified during the assessment process of this specific project have been the following:

- Using of specific or general factors for coal emissions
- Limits for the conservative approach (e.g. 90% - confidence interval)
- Number and size of control groups.

The second example is the Chacabuquito Run of River Project in Chile. The project has been contracted by the Prototype Carbon Fund of the World Bank and has been initially verified in 2002 by TÜV Süddeutschland.

The baseline scenario in this project is the building of a gas turbine power plant. As a special characteristic the project contains variable baseline emissions, defined by the actually substituted power plants according to the national dispatch center (CDEC).

The initial verification has led to the following experiences:

- Transparent start after project implementation
- Opportunity to make adjustments regarding the monitoring-procedure
- The introduction and certification of a management system according to ISO 9000 supports project reliability.

4 Lessons learned

The lessons learned from the assessments of projects were with respect to the Project Design Document (PDD) as follows:

- The baseline scenario is often built on the continuation of the current status and does not take into account a development of the energy sector in the respective country in the future.
- In the context of the EU enlargement it is demanding to predict administrative, legal and economic developments in the future.
- And even for non-accession countries the future development (until 2012) seems to be difficult to predict.
- Hence, to prove that the project baseline is based on assumptions that have a confidence interval of 90-95% is difficult.

Regarding the project type and size it can be stated the following:

- Renewable energy (RE) projects are the preferred option in comparison to energy efficiency projects as RE projects are less demanding regarding monitoring issues, and have hence lower transaction costs.
- Moreover, the participation of countries, companies and plants in the EU emissions trading scheme has to be taken into account.
- By doing so, the number of potential JI projects will decrease.

5 Outlook

HFC and CH4 projects will be favored options due to their high GHG potential. In addition, CO_2 projects which fulfill the following prerequisites:

- a favorable ratio: investment volume/ ROI due to carbon credits,
- can be duplicated,
- can prove technical additionality,
- will be selected mostly.

An example for the fulfillment of these prerequisites is the project, presented as an example here, the Svilosa Biomass Project.

Regarding the certification process it can be said that the CDM has become operational by the establishment of the CDM executive board. In the meantime 16 inspection companies have applied as designated operational entities. In order to have a standard assessment level, also TÜV Süddeutschland contributed as a member of the drafting team to the development of the Validation & Verification Manual (see http://www.vvmanual.info), an initiative of all Applicant Operational Entities, which aims to harmonize the process and quality of all GHG assessments.

TÜV SÜDDEUTSCHLAND

TÜV Carbon Management Service

Experiences from the certification of JI/CDM projects

Michael Rumberg
TÜV Süddeutschland Bau und Betrieb GmbH

CTI Capacity Building Seminar :
"Climate Technology and Energy Efficiency"

Tutzing, 22th of September 2003

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 1

TÜV SÜDDEUTSCHLAND

Presentation overview

1. Introducing TÜV Süddeutschland
2. Current status of CDM/JI
3. Project examples and resulting experiences
4. Lessons learned
5. Outlook

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 2

TÜV SÜDDEUTSCHLAND

1. Introducing TÜV Süddeutschland

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 3

TÜV SÜDDEUTSCHLAND

TÜV Carbon Management Service (CMS)

Background

TÜV Holding AG:
> 11.500 employees active world wide in the field of inspection and auditing
CMS:
Interdisciplinary team (economists, natural sciences, engineers)
Basic idea:
- know-how in plant engineering and energy management,
- experiences in industry and
- competencies in strategy consulting and risk management

→ offering to the market as a qualified certification organisation

Services

- Validation, verification and certification of GHG projects (national/JI/CDM)
- Verification and certification of emission inventories (EU-Directive)
- Certification of energy from renewable sources
- Knowledge management (www.netinform.net)

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 4

TÜV SÜDDEUTSCHLAND

Experiences of TÜV with GHG projects

...in national as well as international frameworks:

Project locations:

- Rumania
- Bulgaria
- South Africa
- Marocco
- Brazil
- Chile
- Panama
- Trinidad
- Russian Federation
- Czech Republic
- India

....and Germany

Projekt types:

- Renewable energy
- Energy efficiency
- Fuel switch
- Landfill gas
- Afforestation

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 5

TÜV SÜDDEUTSCHLAND

2. Current status of the CDM/JI

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 6

TÜV SÜDDEUTSCHLAND

CDM: Situation from a AOE perspective

Political framework

CDM procedures are lengthy and complicated. They have to become more efficient as the number of approved methodologies increases.

Market players

Companies have applied with projects and methodologies.
Result: - First two methodologies have been approved,
- Methodologies approved are HFC and methane project,
- Soon the project cycle will be completed.

In the future: companies will apply mostly with projects and methodologies which already have been approved.
Result: - Single project types will be duplicated in the same and other regions.
- Project developers will specialize to certain methodologies.
- Only bigger projects may start new approval processes.

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 7

TÜV SÜDDEUTSCHLAND

JI: Project types and locations

Source: Projects contracted under the PCF and ERUPT at the 1 of July 2003

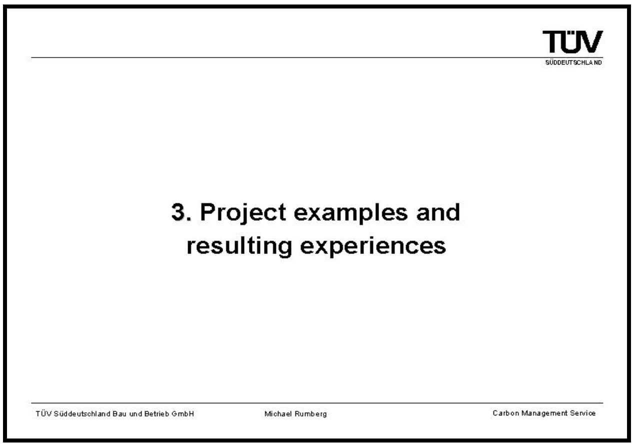
Project types:
- Renewable energy (5)
- Landfill gas (2)
- Energy efficiency (2)

→ *Renewable energy is the "most important" project type.*

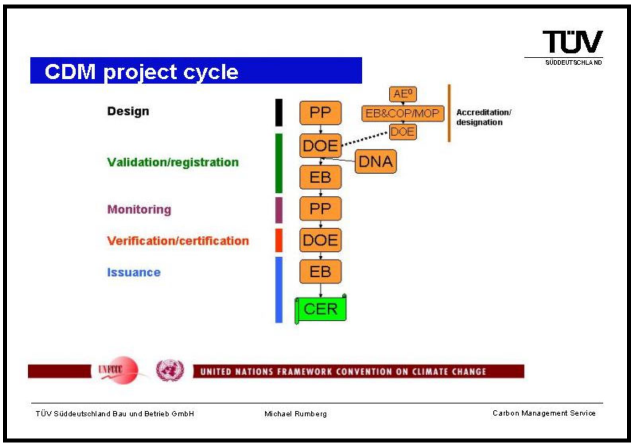
Locations:
- Romania (4), Czech Republic, Poland, Hungary, Slovakia, Latvia

TÜV Süddeutschland Bau und Betrieb GmbH — Michael Rumberg — Carbon Management Service

Slide 8

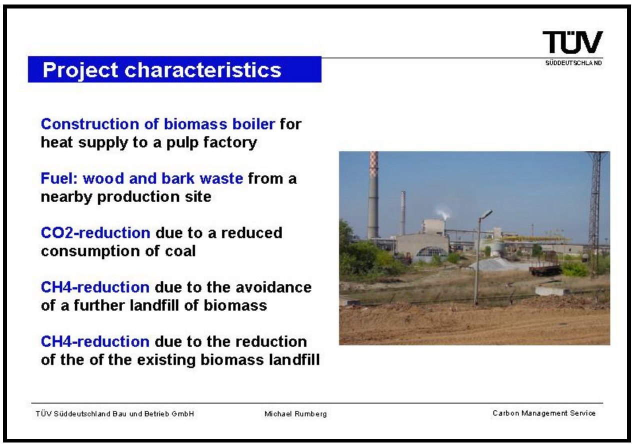


Slide 9

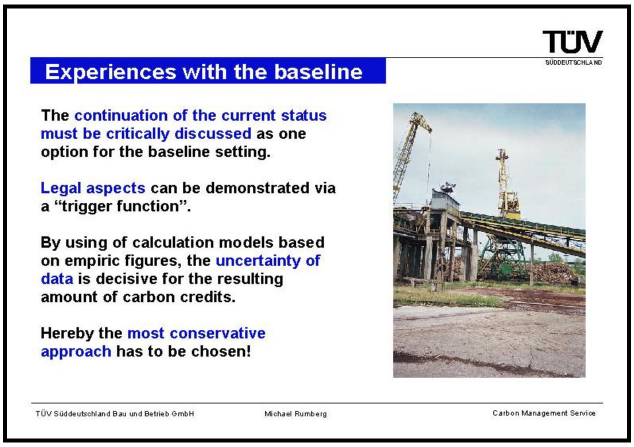


Slide 10

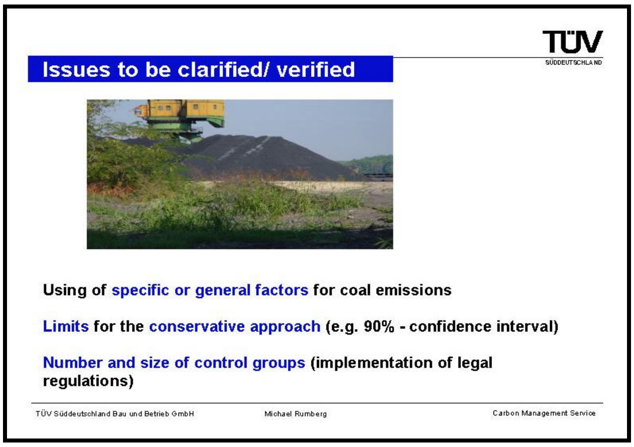
Slide 11



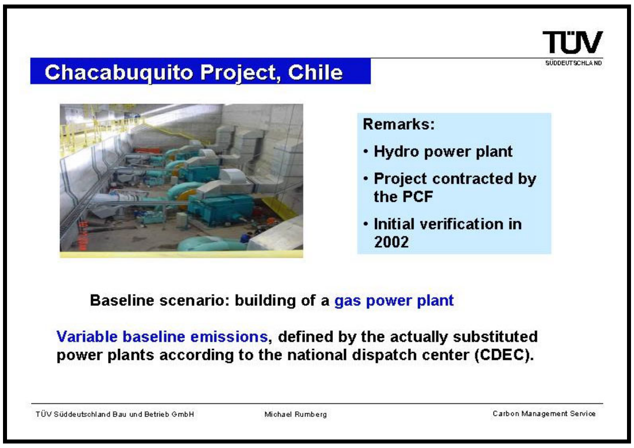
Slide 12



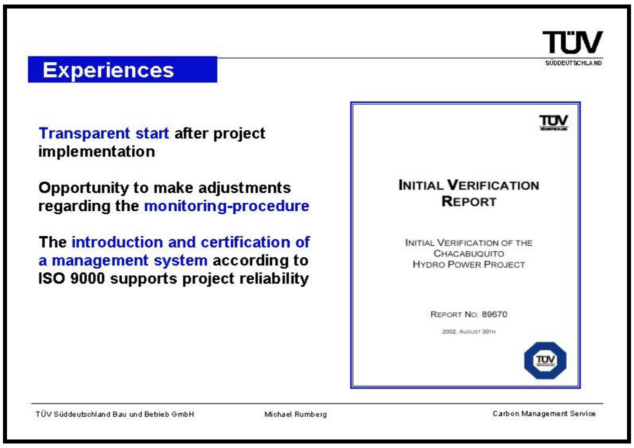
Slide 13



Slide 14



Slide 15



Slide 16

4. Lessons learned

TÜV Süddeutschland Bau und Betrieb GmbH | Michael Rumberg | Carbon Management Service

Slide 17

Project Design Document

The baseline scenario is often built on the continuation of the current status and does not take into account a development of the energy sector in the respective country in the future.

In the context of the EU enlargement it is demanding to predict administrative, legal and economic developments in the future.

And even for non-accession countries the future development (until 2012) seems to be difficult to predict.

In addition to prove that the project baseline is based on assumptions that have a confidence interval of 90-95% is difficult.

TÜV Süddeutschland Bau und Betrieb GmbH | Michael Rumberg | Carbon Management Service

Slide 18

Project type and size

Renewable energy projects are the preferred option in comparison to energy efficiency projects as RE projects are less demanding regarding monitoring issues, and have hence lower transaction costs.

Moreover, the participation of countries, companies and plants in the EU emissions trading scheme has to be taken into account.

By doing so, the number of potential JI projects will decrease.

TÜV Süddeutschland Bau und Betrieb GmbH | Michael Rumberg | Carbon Management Service

Slide 19

5. Outlook

TÜV Süddeutschland Bau und Betrieb GmbH | Michael Rumberg | Carbon Management Service

Slide 20

CDM/JI projects

Project type:

HFC and CH4 projects will be favoured options due to their high GHG potential.

CO2 projects which fulfill the following prerequisites:
- a favourable ratio: investment volume/ ROI due to carbon credits,
- can be duplicated,
- can prove technical additionality,

will be selected mostly.

Example:

Svilosa Biomass Project

TÜV Süddeutschland Bau und Betrieb GmbH | Michael Rumberg | Carbon Management Service

Slide 21

Certification process

CDM has become operational by the establishment of the CDM executive board.

16 inspection companies have applied as designated operational entities.

TÜV Süddeutschland contributed as a member of the drafting team to the development of the

Validation & Verification Manual

(see http://www.vvmanual.info), an initiative of all Applicant Entities, which aims to harmonize the process and quality of all GHG assessments.

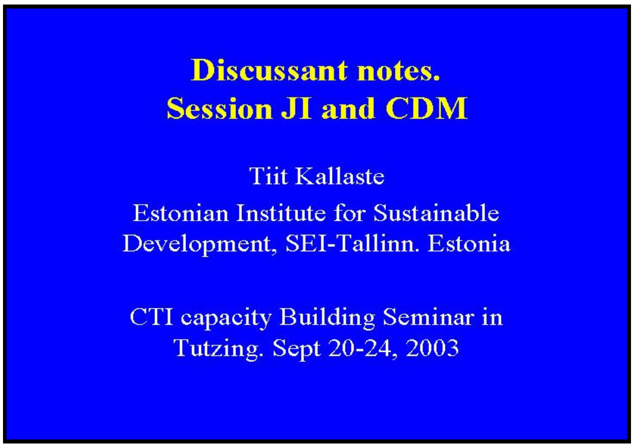
TÜV Süddeutschland Bau und Betrieb GmbH | Michael Rumberg | Carbon Management Service

Slide 22

Slide 23

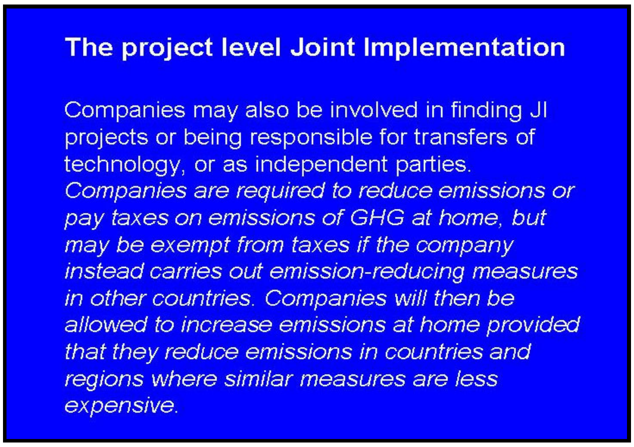
Discussant Notes
Session JI and CDM

Dr. Tiit Kallaste
Estonian Institute for Sustainable Development, SEI-Tallin



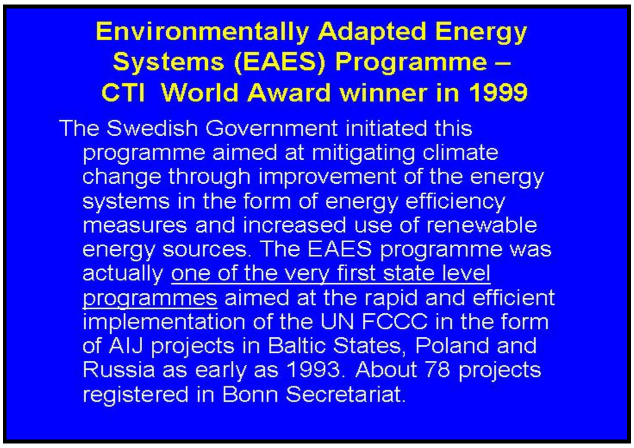
Slide 1

Slide 2

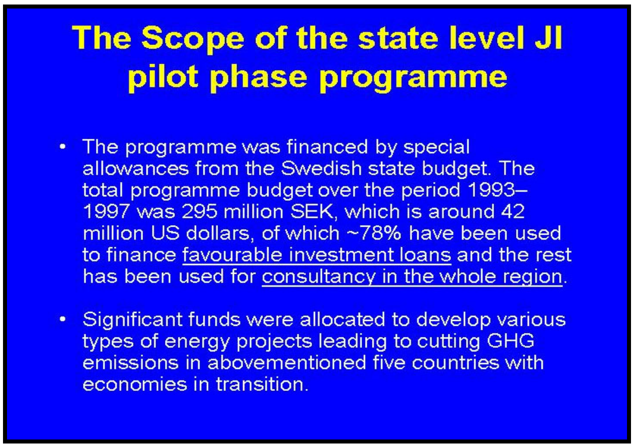


Slide 3

Slide 4



Slide 5



Slide 6

Four categories of projects of the EAES Programme

1. Conversion of heat production plants from fossil fuels to the local bio-fuels;
2. Energy conservation in district heating systems;
3. Energy efficiency in the end-use in buildings;
4. Comprehensive projects, which combined all three abovementioned projects.

Slide 7

How to go further on?

- This morning session presentations gave some preliminary ideas, we now have to test, amend and elaborate them with the aim to gain the best out of them!
- There is a large expertise in World Bank, in particular with CDM.
- Huge work done by BMU in the sphere of KP fexible mechanisms implementation.
- Good results and long experience of EAES Programme in Russia, Poland and 3 Baltic States.

Slide 8

Analysis and generalisation of learned experience in JI, merging with the WB experience in CDM, etc.

- Long and voluminous experience in JI pilot phase –AIJ in many EIT countries, plus the WB PCF etc., ERUPT and other approaches should be rationally analyzed and adopted for JI and CDM projects further fastened development.
- General direction in EIT countries to JI First Track. In most Annex I host countries the majority of requirements are fulfilled. The major issue/problem – The Registries!

Slide 9

Analysis and generalisation of experience …

- Also, the Verification procedure.The capacity building in the spehere of verification has huge perspective in the sense of significant lowering transaction costs and accelerating the practical implementation of projects. TÜV Süddeutschland or itś daughter companies could be appropriate candidates to start capacity building!? This could be the solution to start from the reason, not deal with the result.
- Also, inventories issue.
- Regular reporting to Climate Convention Secretariat in Bonn, etc.

Slide 10

The questions for the discussion

- Possible merging JI and EU Emission Trading Scheme (EU ETS)
- Linking Trade under Article 17 with the Greening of AAU´s
- Could it be possible to merge JI and ET during next coming years, before the KP First Commitment period will start?
- Possible simplification of CDM lenghty and voluminous procedures!?
- The EU Linking Directive, any hopes towards simplification?

Slide 11

The EU Directive on Electricity from Renewable Energy Sources 2001/77/EC

Prof. Dr. Volkmar Lauber
University of Salzburg

1 Political processes and context of drafting the directive

The idea of an internal market for energy appeared on the agenda of the European Community in the mid-1980s with the Delors report of 1989 and began to be transposed in the 1990s. Since that time, many directives have been adopted in this area, with the emphasis clearly on increasing competition; this process is far from being finished (Cini/McGowan, 1998; Palinkas and Maurer, 1997).

It is in this context that electricity from renewable energy sources (in short, RES-E) appeared on the agenda, partly because it was clear that RES-E had little chance to develop under intensified competition and therefore needed a special regime, partly because climate change as well as considerations of security of supply – i.e. growing import dependence on fossil energy resources in the first decades of the 21st century – made it desirable to merge and harmonize national support policies which already existed in quite a few member states.

In 1996, the European Commission submitted a Green Paper on renewable energy sources (European Commission 1996); it was clearly de-regulationist in inspiration and already proposed a quota system accompanied by tradable certificates. This also applies to the subsequent Commission White Paper on the subject (European Commission, 1997). For several years this was also the main inspiration for the draft proposals issuing from DG TREN (Transport and Energy) and its predecessor, which in this respect was under strong influence from DG Competition.

Import dependence

With about 6 per cent of the world's population, the EU is responsible for some 14-15% of global energy consumption (European Commission 2000b: 26). EU gross energy consumption breaks down as in table 1 (ibid.: 21-24).

Table 1: Energy sources in the EU: Contributions to gross energy consumption and import dependence 1998

Oil and oil products	41%	76%
Natural gas	22%	40%
Solid fuels (mostly coal)	16%	50%
Nuclear (uranium)	15%	95%
Renewables	6%	near 0%

In 1998, 49 per cent of these energy sources were imported. This figure is expected to rise to 71 per cent by 2030 for the current 15 member states (ibid., 80).

As to electricity generation, the share of primary energy sources in the EU is as in table 2 (ibid.: 14, 21-24).

Table 2: Primary energy sources for electricity generation and their ratios of import dependence - EU 1998

	Total share (%)	Import dependence (%)
Solid fuel (mostly coal)	27	50+
Oil	8	76
Natural gas	16	40
Nuclear (uranium)	35	95
Renewable energy sources	15	near 0

Actors and conflicts

Most important are the European Commission and the Council of energy ministers, i.e. the member states. The European Parliament plays a somewhat lesser role; this applies even more strongly to the European Court (Hix 1999). So much for the EU actors proper. Outside actors providing important input to these public actors are the renewables industry with its associations, the energy sector more generally, and environmental NGOs.

The European Commission encompasses several sub-actors which are relevant for renewable energy politics (Lauber 2001). While the college of Commissioners acts as a single body with majority voting (Hix 1999: 32), the DGs (there are two dozen directorates-general) may follow different administrative traditions and paradigms. Central for renewable energy is DG Transport & Energy under Commissioner Loyola de Palacio; before 1999 it was DG Energy under Christos Papoutsis which was in charge of the legislative dossier for the directive. Under Papoutsis this DG argued that only a system of tradable certificates or similar system was compatible with electricity liberalization (European Commission 1999). De Palacio was more pragmatic from the beginning.

Another important actor within the Commission is DG Competition, in recent years under Commissioner Monti. It has several instruments to participate in the political struggle around renewable energy policy. It formulates Community frameworks on environmental state aid (the last one was issued in early 2001, see European Commission 2001a) which contain clauses pertaining to renewable energy and which limit member states' ability to subsidize this activity. It may also initiate lawsuits against member states for violating the Community state aid regime (usually settled out of court) and has in fact exerted pressure on member states' governments to keep away from fixed feed-in tariffs (e.g. Denmark, Germany until 2002, Ireland).

DG Environment also played a role on occasion, especially in the legislative process regarding the directive. Thus, Commissioner Wallström came out forcefully against the approach of Papoutsis, arguing that his proposal was likely to do more for competition than for the environment (Lauber 2001: 38).

The Council is clearly the most important organ in Community legislation, even under the co-decision procedure applicable to the res-e directive. This is well illustrated by two central conflicts between Council and Parliament, i.e. regarding mandatory versus indicative targets for member states and the recognition of household waste for incineration as (partly) biomass. On both issues the (Energy) Council prevailed.

In the European Parliament, the most important committee dealing with the directive was the Committee on Industry, External Trade, Research and Energy, with Mechtild Rothe as rapporteur. The Environment Committee provided an opinion, formulated by Hans Kronberger. A key role was also played by Claude Turmes, MEP from Luxemburg. The European Parliament wanted mandatory rather than indicative targets for the member states and a clause favoring fixed feed-in tariffs, at a time when the Commission wanted to phase those out. Within parliament, support for renewable energy (when in conflict e.g. with nuclear power) comes most consistently from the Greens (e.g. Turmes) and the Party of European Socialists (e.g. Rothe), with the European People's Party comparatively more likely to espouse the nuclear cause. Support for the directive was however quite broad in the final vote.

The European Court of Justice played an important role due to its decision in PreussenElektra v. Schleswag. In matters of state aid, the Court is the chief control on the Commission. It rejected the reasoning of DG Competition, i.e. that the German system of fixed feed-in rates should be viewed as state aid even though it clearly did not fit the criteria of state aid applied so far (Advocate General 2000). The final decision was handed down during the legislative process of the directive and was of momentous importance. By implication, it meant that the Commission would not be able to use the Treaty articles on state aid (art. 87 and 88) against systems based on fixed feed-in tariff.

On the outside, a key role is played by the European associations of renewable energy producers, especially EREF (European Renewable Energies Federation), Eufores (European Forum for Renewable Energy Sources), EWEA (European Wind Energy Association), European Photovoltaic Association (EPIA), European Biomass Association, supported by related organizations such as FEDARENE (European Federation of Regional Energy and Environmental Agencies). National associations also played an important role at times.

While renewable energy associations act more backstage, greater orientation towards the general public and open political conflict is practiced by environmental NGOs, most notably by Greenpeace and WWF. They have very resolutely espoused the cause of renewable energy production, conducting important campaigns at a time when the renewables industry itself was still in its infancy. In general they took a line similar to that of the European Parliament (in favor of mandatory targets and against phasing out fixed feed-in tariffs).

Conventional energy producers: An important actor representing conventional utilities – in many countries no great friends of renewable energy sources – is the Union of the Electricity Industry/EURELECTRIC. It sided with the Commission on the issue of tradable credits, made concrete proposals and with Commission support is organizing such a trade on a private basis. This RECS-system suffered an important setback in 2003 when the Netherlands stopped credit trading.

2 Chief contents of the directive

After defining renewable energy sources (see above, section one), the directive sets national indicative targets for the consumption of res-electricity by 2010, lays down some principles for national support systems and provides for a guarantee of origin of res-electricity. It requires member states to introduce simplified, transparent and non-discriminatory administrative and grid practices. Finally, it provides for a report on implementation referring to external costs.

Definition of renewable energy for the purpose of directive 2001/77/EC

The directive defines renewable energy sources in its art. 2 as "non-fossil energy sources ("wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases"). The original Commission proposal (European Commission 2000a) limited hydro to 10 MW; this provision was eliminated. Biomass is further specified to mean "the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste". This was included upon the insistence of the Dutch, British, Italian and Spanish governments against the opposition of both Commission and Parliament (*European Voice*: 7-13 June 2001; *Solarthemen* 21.6.01: 4). The proportion of electricity produced by renewable energy sources in such plants may now also be considered as res-e if the waste treatment hierarchy is respected.

National targets

Historically, national commitments to renewable energy varied greatly with the vagaries of the oil market. Crash programs in the 1970s and early 80s were generally followed by a decline in activities following the oil price decrease in 1986. The progress of renewable energy technologies also differed significantly among member states; breakthroughs were rare and incomplete. One of the ideas of the green and white papers on renewable energy sources was to reduce the costs of these technologies by achieving mass production on a European level (reinforced by exports once leadership was reached in this area); this in turn required a Community-wide effort. To achieve this effect, mandatory targets were seen as an appropriate instrument. This case was argued with great perseverance by the European Parliament. On the other hand, nearly all member states were unwilling to accept such targets (Denmark and later on Germany were the only exceptions).

Art. 3 of the directive proposes only indicative targets, with member states required to "take the appropriate steps ... in proportion to the objective to be attained" and to document their efforts in regular reports (no later than 27 Oct 2003, the date by which the directive is to be transposed into national law, and thereafter every two years) which the Commission shall evaluate. If member states fail to live up to their targets without valid reasons, the Commission shall make appropriate proposals which may include mandatory targets.

Table 3: Annex to directive 2001/77/EC: Reference values for member states' national indicative targets for the contribution of electricity from RES to gross electricity consumption by 2010

	RES-E TWh 1997	RES-E TWh 1997	RES-E % / 2010
Belgium	0.86	1.1	6.0
Denmark	3.21	8.7	29.0
Germany	24.91	4.5	12.5
Greece	3.94	8.6	20.1
Spain	37.15	19.9	29.4
France	66.00	15.0	21.0
Ireland	0.84	3.6	13.2
Italy	46.46	16.0	25.0
Luxembourg	0.14	2.1	5.7
Netherlands	3.45	3.5	9.0
Austria	39.05	70.0	78.1
Portugal	14.30	38.5	39.0
Finland	19.03	24.7	31.5
Sweden	72.03	49.1	60.0
United Kingdom	7.04	1.7	10.0
European Community	338.41	13.9	22.0

Support schemes

Apart from the issue of targets, this was one of the most hotly contested provisions of the directive. At first, it was planned to progressively liberalize the area of RES-E in order to arrive at a community-wide harmonized regime fairly soon. It was also a conflict over renewable energy certificates combined with quotas versus fixed feed-in tariffs. The first draft proposals submitted by energy commissioner Papoutsis made clear that only support schemes which relied on "competition" were judged compatible with electricity liberalization. This referred to the tendering systems practiced at that time in some member states and ignored that there is competition also under fixed feed-in tariffs (Hvelplund 2001). These tendering schemes consisted in prospective res-generators submitting competitive bids for fixed-price contracts. Such a system was practiced in Britain (where the NFFO system was no great success in expanding production of res-electricity; Mitchell 2000), France (where results were simply dismal) and Ireland (where this system still exists). Britain and France in particular had low (or simply slow) rate of completion of accepted projects, even though they dispose of the best wind resources in the EU. This contrasted with the successful market introduction of res-electricity achieved by those states which relied on fixed feed-in tariffs, i.e. Denmark, Germany and Spain, responsible for about 80-90 percent of wind power installations in the EU.

Later on, Papoutsis seems to have favored a quota/tradable certificate approach. Under such an approach, generators of res-electricity would sell, on the one hand, the physical electricity they produced; on the other, they would sell certificates embodying the "greenness" of that electricity, which could then be traded on an exchange so that a market price would result. This in turn would promote trade of res-electricity within the EU, encourage its development in those regions where conditions were most favorable and thus reduce costs. At the time the directive was discussed, such a system was favored by Denmark, the Netherlands, the United Kingdom, Italy and the Flemish part of Belgium; it also had supporters in Sweden and Austria. It was opposed most vociferously by Germany.

Confronted with intense protests against his draft proposals, Papoutsis published the philosophy underlying his approach in the Working Paper in April 1999 (European Commission 1999). This paper argued rather ideologically the perspective of policy-makers who had successfully deregulated transports, telecommunication, electricity and gas, achieving considerable efficiency gains in monopolistic or oligopolistic sectors affected by "friendly" regulation – not exactly the situation of the res-sector. It claimed that according to economic theory, competition-based systems simply had to be better with regard to innovation and lowering prices. This claim seemed questionable especially with regard to innovation, where the competition-based systems – due to the narrow markets they created – fared quite poorly when measured against the others; above all, competition-based systems seem less capable of developing an RES-E industry (Lauber 2004).

Loyola de Palacio followed a different course, after having suffered one more setback with the previous philosophy. Her proposal for a directive was generally neutral with regard to this issue, although she was not willing to include an express provision, demanded by some, to protect feed-in tariffs from state aid scrutiny. However, this issue was settled by the European Court in the PreussenElektra v. Schleswag case. Fixed feed-in tariffs under which consumers pay a premium price for res-electricity do not constitute state aid according to this judgment. This means that the "German system" can no longer be questioned from this angle (Nagel 2001).

The directive now provides that the Commission shall evaluate the various national support mechanisms and present a report by October 2005 on their success, including their cost-effectiveness. If necessary, it shall at this point make a proposal for a Community framework with regard to support schemes which shall promote res-electricity in a simple and effective way. This proposal will have to provide for transitional period of at least seven years, so that no harmonized regulation can enter into force before 2012.

Guarantees of origin

Art. 5 of the directive regulates the way in which member states shall set up systems of guaranteeing the authenticity of res-electricity. The term "certificates" was avoided as some member states viewed this as a first step towards introducing a system of tradable certificates/quota-based support schemes. The significance of this formula was confirmed by items 10 and 11 of the preamble to the directive.

Administrative procedures

Art. 6 provides that member states shall evaluate their regulatory frameworks for res-electricity (authorizations, permits, support decisions etc.) with a view to reducing regulatory barriers, streamlining procedures and ensuring that rules are objective, transparent and non-discriminatory, taking into account the particularities of the various renewable energy technologies. They have to submit reports on action taken to this effect on 27 October 2003. Even though obstacles in this area are important in many member states, no provision is made for Commission proposals in this area, only for a report on best practices.

Grid access

Art. 7 regulates the relation between res-electricity producers and operators of the transmission and distribution system. Its purpose is to make sure that there is no discrimination against such producers taking into account all the costs and benefits of RES-E, e.g. in grid access, connection costs or transmission and distribution fees. Prospective connection costs must be communicated to RES-E generators and standard rules on costs published. The original Commission proposal – supported by Parliament – provided for priority access. The Council changed this to "guaranteed access", although priority access may still be granted. In dispatching generating installations, transmission system operators shall give priority to res-electricity producers insofar as the operation of the national electricity system permits. This clause is important as in many areas grid operators are hostile to res-electricity and try to impede its deployment. Member states shall report on measures taken to facilitate access to the grid in the report referred to in the preceding subsection.

External costs and subsidies
Summary report on implementation

Art. 8 provides for the Commission to submit a summary report on implementation on the basis of the member states' reports referred to above (see the subsections on indicative targets and administrative procedures) at the end of 2005, and thereafter every five years. Such a report "shall consider the progress made in reflecting external costs of electricity from non-renewable sources and the impact of public support granted to electricity production" as well as progress on achieving national targets and discrimination between different energy sources.

The chief purpose of the directive is to make res-electricity competitive for the internal electricity market. Now the competitiveness of this form of electricity is greatly inhibited by the fact that the generation of electricity from conventional sources is not charged with its full external costs, and often receives subsidies on top of that. Research conducted for the EU in the ExternE project shows that the cost of electricity generated from coal and oil in the EU would on average double if external costs to environment and health were included; from gas, it would increase by 30% (Massy 2002; Milborrow 2002; Elliott 2003). In addition, fossil and nuclear generation is often subsidized by a variety of mechanisms. Without these market distortions, res-electricity would not need the same amount of support. The issue is highly controversial; in early 2002 the European Parliament only narrowly prevailed upon the Council with its demand for a provision, in the 6th Environmental Action Program, aiming at the progressive elimination of environmentally negative subsidies (*Environment Watch Europe* 15.2. 2002: 5 and 29.3.2002:11). Also in the context of the adoption directive 2001/77/EC, DG Competition promised to look at subsidies to nuclear generation (low insurance coverage, waste disposal etc.; *Financial Times* 19.6. 2001). Still, the value of art. 8 is primarily programmatic because it focuses discussions of support on the comparative treatment of all forms of electricity generation.

3 Developments since the adoption of Directive 2001/77/EC

Indicative targets

There is a steadily growing body of evidence that the EU and its member states may not be able or willing to reach self-set targets on RES-E, at least without major policy changes. This was first stressed in a report prepared by consultants Ecofys, 3E and Fraunhofer ISI for the European Commission in mid-2002 (Renewable Energy Report 42, August 2002, 20). The same conclusion was voiced by EREF (European Renewable Energy Federation, 2002) and by the European Environmental Agency in mid-2003 (Environment Watch Europe, 4 July 2003, 23). But the European Commission does not seem to worry (Windpower Monthly, Feb. 2003, 14).

The situation became more alarming in the summer of 2003. Several member states are likely to increase their generation capacity after the recent electricity shortages. It is likely that RES-E will not keep pace.

The overall indicative target of 22% for 2010 is also likely to be lowered as a result of Eastern European enlargement. Individual targets for accession states were negotiated in mid-2003. Even though they are quite ambitious, they provide for an average of 11% for this group (table 4) – which would reduce by one point the original 22% target of the Directive. But particularly the political context (stronger fossil and nuclear orientation of policy makers, low electricity prices in some states, over-capacity in some others, weaker environmental interest) raises some doubts as to the future political determination to pursue an aggressive RES-E policy.

Table 4: Planned expansion of green power share in accession states

	RES-E TWh in 1999	RES-E % in 1999*	RES-E % in 2010*
Cyprus	0.002	0.05	6.0
Czech Republic	2.36	3.8	8.0
Estonia	0.02	0.2	5.1
Hungary	0.22	0.7	3.6
Latvia	2.76	42.4	49.3
Lithuania	0.33	3.3	7.0
Malta	0.0	0.0	5.0
Poland	2.35	1.6	7.5
Slovakia	5.09	17.9	31.0
Slovenia	3.66	29.9	33.6
Total	16.8	5.4	11.1
EU 25	355.2	12.9	21.0

*as percent of power consumption in 2000 (in both cases)
Source: Hinsch 2003

Support systems

So far, only the UK seems to have introduced a quota/certificates system that is clearly attractive to RES-E industry – and even here many important issues remain unsolved. As a result, many observers (in particular the consultant reports cited above, the EEA and RES-E industry associations) conclude that market-based instruments have not really proven their worth so far and that therefore the harmonization proposal due in 2005 (or later) should not rule out feed-in tariffs.

4 Broader political context of RES-E development in the EU

How does the current political constellation augur for the future development of RES-E under directive 2001/77/EC? There are, to be sure, some favorable factors. Strong support for RES-E still prevails in public opinion (European Voice 9:10, 13-19 March 2003; Renewable Energy World, May-June 2003, 11). Nuclear power – a traditional competitor for public funding – experienced severe setbacks in Germany, Belgium and the UK during the past two years. The production of RES-E equipment is an area where the EU can claim world leadership, it should have an interest in fostering this asset. It may become particularly interesting if oil and gas production should reach its peak during the current decade, as many geologists expect, leading to intensified competition for oil and gas from rapidly industrializing states in Asia and Latin America (Schindler/Zittel 2001; Deffeyes 2001; Zittel/Schindler 2003; Campbell et al., 2003; European Commission 2000b:27). Also, the EU has in the past placed great emphasis on leadership in climate change policy; a major government-level conference is planned for 2004 in Bonn and could bring about significant progress.

But there are other factors which are less favorable and indeed outright problematic for RES-E development. Nuclear power enjoys strong support in the Commission and in some of the accession states, and Finland may soon order an additional nuclear power plant. In Germany, the leading country in Europe with regard to wind energy and photovoltaic, 2003 has seen declining cohesion on RES-E policy on the part of the red-green coalition and a revival of large utility resistance against RES-E; this may endanger the reform of the renewable energies law. A production peak – followed by gradual decline – for oil and gas might also lead to a run on coal and nuclear, as renewables would have trouble replacing those sources of energy; wind or solar PV are growing very fast, but the basis from which they grow is still very modest so far, so that even very high growth rates are likely to have only a limited impact during the next decade. The progressive watering down of climate change policy during the Kyoto process (particularly the Bonn and Marrakech agreements) and the decision of the Bush administration not to ratify the Kyoto protocol are likely to lead to a greater reliance on flexible instruments also on the part of the EU member states, particularly as joint implementation credits are becoming cheaper due to the US absence from the market of carbon credits. As a result, reform of domestic energy policies becomes less urgent, at least until 2010. It is clear that RES-E policy still faces an uphill struggle.

References / Documents / Links

Advocate general (2000): Opinion of advocate general delivered on 26 Oct. 2000, Case C-379/98, PreussenElektra v Schleswag.

Campbell, Colin/Liesenborghs, Frauke/Schindler, Jörg/ Zittel, Werner (2003). Ölwechsel! Das Ende des Erdölzeitalters und die Weichenstellungen für die Zukunft. Munich, dtv.

Deffeyes, Kenneth S. (2000): Hubbert's Peak: The Impending World Oil Shortage. Princeton, Princeton University Press.

Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced for renewable energy sources in the internal electricity market. Official Journal of the European Communities, 27.10.2001, L 283/33.

Elliott, Dave (2003). Liberalisation and renewables. Paper for Summer School on the Politics and Economics of Renewable Energy, Salzburg, 12-26 July 2003.

European Commission (1996): Green Paper for a Community Strategy – Energy for the Future: Renewable Sources of Energy, COM(96)576, 19 November 1996.

European Commission (1997): Energy for the Future: Renewable Sources of Energy. White Paper for a Community Strategy and Action Plan, COM(97)599 final, 26 Nov 1997.

European Commission (1999): Working Paper. Electricity from renewable energy sources and the internal electricity market, SEC(1999)470, 13 April 1999.

European Commission (2000a): Proposal for a directive of the European Parliament and of the Council on the promotion of electricity from renewable energy sources in the internal electricity market, COM(2000)279 final, 10 May 2000.

European Commission (2000b): Green Paper Towards a European strategy for the security of energy supply, COM(2000)769, 29 November 2000.

European Commission (2001a): Community guidelines on State aid for environmental protection. Document 301Y0203(02) , Official Journal C 037, 03/02/2001, 3-15.

European Court of Justice (2001): Judgement in Case C-379/98, PreussenElektra v Schleswag, 13 March 2001.

European Renewable Energy Federation (2002). Missing Targets. How European countries are failing to achieve their renewable electricity targets. Brussels, Nov 2002.

Hinsch, Christian (2003). Going forward. New Energy, August 2003, 36-38.

Hix, Simon (1999): The Political System of the European Union, London.

Hvelplund, Frede (2001): Political price or political quantities? In New Energy 5/2001, 18-23.

Lauber, Volkmar (2001): Regelung von Preisen und Beihilfen für Elektrizität aus erneuerbaren Energieträgern durch die Europäische Union, in: Zeitschrift für Neues Energierecht 5:1, 2001, 35-43.

Lauber, Volkmar (2004). REFIT and RPS: options for a harmonized Community framework. Energy Policy, forthcoming.

Massy, Janice (2001): External costs benchmark too low, in: Windpower Monthly, October 2001, 24.

Milborrow, David (2002): External Costs and the Real Truth, in: Windpower Monthly, January 2002, 32.

Mitchell, Catherine (2000): The England and Wales Non-Fossil Fuel Obligation: history and lessons, in: Annual Review of Energy and the Environment 25, 285-312.

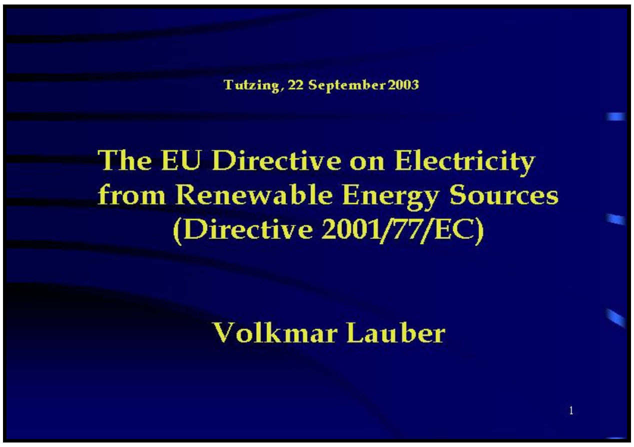
Nagel, Bernhard (2001): Rechtliche und politische Hindernisse bei der Einführung Erneuerbarer Energien am Beispiel Strom, in: Solarzeitalter 13:4, 14-20.

Palinkas, Peter/Maurer, Andreas (1997). Erneuerbare Energien als Teil der Energiestrategie der Europäischen Gemeinschaft: Entwicklung, Stand und Perspektiven, in Hans Günter Brauch (ed), Energiepolitik. Heidelberg, Springer 1997.

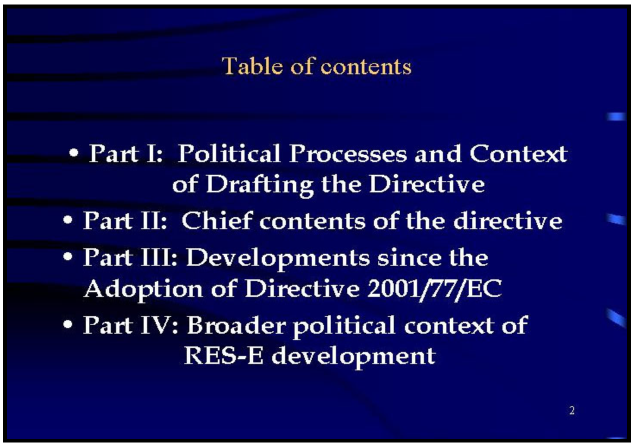
Ruijgrok, E./Oosterhuis, F. (1997): Energy Subsidies in Western Europe. Greenpeace, Amsterdam.

Schindler, Jörg/Zittel, Werner (2001): Die künftige Verfügbarkeit von Erdöl und Erdgas, in: Solarzeitalter 13:4 (2001), 5-7.

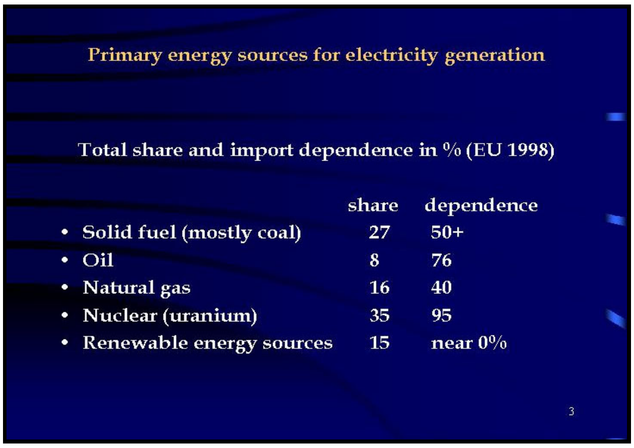
Zittel, Werner/ Schindler, Jörg (2003): Future world oil supply, www.sbg.ac.at/pol/ress > downloads.



Slide 1



Slide 2



Slide 3

Slide 4

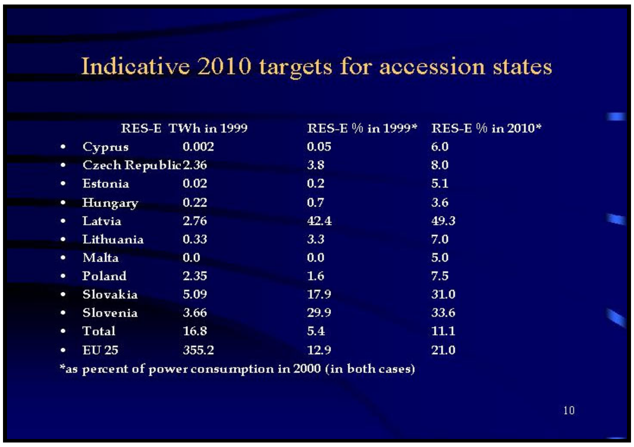
Slide 5

Slide 6

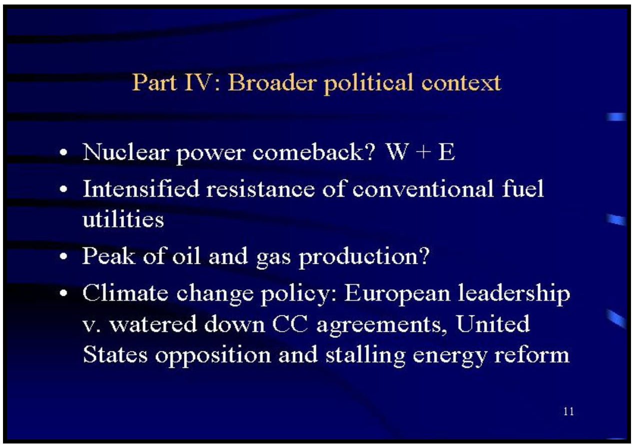
Slide 7

Slide 8

Slide 9



Slide 10



Slide 11

Amending the Renewable Energy Sources Act

Thorsten Müller
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin

Ladies and Gentlemen,

Thank you for the invitation to your seminar. It gives me great pleasure to be here to talk to you about the ongoing amendment to the Renewable Energy Sources Act in Germany.

I would like to begin with an overview of the existing Renewable Energy Sources Act, which I will refer to by its German abbreviation, the EEG. I would also like to outline the success this Act has had in the expansion of renewable energies for electricity generation over the past three years.

Following that, I will explain the reasons for the current amendment and highlight some of the most significant changes. I will conclude my presentation with an overview of the expected developments in renewable energies over the coming years.

How does the Renewable Energy Sources Act work?

The EEG replaces the Electricity Feed Act. It entered into force on 1 April 2000. It regulates the feeding into the grid and the compensation for electricity from renewable energies: according to this Act, operators of installations for generating electricity from renewable energies are entitled to priority connection to the grid and to compensation for the generated electricity. Compensation must then be paid for this electricity in line with legally prescribed minimum amounts over a period of twenty years.

However, the entitlement to compensation only arises if renewable energies were used exclusively. The amount of compensation varies depending on the type of renewable energy and the size of the installation. The goal of this differentiating system is to facilitate a cost-effective operation of these installations. For example, 8.9 resp. 6.0 cents are currently paid for a kilowatt-hour of electricity from a wind power installation, while 45,7 cents are paid for a kilowatt-hour from a photovoltaic installation.

The compensation paid by grid operators is shared equally among those utility companies supplying end users with electricity. Theoretically this ensures each electricity consumer makes an equal contribution to the expansion of renewable energies and thus to climate protection that is proportionate to consumption.

In other words, consumers are financing the expansion of renewable energies. This is justified by the fact that it is their behavior and the current structure of electricity generation, which is overwhelmingly reliant on fossil fuels, which cause this portion of CO_2 emissions.

What has the Renewable Energy Sources Act achieved so far?

The EEG and the Electricity Feed Act have made a considerable contribution to increasing the share of renewables in electricity consumption from 4.6% to 8.5% since 1998. This share will rise to 9% by the end of this year.

Before the entry info force of the Electricity Feed Act and the EEG, hydropower was the only renewable energy to play a significant role in electricity production. This has now changed.

The greatest proportion of the increase has been achieved by wind energy, shown here in turquoise. In Germany there are now over 12.800 wind power installations with an installed capacity of over 14.000 megawatts. They generate more than 17 million kilowatt-hours of clean, green electricity per year. Wind energy has doubled since the introduction of the EEG. Biomass also makes a significant contribution to electricity generation - highlighted in green on this transparency. The installed output has also doubled in this area. About 2 million kilowatt-hours of "green" electricity were generated in 2002. Electricity volumes from waste incineration are not taken into account here. According to the current EEG this is not a form of renewable energy.

There has also been major growth in the field of photovoltaic. The installed electricity capacity has increased by over 400%. However, their contribution to electricity generation is still only very small; which is why they can't be seen on this diagram.

As a result of these success stories, around 20 million tons of CO_2 can be saved every year. They have also given rise to a new industry, which created 130,000 jobs and had a turnover of around 8 billion Euro in 2002.

What are the reasons for the amending?

This success raises the question of why we need to change the Renewable Energy Sources Act at all. There are three main reasons:

Firstly: The German Government's goal is to increase the share of renewable energies in energy consumption to 50% by the middle of this century. Enormous effort is required to achieve this goal. Every possible option for expansion must be fully exploited. The EEG provides for the accuracy of its instruments and compensation rates to be reviewed at regular intervals. The German Government published the results of a review in a progress report last June. One conclusion was that the compensation rates have to be adapted. The current provisions do not allow costs-effective operation for certain energy sources and installation sizes - even though this is a central goal of the EEG.

Secondly: problems regarding some delineation and structural issues have arisen. To ensure a smooth implementation of the Act these problems need to be solved.

Thirdly, the EU Directive on the promotion of electricity produced from renewable energy sources has to be transposed into national law. Although Germany's Renewable Energy Sources Act is an effective instrument for reaching the goals laid down in the Directive, small changes are needed nevertheless.

What changes are being made?

On 13 August Federal Environment Minister Trittin submitted a draft Act on amending the EEG. This prescribes a number of small and more significant changes. It is not always possible to clearly assign the proposed changes to one of the three reasons I have just listed. So instead I will merely list a few examples to illustrate the aims and the impacts of the changes.

Major changes are proposed for the compensation rates of the individual types of renewable energies. As you have perhaps seen in the media over the past few weeks, the discussion on the regulation for wind energy is particular intensive. I would therefore like to go into this in more detail.

The draft Act prescribes a reduction in the guaranteed compensation for electricity generated from wind energy - the strongest branch of Germany's renewable energies sector. Such major progress has been made with technical developments in this field that prices for installations have fallen more quickly than legislators predicted.

At the same time, the advancing expansion of wind energy has led to discussion on whether expansion should also be aimed for in inland areas with less favorable wind conditions. The draft Act therefore prescribes minimum requirements for the quality of sites as a solution. On the other hand, practice shows that the conditions for the expansion of offshore wind energy use are not structured well enough in the existing EEG. Although there are already several offshore wind parks - in Denmark for instance - very little has been done in this field in Germany. This is partly due to the different geographical conditions. The on-going planning in Germany also includes areas a long way from the coast. The conditions here are correspondingly tougher and thus the costs higher.

The draft amendment to the EEG therefore provides for clearly improved conditions for offshore use for a transitional period up to the end of this decade. The Government's goal is to have an installed capacity of 3000 megawatts by this date. In the long term, the goal is for 15% of Germany's electricity requirement to be covered by offshore installations.

A further major aspect of the ministry draft is a new provision for the biomass sector. This form of energy offers considerable potential and plays a major role in future scenarios. Electricity from biomass flows continuously and, unlike wind and solar power installations, is not dependent on the weather.

Unfortunately, the expansion of biomass has stagnated in recent years. Findings of a governmental review show that the compensation rates for small installations and for the use of regenerative raw materials such as forestry timber and farmland plants, are insufficient. These compensation rates will now be adapted accordingly. An additional financial incentive will be created for using regenerative raw materials. This should also enable farmers to have a supplementary source of income in addition to food production.

The EU Directive on the promotion of electricity produced from renewable energy sources even recognizes the biogenic share of waste as a renewable energy. The ministry draft makes use of the option included in the Directive to exclude this from the EEG compensation system.

Finally, I would like to briefly talk about the new provisions for solar radiation energy. Although its contribution to electricity generation is currently only minor, it offers enormous potential in the medium to long term.

The huge growth of around 400% in the past three years is partly due to the EEG, and partly to the German Government's 100,000 roofs program. This funding program provides low-interest loans to facilitate the setting up of photovoltaic facilities on buildings. The program's goal was an overall capacity of 300 megawatts. This was achieved this year - over a year sooner than planned.

The submitted draft amendments provide for balancing out this concluded program. Photovoltaic installations on buildings are therefore entitled to an increased compensation rate.

To be able to fully exhaust the huge potential of solar radiation energy, a clear decrease in electricity costs is needed in the longer term. The EEG provides an incentive - an annual decrease of 5% in the guaranteed compensation for electricity fed into the grid. To achieve a further significant decrease in costs, it will be possible to build large ground-level installations during a transition period of a good ten years. The higher demand resulting from this will trigger considerable development in the photovoltaic sector, which is needed to be able to reduce costs even further.

Amendments are also planned for other renewable energy forms. There will be a slight decrease each year in all compensation rates for new installations. The aim here is to create additional incentives for technological innovation.

The inclusion of hydropower over 5 megawatts of capacity is a new aspect. Studies have proven that the potential offered by this sector cannot be fully exploited without additional incentives. However, compensation should not be paid for electricity from existing installations - it should only be paid for electricity resulting from expansion.

Further changes are geared towards improving the functionality of the EEG. Uncertainties and disputed issues that have arisen are also dealt with to improve legal certainty and investment security.

Finally, the draft amendment also contains further new provisions to increase the EEG's transparency and to prevent misuse. The precise costs supplementary to the compensation are not yet known. This uncertainty is often used in political discussions to argue against the EEG. It is also important to prevent unnecessary costs in order to keep the burden on citizens and enterprises for the expansion of renewable energies as small as possible.

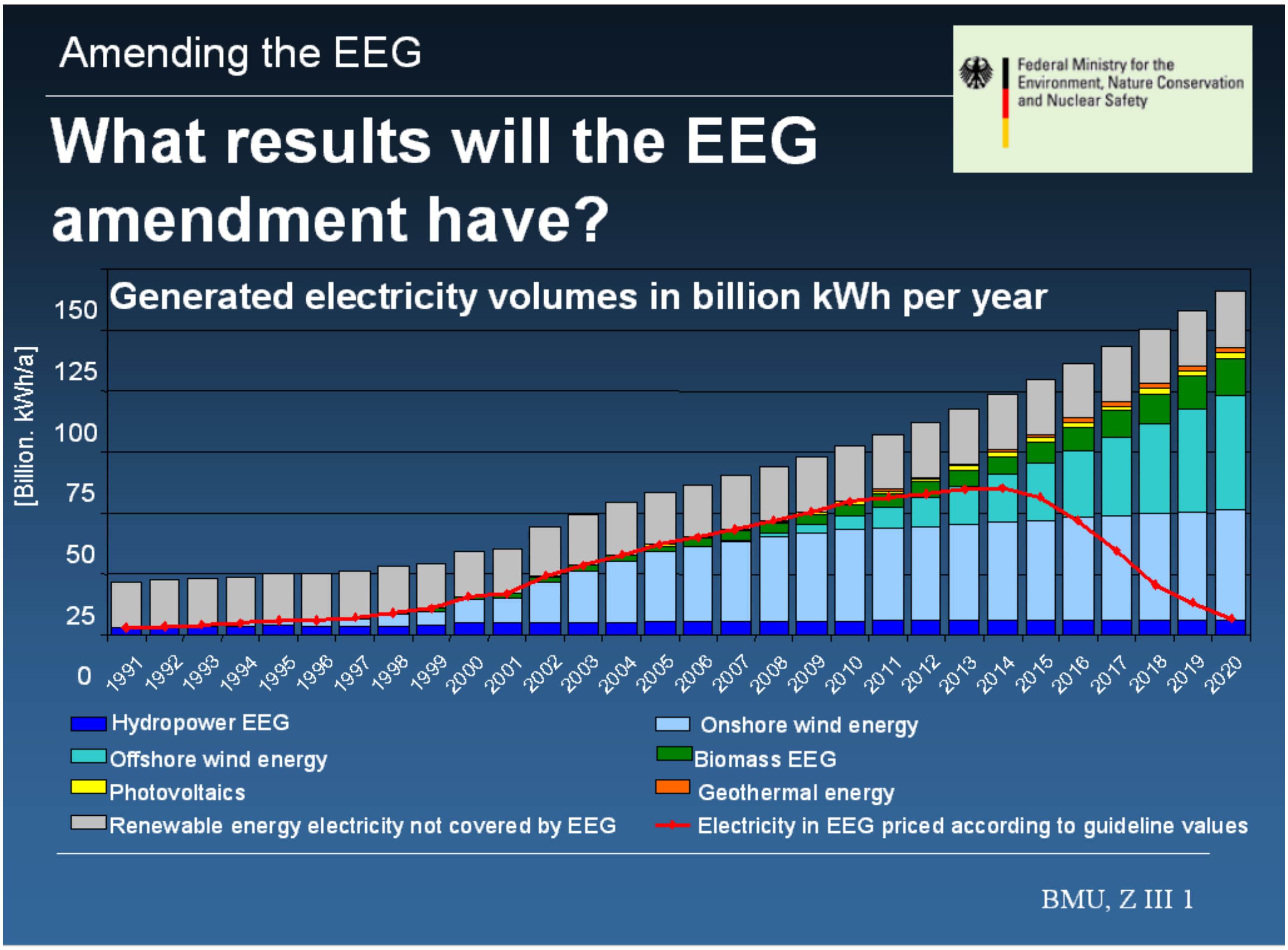
In this context, I would also like to briefly address the provisions regarding the certification of electricity from renewable sources. The Directive on the promotion of electricity produced from renewable energy sources prescribes that guarantees can be issued regarding the production of electricity from renewable energies. This issue is not addressed in the current EEG and must now be resolved with an amendment.

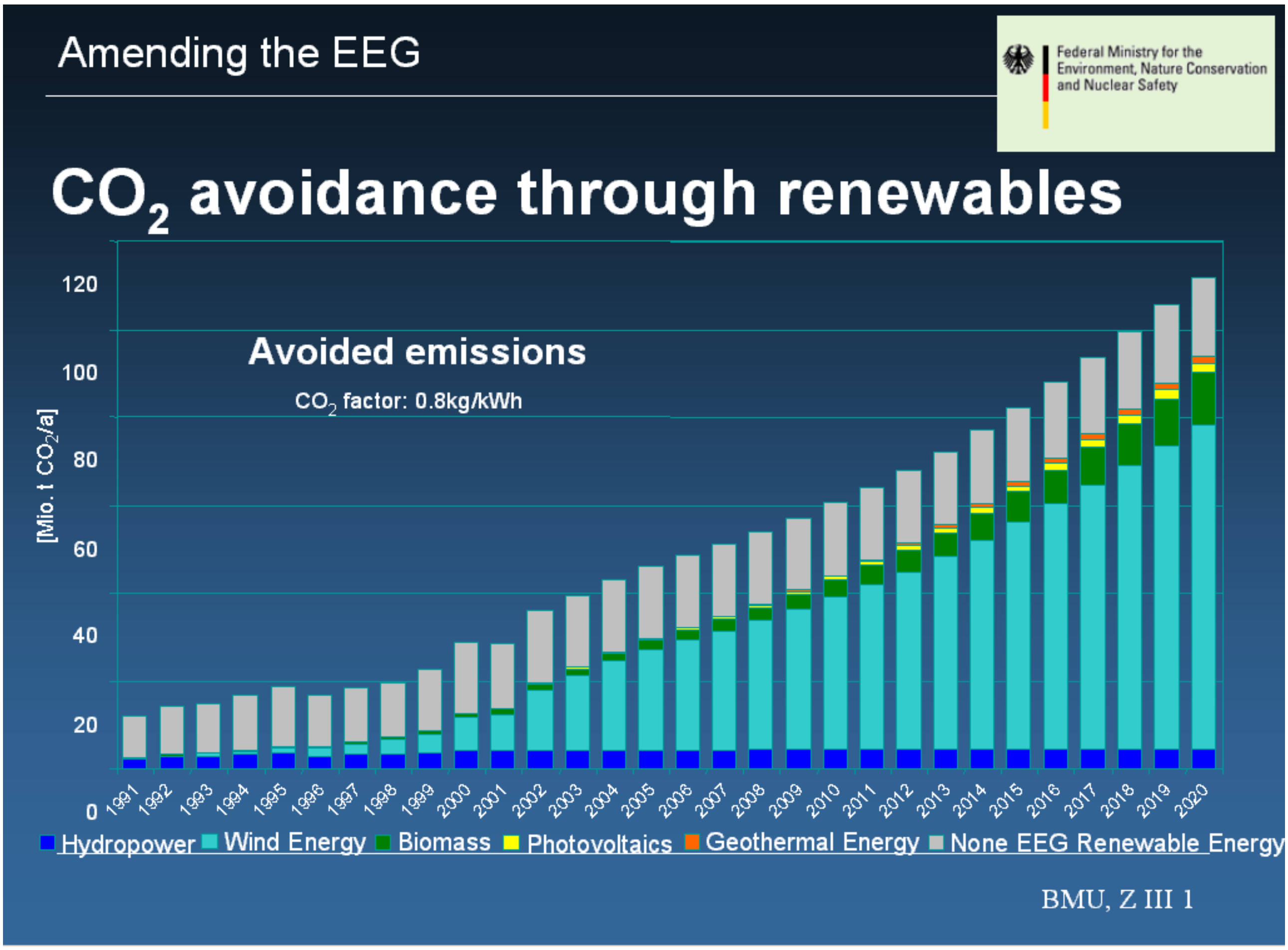
What impact will the changes have?

The Federal Environment Ministry ordered a review of how the expansion of renewable energies will develop on the basis of the proposed changes, and the costs that can be expected. The outcome was that it is possible to increase the share of renewable energies to 20% of overall electricity consumption by 2020. The majority of this growth is expected in the wind sector. This transparency shows wind energy generation on land in blue and offshore wind energy generation in turquoise. Biomass - marked in green - will also play a major role.

The costs for this expansion are very moderate. They will increase slightly until around 2010, but then will fall. The red line shows the development of costs. At present an average household pays around 1 euro per month towards EEG costs. With the predicted increase in costs for conventional electricity, the additional economic costs for the expansion of renewable energies will fall to zero from the middle of the next decade. Then economic profit can be reckoned with.

As you can see from the second transparency, almost100 million tons of carbon dioxide can be avoided in 2020 as a result of the EEG. The Renewable Energy Sources Act is thus an effective national instrument in Germany for avoiding carbon dioxide and thus achieving the Kyoto and EU climate protection goals.


Amending the EEG
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
What results will the EEG amendment have?
Generated electricity volumes in billion kWh per year
[Billion. kWh/a]
0
25
50
75
100
125
150
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Hydropower EEG
Onshore wind energy
Offshore wind energy
Biomass EEG
Photovoltaics
Geothermal energy
Renewable energy electricity not covered by EEG
Electricity in EEG priced according to guideline values
BMU, Z III 1


Amending the EEG
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
CO_2 avoidance through renewables
Avoided emissions
CO_2 factor: 0.8kg/kWh
[Mio. t CO_2/a]
0
20
40
60
80
100
120
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Hydropower
Wind Energy
Biomass
Photovoltaics
Geothermal Energy
None EEG Renewable Energy
BMU, Z III 1

So, to summarize:

The amendment to the EEG will further improve this successful instrument for expanding the use of renewable energies for electricity production. It will promote a shift towards a sustainable system for electricity production.

Experience shows that the expansion of renewable energies requires initial state subsidizing. The monopoly-like structures and the current low costs for conventional electricity do not allow for a market breakthrough otherwise.

However, in the medium term renewable energies will become competitive. The costs arising from the EEG are moderate and will fall in the foreseeable future.

The Renewable Energy Sources Act is therefore a success story for climate protection in Germany - a success that will continue with the amendment submitted by Minister Trittin.

Thank you very much for your attention!

The New Renewables Support Scheme in the Czech Republic

Dr. Martin Bursík
Ecoconsulting s.r.o., Prague

Czech Republic and the EU Commission negotiated the indicative national target of electricity production from renewables on the gross national electricity consumption in the Czech Republic at the level of 8% by the year 2010. Czech Republic approved this obligation by signing the amendments to the EU accession treaty in Athens this year. At the same time, the task to implement the 2001/77/EC Directive on the support of renewable electricity production together with the governmental engagement to adopt the special act for the green electricity production were the impulses to start the expert work on the new support scheme in the Czech Republic.

An existing support scheme is based on the feed-in tariffs system in which the obligation to buy green electricity from the producer is on the regional distribution company. This system, (with the necessity to recalculate the tariffs for different types of the green electricity) will be effective until the full opening of the internal electricity market, that is until January, 1st, 2006. Since than, due to the unbundling of the electricity supply and distribution according to the 54/2003/EC Directive the distribution companies won't have the license for electricity trade any more in the Czech Republic. However, plants with the installed capacity less than 200 KWhe will be obliged to continue its' operation via the feed-in tariff system. The electricity production of these producers should be used by the regional distribution company for covering of the electricity losses and balancing its' diagram.

Besides the existing feed-in tariffs support scheme the new scheme, based on the duty of each electricity supplier to reach the yearly quota of the green electricity in his portfolio, is proposed. The yearly quota will be set by the Energy Regulatory Office with the aim to reach the 8% of green electricity production by the year 2010. All types of RES will be supported via differentiated prices of certificates for each type of green electricity production. Green electricity producer will sell - together with the electricity for the market price (which differs due to the level of instability of certain type of RES) - the certificate as well. The scheme is far away from the clear certificate system because the minimal price of the certificate is regulated by the Energy Regulatory Office on the basis of different installation and operational costs. The price of the certain type of certificate will be calculated so that it guarantees an average payback and reproduction period of 15 years for each type of renewable installation.

The details of the proposed scheme, basic information about the current situation in renewables as well as the forecast of the future RES development will be presented and discussed.

The New Renewables Support Scheme in the Czech Republic

Martin Bursík, CTI Capacity Building Seminar
September 22, 2003 Tutzing, Germany

ecoCONSULTING s.r.o.
energy and environment

1

Slide 1

New RES support scheme requirements:

- *to accelerate the use of renewable energy sources (RES),*
- *to reach the national indicative target of **8%** green electricity on gross electricity consumption by 2010,*
- *to support **all types** of RES,*
- *to set the prices so that they guarantee reasonable **payback period** and an appropriate income,*
- *to guarantee the **sale** of all the green electricity produced,*
- *to support renewable **heat** production,*
- *to implement 2001/77/EC Directive on the support of renewable electricity production,*

2

Slide 2

Implementation of Unbundling into Czech Electricity Market:

2003/54/EC common rules for the internal market in electricity

Art. 15

Unbundling of Distribution System Operators

1) *Where the distribution system is part of a vertically integrated undertaking, it shall be independent at least in terms of its legal form, organisation and decision making from other activities.*

Czech Energy Law 458/2000 Sb. Amendment

Art. 25

3) *The distribution system operator, to whose system more than 100,000 end-customers are connected, is not obliged to hold the licence for electricity prodution and trade (since January, 1st, 2006)*

3

Slide 3

New RES support scheme:
feed-in tariffs (31.12.2005 + for small)

- *designed for small producers with less than 200 kW_{IC},*
- *+ for photovoltaic plants,*
- *if technically feasible, for facilities with higher installed capacity as well,*
- *the obligation to buy green electricity is on the regional operator of the distribution system,*
- *his ability to buy green electricity is limited by his own need and to cover losses in the network,*
- *the tariffs are being set by the Energy Regulatory Office,*
- *the right to sell the certificates passes to the operator of the distribution system.*

4

Slide 4

New RES support scheme:
tradable certificates (since 2006)

- *the system is based on issuing tradable certificates by the Operator of the Market,*
- *prices of the certificates are regulated by Energy Regulatory Office and are diferentiated according to the type of RES,*
- *green electricity producers sell - together with the electricity for the purchase price - tradable certificates as well,*
- *suppliers are obliged to meet the annual quota for a calendar year which is laid down by the Energy Regulatory Office in advance,*
- *the supplier who does not meet the quota is obliged to pay a fee to State Environmental Fund (use bound for promotion of RES).*

5

Slide 5

Model procedure for creating the prices of certificates

	Purchase price 2003 (EUR/MWh)	Purchase price 2004 (EUR/MWh – est.)	Minimal price of certificate 2006	Price of the electricity on the market 2006 (est.)
Small hydro PP	50	65	45	20
Wind PP	100	100	93	7
Biomass electricity plants	83	100	77	23
Bio-gas electricity plants	83	116	93	23
Waste water/landfill EPP	83	67	44	23
Geothermal electricity P	100	200	177	23
Photovoltaic electricity P	200	500	-	-

6

Slide 6

Model procedure for creating the prices of the certificates

2004	Production in MWh (est.)		Minimal price of certificate 2006 (€)	Total price for Purchased Certificates (€)
Small hydro (to 10 MW_{IC})	850 000		45	38 250 000
Wind	55 000		93	5 115 000
Biomass electricity	250 000		77	19 250 000
Bio-gas electricity	64 000		93	5 952 000
Waste water/landfill	30 000		44	1 320 000
Geothermal electricity	0		177	0
Photovoltaic electricity	80		-	-
Total:	**1 249 080**			**69 887 000**
Average:	1 MWh		= 56 €	
Electricity production	**54 000 000**		1 $MWh_{el\ sold}$	must buy 1,30 €

Slide 7

New RES support scheme – other principles

- *an obligation to preferential connection of RES to transmission and distribution systems,*
- *tax „holidays" for the period of five years since RES was put into operation,*
- *guarantee of the minimal income for produced KWh of the green electricity for the period of 15 years (on the level of the regulated feed-in tariff or the price of the certificate at the year, in which RES was put into operation),*

8

Slide 8

Support of Heat Production from RES

- *an **owner of source of thermal energy**, when constructing a new source with total output greater than 1 MW_t, is obliged to ensure that the source will produce at least 30% of the thermal energy from renewable sources,*
- *dtto for source greater than 10 MW_t at least 20% by December, 31, 2008,*
- *obligation shall not apply when energy audit demonstrates that meeting the obligation would mean the increase in economic expenditures by more than 50%.*

9

Slide 9

Support of Heat Production from RES

- *the **builder of the new construction**, if financed at least by 50% from public finances, is obliged to ensure that it will use at least 20% of heat energy from RES,*
- *obligation shall not apply when energy audit demonstrates that meeting the obligation would mean the increase in economic expenditures by more than 50%,*
- *obligation shall not apply when the specific heat energy consumption is less than 50 kWh/m^2 (pasive building),*
- *obligation shall not apply when the construction is connected to the central heating system.*

10

Slide 10

Expert estimation - filling the 8% RES_{el} obligation by 2010

Type of RES	Green Electricity Production in 2001 (GWh)	Green Electricity Production in 2010 (GWh)
Small hydro (to 10 MW_{IC})	826	1 120
Wind	0,6	930
Large water power plants	1 165	1 165
Biomass electricity	5,9	2 200
Geothermal electricity	0	15
Photovoltaic electricity	0	15
Total:	1 998	5 445

5 445 GWh of the green electricity from RES = 19,6 PJ = 23% of the total energy production from RES

11

Slide 11

Expert estimation - increase the RES_{heat} production by 2010

Type of RES	Heat Production fro Renewable Sources of Energy by 2010 (PJ)
Solar	2,2 PJ
Heat Pumps	7,2 PJ
Biomass Heat	55,3 PJ
Total RES heat:	64,7 PJ

64,7 PJ of heat from RES = 77% of total energy production from RES

12

Slide 12

Time schedule of the adoption of the Czech EEG Act

09/2003	*to be send to the Government*
11/2003	*to be adopted by the Government*
11/03 – 02/04	*Parliamentary procedure, passing*
1. May 2004	*the Act shall come into effect with the exception of the provisions linked to the fully opening of the electricity market by 1.1.2006*

ecoCONSULTING s.r.o.
energy and environment
Snemovni 174/7
118 00 Prague 1, Mala Strana
Czech Republic
martinbursik@mbox.vol.cz

Thank you for your attention

13

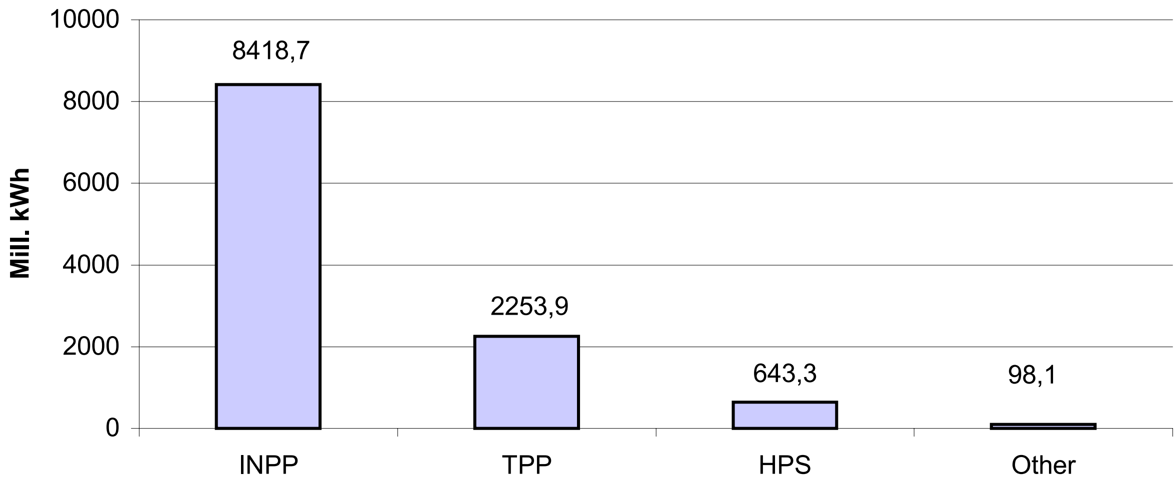
Slide 13

Replacing Nuclear Energy by Renewables. The Case of Lithuania

Dr. Kęstutis Buinevičius
Kaunas University of Technology

At present Lithuania is undergoing important reforms in the sphere of power plant structure. Further privatization of energetic sector, decommissioning of the Ignalina Nuclear Power Plant, reconstruction of the Lithuanian Power Plant working on fossil fuels, alongside with implementation of new modern technologies of renewable energy will be significant factors having a great importance of our country. All country receive electric energy from the only electric grid, mutual for all country, which has recently belonged to a joint-stock company JSC "Lithuanian Energy" .

Figure 1: Generation of electric energy by power plants of different types in Lithuania INPP – Ignalina nuclear PP, TPP- thermal PP, HPS – hydro PP



Ignalina NPP is the largest electric power plant and has got a special position in the policy of energy supply in Lithuania. The INPP produces the largest share of total electric energy in Lithuania, which varies every year from 73 % up to 87 %. Lithuania is the first in the world according to this index now. The total electric capacity of the INPP is 2600 MWel..

Ignalina NPP Unit-1 will be shut down in 2004. This date has been coordinated with European Union few years ago. Long negotiations and discussions have been under way under the subject of shut down of Ignalina NPP Unit-2. In 2002 Government of Lithuania has decided that Ignalina NPP Unit-2 will be shut down in 2009.

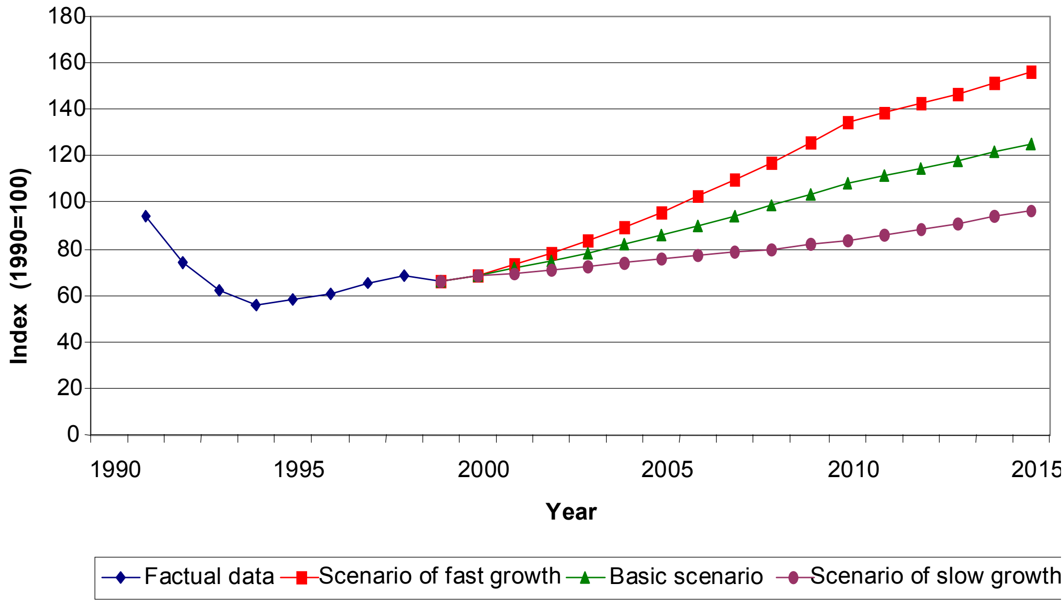
After the shut down of the Ignalina NPP, the power supply would be assured through the thermal power stations, the capacity of which would be sufficient until 2015-2020, because energy consumption has significantly decreased after the year 1990 during the time of independence of Lithuania.

1 Development of economical parameters in Lithuania.

Principal changes of economical system of the country – conversion into the market economy – were triggered by reestablishment of Lithuania's independence. Deep decline in economy was caused by transition period and reorganization to market economy, changes of production sale and related quantitative and qualitative changes of production. Gross Domestic Product (GDP) of year 1994 took only 56 % of the year 1990 level. Tendencies of increase were manifested in 1995. Since that time economy of the country has started rising as it could be seen from analysis of major macro economical factors: GDP increased by 3,9 % in the year 2000 and by 5,7 % in the first half of 2003 .

There are three major scenarios of economy development: the main scenario, scenario of fast economy growth, scenario of slow economy growth. The main scenario is based on the tendencies of economy development, taking into consideration the temperate economy growth, prepared by the Ministry of Economy . This scenario was expanded till 2010 by making assumption that the rate of GDP increase will be 4,7 %. Very fast rate of economy growth in Lithuania is forecasted in the scenario of fast economy growth till 2010 (7,0 % in average per year). The basic assumption of all these three scenarios is that the rate of GDP will be 3 % per year after 2010 (when the first stage of economy renovation is completed).

Figure 2: Scenarios of Gross Domestic Product increase



Total demands of primary energy. Decline of economy was accompanied by the similar decrease of energy consumption during transition period into market economy. Primary energy consumption in Lithuania reached 4,6 tons in oil equivalent (toe) per capita in 1990. It was 1,3 times higher than the average consumption in Western Countries of that period. Primary energy consumption in Lithuania dropped till 1,9 toe per capita in 2000, i.e. 2 times lower than the average consumption in the countries of European Union nowadays. Primary energy consumption in Scandinavian Countries reaches 5,8-6,5 toe per capita, in Central and Eastern European Countries – 2,4-2,8 toe.

Decrease of energy intensity, i.e. energy consumption per unit of GDP is extremely important for the economy of the country. Consumption of the final energy, i.e. the total input of different energy sources in sectors of economy per one unit of GDP (by evaluation of GDP value according to parity of purchasing power) in Lithuania now is still 1,2-1,5 times higher than in countries of the European Union on average. However, a great advance in the field of energy efficiency improvement can be noticed – intensity of the final energy has decreased by 35 % in Lithuania in period of 1990-2000. Energy intensity decreased approximately by 43,5 % in the sectors of industry, commerce and public services. Energy consumption per unit of GDP in the sectors of household and transport was slightly higher in 2000 compared to the energy consumption in 1990.

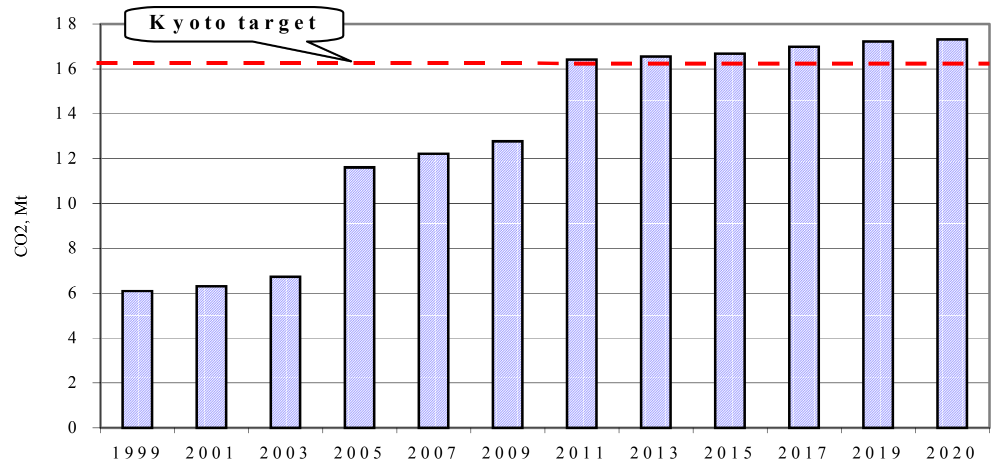
Demands of final energy, which is consumed in the sectors of economy, would increase for only 30 % per fifteen years according to the scenario of slow economy growth. Demands of energy and energy efficiency would be the highest according to the scenario of the fast economy growth. Even by this scenario, if the energy demands in 2015 were higher by 70 % than in 2000, it would take only 75 % of the energy consumption in 1990. Meanwhile, GDP at the end of the forecasted period would exceed the level of 2000 by 2,3 times.

2 Influence on environment after the decommissioning of Ignalina NPP

Lithuania has signed the UN Convention on Long Distance Emissions (1979) and the Nations Framework Convention on Climate Change (UNFCCC, 1992), which is intended to perform regulation of the emission of “greenhouse” gas (GHG). Large part of EU requirements on reduction of environmental pollution in the sectors of energy and industry concerning assessment of air quality have already been implemented in Lithuania [85]. Commitments of Lithuania, as well as of other European countries, according the Kyoto Protocol in 2008-2012 are to reduce GHG emissions by 8% based on 1990 level. Such requirements are set in Kyoto Protocol of UN Framework Convention on Climate Change (1997). In addition, Lithuania is obliged to assure, that till the year 2010 the emission of the following pollutants will fall short the following limits: emission of SO_2: 142·103 t/a, emission of NO_x: 110·103 t/a and emission of non-methane volatile organic compounds (VOC): 92·103t/a. The limit for emission of CO_2 from stationary sources of energy generation would make 28·106 tons. Keeping to this limit depends on the future of Ignalina Nuclear Power Plant, development of industry, energy efficiency improvement and utilization of renewable energy sources. Emission of CO_2 will increase after decommissioning of Ignalina NPP because the demand of electric energy will be covered by existing thermal power plants, i.e. by burning fossil fuel.

The largest emission of GHG in Lithuania falls to the sector the sector of production of thermal and electric energy. A forecast of emission of CO_2 for this sector was performed by experts of Lithuanian Energy Institute.

Figure 3: Forecast of emission CO_2 in electric and thermal power generation sector



Emission of CO_2 from this sector will increase sharply in 2005 and 2011 after decommissioning of Ignalina NPP Unit-1 in 2004 and Unit-2 in 2010 correspondingly. After decommissioning of Ignalina Unit-2 in 2010 emission of CO_2 will achieve 16,3 Mt, 16,5 Mt in 2012 and 17,3 Mt in 2020. It can be stated according to such forecasts, that Kyoto target can not be implemented without additional measures for reduction of atmospheric pollution in the sector of electric and thermal energy generation. The main measures are as follows:

- to install modern technologies in energy production - progressive systems for consumption of organic fuel (co-generation- small and big scale CHP;
- to use fuel with less emissions of SO_2 or CO_2 – natural gas instead of heavy fuel oil;
- to renovate buildings and modernize their energy facilities.
- to use local, renewable and waste energy resources;
- to increase the energy efficiency in the industrial processes;
- to perform information, education and consultation activities.

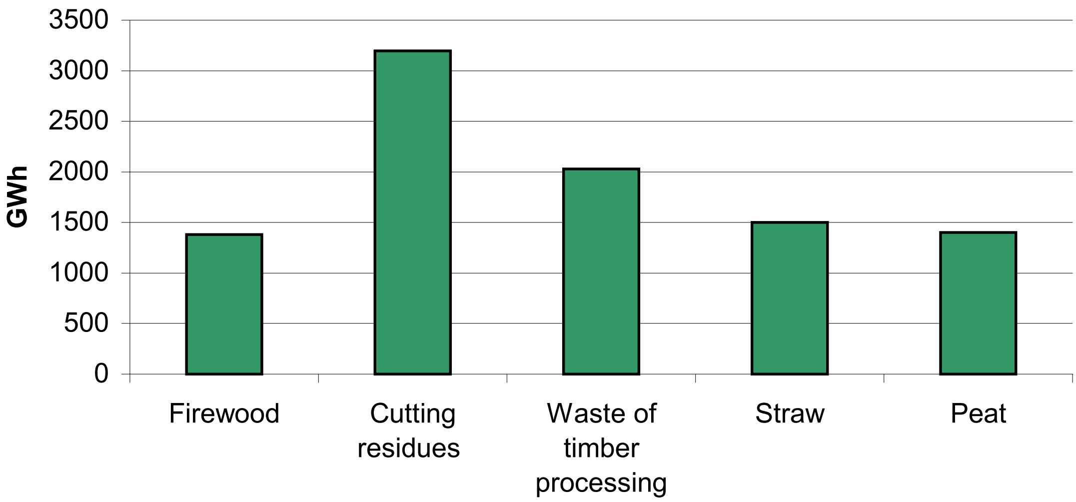
The another problems for Lithuania will occur due to implementation of Directive 1999/32/EC of European Union because usage of heavy fuel oil with large content of sulfur (more than 1 %) will not be allowed since 1 January 2003. This directive was adopted as a law of Lithuania according to the order of Ministry of the Environment and Ministry of Communication of Republic of Lithuania “About confirmation of fuel quality indexes, related with environment protection”, issued on 31 August 2001. Under this order, consumption of heavy oil fuel containing more than 1 % of sulfur will be forbidden in territory of Republic of Lithuania since 1 January 2004. It will make great influence on consumption of fuel oil, because only two ways will be left – consumption of fuel oil with low content of sulfur or installation of equipment for cleaning of smoke. Price of energy, generated by using this type of fuel will rise in any way. Alternative way would be to switch on consumption of natural gas. This way requires large investments into development of system of gas supply.

Due to this fact energy production by the means of renewable sources would be especially important in the whole Lithuania. One of the goal of the National Energetic Strategy of Lithuania is to achieve that renewable energy sources would share not less than 12 % in balance of primary energy by 2010.

3 Renewable energy sources in Lithuania

Plant biomass utilization as solid fuel. The plant biological mass (wood residues, straw, energy plants) is one of the most significant renewable energy sources in Lithuania, that comprises the important part of the local fuel. The annual potential of the wood fuel is approximately 3 Mm3 (1,4 Mm3 of the felling waste, 0,6 Mm3 waste of timber industry and 1 Mm3 of the fire-wood). Now about 2 Mm3 of the fire-wood and timber waste, i.e., approximately 60 - 70 % of the total potential of the wood fuel, is used for the thermal energy requirements, the total power of which is 350 MW. There are many companies in Lithuania that produce equipment for burning of waste wood. The power of the boiler-houses using the wood fuel is constantly increasing. mio. tons of the straw annually is gathered in Lithuania. About 0,5 mio. tons could be used as a fuel. Now 5 boiler-houses using the straw as a fuel with the total power of 10 MW are operating in the country. Only 1-2 % of the straw resources is used for the energy needs. Several enterprises of Lithuania make the equipment for the straw burning in Lithuania.

Figure 4: Potential of local energy sources in Lithuania in GWh/a.



Besides about 30 thousand hectares of the land are not suitable for agriculture in Lithuania and there are about 20 thousand hectares of the peat-bogs the exploitation of which soon be finished. The plantations of the energy plants or quickly-growing trees can be grown there. With the average yield of 10 tons/ha of the dry biomass, 500 thousand tons of the biomass can be harvested annually. There is a possibility to use the silt of the effluent from the water treatment plants to fertilize these plantations. Such investigations were started in Lithuanian Institute of Forestry.

The resources of the biomass fuel can be replenished by using some part of the arable land for the growing of energy plants (agricultural crops and grasses). Such energy crops can give about 10 t/ha of the dry biomass every year, these plants do not exhaust the soil, as they keep the nitrogen in the soil, the usual agricultural machinery is suitable for their harvesting, these areas can be readily re-cultivated. But all these technologies (either tree plantations, or the cultivation of the areas of the energy plants, the plant care, the yield harvesting, the storage and the fuel preparation) must be substantiated. The growing of the energy plants would increase the employment of the village inhabitants.

In order to replenish the resources of the fuel made from the plant bio-mass, the technologies and the strategy of the growing of the plantations of the energy trees and plants must be prepared. The resources of the biomass (agricultural crops and grasses) suitable for the fuel, their growing, the utilization methods and means for the energy needs must be determined. The growing of the energy plants for the fuel would increase the employment of the village inhabitants.

Liquid bio fuels . Approximately 550 thousand tons of diesel fuels and 15 thousand tons of various oils are used annually in Lithuania. The fuels are made of imported crude oil and the oils are imported from abroad. Minimizing the import expenditures and with the employment and environmental problems in mind, it is expedient to substitute some part of the mineral fuels and oils by the biological ones, produced from the rape grown in Lithuania. About 34 thousand tons of ethanol is made annually in Lithuania, but the production capacity is twice as much. The ethanol produced from the extra grain and other agricultural products could be used in the process of the petrol production in company "Mazeikiu nafta". Now is starting to produce bio fuel for diesel engines in Klaipeda region.

Biogas . The resources of the organic materials that can be used for the production of biogas are constantly accumulating and regenerating in the agricultural production of the countries. Some of them are the animal manure and the organic waste of the food processing industry . The total energy potential accumulated is 87,4 mio. m3 of biogas per year or 524,4 GWh.

Consumption of biogas has begun in recent 6-7 years. UAB “Sema”, producer of alcohol in Panevežys town was among the first to start biogas burning in steam boiler of their own. Demonstrational system of 0,185 MW electric and 0,6 MW thermal power was installed in agricultural company “Vyčia” of Kaunas district. Consumed biogas is generated by means of the process of pig’s manure fermentation. Major sponsor of this project was the Government of Denmark. Biogas, generated in Kaunas Sewage Treatment Plant is used for the needs of this plant and has been supplied into boiler-house of Kaunas rajonas heating company since 2001. In boiler-house this biogas is used for generation of thermal power. Quantities of biogas are sufficient for providing hot water into Noreikiškės settlement during summertime. Building of Sewage Treatment Plants is in progress in some other towns and it is projected to consume biogas in those Plants. Biogas from agricultural production and animal husbandry is practically not consumed. Great potential in renewable energy resources could be found here. Monitoring of the operating demonstration power plants and the updating of their technologies will be proceeded.

Wind energy. In order to calculate the potential of wind power and resources of wind power in energy units per year it is necessary to know an annual distribution of wind power in the researched area. However, these data are insufficient for a detailed evaluation of wind power potential because potential of wind power depends on the third degree of wind velocity. Therefore it is necessary to estimate probability of annual distribution of wind velocity. Weibull distribution is the best option to choose here. Theoretical potential of wind power in western Lithuania must be 6 – 7 times higher than in eastern Lithuania .

A possible real potential is indicated 0,2 TWh or 200 GWh . The forecast of wind power consumption in the year 2020 is equivalent to 6300 toe what corresponds to 73 GWh of electric energy. Only 22 MW of constantly operating electric power from conventional power stations or about 65 MW of the total installed capacity in case of wind turbines are necessary in order to generate 200 GWh of energy per year. This amount of energy can be easily generated by a small quantity of WT because their capacity reaches 1 – 5 MW. Much larger quantity of modern WT could be built on the shores of the Baltic Sea, offshore and on a coastal strip.

Results of calculation of technical and economical potentials of wind energy in Lithuania are presented in table 1.

Table 1: Approximate technical and economical potentials of wind energy in Lithuania

Territory	Annual av. Wind velocity	Total area	Agricultural land	Number of 1,5 MW WT	Annual operation time	Annual technical potential	Annual economical potential *	Annual economical potential **
	M/s	km^2	km^2		h	GWh	GWh	GWh
Entire Lithuania	4,0-5,5 red area	3 325	1 662	8 312	1100	13 715	2 743	1 371,5
	3,5-4,0 green area	16 328	8 164	16 328	700	17 144	857	342,9
	2,5-3,5 blue area	43 712	Installation of WT is not recommended					
	<2,5 yellow a.	1 935	Installation of WT is not recommended					
	In total	65 300	–	24 640	–	30 859	3 600	1 714,4

Solar energy. Potential of solar radiation energy (SRE) in Lithuania is investigated. Sunshine duration has been the only energetic parameter of solar radiation perennially measured in majority of Hydro Meteorological Stations (HMS) of Lithuania. Perennial observations of solar irradiance were performed only in Kaunas and Šilutė HMS and only in horizontal plane of solar energetic space. Solar irradiance has been recorded manually once per hour. The data of solar irradiance of Kaunas and Šilutė HMS has been analyzed accordingly to the research program “Solar energy and other sources of renewable energy in agriculture”, 1996-1999. 15 posts for registration of sunshine duration were or will be installed.

The most, medium and the least perspective areas for development of sun energetic in Lithuania were determined . Western Lithuania belongs to the most perspective areas for development of sun energetic. Few small factories have begun the production of simple and cheap (1 m^2 costs 125 EUR) solar cells. Usage of such solar cells could become economic.

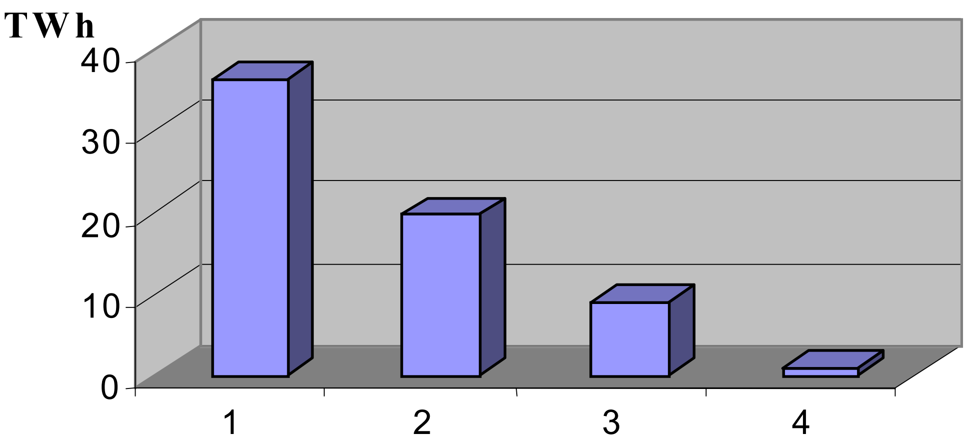
The biggest solar panel (150 m^2) was mounted to cover the summer load for hot water consumption at the Sanatorium for children near Kaunas city.

Photovoltaic. Photovoltaic is considered as the most promising renewable energy species in the Worlds Solar Program 1996-2005. At present the efficiency of commercial solar cells converting solar radiative energy into electricity consists ~15%, that of experimental cells - ~20% and little more. However there are several demonstration photovoltaic modules in Lithuania. The development of solar energy technologies are hampered by a very high cost.

Hydro-energy. The relief of the territory of Lithuania is flat. Average altitude of Lithuanian territory above the sea level is 98 m. Such conditions may be considered as of moderate quality with respect to hydropower resources.

The permission to connect agricultural enterprises to electrical network in 1959 has stopped the development of hydropower and the number of HPP was reduced to the level of 12 HPP in 1988. After restoration of independence in Lithuania (1990) the prices of energy started to grow intensively, therefore hydropower resources have been attracting more and more attention. Employment of hydropower resources goes on and number of HPP is increasing. At present the number of them is 39. The biggest one is Kaunas HPP (110 MW). Now HPP produce about 3% of electric energy in Lithuania.

Figure 5: Proportions of theoretical (1), technical (2) and economical (3) potentials and (4) used hydropower in Lithuania



4 Forecast of replacing nuclear energy by renewables.

Importance, effectiveness and usefulness of utilization of renewable and local energy sources are being discussed by the public and by politicians in Lithuania. The substitution will be stimulated by integration into the European Union, international covenants on environmental protection, increase in the price of imported fuel and so on. It is expected that biomass will be the most important renewable energy source in the future.

Potential and importance of local energy sources (biomass) in Lithuania are highlighted in the Energetic Law of Lithuania, the National Energetic Strategy and Law of Bio fuel.

Firewood and waste wood have been always used in Lithuania for domestic purposes (heating of houses) only and not for central supply of energy. Cutting residues – tops, branches, small stems, bark have not been utilized at all. These are additional and quite sufficient sources of biomass. All this biomass is a potential source of fuel. Straw is the main type of waste of agricultural production. Approximately 10 % of straw may be used for energetic purposes in Lithuania. It is estimated that potential of straw in Lithuania reaches 0,4· 106 – 0,5 · 106 tons annually.

Level of agricultural production in Lithuania will be reduced according to the requirements of the European Union. So, favorable conditions for cultivation of energetic plants should come about.

The largest potential of wind energy is existing in the western part of Lithuania. Present capacities of electric energy generation are distributed unevenly and this is another important factor. All major generators of electric energy are located in the eastern part of Lithuania. Almost all needed electric energy for the western part of Lithuania is transported from Ignalina Nuclear Power Plant and Elektrėnai Thermal Power Plant. Supply lines are exceeding 400 km, and losses of electric energy in supply line reaches 3 – 4 %. Needs for electric energy generation in the western part of Lithuania will emerge after decommissioning of Ignalina NPP. Wind energy is the most acceptable one from ecological point of view. It was calculated that installation of wind energy plants of 800 MW capacity would cover electric energy needs of all Western Lithuania. Installation of wind energy plants in the western part of Lithuania should reduce disproportion of capacities and lower energy losses in supply lines.

One of the goal of the National Energetic Strategy of Lithuania (November, 2002) is to achieve that renewable energy sources would share not less than 12 % in balance of primary energy by 2010.

Table 2: Consumption and forecast of consumption of renewable energy sources an local fuel in Lithuania in 2000 and 2010, in 103 toe

TYPE OF RESOURCES	2000	2010
Wood and wood waste	619.8	795
Peat	11.2	31
Straws	2.5	12
Biogas	1.7	12
Wind energy	-	13
Solar energy	0.001	0.2
Geothermal energy	-	23
Bio fuel	-	64
Municipal waste	-	17
Hydro energy	29.2	40
Total, % in primary energy balance	659.9 9.0	1007 12.0

All energy resources will have to be consumed depending on their possible impact on the environment and human health. All efforts should be made in order to remove all barriers to develop environmentally sound energy supply systems that encourage the sustainable development.

References / Documents / Links

Counties of Lithuania. Economic and social development. LR Statistical department, Vilnius. 2001

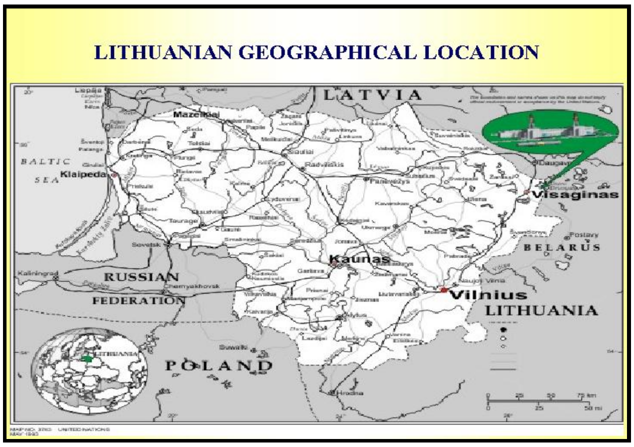
Elaboration of an exemplary energy-conception concerning the intensified supply of renewable energies in the region of apskritis Utena. Report. GERTEC- Kaunas University of Technology, 2002.

Energy in Lithuania 2001. Lithuanian Energy Institute, 2002.

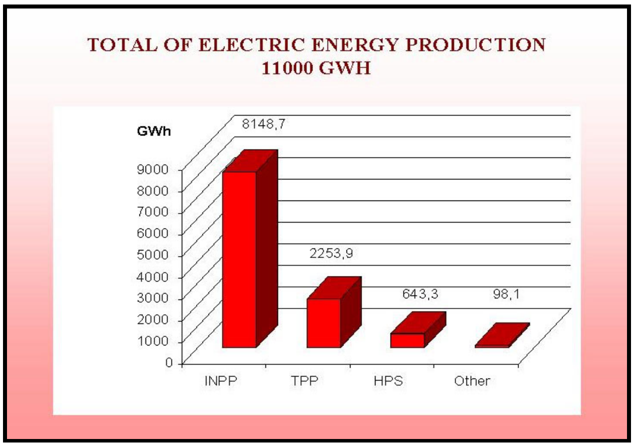
Jarmokas R. Nacionalinei energijos vartojimo efektyvumo didinimo programai – 10 metų // Statyba ir architektūra. 2002. Nr. 4 – 5. P.3-7.

Lietuvos ūkio plėtros prognozė 2002-2005 metams. LR Finansų ministerija.

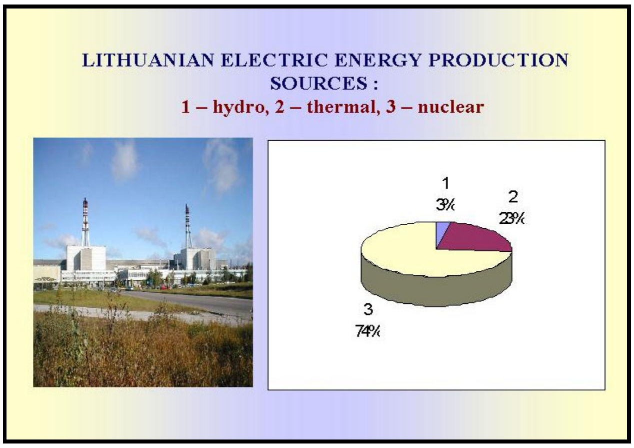
Long-term Strategy of Economy Development in Lithuania. Strategy of Development of Energetic till year 2015. Project. December 2001



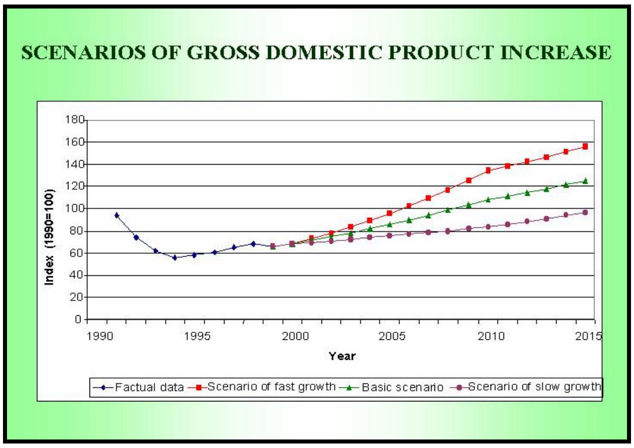
Slide 1



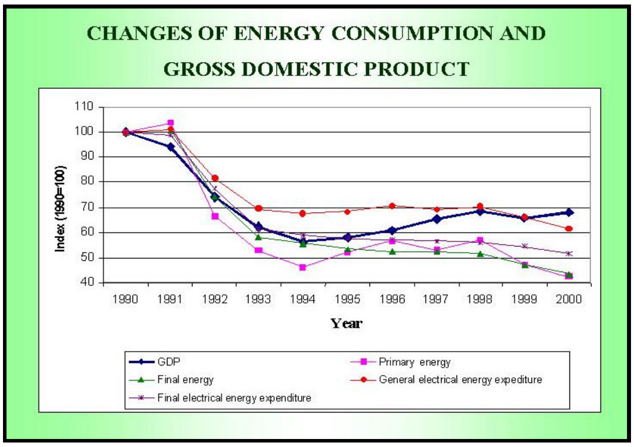
Slide 2



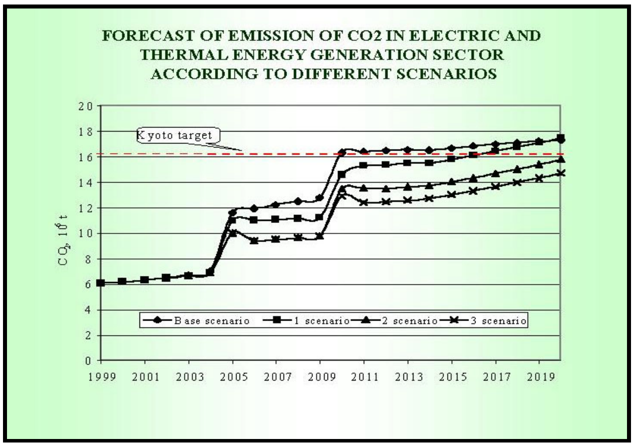
Slide 3



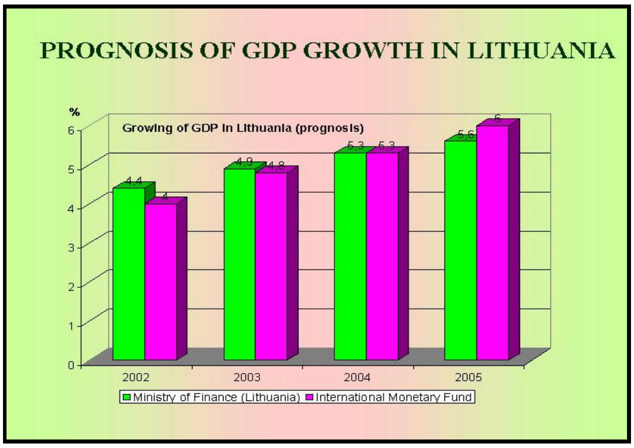
Slide 4



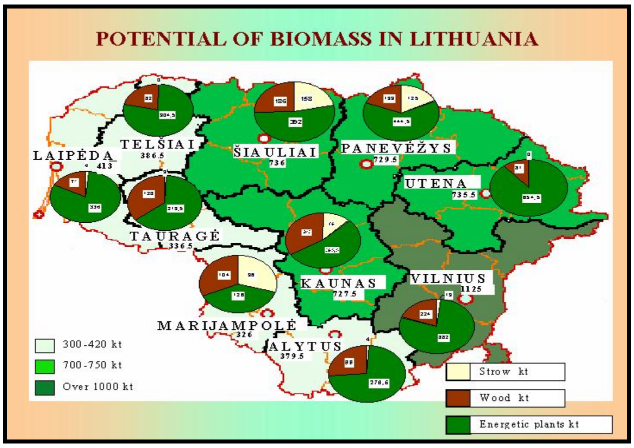
Slide 5



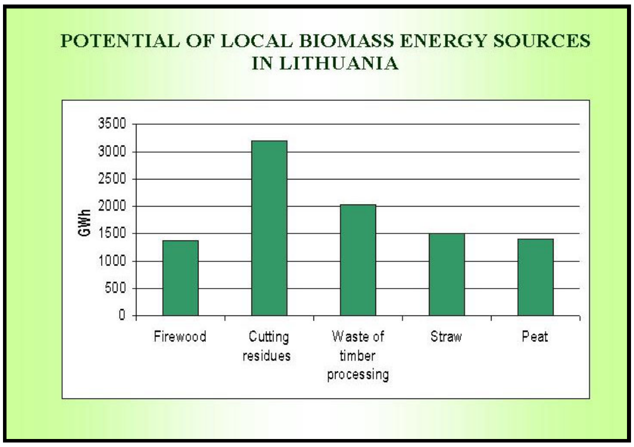
Slide 6



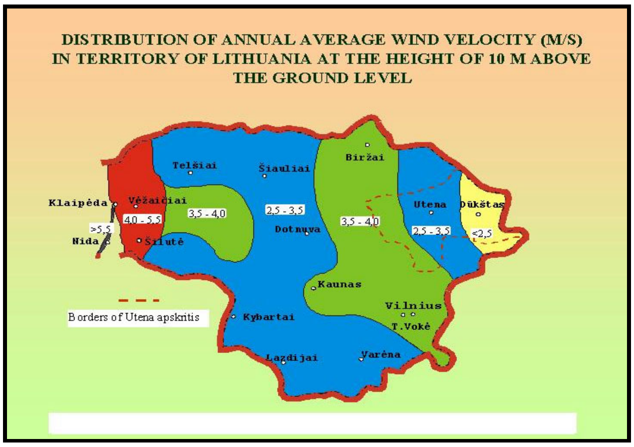
Slide 7



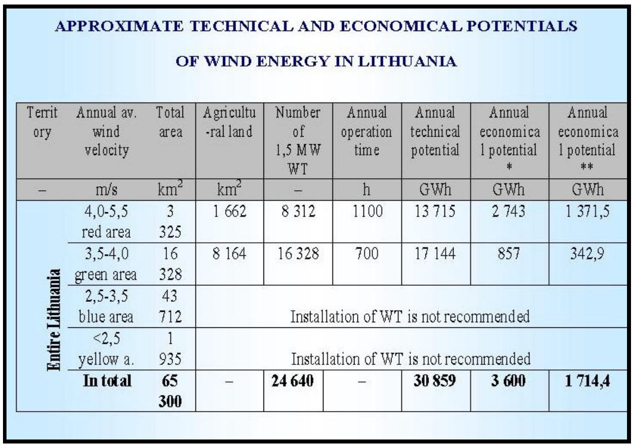
Slide 8



Slide 9



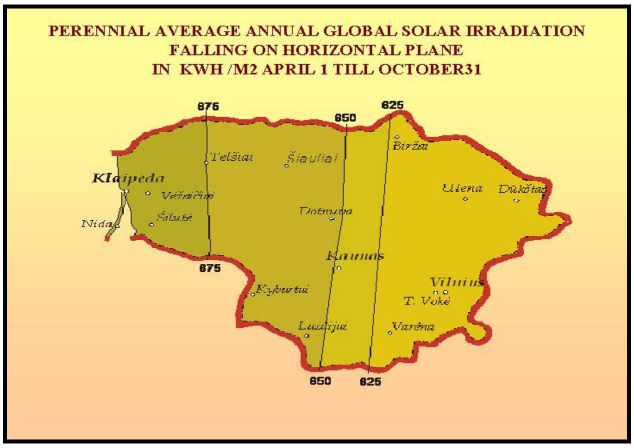
Slide 10



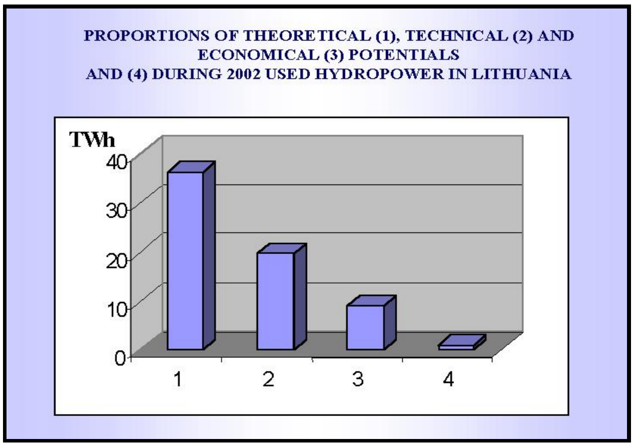
APPROXIMATE TECHNICAL AND ECONOMICAL POTENTIALS OF WIND ENERGY IN LITHUANIA

Territory	Annual av. wind velocity	Total area	Agricultu-ral land	Number of 1,5 MW WT	Annual operation time	Annual technical potential	Annual economical potential *	Annual economical potential **
–	m/s	km²	km²	–	h	GWh	GWh	GWh
Entire Lithuania	4,0-5,5 red area	3 325	1 662	8 312	1100	13 715	2 743	1 371,5
	3,5-4,0 green area	16 328	8 164	16 328	700	17 144	857	342,9
	2,5-3,5 blue area	43 712	Installation of WT is not recommended					
	<2,5 yellow a.	1 935	Installation of WT is not recommended					
	In total	**65 300**	–	**24 640**	–	**30 859**	**3 600**	**1 714,4**

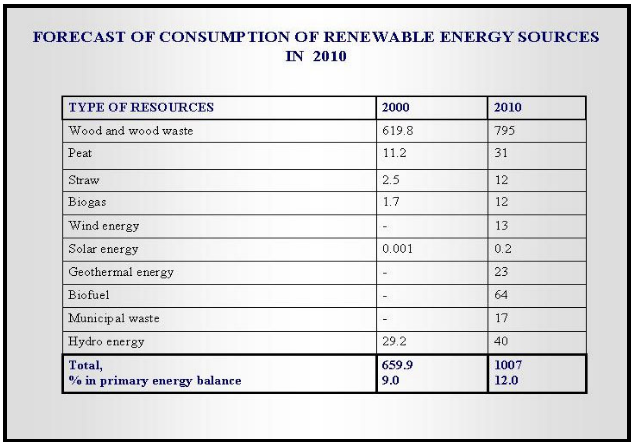
Slide 11



Slide 12



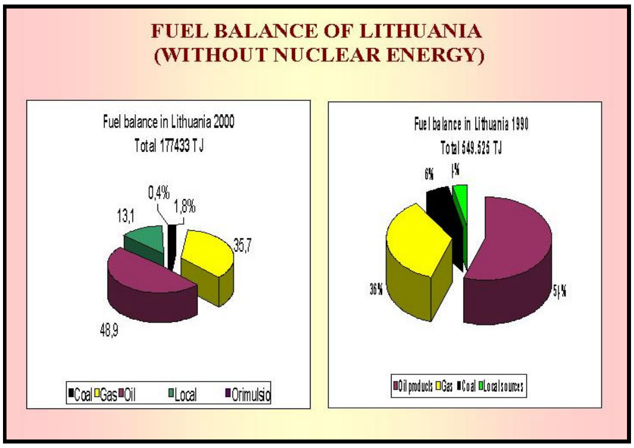
Slide 13



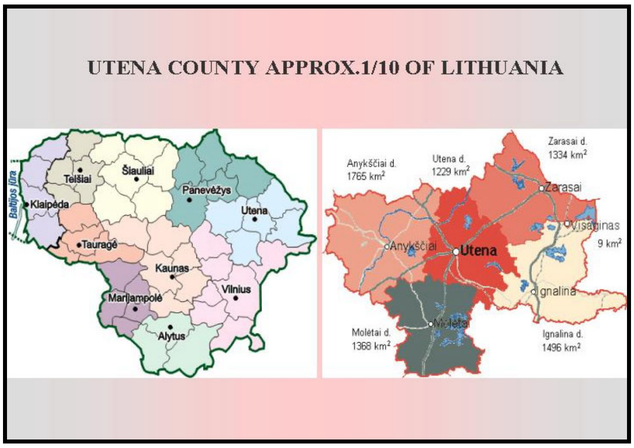
FORECAST OF CONSUMPTION OF RENEWABLE ENERGY SOURCES IN 2010

TYPE OF RESOURCES	2000	2010
Wood and wood waste	619.8	795
Peat	11.2	31
Straw	2.5	12
Biogas	1.7	12
Wind energy	-	13
Solar energy	0.001	0.2
Geothermal energy	-	23
Biofuel	-	64
Municipal waste	-	17
Hydro energy	29.2	40
Total, **% in primary energy balance**	**659.9** **9.0**	**1007** **12.0**

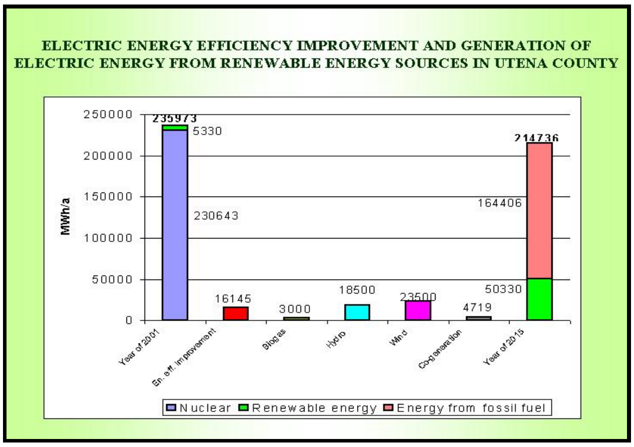
Slide 14



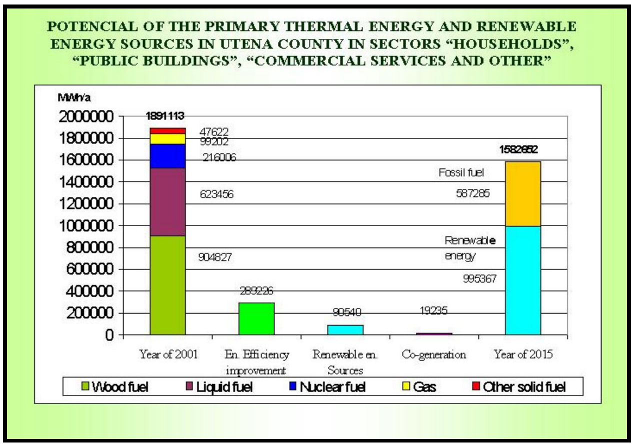
Slide 15



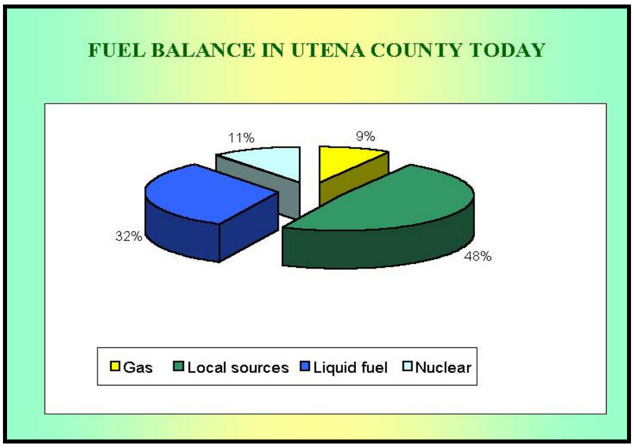
Slide 16



Slide 17



Slide 18



Slide 19

Renewables in the New Energy Acts of Estonia

Dr. Villu Vares
Estonian Energy Research Institute at Tallinn Technical University

In Estonia the Energy Act was entered into force on 1 January 1998. The Act has been amended in 1998, 1999 and in 2001. The latest amendments were enforced on May ; 7, 2001. In 2001 the preparations started to elaborate four new energy-related legal acts (laws), which replaced the Energy Act from the 1st of July 2003. These acts are:

- Natural Gas Act,
- Liquid Fuel Act;
- District Heating Act;
- Electricity Market Act.

Only in the new Electricity Market Act there are articles containing directly or indirectly renewable energy related issues.

According to Electricity Market Act renewable energy sources could be hydro, wave, tidal, solar, geothermal and wind energy, also biomass, landfill gas, biogas and gas collected from sewage water treatment appliances.

Renewable energy producer has to separate in bookkeeping balance all commitments and returns concerning renewable energy from other charges and returns. It allows selling renewable electricity to the grid with 1.8 times higher price than conventional big producers over than 500 MW installed capacity during previous calendar year. It is restricted to cross-subsidy production of renewable electricity by other activities and vice versa. Previously selling price of renewable electricity was connected with final consumer price what is now changed with just mentioned scheme.

A new issue in the Electricity Market Act concerns balancing procedures between electricity producers and consumers. In order to avoid misbalances between production and consumption, grid operator has to check accordance of electricity production and consumption and producers have to supply electricity according to agreed schedule, i.e. if a renewable electricity producer can't supply agreed amount of energy, producer has to compensate using of grid reserves. It might indirectly influence to compatibility of renewable energy producers. As the Electricity Market Act is in force only from 01.07.2003, not all aspects of this feature are clear.

The operation license is needed only for electricity producers over the installed capacity 100 kW, i.e. small scale hydro power plants may operate and sell electricity without bureaucratic procedures for obtaining license and avoid payment of grid connection fee what are obligatory for bigger power producers.

The Electricity Market Act is the main document fixing support to renewables. It is a rather complicated justice document with few subdocuments and near future will show how the new legal system will influence situation in the electricity market and future implementation of renewable energy sources.

Renewables in the New Energy Acts of Estonia

Villu Vares

Estonian Energy Research Institute at Tallinn Technical University

Slide 1

Plan of the presentation

- Changes in energy related legislation
- RES support schemes
- Plans for the future
- Real utilisation of renewables

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 2

Changes in energy related legislation

- Up to 01.07.2003 only one act
  - Energy Act
- From 01.07.2003 four acts
  - Natural Gas Act *
  - Liquid Fuel Act *
  - District Heating Act *
  - Electricity Market Act

*Do not contain any comments on renewables

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 3

Renewables according to Electricity market act

- Non fossil energy sources:
  - hydro, wind, solar, wave, tide, geothermal, landfill gas and biogas, biomass
- Definition of biomass:
  - Agricultural organic waste
  - Wood fuel, forest residue, wood processing residue with biological background
  - Components of industrial and municipal waste with biological background

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 4

Obligation to purchase electricity from renewables

- Distribution company has to purchase electricity from:
  - hydro and biomass (if production started in 1.1.2002 or later - obligation up to 7 years but not longer than 31.12.2015)
  - other renewable resources, mainly wind (if production started in 1.1.2002 or later - obligation up to 12 years but not longer than 31.12.2015)
- If renewable electricity production started before 1.1.2002, purchasing obligation is valid until 31.12.2008

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 5

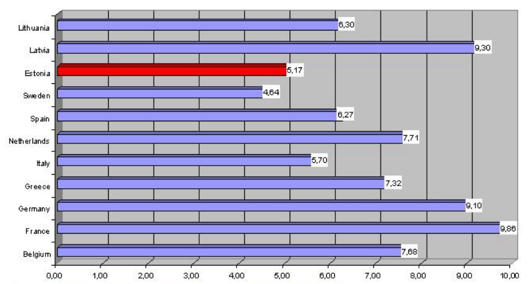
Pricing of electricity from RES

- According previous Energy act (before 1.7.2003)
  - An energy trader has to purchase alternatively produced electricity
    - at a price which constitutes **90% of the basic rate for residential customers** (if the sales volume of alternatively produced electricity doesn't exceed 2% of totally utilised electricity during the previous year
    - at a price which constitutes 60-90% of the basic rate for residential customers (if the sales volume of alternatively produced electricity **exceeds 2% of totally utilised electricity**
  - The VAT level for electricity from wind and hydro **is fixed 0%**
- According Electricity market act (after 1.7.2003)
  - Power grid company has to purchase electricity from renewables with **1.8 times higher price than from big power producers** (over 500 MW) during previous year
  - Higher price will be compensated by power transmission company
  - Sold renewable electricity measuring has to be remotely controlled
  - Renewable electricity producer have to exclude cross subsidies
  - Producers less than 100 kW have not to pay licence fee

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 6

Feed in tariffs in some countries



Source: BTM Consult (03.2002), WindPower Monthly, ETEA, LWEA,

Sweden: also investment support 15%

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 7

Green certificates

- Targeted only for consumers to support development of renewable electricity
- Green certificates allow to deliver support for Estonian Nature Foundation:
  - With level 1 certificate 12000 EEK/767 EUR
  - With level 2 certificate 6000 EEK/383 EUR
  - With level 3 certificate 600 EEK/38 EUR
  - With household certificate 120 EEK/8 EUR

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 8

Green certificates for consumers

Type	Consumption of green electricity, kWh	Target group	Price of certificate, EEK/EUR	Number of certificates
Level 1	120 000	Big companies	103757/ 4311	15
Level 2	60 000	Big and medium companies	51878/311	50
Level 3	6 000	Small companies and public institutions	5131/328	150
House-holds	1 200	Private consumers	1020/65	800

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 9

Rules of state support for environmentally friendly energy projects 1

- Allowed to implement for following projects
  - Energy production from renewables and municipal waste
  - Energy conservation
  - CHP
  - Cleaning of polluted industrial areas
  - Other activities to decrease environmental impact of industry

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 10

Rules of state support for environmentally friendly energy projects 2

- Investment support
- Support to cover operating costs
  - Only additional operating costs after projects' implementation could be compensated
  - Projects could be supported during up to 5 years
  - If support for the first year covers 100% of additional costs, next year support has to decrease
  - If support during the period is constant, it has to less than 50% of additional annual costs

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 11

Development scenarios for development of renewable electricity

Conservative/ main/optimistic scenario	2000	2005	2010	2025
Wind	0.332	20/45/ 60	80/120/200	300/–/600
Hydro	6	18/23/25	24/30/30	60/–/210*
Other electricity from renewables	–	20/55/60	80/170/200	240/–/600
Electricity from peat	19	25/30/40	40/50/60	50/–/80

* - inc 30% of production of HPP on the border river

Electricity production from renewables should be 5.1% of total inland consumption in 2010 according to signed contract with EU

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 12

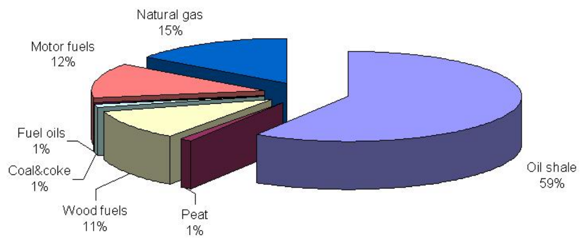
Electricity generation in 2001

Oil shale	7 719 GWh	90.7 %
Peat	19 GWh	0.2 %
Heavy fuel oil	2 GWh	0.1 %
Shale oil	32 GWh	0.4 %
Natural gas	560 GWh	6.6 %
Other fuels	172 GWh	2,0 %
Hydro- and wind energy	6 GWh	0.1 %

20-24/09/2003 Tutzing, CTI Villu Vares

Slide 13

Shares of energy sources in TPES, 2001



20-24/09/2003 Tutzing, CTI Villu Vares

Slide 14

Thank you for your kind attention!

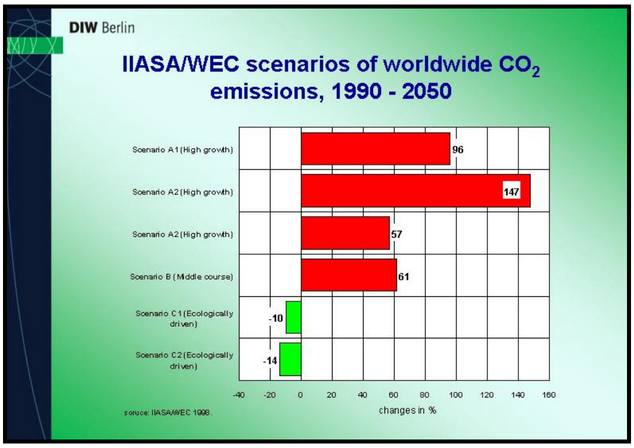
20-24/09/2003 Tutzing, CTI Villu Vares

Slide 15

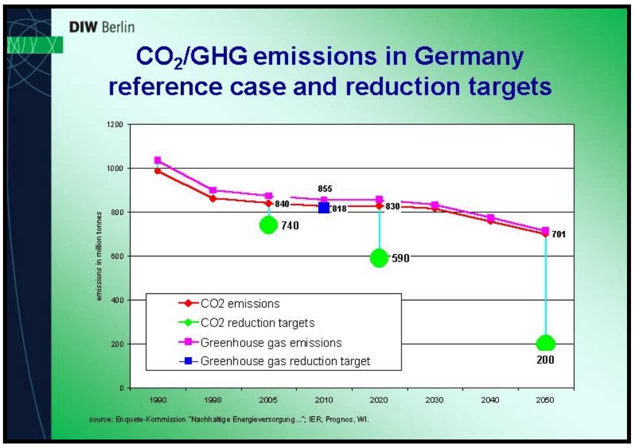
Discussant Notes:
Session Incentive Schemes for Renewables

Dr. Hans-Joachim Ziesing
German Institute for Economic Research (DIW), Berlin

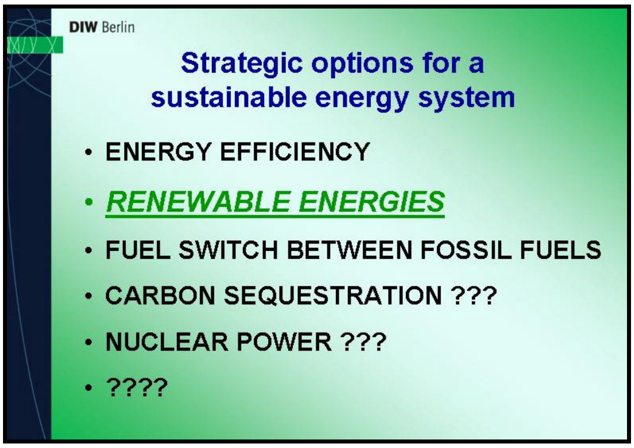
Slide 1



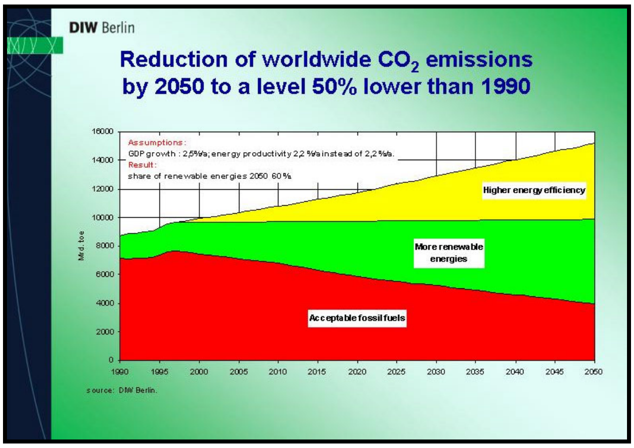
Slide 2



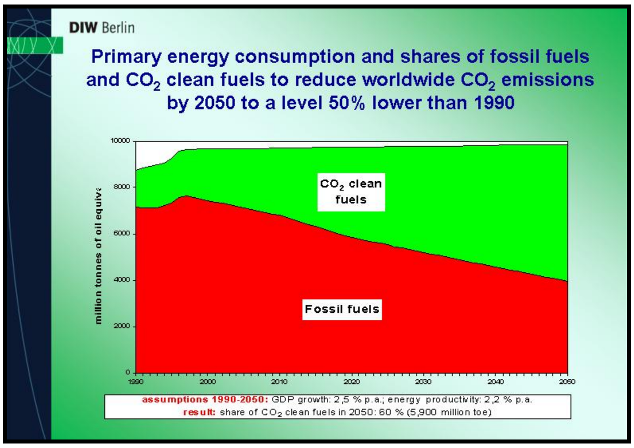
Slide 3



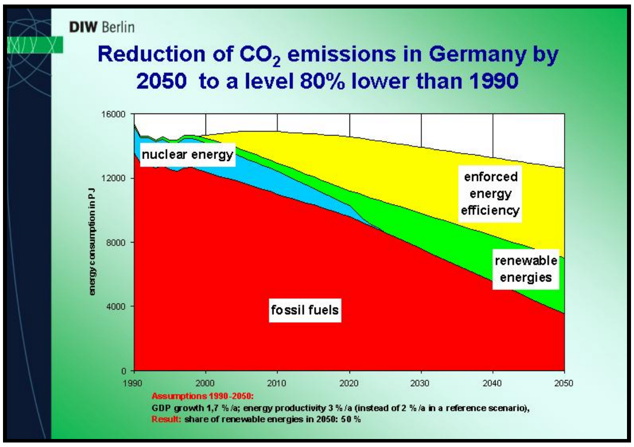
Slide 4



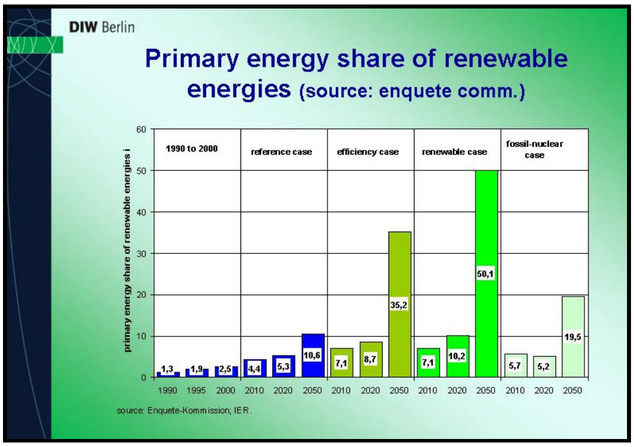
Slide 5



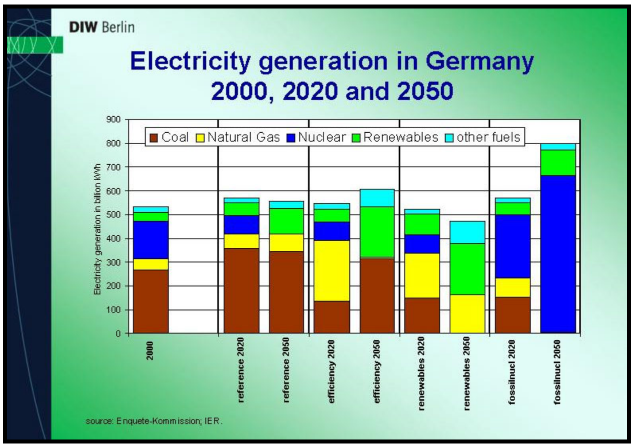
Slide 6



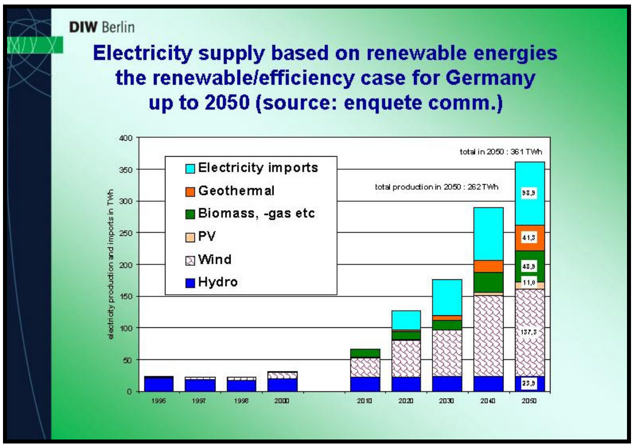
Slide 7



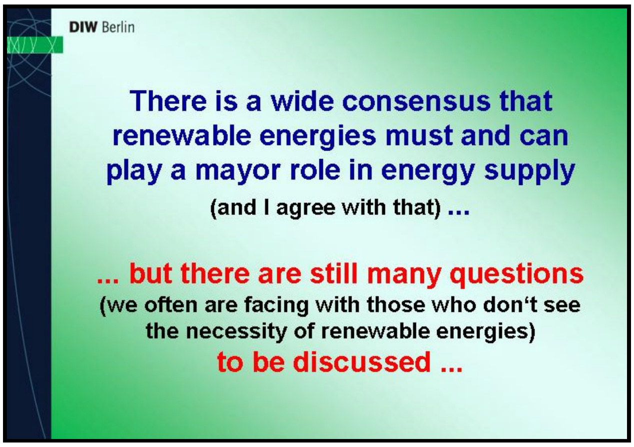
Slide 8



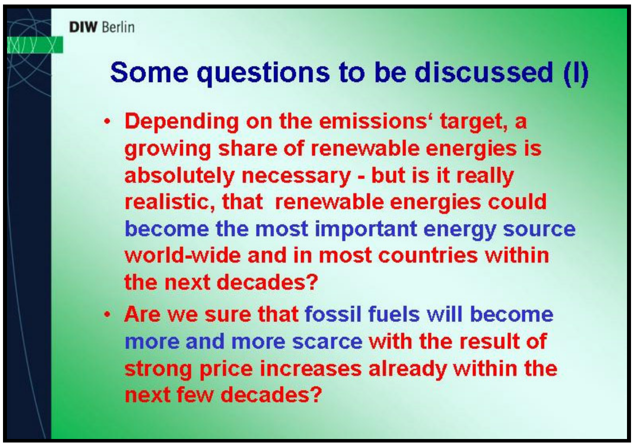
Slide 9



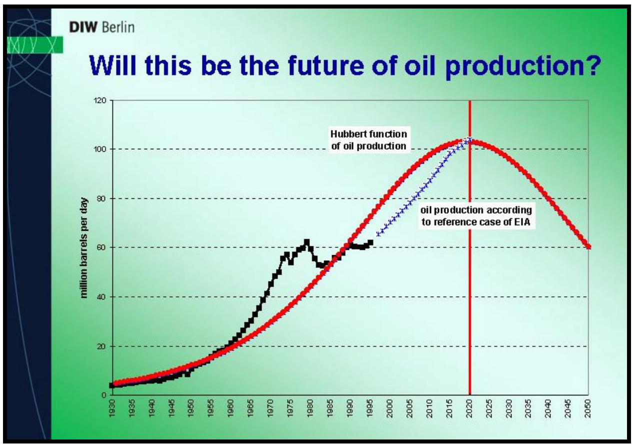
Slide 10



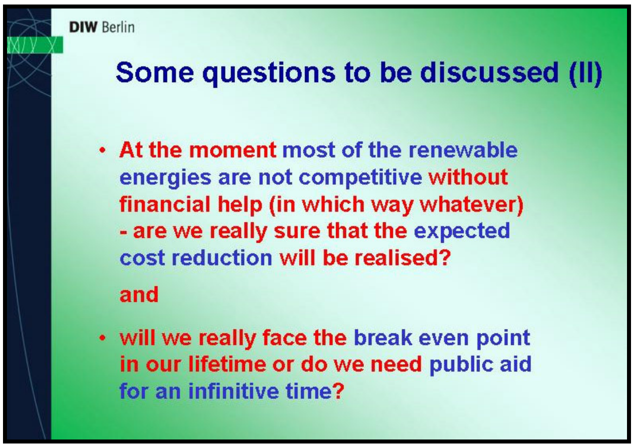
Slide 11



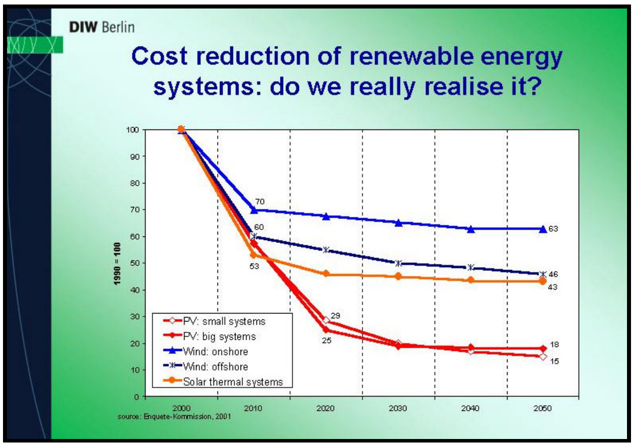
Slide 12



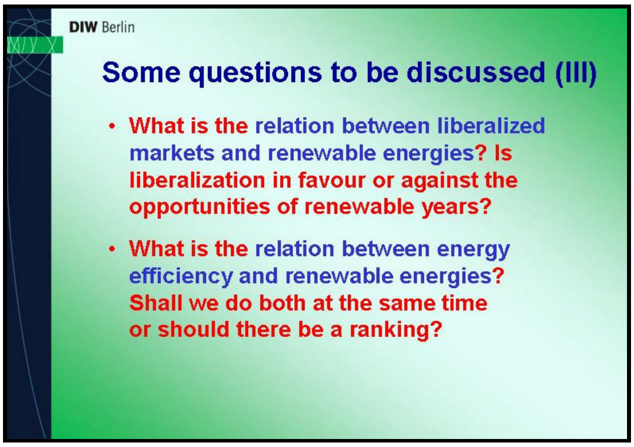
Slide 13



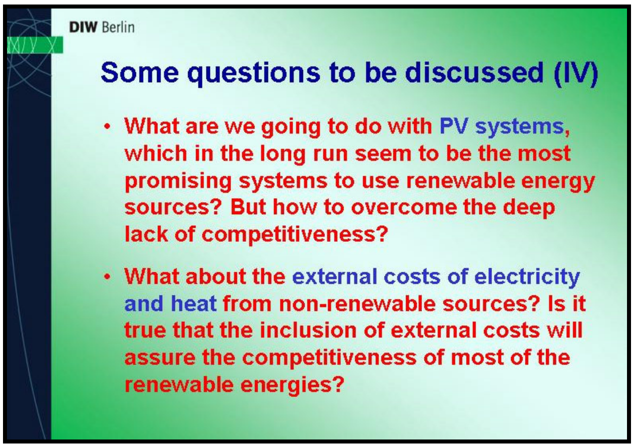
Slide 14



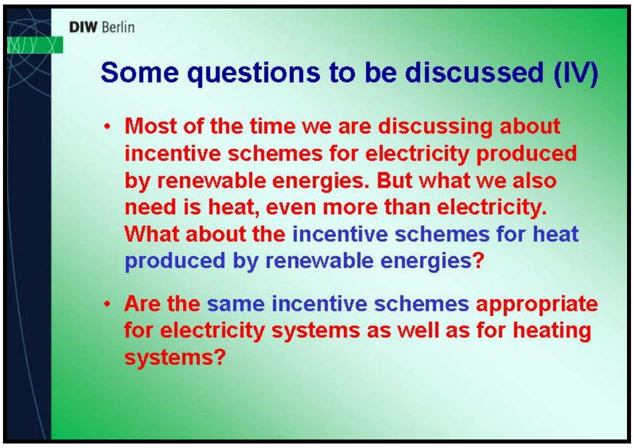
Slide 15



Slide 16



Slide 17



Slide 18

Slide 19

Bankable Energy Efficiency Projects - How to Get Energy Efficiency Investment Financed

Dr. Petra Opitz
German Energy Agency (dena), Berlin

In January 2003 the EU-SAVE Project Bankable Energy Efficiency Projects – BEEP took off. It is designed to develop economically viable, large-scale investment projects for improving energy efficiency in selected Central and Eastern European (CEE) countries (Poland, Czech Republic, Slovakia, Bulgaria and Romania). BEEP will find and fully develop at least one profitable investment project for improving energy efficiency in each participating CEE country, and prepare each project's funding application to the European Bank for Reconstruction and Development (EBRD) and/or national financial institutions. This work will also include selecting appropriate national or international investors for the preferred model of private financing.

The selected projects will be designed to meet the standards of the EBRD and will take into account legal, administrative and economic factors in participating countries.

Nine partners from the EU and accession countries are involved in this project. The partners participating in BEEP are: dena (coordinator, Germany), CRES (Greece), EEA (Bulgaria), ENVIROS (Czech Republic), E.V.A. (Austria), ife (Norway), ISPE (Romania), KAPE (Poland) and SEA (Slovakia). It is also supported by a steering committee of EBRD, KfW, UNDP, World Bank and BASE representatives, who will provide needed advice.

BEEP will assess, record and compare the present capacity to finance measures for improving energy efficiency in all partner countries. Projects will aim to meet the requirements of banking institutions regarding risk assessment, equity capital, contractual arrangements and legal framework conditions. BEEP will also continually update information on the status of legislation to promote energy efficiency in participating CEE countries and disseminate this information to interested parties in partner countries. National reports on the existing framework have been published on the project’s own website: www.save-beep.org

The EBRD "Guide to Bankable Energy Efficiency Proposals" will be expanded to list relevant national prerequisites and requirements, information needed by financial institutions for assessing the “bankability” of proposed energy efficiency projects. The guide will also address political and administrative decision-makers and others in the energy sector, advising them how to set framework conditions that attract private capital. Energy managers, banking staff, consultants, investors and others have been be trained by the EBRD in May 2003 to design business plans, a fundamental part of applying for large-scale investment funding.

Finally, a workshop held in each of the five participating CEE countries will draw the attention of potential private investors to the new market for installing energy efficiency measures in CEE countries.

BEEP will contribute to exploiting the energy savings potential in CEE countries, a potential that needs large-scale private investment to be fully accessed. It will help to overcome investor reluctance due to the inability to deal with changing conditions coupled with financial institutions' planning and information requirements. The project will help to open up new market opportunities for suppliers of technology and energy providers in EU countries; it will provide the EU with information on the conditions for improving energy efficiency in CEE countries.

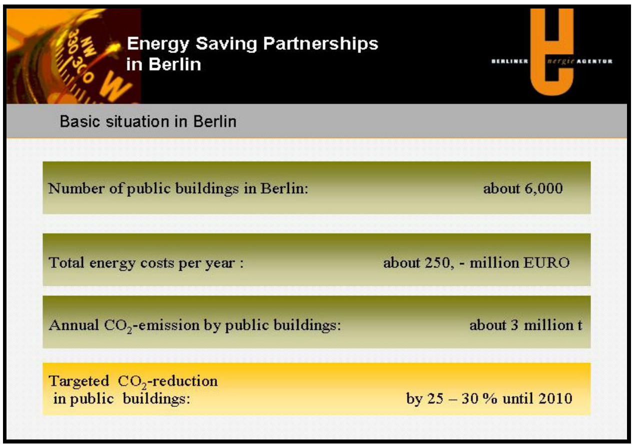
The project will also help to integrate EU accession countries by advising political decision-makers on how to create competitive market conditions and encourage private investment in energy efficiency measures. It will be terminated at the end of 2004.

Clear Contract - Clearinghouse for Contracting

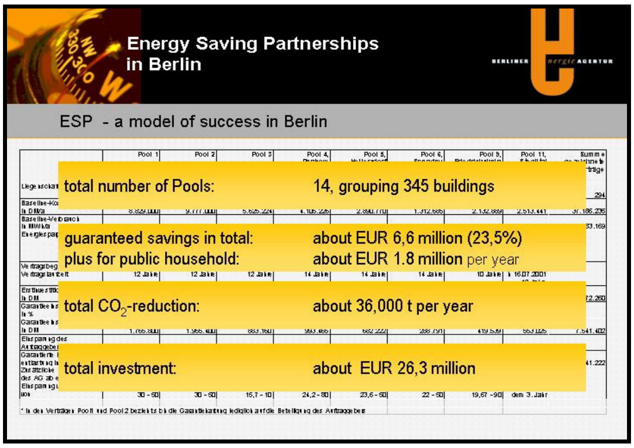
Ralf Goldmann
Berlin Energy Agency

Slide 1

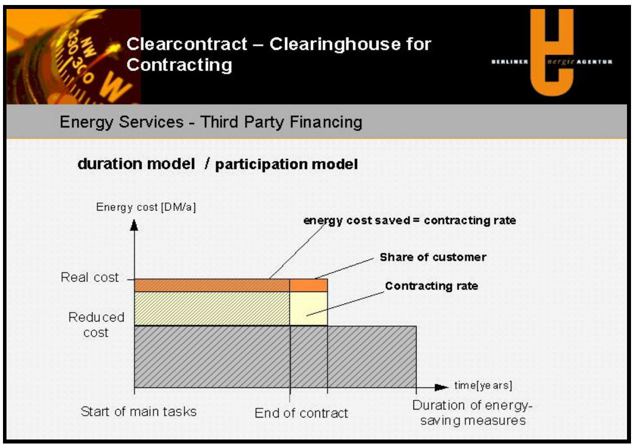
Slide 2



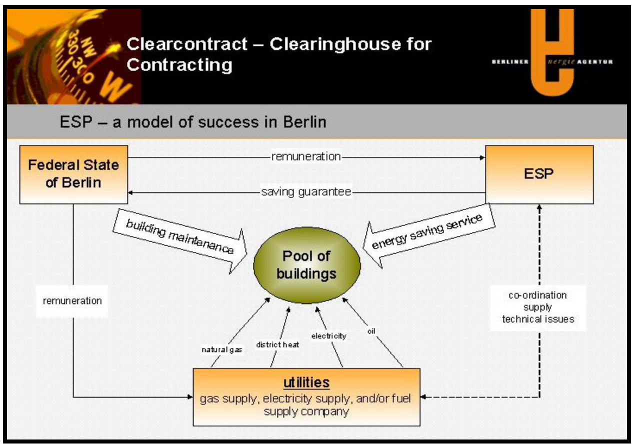
Slide 3



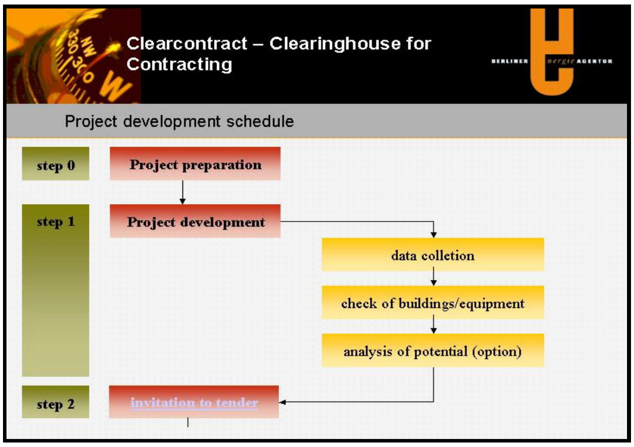
Slide 4



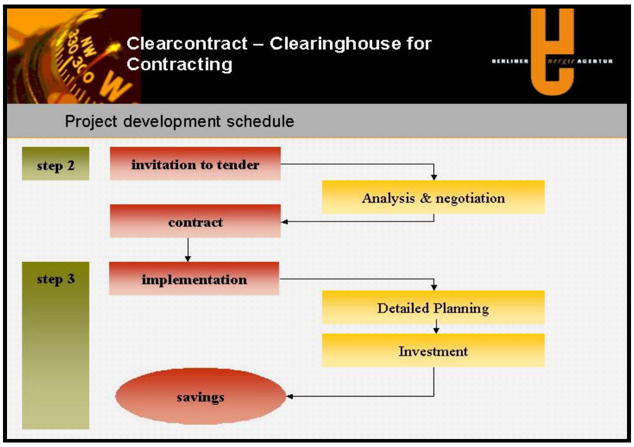
Slide 5



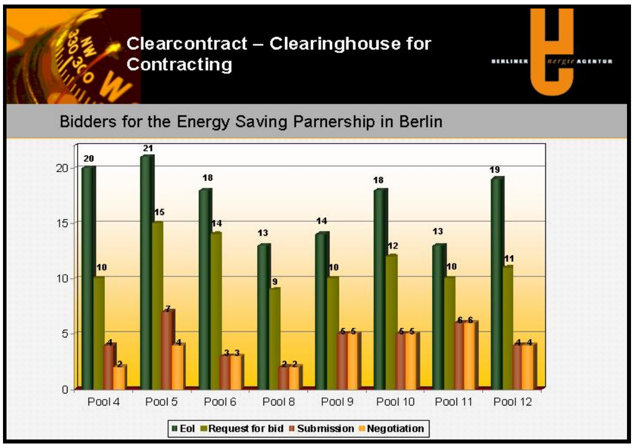
Slide 6



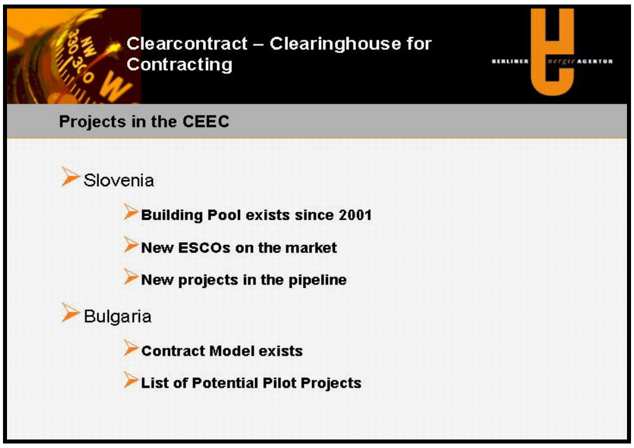
Slide 7



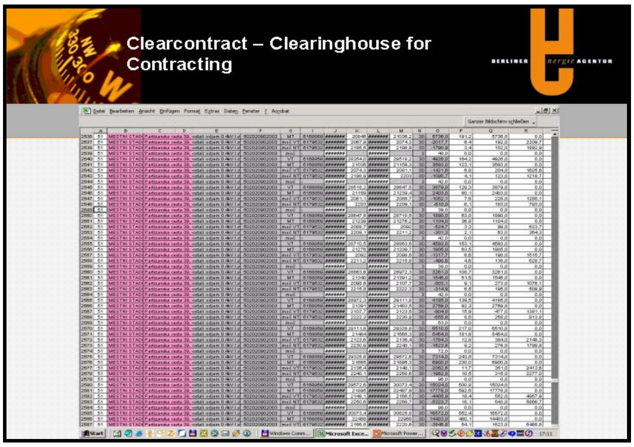
Slide 8



Slide 9

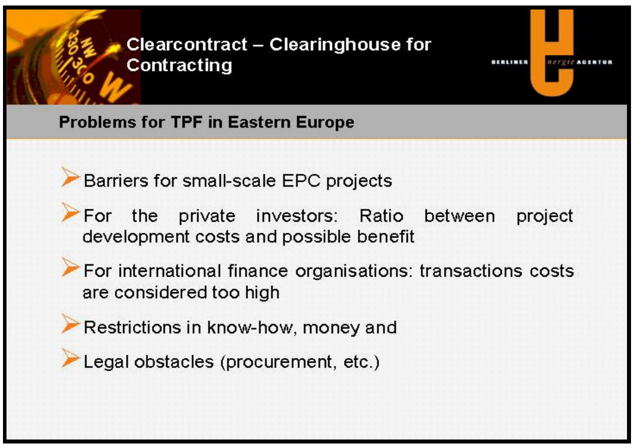


Slide 10



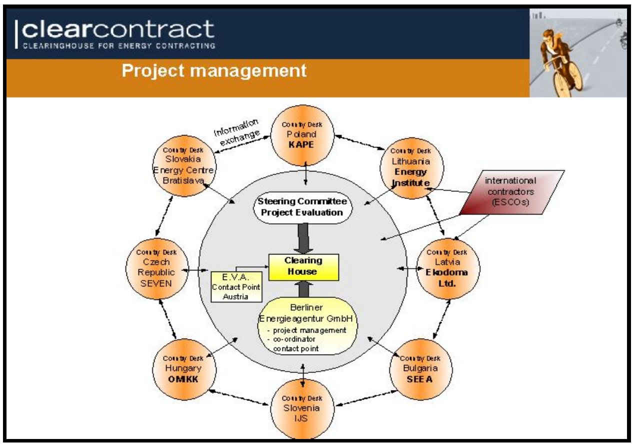
Slide 11

Slide 12



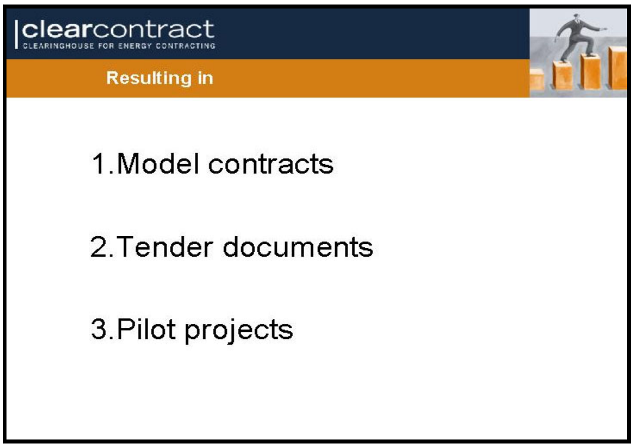
Slide 13

Slide 14



Slide 15

Slide 16



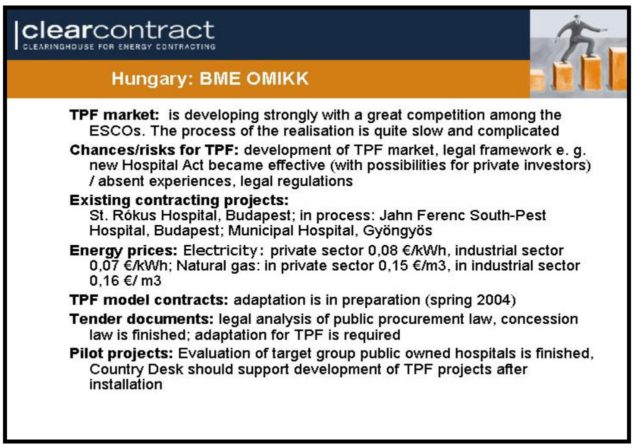
Slide 17

Slide 18

Slide 19

Slide 20

Slide 21



Slide 22

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Poland: KAPE

TPF market: TPF is existing from the beginning of 90's, but total market share is insignificant; there are only a few Polish and foreign providers (total 15)
Chances/risks for TPF: existing TPF potential, legal framework / barriers (awareness, know how, financing), e. g. absence of experiences; lack of guarantee fonds and specific knowledge for financing projects
Existing contracting projects: projects cover both the municipal sector (public buildings, infrastructure) as well as private one (mainly housing cooperatives), a project started recently in the city of Łódź covering over 400 public buildings
Energy prices (average): heating oil: 1,59 PLN/l (0,37 €/l) natural gas: 1,16 PLN/m3 (0,27 €/m3, LPG: 1,20 PLN/l (0,28 €/l), hard coal: 480,00 PLN/t (110,50 €/t) electricity: 0,32 PLN/kWh (0,07 €/kWh), district heating: 24 – 42 PLN/GJ (5,53 – 9,67 €/GJ)
Model contracts, Tender documents : elaboration of standard documents is in preparation, realisation till February 04
Pilot projects: several are planned (hospital, municipality, housing company, prison); additional including of thermal refurbishment in TPF

Slide 23

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Lithuania: LEI

TPF market: TPF potential is availabel, but there is not a developed market, total market share of TPF is insignificant; there are only a few Lithuanian and foreign providers
Chances/risks for TPF: existing TPF potential / barriers (awareness, know how, financing), main barriers are the ration between the project development costs and the possible benefit from the project for the private investor (absence of experiences; lack of guarantee fond and specific knowledge for financing projects), absence of special legal regulations
Existing contracting projects: some positive projects, which have been implemented in past
Energy prices (average): electricity 0,084 €/kWh (residential sector)
Model contracts, Tender documents: elaboration of standard documents was started (adaptation of Hesse model contract till end of October), realisation till June 04
Pilot projects: 3 potential pilot projects are identified, first preparation started with hospital Alytis

Slide 24

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Latvia: EKODOMA

TPF market: potential available, emerging market, competition among the ESCO's
Chances/risks for TPF: development of TPF market, legal framework e. g. for municipalities Concession tender, Concession Contract / absent experiences
Existing contracting projects: Leasing of boiler stations, CHP-projects, TPF projects for street lighting and efficient lighting of a sports hall
Energy prices: Electricity: 0,0617 €/kWh
Model contracts: adaptation of Hesse model contract till March 04
Tender documents: elaboration of standard documents till July 04
Pilot projects: in preparation for public buildings, residential and private service sector

Slide 25

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Bulgaria: EEA

TPF market: TPF potential is availabel (energy efficiency potential of building stock 30-40%), but there is not a developed market; there are only a few Bulgarian and foreign providers
Chances/risks for TPF: existing TPF potential, model contract for EPC, legal framework / barriers (awareness, know how, financing), main barriers are the absence of experiences and specific regulations, lack of guarantee fond and specific knowledge for financing projects
Existing contracting projects: EPC in a pool of 300 public buildings in Sofia (KES), co-financed by RWE solutions; some projects with combined energy services in municipalities (schools, hospitals), co-financed by GEF/UNDP
Energy prices (average): electricity: for private sector 0,039 €/kWh, industrial sector 0,043-0,056 €/kWh; district heating 15,69 €/MWh; natural gas: 127,9 €/1000Nm3
Model contracts: Hesse model contract is adapted,
Tender documents: standard documents will be elaborated for pilot projects
Pilot projects: some potential pilot projects were identified and assessed (owned by Ministry of Education, Municipalities), preparation was started

Slide 26

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Slovenia: IJS

TPF market: TPF market is evolving slowly, there are some domestic TPF providers, while foreign ESCO's until now haven't shown too much interest to get involved (might be partly due to the small market and partly due to the pretentious requirements for the bidders from the Publ. Procurem. Act)
Chances/risks for TPF: existing TPF potential, model contract for EPC, legal framework / barriers (awareness, know how, financing), main barriers are the poor data availability, the absence of experiences and lack of interest by the building owners
Existing contracting projects: One EPC project existing in the Urban Municipality of Kranj, Gorenjska region. The contract for a pool of 26 public buildings was signed in November 2001.
Energy prices (average): electricity: for industry: 0,0516–0,0602 €/kWh, for service sector: 0,0795 €/kWh (excluding VAT), app. 0,0954 €/kWh (including VAT, which is now 20 %);heat price for industry and service sector: 0,0473 €/kWh (including VAT)
Model contracts: Hesse model contract is adapted
Tender documents: standard documents fro project Kranj can be adaptated
Pilot projects: preparation for the municipalities of Koper, Trbovlje and hospitals Valdoltra, Nove mesto

Slide 27

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Slovakia: ECB

TPF market: TPF market is developing strongly with a great competition among the ESCOs, there are 32 ESCO's
Chances/risks for TPF: existing TPF potential, legal framework / main barriers are the lack of financing, standard tools and knowledge (e. g. of commercial banks) for TPF
Existing contracting projects: 20 large district heating projects, some DC and EPC projects in hospitals, a swimming pool, service and industrial companies
Energy prices (average): electricity 0,042 €/kWh (private sector)
Model contracts: adaptation of Hesse model contract in co-operation with SEVEn in preparation
Tender documents: standard documents will be elaborated for pilot projects (final model of public procurement procedure)
Pilot projects: 2 pilot project for EPC in Bratislava (public swimming pool, ice-scating centre) and 1 pilot projects for DC in Handlova are in preparation; 6 audits of public lighting systems are finished

Slide 28

clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Czech Republic: SEVEn

TPF market: TPF market is slowly growing, there are several ESCO's
Chances/risks for TPF: existing TPF potential, legal framework (Energy Conservation Act / main barriers are the lack of financing, knowledge (e. g. of commercial banks) for TPF
Existing contracting projects: roughly some 70 projects were prepared, some of them (15) have been finished
Energy prices (average): Electricity 3,16 CZK/kWh (0,1 €/kWh), Natural gas 0,71 CZK/kWh (0,023 €/kWh); Lignite 163 CZK/100 kg (5,17 €/100kg); Heat price: 334,65 CZK/GJ (10,62 €/GJ) (domestic and small consumers; average - 2001)
Model contracts: standard model contracts were adapted
Tender documents: standard documents were elaborated
Pilot projects: 2 EPC pilot projects: Ostrava railway station, pool with 6 schools in Praha 15 (tendering procedures were finished award decision took place); other projects are in identification

Slide 29

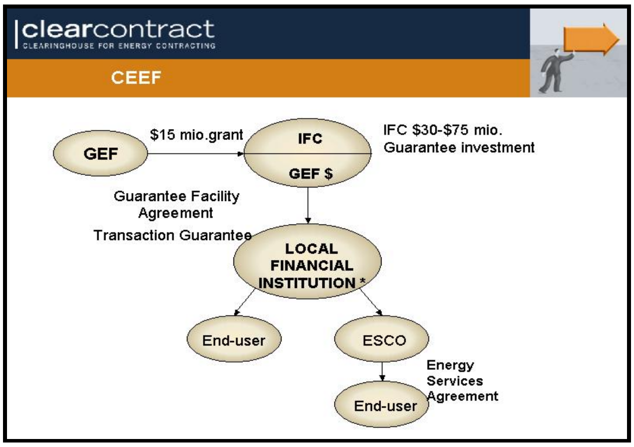
clearcontract
CLEARINGHOUSE FOR ENERGY CONTRACTING

Financing Problems

- Financing Energy Efficiency is still a problem
  - Banks do not understand the system
  - Performance risk
  - Payment risk
  - Relatively small project size
  - Long term contracts

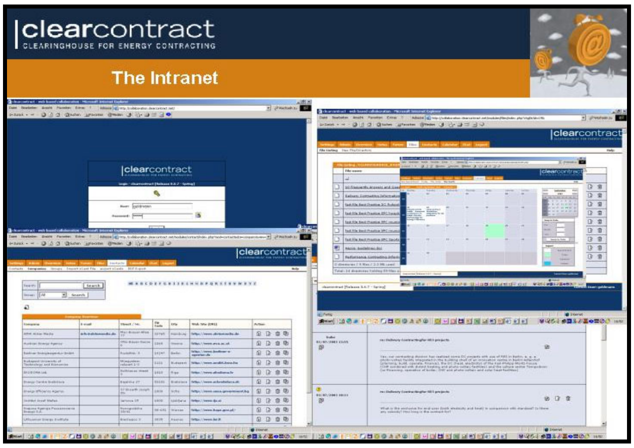
Slide 30

Slide 31



Slide 32

Slide 33



Slide 34

Slide 35

Slide 36

CHP as an Important Element of a Sustainable Energy Use in Germany

Dr. Jürgen Landgrebe
Federal Environmental Agency, Berlin

Introduction

Efficient management of available resources is an important element of sustainable energy supply. Combined heat and power (CHP) generation – the simultaneous conversion of energy into electricity and heat – is a particularly efficient form of energy use.

The advantage which CHP has over conventional, separate forms of production of electricity and heat is that the heat which arises automatically during electricity generation is utilized (cogeneration and high fuel efficiencies). This makes it more environmentally friendly, because it can involve lower CO_2 emissions and a lower consumption of primary energy compared to conventional, separate forms of production. It should be noted, however, that CHP is economically viable only under certain conditions – usually when the plant operates at full load for much of its operating time and if it is located close to heat consumers.

CHP can be used wherever there is a simultaneous demand for thermal and mechanical or electrical energy. Such potential mainly exists in various industrial and service sectors producing energy mainly to meet their own requirements. But CHP can also be used for the efficient provision of electricity and heat to households and small consumers.

The development of CHP can result in a considerable reduction of emissions of the greenhouse gas carbon dioxide (CO_2). Increased use of CHP, therefore, is one central element of the German government's climate protection program.

1 Development, current status and potentials of CHP generation in Germany

CHP plants are, in principle, more efficient than the separate provision of electricity and heat. However, the degree to which energy is saved and, thus, CO_2 is reduced depends strongly on the capacity and type of CHP plant, its design and mode of operation, the system with which it is compared, and the input fuel. Typical indicative values for the energy saving achieved by CHP are between 15 and 30%. Depending on input fuel and the system with which CHP is compared, CO_2 reduction can vary between +-0% (coal-fired CHP plants) and +50% (gas-fired CHP plants).

According to capacity needs, possible uses of CHP range from heat supply to small and medium-sized buildings, through local heat supply systems and networks, to improved usage of existing large district-heating networks. Economically viable CHP potentials can be tapped through the following measures, in particular:

- Increasing the CHP coefficient, e.g. through modern combined-cycle gas turbines,
- Replacement of heating stations, particularly when done in combination with a conversion to gas,
- Increasing connection rates, particularly where a district-heating network already exists,
- Modernization of industrial CHP plants.

Problems facing CHP in Germany

The development of CHP plants was, however, hindered considerably in the past decade by economic problems. Against the backdrop of the liberalization of energy markets, electricity became cheaper whilst the prices for the fuels – such as oil or gas – increased. This made CHP plants less profitable. As a result, hardly any new plants were built in Germany in the late 1990s, and many plants had to go off-stream for economic reasons. In industry the amount of electricity produced in CHP plants before and after the liberalization of electricity markets fell from 44 159 TWh in 1995 to 35 662 TWh in 1999 (see figure in Policy Scenarios III, p. 65).

Supply of district heating (feed-in to the grid) also decreased – since 1990 in the new Federal States and since 1996 in the old Federal States (see figure AGFW). The extension of heat distribution networks (small and large) plays an important role for the use of CHP. However, in Germany, only some 7% of final energy consumption for space heating and hot water in private households is supplied by district heating. Just under 80% of this amount comes from environmentally compatible CHP and about 2% from the use of industrial waste heat. There is still considerable development potential, particularly for the provision of district heating by CHP plants.

CHP electricity currently accounts for only about 9% of total electricity production. For comparison: in Finland its share of total electricity production is about 35%, and in the Netherlands and Denmark, Germany's neighbors, about 50%!

Especially the need for renewal in the power plant sector in coming years will present substantial opportunities for CHP in Germany (see slide: Development of power plants up to 2020).

2 Techniques for an efficient use of CHP

Plant technology

A broad spectrum of efficient and cost-effective CHP plants ranging in capacity from a few kWel to several 100 MWel are already available today. In the upper capacity range, modern gas-fired combined-cycle power plants will likely play a prominent role.

These plants, which today are mostly run in the medium-load range, can be adjusted quickly, due also to their small size, and therefore offer flexibility in responding to fluctuations in demand in the context of an intelligent grid management. This means that the development of this plant technology is a technically feasible and economically viable option also under the conditions of a further development of renewable energies – particularly wind energy. The higher fuel costs for natural gas – as compared to coal – contrast with distinctly lower fixed costs in the operation of gas-fired combined-cycle power plants.

In the low and medium capacity range, plants for decentralized CHP generation are increasingly penetrating the market. Internal combustion engines, gas and micro-gas turbines, fuel cells, Stirling engines, Organic Rankine Systems (ORC) and Kalina Cycle systems are all very dynamic in their technical and economic development. These plant technologies make it possible to provide individual purchase profiles which enable an efficient use of CHP and the connection of additional consumers. The fuel cell is expected to have the largest potential in this regard. With the gas-fueled stationary fuel cell, a highly efficient CHP electricity generation technology will be launched on the market - probably from the year 2005 - whose high flexibility will make the decentralized use of CHP distinctly more attractive. Provided that the pilot projects currently ongoing do not uncover any serious technical problems, total installed capacity is expected to reach some 700 MW as early as 2010.

Decentralized CHP

Decentralized supply of heat and electricity offers considerable potential and opportunities for CHP. Small decentralized systems have the potential to be more reliable, efficient and environmentally friendly not only because of their proximity to the consumer. By pooling many decentralized producers by means of instrumentation and control technology, "virtual power stations" can be created which have system-inherent advantages over large, centralized power plants. The trend towards integration into decentralized systems can, however, only assert itself if it is not impeded by external framework conditions. Thus, in Germany, it is important to ensure in coming years that market access for small decentralized energy supply systems is not blocked by new investments in large centralized power plants. In order to gain an increase in the use of decentralized CHP plants, particular attention must be given to the effective promotion of medium-sized energy companies. The larger variety of actors this would bring would boost competition on the energy market. What is more, technologies that can be applied in a decentralized manner require a considerably lower level of investment than conventional power plants and therefore suggest themselves as a field of action for small and medium-sized energy supply companies.

3 Instruments for the promotion of CHP

The new Act on combined heat and power generation of 19 March 2002

The new CHP Act (Act on the preservation, modernization and development of combined heat and power generation) of 19 March 2002 aims to support the German government in its goal to reduce CO_2 emissions by a total of 23 million tones by 2010 by developing CHP. This goal is to be achieved by protecting for a limited period, and modernizing existing cogeneration plants, the additional construction of small cogeneration plants (< 2 MWel) and by launching fuel-cell power stations on the market.

The new CHP Act is integrated into the Agreement between the Government of the Federal Republic of Germany and German Business on the increased use of CHP generation, which was concluded on the basis of the Agreement on Climate Protection of 9 November 2000. In order to promote

CO_2 reductions by the use of CHP, a specific agreement was concluded on 25 June 2001. It supplements the general Agreement on Climate Protection between the German government and German business and aims to reduce absolute CO_2 emissions by 10 million t by 2005 and by 23 million t by 2010 compared to 1998. This agreement further specifies the CHP development goal of doubling the share of CHP electricity by 2010.

The actual implementation of this agreement is of utmost importance: If the CO_2 reduction contributions to be made by CHP plants under the CHP Act are not achieved, there is the risk that the climate protection targets set by the German government, resulting inter alia from the EU burden-sharing arrangement in the framework of the implementation of the Kyoto Protocol, will not be achieved, either.

Important intermediate targets (also on the path towards sustainable energy use) in Germany are:

- Reduction of emissions of greenhouse gases by 21% by 2012 at the latest, and
- Reduction of CO_2 emissions by 25% by 2005 and by 40% by 2020 compared to 1990 levels.

Promotion of CHP plants under the CHP Act

The advantage granted to CHP plants takes the form of remuneration, which, however, must be paid only for those amounts of electricity which are fed into the general supply grid. The remuneration to be paid for CHP electricity fed into the grid varies according to category, and is normally digressive (exception: new small CHP plants of up to 50 kWel and new fuel cells). Details of the remuneration scheme under the CHP Act are shown in the table below.

<table>
<tr><th>Remuneration in cent/kWh</th><th>2002</th><th>2003</th><th>2004</th><th>2005</th><th>2006</th><th>2007</th><th>2008</th><th>2009</th><th>2010</th></tr>
<tr><td>Existing plants
(brought into service by 31.12.1998)</td><td>1.53</td><td>1.53</td><td>1.38</td><td>1.38</td><td>0.97</td><td></td><td></td><td></td><td></td></tr>
<tr><td>New existing plants (new plants or plants modernized at a cost of at least 50% of the original costs that were brought into service between 01.01.1990 and 31.03.2002</td><td>1.53</td><td>1.53</td><td>1.38</td><td>1.38</td><td>1.23</td><td>1.23</td><td>0.82</td><td>0.56</td><td></td></tr>
<tr><td>Modernized plants
(existing plants modernized and again brought into permanent operation between 01.04.2002 and 31.12.2005)</td><td>1.74</td><td>1.74</td><td>1.74</td><td>1.69</td><td>1.69</td><td>1.64</td><td>1.64</td><td>1.59</td><td>1.59</td></tr>
<tr><td>New small CHP plants with a capacity greater than 50 kWel to 2 MWel brought into service from 01.04.2002 and of up to 50 kWel brought into service after 31.12.2005</td><td>2.56</td><td>2.56</td><td>2.40</td><td>2.40</td><td>2.25</td><td>2.25</td><td>2.10</td><td>2.10</td><td>1.94</td></tr>
<tr><td>New small CHP plants with a capacity of up to 50 kWel brought into service between 01.04.2002 and 31.12.2005</td><td colspan="9" rowspan="2">5.11 cents/kWh for a period of 10 years
from the time the plant is brought into permanent operation</td></tr>
<tr><td>New fuel cells brought into service from 01.04.2002</td></tr>
</table>

Effects of the CHP Act

The external conditions under which the remuneration may be claimed have, however, resulted in the Act having a limited effect in practice, especially since it strictly limits the development of CHP to small CHP plants and fuel cells (with a cap on maximum production). The effect of the Act is mainly geared to the modernization and preservation of existing plants, although the CO_2 reduction effects of modernization measures have not been sufficiently exploited, either, to date.

This means that so far, the CHP Act has helped to only a small extent to tap existing CHP development potential. In particular, the additional construction of CHP plants without the use of government instruments, as announced by industry in its voluntary commitment, is not making sufficient headway. The current provisions do not give plant operators sufficient incentive to build new and modernize existing plants. The fact that the Act is applicable for a limited period and makes remuneration for certain plants subject to a capping ceiling means that potential investors have limited investment security.

Another disadvantage is that the support so far is limited only to CFC electricity which is fed to the general supply grid. No remuneration is granted for electricity generated in industrial and other non-public plants for auto-consumption purposes, although such auto-consumption makes particularly good sense from an environmental protection perspective.

Obstruction of the economic success of small CHP plants, due in particular to the compensation practices of grid operators (reduction of the feed-in price), constitutes a further problem in the implementation of the Act.

The Act thus responds only partially to ecological and climate protection concerns. It is to be expected that the target of reducing CO_2 emissions by 10 million tones by 2005 will be missed by a clear margin. According to current estimates, the reduction of CO_2 emissions by 2005 through development of CHP will amount to markedly less than 5 million tones. A first rough estimate of the CO_2 emissions additionally avoided by the production of CHF electricity in modernized plants arrived at a figure of some 2.8 million tones of CO_2.

Evaluation of the CHP Act in 2004

The CHP Act provides for the Federal Government and German business to carry out an interim review at the end of 2004 to evaluate the framework conditions and the effects of the existing set of instruments. At that time at the latest, the performance capacity of the current CHP Act as well as the political, economic and legal framework conditions will have to be subjected to fundamental review.

If this review has a negative outcome, alternative and regulatory measures which ensure that the emission reduction targets can be achieved should be considered. In this context, the German government will also consider the introduction of a quotas scheme, a subject which has already been discussed extensively.

4 Amendment to Germany's Ordinance on Large Combustion Installations (13th BImSchV)

In order to transpose the EU Large Combustion Plant Directive into German law, the current draft amendment to the Ordinance on Large Combustion Installations includes an obligation for all operators to consider whether CHP measures are technically feasible and whether such measures are proportionate, taking the costs and benefits into account. This obligation applies to the establishment and upgrading of combustion plants. A report on the outcome of this examination must be submitted to the competent authority. If the prerequisites for cogeneration are fulfilled, corresponding measures must be taken when establishing or upgrading the relevant plant.

What direct effects this not very stringently worded requirement will have in the licensing of combustion plants in Germany depends in large part on the consistent behavior of the enforcement authorities, and only the coming years will tell what form they will take.

In view of the Agreement concluded in June 2001 "between the Government of the Federal Republic of Germany and German Business on the reduction of CO_2 emissions and the promotion of combined heat and power production to supplement the Climate Agreement of 9 November 2000", farther-reaching requirements on CHP – such as the goal formulated by the Bundestag Enquete Commission in 1995 which envisages that licenses should only be granted to power plants operated according to the CHP principle – do not currently appear to be politically feasible in Germany.

The German government has stated that it will only refrain from taking regulatory measures if the objectives of the Agreement are achieved.

5 EU Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market

The European Commission already proposed a "Community Strategy" in 1997, which aimed to double the share of CHP electricity production in the EU to 18% by 2010.

In future, cogeneration plants will be supported in the European Union under the new "Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market" (proposal by the European Commission of July 2002). The proposed directive is currently under discussion between the European Parliament, the European Commission and the Council of Ministers. The adoption of the directive is expected for 2003, so that it will likely enter into force at the beginning of 2004. The proposal does not make the above mentioned development target a binding requirement, but it does create a "framework for the promotion" of cogeneration at European level. Among other provisions, the proposed directive requires Member States to establish an analysis of the national potential for cogeneration. It does not include, however, any binding quantitative targets or an obligation to promote CHP.

From today's point of view, this directive will create little impetus for a stronger promotion of CHP in the European Union and Germany. The only elements that will likely give CHP some boost are the required non-discriminatory access to the grid, the standardization of the administrative procedures, and the harmonization of the definition of the term “cogeneration”, the support criteria and the guarantee of origin of electricity from high-efficiency cogeneration.

Binding development targets as well as binding arrangements for the creation of support instruments in all Member States do not as yet exist, and should be incorporated into the directive during future negotiations.

6 Conclusions / Summary

Combined heat and power generation is an effective option for using primary energy sources efficiently and does not pollute the environment as much as the separate production of electricity and heat. CHP plants play a central role for climate protection, as they make the heat generated during electricity production available for use and are thus a cost-effective way to avoid CO_2 emissions.

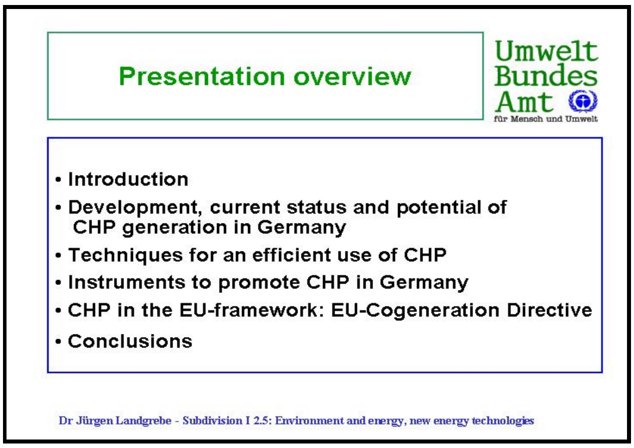
There is considerable potential in Germany for the development of CHP. A wide variety of techniques enabling an efficient and cost-effective use of CHP is already available today for the entire capacity range. Decentralized supply of heat and electricity offers considerable potential and opportunities for CHP. Especially the need for renewal in the power supply sector in coming years will open up substantial opportunities for CHP.

The promotion of CHP in Germany and the European Union has not been a success story to date. The instruments currently in place (in Germany, the CHP Act) and the future EU Cogeneration Directive) are a step in the right direction. They will not, however, effectively induce additional construction of new CHP plant.

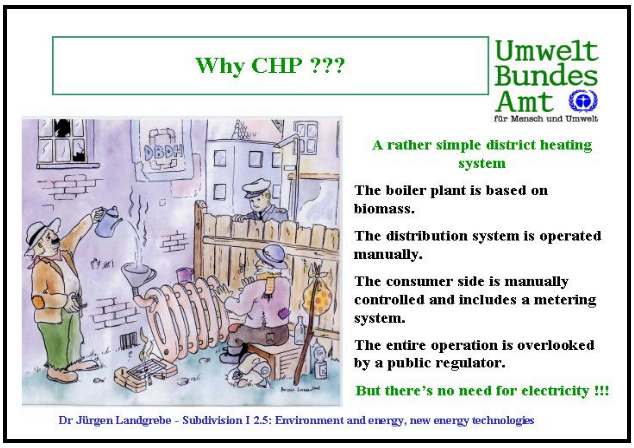
The impending evaluation of the CHP Act in Germany in 2004 offers the chance to provide new impetus to the promotion of CHP. At that time, at the latest, the performance capacity of the CHP Act as well as the political, economic and legal framework conditions will have to be subjected to a fundamental review. The following points should be given particular attention:

- further inclusion of new CHP plants,
- inclusion of the promotion of CHP plants in industry, the commercial sector and households, which serve to meet the operators’ own requirements,
- extension of the compensation to be paid for electricity from modernized CHP plants to also cover CHP electricity generated as a result of the extension of district heating systems,
- tying the promotion of CHP plants to compliance with energy efficiency criteria and specific CO_2 emissions (in analogy to, e.g., new EU Cogeneration Directive),
- effective promotion of new efficient CHP technologies, particularly in the area of decentralized energy supply based on renewable energy sources (e.g. use of biogas in fuel cells).

CHP’s cost-effective, environmentally friendly and resource-conserving potentials should be intensely exploited in particular at locations where district heating networks already exist and in those countries which are about to embark on a renewal or restructuring of their energy supply.



Slide 1



Slide 2

Why CHP ???

Combined heat and power (CHP) generation – the simultaneous conversion of energy into electricity and heat – a very efficient form of energy use …

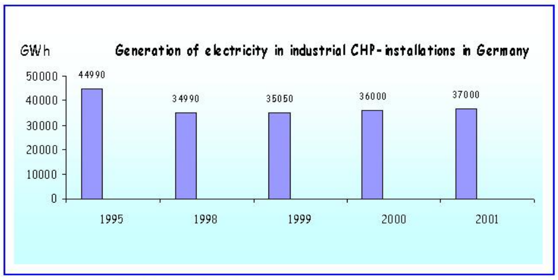
- **Lower consumption of primary energy (15-30%)**
- **CO_2-reduction up to 50% and high cost-effectiveness of CHP can be achieved**
- **Economic viability of CHP dependent on …**
  - **operating conditions (full load)**
  - **plant located close to heat consumers**
  - **high connection rates**

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 3

Development of CHP generation in Germany I

Umwelt Bundes Amt für Mensch und Umwelt

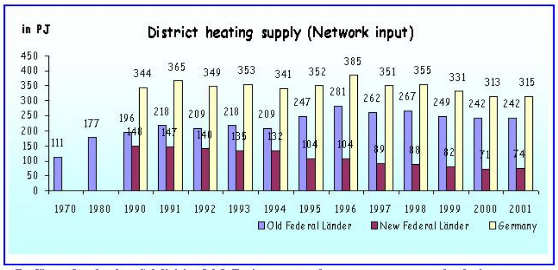


Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 4

Development of CHP generation in Germany II

Umwelt Bundes Amt für Mensch und Umwelt

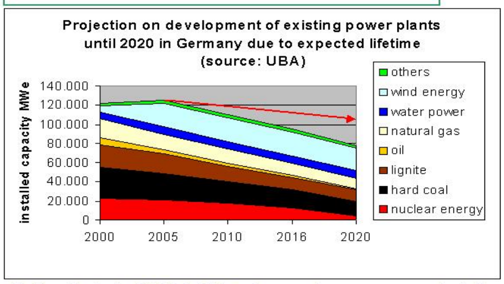


Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 5

Potentials for future CHP generation in Germany I

Umwelt Bundes Amt für Mensch und Umwelt



Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 6

Economically viable CHP potentials

Umwelt Bundes Amt für Mensch und Umwelt

Measures:

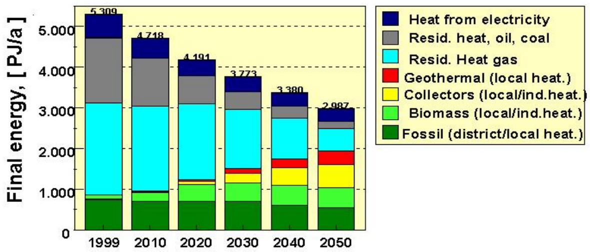
- Increasing the CHP coefficient, e.g. through modern combined-cycle gas turbines
- Replacement of heating stations, particularly when done in combination with a fuel-switch to gas
- Increasing connection rates, particularly where a district-heating network already exists
- Modernisation of industrial CHP plants

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 7

UBA Long-term Scenarios: (-80% CO_2) Structural Changes within the Heat Market

Umwelt Bundes Amt für Mensch und Umwelt

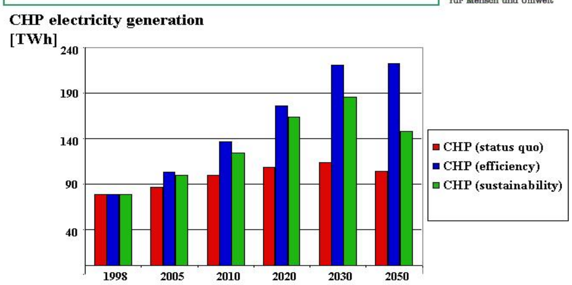


Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 8

UBA Long-term scenarios: (-80% CO_2) Comparison of CHP potentials

Umwelt Bundes Amt für Mensch und Umwelt



Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 9

Techniques for an efficient use of CHP (I)

Plant technology

Umwelt Bundes Amt für Mensch und Umwelt

High capacity range:

- **Modern gas-fired combined-cycle power plants (intelligent grid management – further development of renewable energies – particularly wind energy)**

Low and medium capacity range:

- **Internal combustion engines**
- **Gas and micro-gas turbines**
- **Fuel cells (2010: 700 MW expected)**
- **Stirling engines**
- **Organic Rankine cycle systems**
- **Kalina cycle systems**

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 10

Techniques for an efficient use of CHP (II)
Decentralised CHP

Umwelt Bundes Amt für Mensch und Umwelt

Decentralised CHP supply:
- Small decentralised systems
- More reliable, efficient and environmentally compatible
- Considerably lower level of investments than conventional power plants
- Pooling many decentralised producers to: "virtual power stations"

Requirements:
- Advantageous external framework conditions
- Effective promotion of medium-sized energy companies

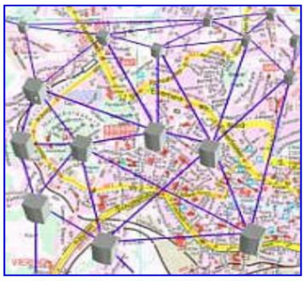
Obstacle:
- Market access for decentralised CHP is often blocked by new investments in large centralised power plants

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 11

Techniques for an efficient use of CHP (III)
Decentralised CHP – the "virtual power plant"

Umwelt Bundes Amt für Mensch und Umwelt



Example:

"Virtual Fuel Cell Power Plant"
- a series of decentralised residential micro CHPs using fuel cell technology
- installed in multi-family-houses, small enterprises, public facilities etc.
- individual heating, cooling and electricity production
- centrally controlled and grid-connected.

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 12

Instruments for the promotion of CHP
The new German CHP Act of 19 March 2002

Umwelt Bundes Amt für Mensch und Umwelt

"Act on the preservation, modernisation and development of combined heat and power generation" of 19 March 2002

Objectives:
- Reduction of CO_2-emissions by a total of 23 million tonnes by 2010 by developing CHP
- Protection of CHP installations for a limited period
- Modernisation of existing cogeneration plants
- Promotion of the additional construction of small cogeneration plants (< 2 MW_{el})
- Launching fuel-cell power stations on the market

Fachgebiet Umwelt und Energie, Dr Jürgen Landgrebe

Slide 13

Instruments for the promotion of CHP
German CHP Act
– bonus system for CHP electricity –

Umwelt Bundes Amt für Mensch und Umwelt

remuneration (€ cent/kWh)	2002	2003	2004	2005	2006	2007	2008	2009	2010
Existing plants (brought into service by 31.12.1998)	1.53	1.53	1.38	1.38	0.97				
New existing plants (new plants or plants modernised at a cost of at least 50% of the original costs that were brought into service between 01.01.1990 and 31.03.2002	1.53	1.53	1.38	1.38	1.23	1.23	0.82	0.56	
Modernised plants (existing plants modernised and again brought into permanent operation between 01.04.2002 and 31.12.2005)	1.74	1.74	1.74	1.69	1.69	1.64	1.64	1.59	1.59
New small CHP plants with a capacity greater than 50 kW_{el} to 2 MW_{el} brought into service from 01.04.2002 and of up to 50 kW_{el} brought into service after 31.12.2005	2.56	2.56	2.40	2.40	2.25	2.25	2.10	2.10	1.94
New small CHP plants with a capacity of up to 50 kW_{el} brought into service between 01.04.2002 and 31.12.2005	5.11 cents/kWh for a period of 10 years from the time the plant is brought into permanent operation								
New fuel cells brought into service from 01.04.2002									

Slide 14

European framework
EU Directive on the promotion of CHP

Umwelt Bundes Amt für Mensch und Umwelt

- "Community Strategy" from 1997: double the share of CHP electricity production in the EU to 18% by 2010
- New "Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market"
  proposal by the European Commission of July 2002 currently under discussion between the European Parliament, the European Commission and the Council of Ministers,
  adoption of the directive is expected for 2003 (last amended proposal was presented by the Commission: 23 July 2003),
  entering into force at the beginning of 2004.
- Problems: Draft does not contain any binding quantitative targets or obligations to promote CHP !!!

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 15

Conclusions I

Umwelt Bundes Amt für Mensch und Umwelt

CHP generation - an effective option for using primary energy sources efficiently

- Central role for climate protection
- Cost-effective way to reduce CO_2 emissions
- Considerable potential is existing in Germany
- Techniques for an efficient and cost-effective use of CHP are already available
- Promotion of CHP in Germany and on EU-level has not been a success story to date !!!

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 16

Action to take !!!
Evaluation of the German CHP Act

Umwelt Bundes Amt für Mensch und Umwelt

Evaluation of the CHP Act in Germany in 2004 offers the chance to provide new impetus to the promotion of CHP

- Inclusion the support of new CHP plants
- Support of CHP electricity generated by CHP plant used to meet operator's own requirements
- Promotion of CHP electricity generated as a result of the extension of district heating systems
- Effective promotion of new efficient CHP technologies, particularly in the area of decentralised energy supply based on renewable energy sources

Fachgebiet Umwelt und Energie, Dr Jürgen Landgrebe

Slide 17

Conclusions II

Umwelt Bundes Amt für Mensch und Umwelt

CHP's cost-effective, environmentally friendly and resource-conserving potentials should be intensely exploited ...

- in particular at locations where district heating networks already exist !
- in countries that are about to embark on a renewal or restructuring of their energy supply systems !

Dr Jürgen Landgrebe - Subdivision I 2.5: Environment and energy, new energy technologies

Slide 18

The European CHP Directive – a Step towards the Smarter Use of Energy

Peter Löffler
COGEN Europe

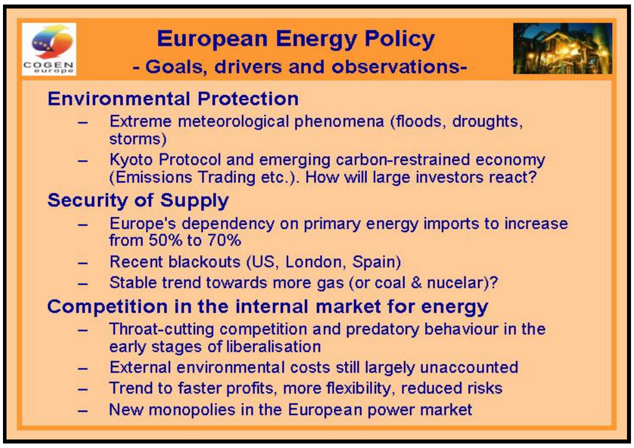
Recent years have been difficult for European Combined Heat and Power (CHP) operators who were struggling with unfavorable economic and regulatory conditions in the wake of the bumpy transition to liberalized energy markets. At the same time, many of the barriers and obstacles to CHP identified and recommended for removal in the Community's CHP Strategy from 1997 remain in place. As a result, the development of CHP in Europe since the late 1990s was generally weak.

In response to this situation, the European Commission issued in July 2002 the long-awaited proposal for a European CHP Directive. A modified version of this draft Directive is now close to adoption. Its principal aim should be to promote the wider use of CHP in Europe. A bigger share of CHP would reduce the huge inefficiency of the European thermal power production system, and it would contribute to the three major objectives of EU energy policy, namely fair competition in a functioning liberalized market, environmental and climate protection, and security of energy supply.

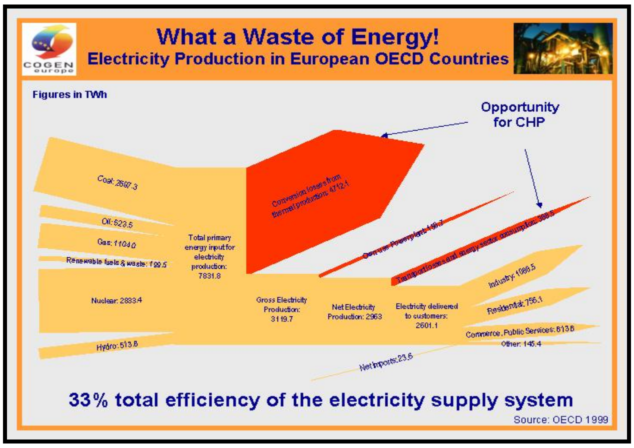
The presentation will provide a snapshot of the recent development of CHP in current and future EU Member States. It will then critically assess the strengths and weaknesses of the proposed CHP Directive and evaluate how it addresses the opportunities and threats to the development of CHP set by the policy and economical context. A number of conclusions will be formulated both regarding EU energy efficiency and climate change policy, and the promotion of CHP at the national level.

Slide 1

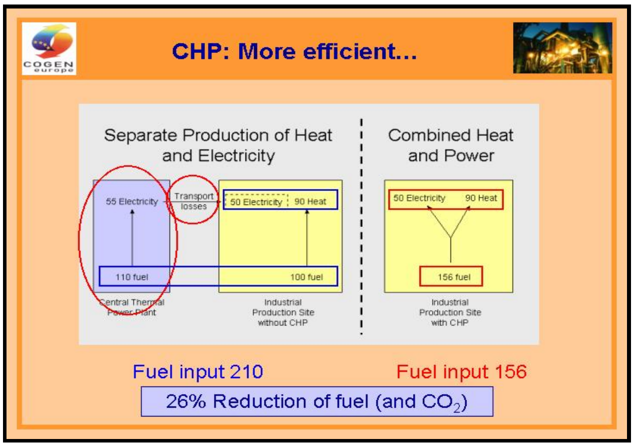
Slide 2



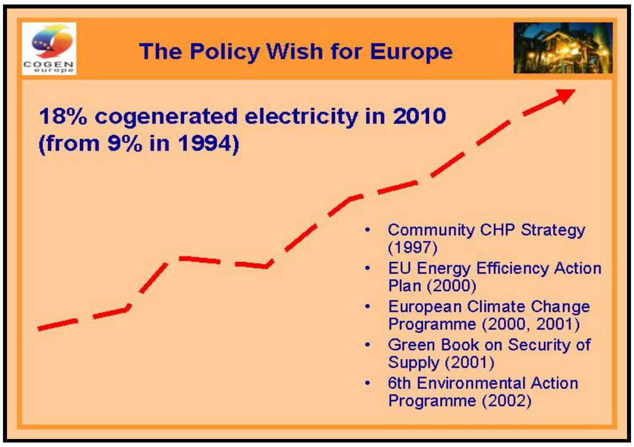
Slide 3



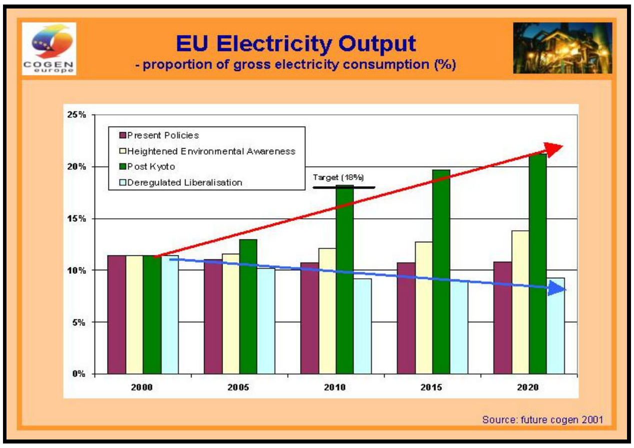
Slide 4



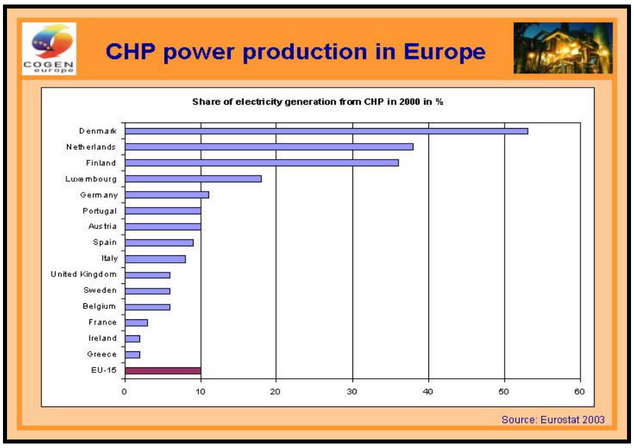
Slide 5



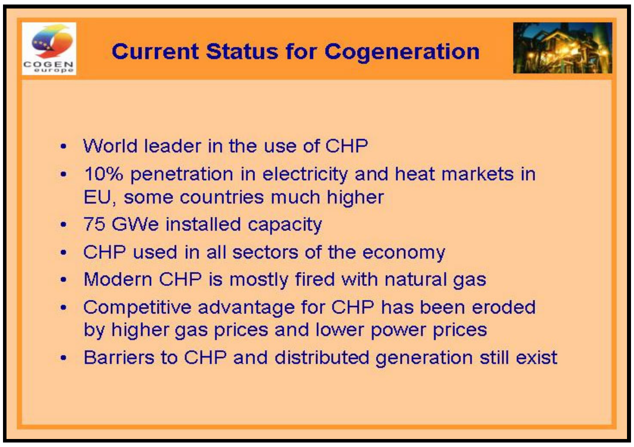
Slide 6



Slide 7

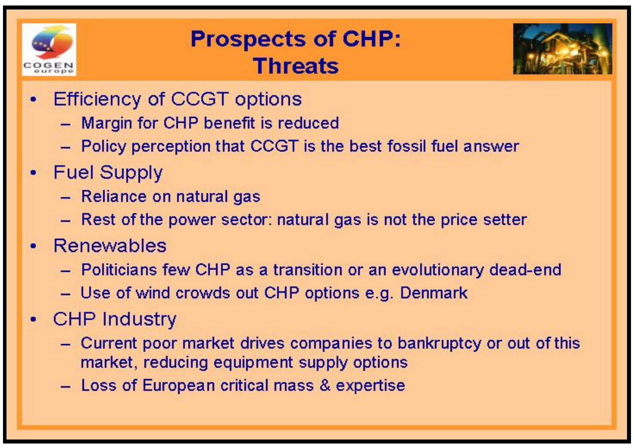


Slide 8



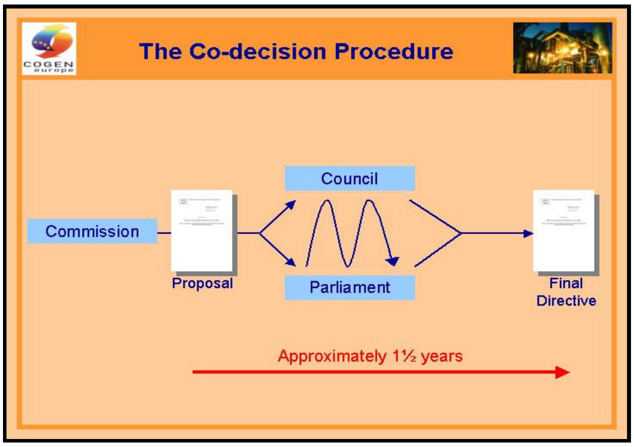
Slide 9

Slide 10



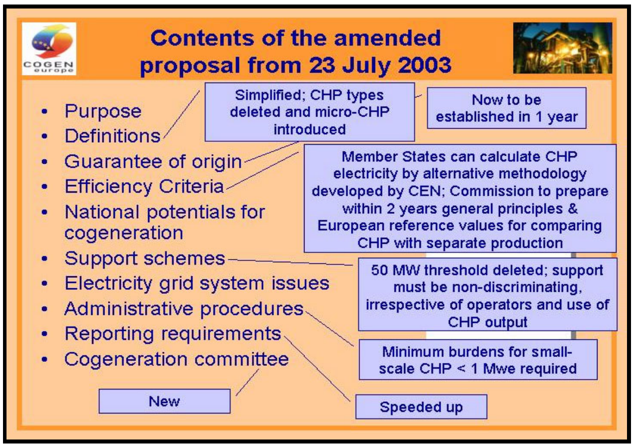
Slide 11

Slide 12

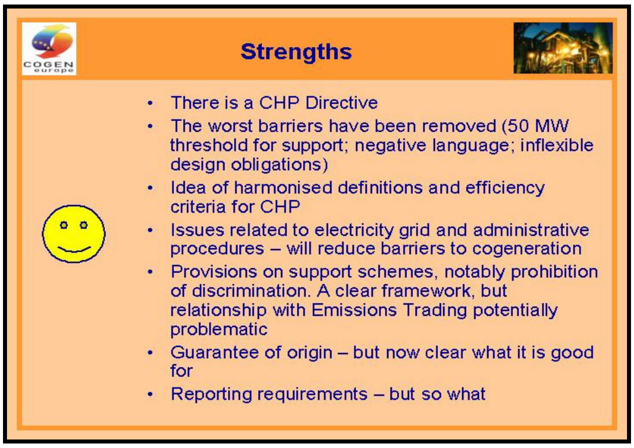


Slide 13

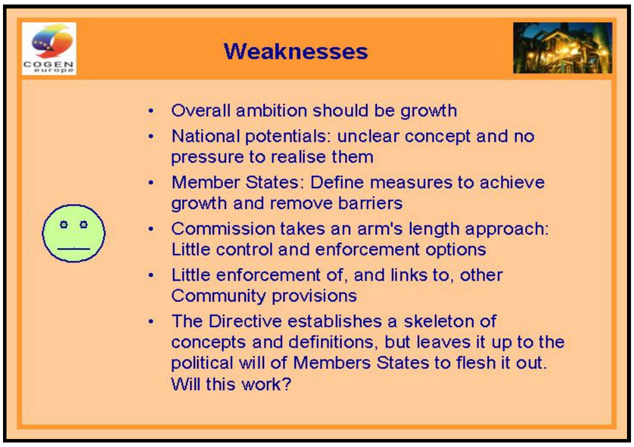
Slide 14



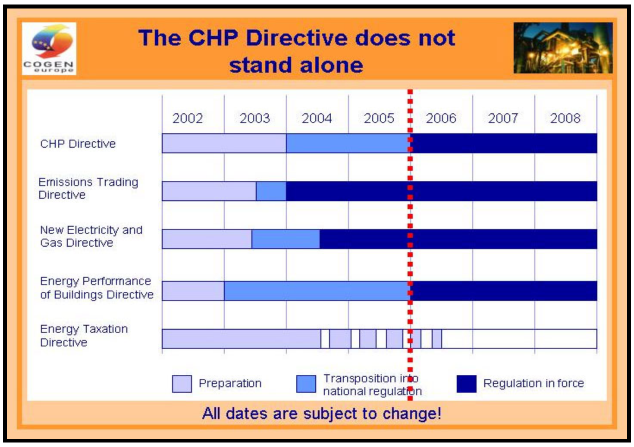
Slide 15



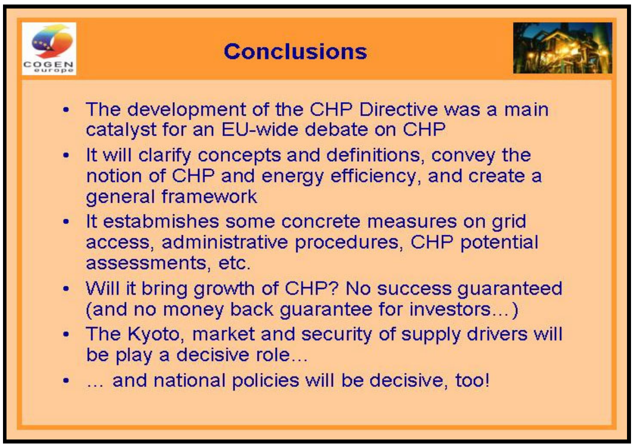
Slide 16



Slide 17



Slide 18



Slide 19

Slide 20

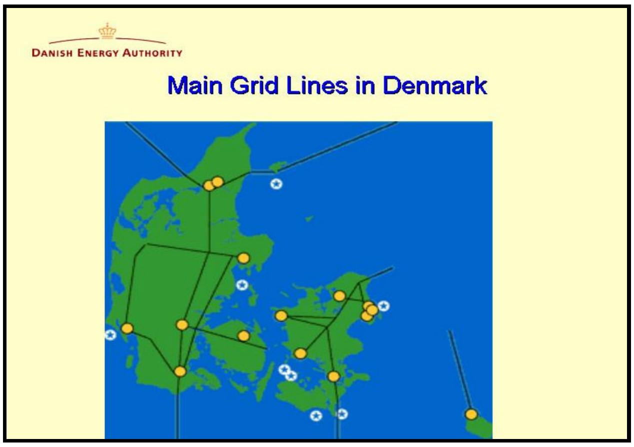
The Interaction between the EU CHP Directive & the New Danish Regulation

Ture Hammar
Danish Energy Authority

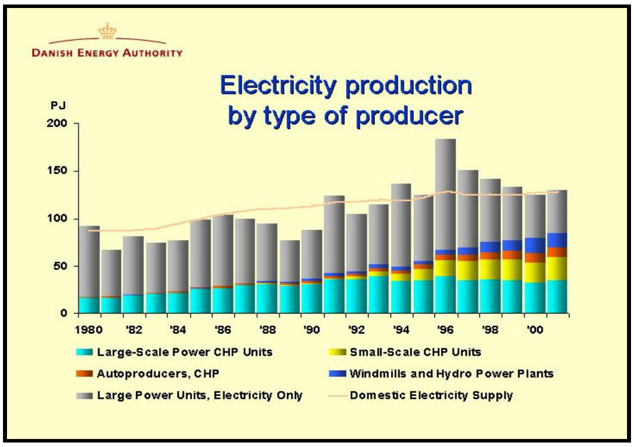
The proposal for an EU directive on electricity from cogeneration was put forward by the Commission in July 2002. The proposal has been intensively negotiated both in the Council of Ministers and in the European Parliament. Many discussions have been quite technical, and a number of clarifications and compromises had to be made to reach an agreement on the directive. The important milestone of consensus was reached in May 2003, and a final and quite amended text has been settled over the summer. In the best case, the final directive will be ready this year.

On the national level, each EU member state has had her own support schemes for CHP. E.g. in Germany and in the UK, quite comprehensive long-term schemes have been agreed upon within the last couple of years.

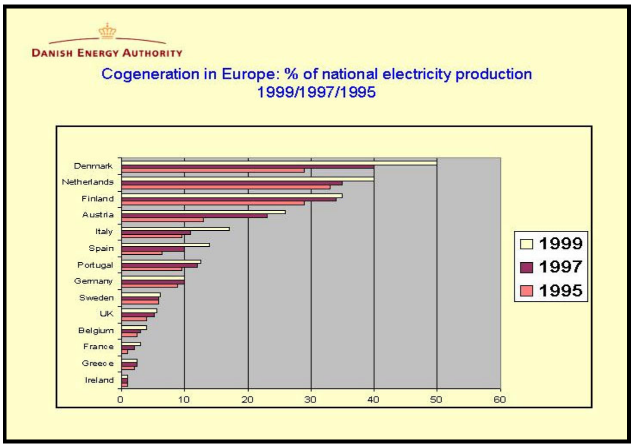
Denmark is now revising the CHP scheme in a new market-oriented context. where both aspects of environmental benefits of CHP production and protection against stranding of investments is included. The proposal for a new CHP regime will be debated in the Danish parliament in October 2003.



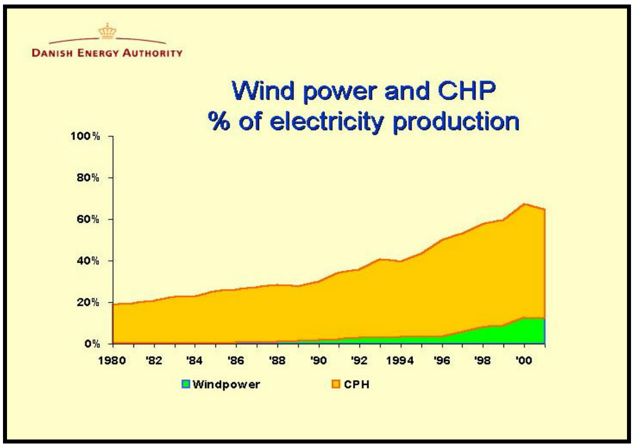
Slide 1



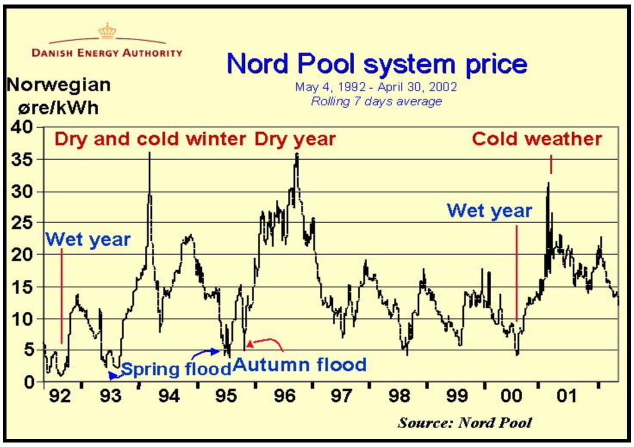
Slide 2



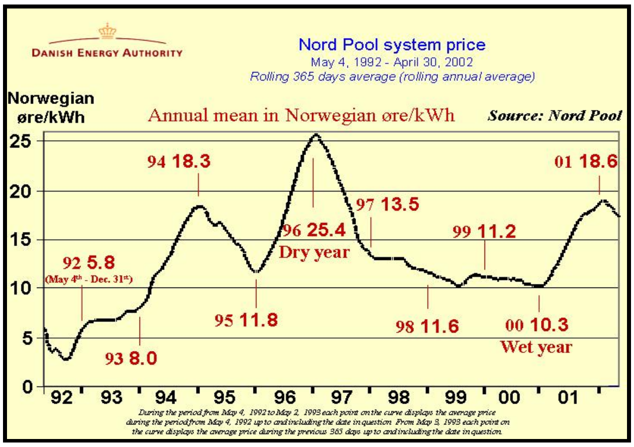
Slide 3



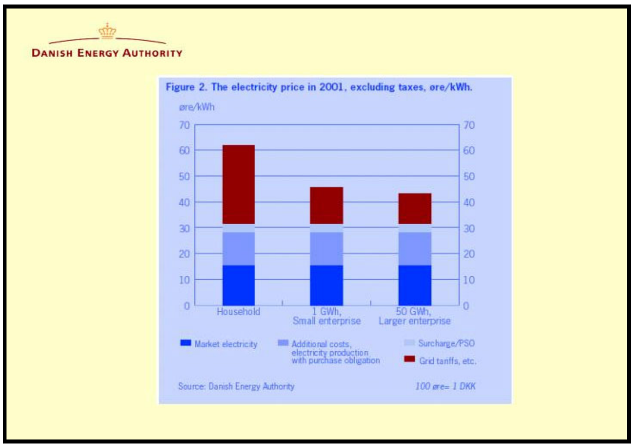
Slide 4



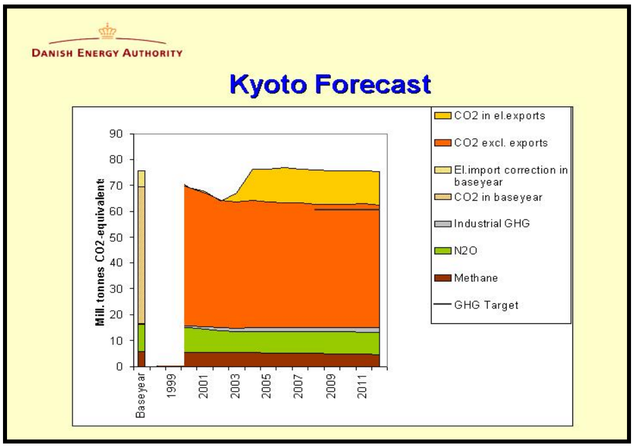
Slide 5



Slide 6



Slide 7



Slide 8

DANISH ENERGY AUTHORITY

Challenges to the Danish electricity market

- Nordic market very volatile and depending on level of hydro magasine
- NordPool prices very fluctuating though increasing and calls for responsive use of thermal power
- Feed-in tariffs for wind power and CHP lead to Danish surplus production in cold windy nights
- Domestic CO_2 emissions will exceed national Kyoto commitment

Slide 9

DANISH ENERGY AUTHORITY

Elements in market orientation of Danish legislation

- Progressive quotas for CO_2 emissions from larger power plants (more than 100 kT per year), combined with a minor penalty fee when cap is exceeded
- Reform of purchase obligation of electricity from small and medium CHP - feed in time-of-use tariffs are converted into an annual subsidy linked to the average Nord pool price
- Emission trading inside and outside EU will be encouraged, including JI and CDM

Slide 10

DANISH ENERGY AUTHORITY

The new Danish CHP legislation

- The objective is to integrate the small and medium CHP plants fully into the electricity market (today's share 26%)
- The purchasing obligation is removed
- The feed-in triple ToU tariff is removed
- Instead, an annual fixed subsidy, calculated for each plant, shall substitute the feed-in revenues
- Enforcement 1 January 2004

Slide 11

DANISH ENERGY AUTHORITY

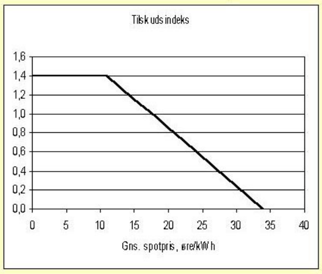
The new Danish CHP legislation

- Each CHP plant shall contract a responsible power producer
- CHP production may be flexible and responsive to the market
- CHP plants may also sell system services (reserve, regulation, etc.)
- The fixed subsidy is estimated and paid on a monthly basis
- The fixed subsidy may continue for maximum 20 years operation of the plant

Slide 12

DANISH ENERGY AUTHORITY

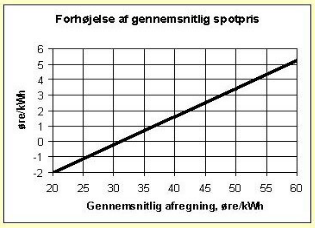
Calculation of subsidy index based on NordPool spot market



Slide 13

DANISH ENERGY AUTHORITY

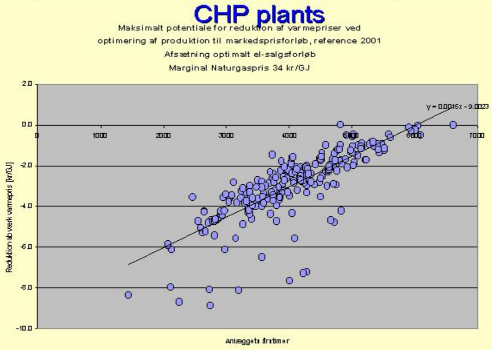
Adjustment of spot price for plants producing intermittent in ToU tariff



Slide 14

DANISH ENERGY AUTHORITY

Impact on heat prices by market operation of CHP plants



Slide 15

DANISH ENERGY AUTHORITY

Danish implementation of the directive on electricity from cogeneration

- Definition of high efficiency cogeneration
  - All existing CHP have been designed as BAT (except experimental plants)
  - Average savings 20-40% compared to separate production
  - Efficiency criteria may reiterated when annexes are ready from Commission
- Potential for CHP
  - Potential assessed before programmes in 1990
  - Energy strategy tradition
  - Excellent data bases on heat market
  - Technology reviews

Slide 16

DANISH ENERGY AUTHORITY

Danish implementation of the directive on electricity from cogeneration

- Definition of high efficiency cogeneration
  - All existing CHP have been designed as BAT (except experimental plants)
  - Average savings 20-40% compared to separate production
  - Efficiency criteria may reiterated when annexes are ready from Commission
- Potential for CHP
  - Potential assessed before programmes in 1990
  - Energy strategy tradition
  - Excellent data bases on heat market
  - Technology reviews

Slide 17

DANISH ENERGY AUTHORITY

Danish implementation of the directive on electricity from cogeneration

- Streamlining of state aid for CHP
  - New legislation still in the pipeline, as described
  - Different from feed-in arrangements, similarity to stranded investments
  - Notification later in 2003
- Guarantee of origin
  - Not yet implemented, coordinated with RE
- Purchasing obligations for CHP electricity
  - To be abandoned
- Administrative barriers
  - Promotional schemes has been abandoned

Slide 18

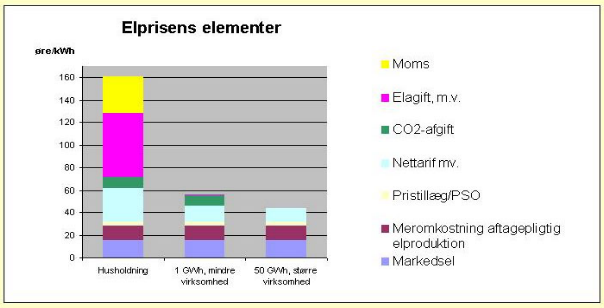
DANISH ENERGY AUTHORITY

Conclusion

- Much work is to be done in the field of CHP
- The internal energy market still more challenging

Slide 19

DANISH ENERGY AUTHORITY



Slide 20

The Future of CHP in Russia

Dr. Igor Bashmakov
Center for Energy Efficiency CENEf, Moscow

The future for large CHPs in Russia is not bright. They were designed for large industrial heat loads with electricity generation as a side product. Due to economic recession industrial load was partially lost. It led to escalation of heat generation costs and to growth of heat losses share. It went alongside with insufficient funds invested in heat transportation systems modernization and with substantial expenditures required to maintain obsolete pipelines. So heat transportation costs escalated as well.

On this background unbalanced and inflexible CHP heat pricing policy led to further scratching the CHPs from the picture. High heat prices made economically viable both efficiency improvements to reduce heat consumption and heat substitution activities alongside with independent heat generation. Demand for CHPs heat was griped in a competition vice between declining demand (competition form energy efficiency and other energy carriers) and growing alternative heat supply at autonomous boilers and small modern CHPs (competition from the supply side). Industrial and municipal boilers were erected often across the road from CHP. Heat load declined even further with additional pressure on heat costs. This released a sear spring and launched the cost escalation mechanism. Both heat and power generation costs started their mounting trajectories.

Power and heat producers as well as regulators failed to balance short-term versus long-term visions of markets evolution. Short-term considerations prevailed over unrecognized long-term treat to loose CHPs market niche. Under such conditions, the more CHP costs were allocated to heat, the sooner CHP heat prices were escalated and (surprisingly) in parallel the sooner CHP electricity became more expensive and uncompetitive. So short-term income maximization considerations worked as a hidden engine in squeezing out the CHP niche at both heat and power markets and pressing CHPs out of business. As a result large utility owned CHPs today are loaded only for 40% of designed capacity[6]. Power and housing reforms deteriorates CHPs future even further and squeeze market faster. The both markets reject expensive electricity and heat from large CHPs.

To keep CHPs in the picture a number of actions and policies are to be taken. CHPs should generate power only at cogeneration cycle with all electricity generated given guaranteed market at least for heating season duration. Power grid companies are to be obliged at least for some transition period to buy power from CHPs during the heating season. An alternative to that is providing subsidies to electricity generated at CHPs to let it compete at the wholesale market. Today there is an investment component in power tariff at wholesale market to finance nuclear power station construction. A similar component is to be introduced for supporting CHP electricity production. Studies to evaluate heat demand price elasticity and alternative heat supply price elasticity are to be conducted. Heat and power pricing policy should be based on the following principles:

- long-term pricing considerations and on identification of the heat tariff thresholds, surpassing which sears spring drives both heat and power tariffs only in one direction – upwards so market niche for large CHP is squeezing;
- separation of generation and distribution costs. Tariffs on transmission and distribution should include cost of serving heat networks as well as costs of lost heat in transmission and distribution systems;
- elimination of heat cross-subsidies taking into consideration the evolution of purchasing power of customers;
- basing heat pricing on heat really delivered to the customer (not to the heat distribution network);
- allocation of generation costs between power and heat generation should be driven by competitiveness considerations for both power market and heat market;
- definition of heat supply zones and introduce zoning tariffs, to motivate closely located large consumers to stay with the centralized system.

Additional consideration is crucial for the future of large CHPs in Russia. Significant reduction of heat losses, non variable costs of heat and power generation, as well as costs of heat transmission and distribution system operation can make the future for large CHPs operation in Russia much brighter. Extra CHP capacities are to be conserved and decommissioned and new small scale CHPs and combined cycle units are to be built to meet potential future demand growth.

[6] G. Kutovoy. Chairman of Federal Energy Commission. “Novosty Teplosnabzhenia” (in Russian). №12. 2002. p. 44.

1 CHP in Russian heat balance

Different sources report differently on the size of Russian heat supply market and its structure. Some statistical sources include only large CHPs and boilers (over 20 Gcal/h) heat supply. Smaller boilers are considered as final fuel consumers in corresponding sectors. While other sources report heat generation from smaller boilers. Tables 1 and 2 present the author's best effort presenting a comprehensive picture of heat indicators and heat balance. Inclusion of small heat sources is important on the background of growing competition to large-scale heat supply systems from smaller ones. Indicators in both tables are self-speaking.

The number of CHPs in Russia is 485. Their contribution to heat supply is 30 %. Comparative to smaller boiler houses based systems they have lower heat losses. Lower, but by no means low. Total real losses are estimated to equal 19%.

RAO "EES Rossii owns 242 CHPs and the rest belong to industrial and commercial companies. CHPs were designed for large industrial heat loads with electricity generation as a side product. Due to economic recession industrial load was partially lost. In 1995-2001 industrial heat consumption fell down by 36%. But even in 2000-2001 industries consumed about 50% of heat generated at CHPs. In contrast, residential and commercial heat demand was almost stable.

The share of buildings in total final heat consumption surpassed the industry and went up to 50%. Industry became only second largest consumer of heat.

Table 1: Russian district heating indicators

Indicator	Units	
Combined heat and power plants	Units	485
Including RAO EES Rossi CHPs	Units	242
Large boilers	Units	>190,000
Individual heat generators and boilers	Units	>600,000
Heat generation	Mio Gcal	2,300
Own use	Mio Gcal	74
Network losses	Mio Gcal	442
Heat networks	1000 km	183.3
Final heat consumption	Mio Gcal	1,784
Fuel efficiency	%	71.5
Total energy inputs to heat generation	Mio toe	462
Heat tariffs, average	$/Gcal	12
Heat tariffs, range	$/Gcal	6-75
Heat sales	$ billion	28.0
Households		
Covered by subsidies		
Shortfall		
Potential savings from efficiency improvements	$ billion	10.0

Source: Updated from I. Bashmakov. Energy Subsidies in Russia: The Case of District Heating. • ENERGY SUBSIDIES/designing and implementing reforms. OECD. 2003

2 Pricing policy griped CHP market in a competition vice

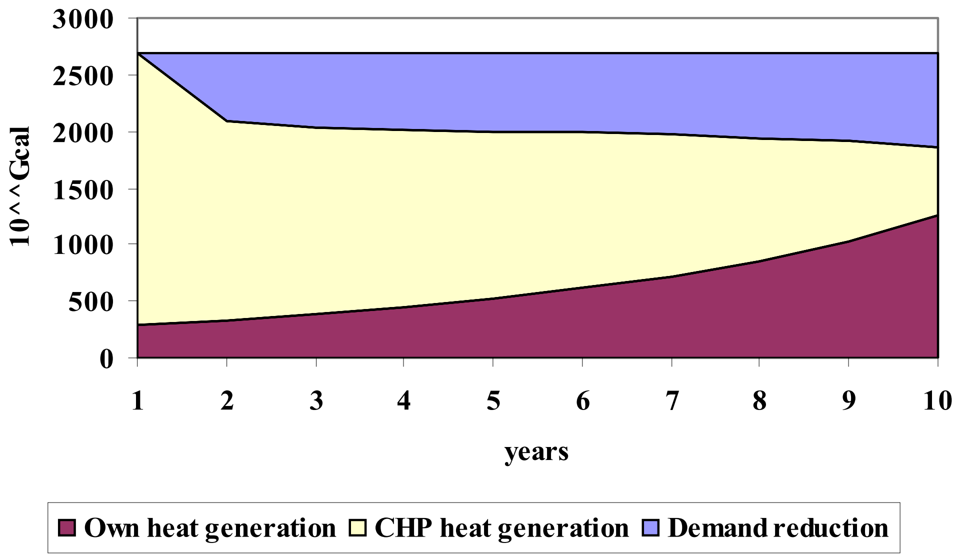
Unbalanced and inflexible CHP heat pricing policy led to further scratching of CHPs from the picture. Demand for CHPs heat was griped in a competition vice between declining demand (competition form energy efficiency and other energy carriers - in 1990-2001 demand declined by 600 million Gcal) and growing alternative heat supply at autonomous boilers and small modern CHPs (competition from the supply side provided additional 52 million Gcal, see figure 1). As a result of that generation at CHPs declined by 35%. Prices were set up without taking into account how remote and how large is the consumer and how large are real heat losses and cost to deliver heat as well as without any seasonal flexibility. In addition, cross subsidies in favor of residential and public consumers made heat for industrial clients across the road from CHP significantly more expensive than heat for small residential customers very remote from CHP.

The perception was that heat consumers have no demand price elasticity and alternative supply choices, and "natural monopoly" was granted as ever lasting gift. General understanding was that the CHP can be easily substituted in power market, but it is more difficult to substitute them at heat market. But since the mid 90-es, as financial shape of industrial enterprises started to improve, more heat meters were installed, both demand and alternative supply squeezed the market for CHP heat (see figure 1). Consumers with sufficient financial resources already switched off the CHPs.

Heat load declined even further with additional pressure on heat costs. This released a sear spring and launched the cost escalation mechanism. Both heat and power generation costs started their mounting trajectories. V. Semenov made the first effort to explain and present this mechanism graphically based on analysis of Hinter graphs[7].

[7] V.G. Semenov. Possibilities of CHP operation at power market. "Novosty Teplosnabzhenia" (in Russian). №12. 2002. p. 44.

Figure 1: CHP heat in competition vice



To illustrate this mechanism with time dimension a simple CHP and heat market model was developed. There are several crucial parameters, which determine flexibility area for heat pricing policy:

- Share of CHP costs allocated to heat generation;
- Heat demand price elasticity;
- Alternative heat supply price elasticity;
- Share of non-variable costs in overall CHP generation costs;
- Rate of heat losses;
- Heat transmission and distribution costs.

For the first glance the first factor is the most important one. In reality it is important (see figure 2 and 3). The more costs some allocated to heat, the higher are heat prices, the sooner demand is declining and alternative supply is growing, so the sooner CHP loses the heat market. There is a hurdle or threshold – 30% of costs allocated to the heat generation - surpassing, which the above mentioned spring works very fast - and CHP is squeezed from the market in less than 10 years. So it takes not very long to see the empty market niche. But the shape of presented curves depends not just on the proportion of costs allocation, but also on five more factors listed above.

When both heat demand elasticity and alternative heat supply elasticities are equal to zero, competition vice does not work. In modeling effort statistically tested assumption was made that price demand elasticity is –0.2 and alternative supply elasticity is 0.2. The higher they are by absolute value, the sooner the CHP is losing its market niche. High CHP heat prices made economically viable investments in efficiency improvements to reduce heat consumption and to substitute heat with other energy carriers alongside with independent heat generation.

Table 2: Russian heat balance. 2000-2001 (million Gcal)

	Public utility companies	Industrial and municipal boilers	Individual boilers	Total
Generation CHP RAO EES Rossii Industrial CHPs	1515.7 680.0 494.0 176.0	613.2	170.7	2299.6
Own use	52.7	21.2		73.9
Sold to network	1463.0	592.0	170.7	2225.7
Share of heat losses (%)	19%	27%		20%
Heat losses	**284.7**	**157.0**	**0.0**	**441.7**
Industry	74.0	17.0		91.0
Agriculture	8.8	3.6		12.3
Residential buildings	61.4	86.0		147.4
Public buildings	105.3	48.4		153.7
Others	35.1	2.1		37.2
Final heat consumption	**1178.3**	**435.0**	**170.7**	**1783.9**
Industry	599.0	96.4		695.4
Agriculture	49.7	20.2		70.0
Residential buildings	143.4	200.6	170.7	514.6
Public buildings	245.8	112.8		358.6
Others	140.5	4.9		145.4

Sources: Calculated by author based on L. Chernyshov. Country us preparing to winter. (In Russian). "Energosberezhenie". № 5, 2001 and V. Semionov and S. Michailov. "Novosty Teplosnabzhenia" (in Russian). №4. 2000; A. Nekrasov and S. Voronina. Economic problems of heat supply in Russia. Vestnik FEC of Russia. №1-3 2001 and other sources.

Figure 2: Evolution of CHP market share as a function of cost proportion allocated to heat generation

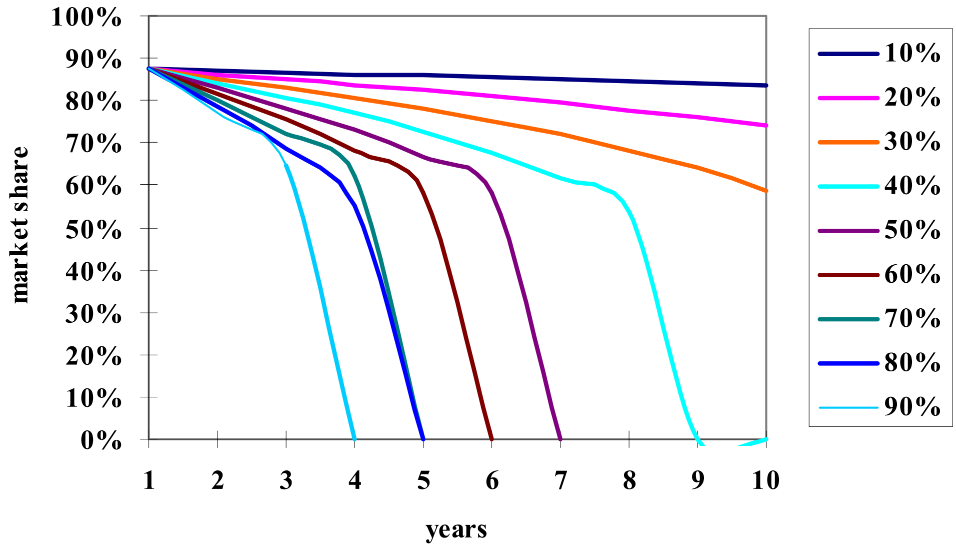


Figure 3: Evolution of heat prices as a function of cost share allocated to heat

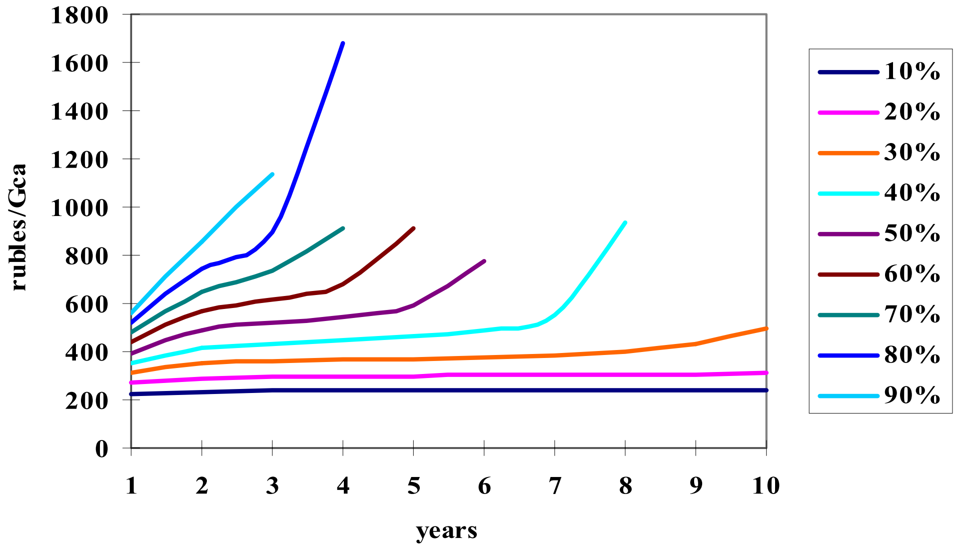


Figure 4: Evolution of CHP market as a function of heat losses

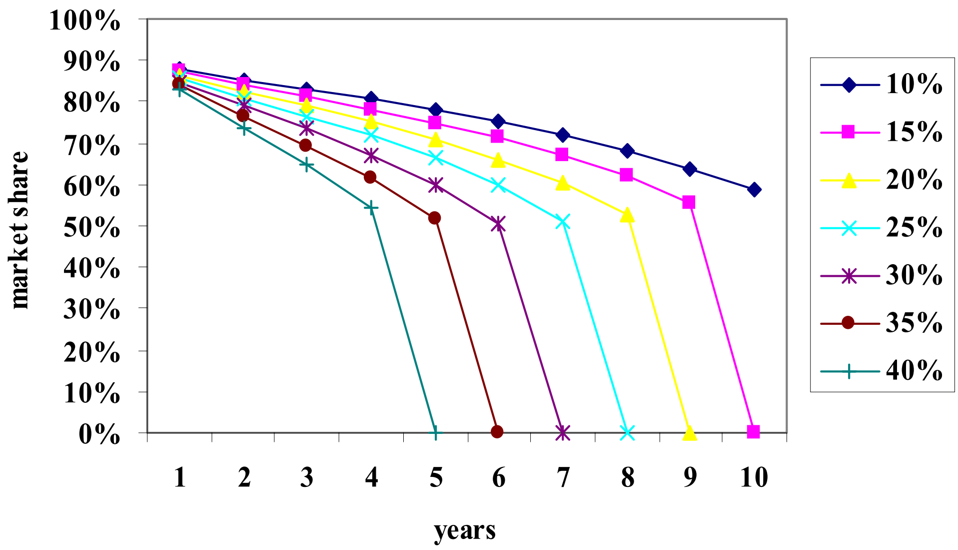
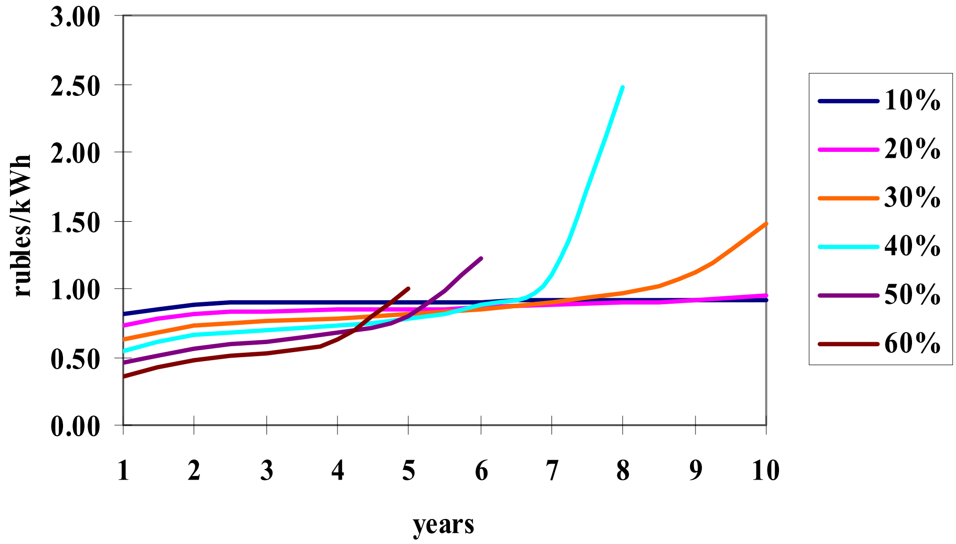


Figure 5: Evolution of electricity prices as a function of proportion of costs allocated to heat generation



Large share of non-variable costs in overall CHP generation costs makes power and heat generated more expensive as demand is declining. So the higher this share is the sooner CHP will be out of business.

The impact of heat losses is shown in figure 4 under the assumptions that 30% of CHP costs are allocated to heat and that heat prices are set for delivered to consumer heat. It is clear, that when real heat losses are going up from 10% to 15%, the threshold in cost allocation is going down from 30% to 20%. Heat losses to serve buildings are higher then those to serve large industrial customers. So shift in consumption pattern in favor of buildings led to the growth of heat losses portion.

Today customers mainly pay for such losses. But the scale is diminishing as they put more and more heat meters. So they pay only for normative losses (about 10%) and extra losses are not covered at all if heat is priced not for delivered to the consumer amount.

Heat transmission and distribution costs are also important determinants of the speed with which sear spring escalates heat costs. Insufficient funds invested in heat transportation systems modernization in last 10 years alongside with substantial expenditures required to maintain obsolete pipelines led to further growth of heat transportation costs. If heat demand and alternative heat supply price elasticities are substantial, as well as shares of non-variable costs in overall CHP generation costs and heat transmission and distribution costs and rate of heat losses is high, the effort to keep power market niche by allocating more costs to heat leads to diminishing heat market niche, decline of both heat and power generation and escalation of power prices. The lower power price is initially, the sooner it skyrockets (see figure 5).

So this mechanism has very important and non-trivial temporal characteristics. Power and heat producers as well as regulators failed to recognize them and to balance short-term versus long-term visions of markets evolution. Short-term considerations prevailed over unrecognized long-term treat to loose CHPs market niche. Under such conditions, the more CHP costs were allocated to heat, the sooner CHP heat prices were escalated and (surprisingly) in parallel the sooner CHP electricity became more expensive and uncompetitive. So short-term income maximization considerations worked as a hidden engine in squeezing out the CHP niche at both heat and power markets and pressing CHPs out of business. As a result large utility owned CHPs in Russia today are loaded only for 40% of designed capacity8. Power and housing reforms deteriorate CHPs future even further and squeeze market faster. The both markets reject expensive electricity and heat from large CHPs.

Price setting process is becoming more centralized with much higher inertia. It is literally stated that jurisdiction for setting prices for electricity generated at all sources, as well as for heat generated by CHPs, supplying to the wholesale market is moving from Regional Energy Commissions to the Federal Energy Commission (this provision contradicts existing laws). In addition, the basic pricing period is one year (it used to be one quarter). FEC should directly set all prices for electricity generation and indirectly all prices for heat generation from CHPs. Prices for heat for those CHPs working on the wholesale market will be set up by FEC. If they are set high to keep electricity competitive, CHP will continue losing local heat markets. If they are set low, CHPs will lose compe-

8 G. Kutovoy. Chairmen of Federal Energy Commission. “Novosty Teplosnabzhenia” (in Russian). №12. 2002. p. 44.

tition at the power market. If electricity prices for all CHPs are set by FEC, it automatically indirectly determines heat tariffs. RECs will have nothing more to do, but just deduct required electricity revenues from CHPs collections and share them with co-generated heat. Such provisions mean that a possibility to introduce more competition to heat supply markets and a possibility to price both electricity and CHP's heat on the basis of economic situations on the local power and heat markets, is lost. There is a long discussion on how to set proper prices for heat and electricity generated at CHPs. Unwise heat pricing policy squeezes CHP heat from heat markets (high prices press demand down and supply from independent boilers up) and makes CHP less competitive both at heat and electricity markets. Many Russian experts proposed approaches with flexible costs allocations between heat and electricity to maximize overall economic and energy efficiency of CHPs[1]. They are to be flexible for seasons, climate conditions and many other factors. This allocation has to take into consideration the market situation at power and local heat markets. Conditions on all local heat markets cannot be fully controlled from the center.

3 Power reform and future for large CHP

The future for large CHP in much degree depends from course of power sector reform and from corresponding level of power tariffs. If they are sufficiently high, then CHP electricity can by priced higher and heat cheaper to keep its market niche. RAO EES Rossii, Ministry of Economic Development, Federal Energy Commission, very large industrial companies, regional authorities, and experts have not come to a concord yet about "economically reasonable electricity prices". Power sector advocates are not happy with the present level of prices, or with a substantial influence of regional governments on the pricing policies. They describe these policies as "artificial restraining of prices"[10] and often refer to higher power prices in Western countries.

Some Russian experts are of a different opinion. A. Illarionov, economic adviser to President V. Putin, thinks that electricity is overpriced in Russia, and profitability of this monopolistic industry is much higher than of industries working in the competitive environment. He believes, that re-distribution of incomes in favor of the power sector will brake economic growth[11]. G. Kutovoi, Chairman of Federal Energy Commission, believes, that for some period of time electricity tariffs can be kept constant, and potentially they can even be reduced by 30-40%[12].

Regional AO-energos, which have large CHPs, keep today only 7% of wholesale market and their capacities are loaded only at 50%. Nuclear power dominates the market (41%), and the load factor for nuclear power plants is 70%. At the same time, hydropower plants (22% of the market) are under loaded. So, when real completion is introduced the hydro load factor will go up and wholesale prices down. CHP electricity would be marginal. It contradicts the need for heat at the whole duration of the heating season. CHP power generated at condensation cycle is not competitive. So CHPs should generate power only at cogeneration cycle with all electricity generated given guaranteed market at least for heating season duration. Power grid companies are to be obliged at least for some transition period to buy power from CHPs during the heating season. An alternative to that is providing subsidies to electricity generated at CHPs to let it compete at the wholesale market. RAO EES Rossii considers three possible futures for its CHPs[13]:

- Creation of JS heat network companies with municipalities. This model requires the improvement of existing CHPs efficiency, heat transmission system development and so growth of CHPS heat generated at cogeneration cycle, modernization of transmission and distribution facilities, and providing more flexible pricing policy and billing systems. 195 RAO EES Rossii CHPs are selected for such model.
- Separation of 47 smaller CHPs into heat supply companies which will work jointly with municipal sources to provide heat.
- Decommissioning of 15 ineffective CHPs and replace them with other heat sources.

9 See. V.G. Semenov. Possibilities of CHP operation at power market. "Novpsty Teplosnabzhenia" (in Russian). №12. 2002. p. 44; G. Kutovoy. Chairmen of Federal Energy Commission. "Novosty Teplosnabzhenia" (in Russian). №12. 2002. p. 44; I. Leonov. "Novosty Teplosnabzhenia" (in Russian). №7. 2003. p. 5

10 Term used in the "Energy Strategy of Russia up to year 2020".

11 A. Illarionov. Do we need to raise tariffs? "Vedomosti". 24.01.2002. See also "Vestnik TEC". 1.2002. p. 10.

12 G. Kutovoi. There is no need to raise tariffs. "Vedomosti". 10.04.2002.

13 A. Levinskiy. Restructuring cogeneration systems in power sector reforming conditions. "Novosty Teplosnabzhenia" (in Russian). №7. 2003. p. 11.

4 Housing sector reform and future for CHP

Housing sector reform at least conceptually and more and more practically is also based on the introduction of competition. Large business is considering domestic heat market, which worth 28 billion US$ sector as attractive activity. So competition pressure is growing. Government announced support to the decentralization of heat supply. Reliability of heat supply became a serious factor in politics.

So more competition is on the supply side: support for individual heat supply, decentralization and diversification of heat supply. It leads to growing heat supply and substitution price elasticity, which, in turn, limits the room for CHP heat cost flexibility.

On the other hand, housing reform also supports installation of heat meters, heat consumption regulators, improvement of buildings envelopes. So it leads to increase in heat price elasticity of demand.

Additional aspect of the reform is balancing purchasing power and heat tariffs. Problems related to setting heat tariffs and municipal and family budget planning are interrelated. When prices are going over purchasing power limits non-payment problem aggravates. Recent studies conducted by the author have shown that payment discipline is deteriorating when threshold of housing maintenance and utility payment - 6% - is surpassed. This threshold is the same in Russia, European Union and in the USA. In some countries it varies from 4 to 10%. So the purchasing power sets the price limit and this limit is one of the major determinants of the price elasticity.

Municipal budget payment discipline is also a derivative from heat price evolution. When prices substantially exceed the municipal budget purchasing power, but supply cannot be interrupted and consumption cannot be regulated, additional price growth leads to the accumulation of debt. The debt of heat suppliers to creditors equals USD billion 4.2 with 70% of this debt originated from the low payment discipline of the government.

High costs and low payment discipline undermine physical reliability of the heat supply system. Lack of resources to maintain infrastructure, in turn, leads to growing budget allocations for handling emergencies. Growing losses and emergency costs escalate heat supply costs further and undermine financial stability of heat suppliers. Their poor financial shape does not inspire financial institutions to lend them money or motivate private companies to enter the market.

5 Bright future for small CHPs

There is a much brighter future for small cogeneration units developed based on construction of new CHP with gas turbines or modernization of existing boilers by adding gas turbine both for industrial and municipal applications. Even small boilers (up to capacity 3 Gcal/|h can be effectively equipped with gas turbines. There are estimates that such units can increase generation of electricity by 150 billion kWh. That would allow meeting additional demand in the European part of Russia[14]. Experts from power sector consider the replacement of existing equipment at large CHPs by small cogeneration units based on gas turbines as well as small scale combined cycle units with cogeneration (with capacity 25 MV) as a solution of present CHP problems as well[15]. The practical application of this approach is taking place[16].

[14] Yu. Sinyak. New concept of heat supply. “Novosty Teplosnabzhenia” (in Russian). №5. 2003. p. 3-5.

[15] Y. Kovylianskii. “Novosty Teplosnabzhenia” (in Russian). №7. 2003. p. 36; .V. Ylianov. “Novosty Teplosnabzhenia” (in Russian). №7. 2003. p. 31.

[16] For example in Archangelsk in 2002 such unit with electric capacity 18 MV was commissioned.

6 Policies to support CHP generation in Russia

For existing CHPs to have a brighter future in Russia a number of actions and policies are to be implemented. CHPs should generate power only at cogeneration cycle with all electricity generated given guaranteed market at least for heating season duration. Power grid companies are to be obliged at least for some transition period to buy power from CHPs during the heating season. An alternative to that is providing subsidies to electricity generated at CHPs to let it compete at the wholesale market. Today there is an investment component in power tariff at wholesale market to finance nuclear power station construction. A similar component is to be introduced for supporting CHP electricity production.

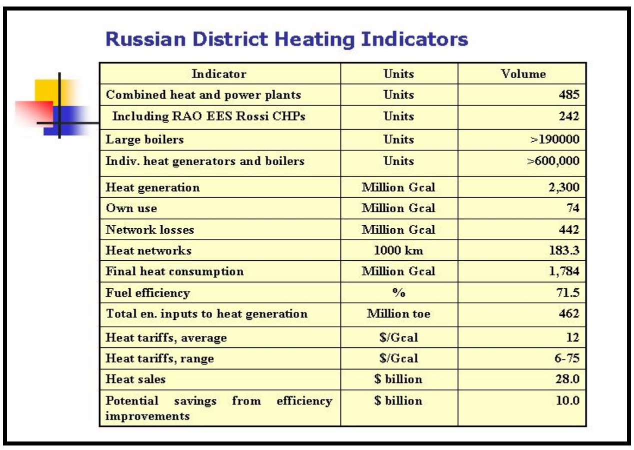
Studies to evaluate heat demand price elasticity and alternative heat supply price elasticity are to be conducted. Heat and power pricing policy should be based on the following principles:

- long-term pricing considerations and on identification of the heat tariff thresholds, surpassing which sears spring drives both heat and power tariffs only in one direction – upwards so market niche for large CHP is squeezing;
- separation of generation and distribution costs. Tariffs on transmission and distribution should include cost of serving heat networks as well as costs of lost heat in transmission and distribution systems;
- elimination of heat cross-subsidies taking into consideration the evolution of purchasing power of customers;
- basing heat pricing on heat really delivered to the customer (not to the heat distribution network);
- allocation of generation costs between power and heat generation should be driven by competitiveness considerations for both power market and heat market;
- definition of heat supply zones and introduce zoning tariffs, to motivate closely located large consumers to stay with the centralized system.

Additional consideration is crucial for the future of large CHPs in Russia. Significant reduction of heat losses, non variable costs of heat and power generation, as well as costs of heat transmission and distribution system operation can make the future for large CHPs operation in Russia much brighter.

Extra CHP capacities are to be conserved and decommissioned and new small scale CHPs and combined cycle units are to be built to meet potential future demand growth.

Slide 1


Russian District Heating Indicators

Indicator	Units	Volume
Combined heat and power plants	Units	485
Including RAO EES Rossi CHPs	Units	242
Large boilers	Units	>190000
Indiv. heat generators and boilers	Units	>600,000
Heat generation	Million Gcal	2,300
Own use	Million Gcal	74
Network losses	Million Gcal	442
Heat networks	1000 km	183.3
Final heat consumption	Million Gcal	1,784
Fuel efficiency	%	71.5
Total en. inputs to heat generation	Million toe	462
Heat tariffs, average	$/Gcal	12
Heat tariffs, range	$/Gcal	6-75
Heat sales	$ billion	28.0
Potential savings from efficiency improvements	$ billion	10.0

Slide 2

Russian Heat Balance. 2000-2001 (million Gcal). Supply Side

Indicator	Public utility companies	Industrial and municipal boilers	Individual boilers	Total
Generation	1515.7	613.2	170.7	2299.6
CHP	680.0			
RAO EES Rossii	494.0		170.7	73.9
Industrial CHPs	176.0	21.2	0.0	2225.7
Own use	52.7	592.0		441.7
Sold to network	1463.0	157.0		20%
Heat losses	284.7	27%		91.0
Share of heat losses (%)	19%	17%		
Heat losses attributed to				
Industry	74.0	17.0		91.0
Agriculture	8.8	3.6		
Residential buildings	61.4	86.0		12.3
Public buildings	105.3	48.4		147.4
Others	35.1	2.1		153.7

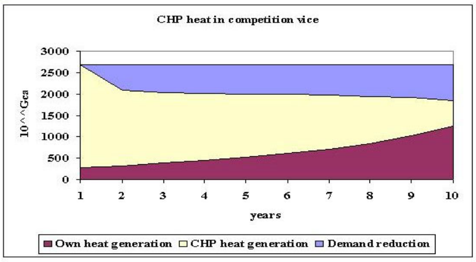
Slide 3

Russian Heat Balance. 2000-2001 (million Gcal). Demand Side

Indicator	Public utility companies	Industrial and municipal boilers	Individual boilers	Total
Final heat consumption	1178.3	435.0	170.7	1783.9
Industry	599.0	96.4		695.4
Agriculture	49.7	20.2		70.0
Residential buildings	143.4	200.6	170.7	514.6
Public buildings	245.8	112.8		358.6
Others	140.5	4.9		145.4

Slide 4

CHP Heat in Competition Vice



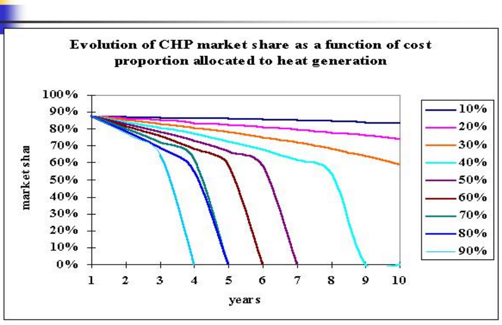
Slide 5

There are several crucial parameters, which determine flexibility area for heat pricing policy:

- Share of CHP costs allocated to heat generation;
- Heat demand price elasticity;
- Alternative heat supply price elasticity;
- Share of non-variable costs in overall CHP generation costs;
- Rate of heat losses;
- Heat transmission and distribution costs.

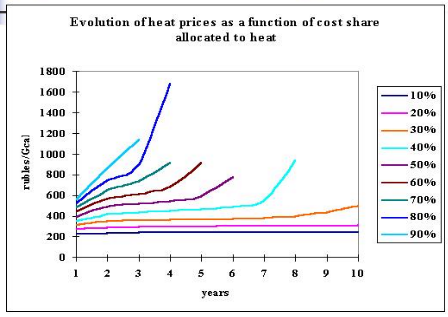
Slide 6

Evolution of CHP market share as a function of cost proportion allocated to heat generation



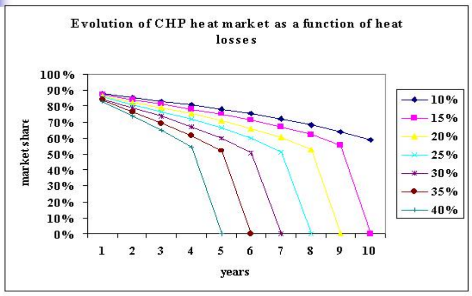
Slide 7

Evolution of heat prices as a function of cost proportion allocated to heat generation



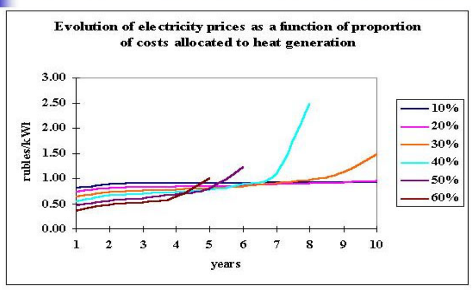
Slide 8

Evolution of heat market as a function of heat losses



Slide 9

Evolution of electricity prices a function of proportion of costs allocated to heat generation



Slide 10

Challenges for CHPs Future

- **Power reform**
- **Housing and communal services reform**
- **Small CHPs**

Slide 11

CHPs and Power Reform

- When real completion is introduced the hydro load factor will go up and wholesale prices down. CHP electricity would be marginal.
- It contradicts the need for heat at the whole duration of the heating season.
- CHP power generated at condensation cycle is not competitive.
- CHPs should generate power only at cogeneration cycle with all electricity generated given guaranteed market at least for heating season duration.
- Power grid companies are to be obliged at least for some transition period to buy power from CHPs during the heating season.
- An alternative to that is providing subsidies to electricity generated at CHPs to let it compete at the wholesale market.

Slide 12

RAO EES Rossii considers three possible futures for its CHPs

- Creation of JS heat network companies with municipalities.
  - **This model requires the improvement of existing CHPs efficiency, heat transmission system development and so growth of CHPs heat generated at cogeneration cycle, modernization of transmission and distribution facilities, and providing more flexible pricing policy and billing systems. 195 RAO EES Rossii CHPs are selected for such model.**
- Separation of 47 smaller CHPs into separate heat supply companies, which will work jointly with municipal sources to provide heat.
- Decommissioning of 15 ineffective CHPs and replace them with other heat sources.

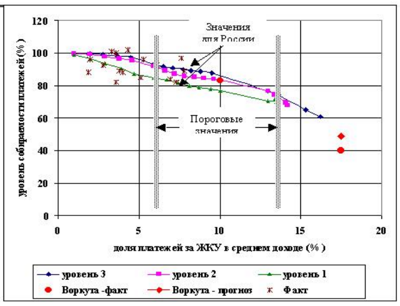
Slide 13

CHPs and Housing Reform

- Housing sector reform at least conceptually and more and more practically is also based on the introduction of competition.
- Large business is considering domestic heat market, which worth 28 billion US$ sector as attractive activity. Competition pressure is growing
- Government announced support to the decentralization of heat supply. Reliability of heat supply became a serious factor in politics.
- More competition is on the supply side: support for individual heat supply, decentralization and diversification of heat supply.
- It leads to growing heat supply and substitution price elasticity, which, in turn, limits the room for CHP heat cost flexibility.
- On the other hand, housing reform also supports installation of heat meters, heat consumption regulators, improvement of buildings envelopes. So it leads to increase in heat price elasticity of demand.

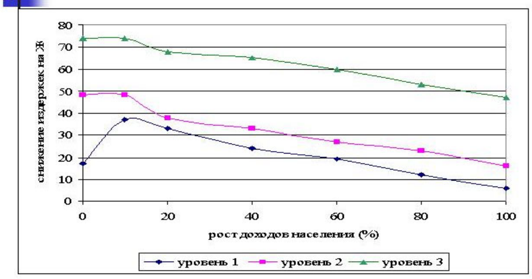
Slide 14

Collection rate as a function of housing and communal services payments/income ratio



Slide 15

Indifference curves: income growth versus costs reduction to provide 95% collection rate



Slide 16

Heat and power pricing policy should be based on the following principles

- long-term pricing considerations and on identification of the heat tariff thresholds, surpassing which sears spring drives both heat and power tariffs only in one direction – upwards so market niche for large CHP is squeezing;
- separation of generation and distribution costs;
- tariffs on transmission and distribution should include cost of serving heat networks as well as costs of lost heat in transmission and distribution systems;
- elimination of heat cross-subsidies taking into consideration the evolution of purchasing power of customers;

Slide 17

Heat and power pricing policy should be based on the following principles

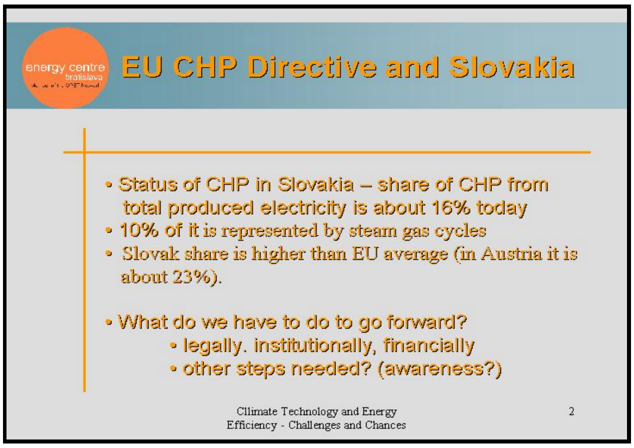
- basing heat pricing on heat really delivered to the customer (not to the heat distribution network);
- allocation of generation costs between power and heat generation should be driven by competitiveness considerations for both power market and heat market;
- definition of heat supply zones and introduce zoning tariffs, to motivate closely located large consumers to stay with the centralized system.

Slide 18

The CHP Competence Centres in the Slovak Republic: Developed Strategies and Work Program

Vladimir Hecl
Energy Centre Bratislava, Slovakia

Slide 1

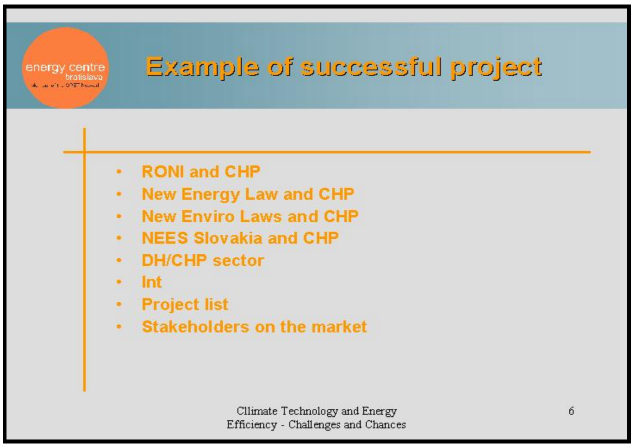


Slide 2

Slide 3

Slide 4

Slide 5

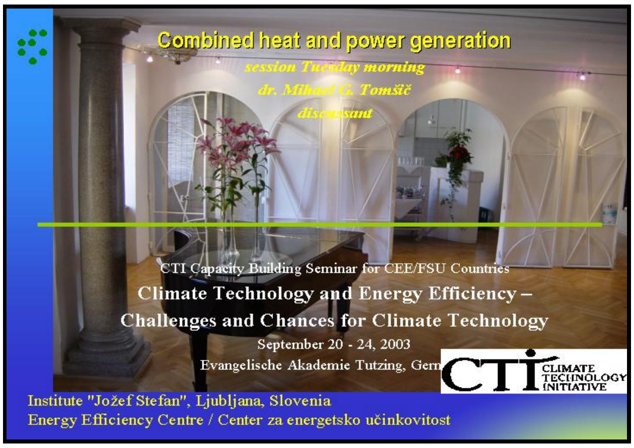


Slide 6

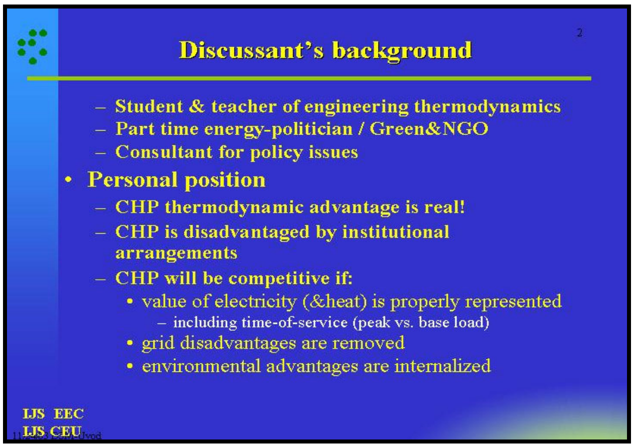
Slide 7

Discussant Notes:
Session Building Renovation and Employment Effects

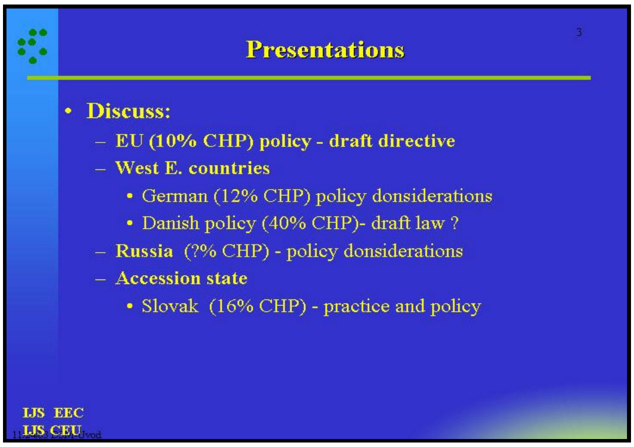
Prof. Dr. Mihael G. Tomšič
Institute "Jožef Stefan", Ljubljana



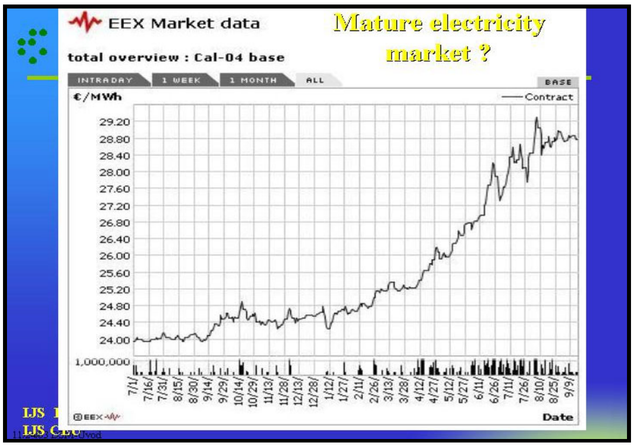
Slide 1



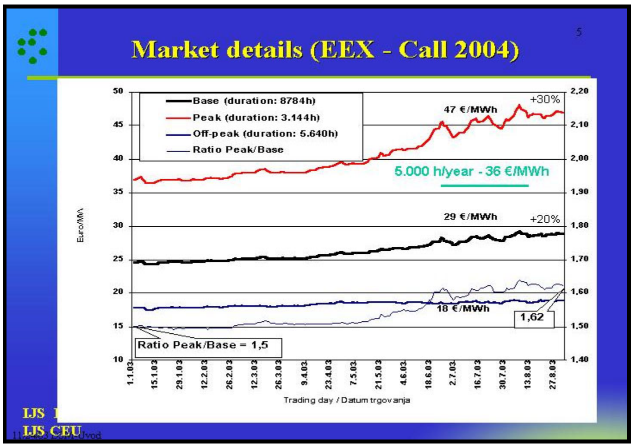
Slide 2



Slide 3



Slide 4



Slide 5

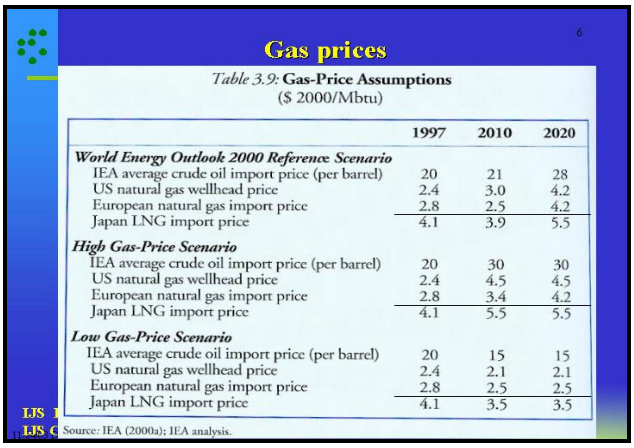
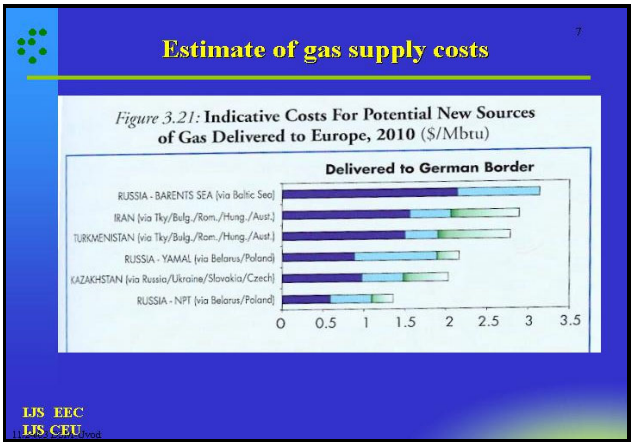


Table 3.9: **Gas-Price Assumptions**
($ 2000/Mbtu)

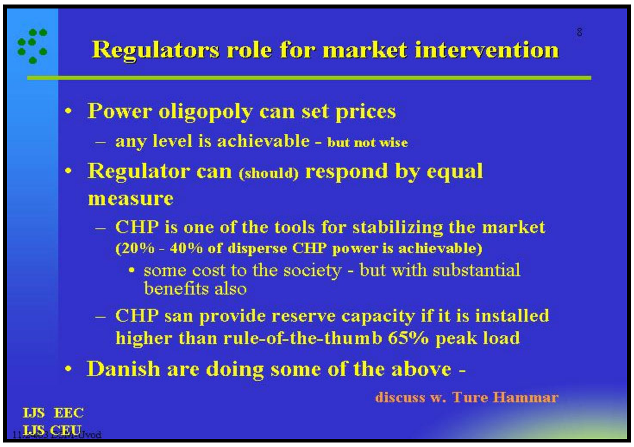
	1997	2010	2020
World Energy Outlook 2000 Reference Scenario			
IEA average crude oil import price (per barrel)	20	21	28
US natural gas wellhead price	2.4	3.0	4.2
European natural gas import price	2.8	2.5	4.2
Japan LNG import price	4.1	3.9	5.5
High Gas-Price Scenario			
IEA average crude oil import price (per barrel)	20	30	30
US natural gas wellhead price	2.4	4.5	4.5
European natural gas import price	2.8	3.4	4.2
Japan LNG import price	4.1	5.5	5.5
Low Gas-Price Scenario			
IEA average crude oil import price (per barrel)	20	15	15
US natural gas wellhead price	2.4	2.1	2.1
European natural gas import price	2.8	2.5	2.5
Japan LNG import price	4.1	3.5	3.5

Source: IEA (2000a); IEA analysis.

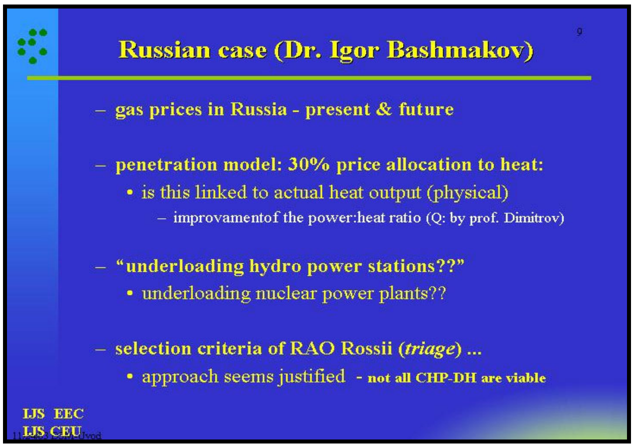
Slide 6



Slide 7



Slide 8



Slide 9

Initiative for Climate Protection & Job Creation in Berlin-Brandenburg

PD Dr. Lutz Mez
Environmental Policy Research Centre, Berlin

The Berlin-Brandenburg region still has large energy saving potentials in the real estate sector. About 750,000 flats are not modernized energetically, and in 2001 the number of energetic modernized units reached only 12,000. With this slow speed of energetic modernization, it would take over 60 years to modernize the building stock of the region.

Another urgent problem is the high rate of unemployment. More than 50,000 unemployed skilled workers are currently registered in the building and construction sector of Berlin-Brandenburg. With additional investment of € 500 million per year, 48,000 additional energetic modernized units and about 15,000 additional jobs can be created.

The project KEBAB (Combined energy saving and job creation project in Berlin) has a long experience with additional employment and education by energetic rehabilitation of buildings. The association “Energie & Arbeit” (Energy & Labor) – which has invented KEBAB – has worked together with the DGB Berlin-Brandenburg (Deutscher Gewerkschaftsbund) to create an initiative for climate protection and job creation in the region Berlin-Brandenburg. The formal foundation of the initiative took place on February 12, 2003. Within a short time the association of housing companies and co-operatives, the association of the landlords, the employer’s association of the construction sector, and the chamber of architects and engineers as well as the associations of skilled workers joined the initiative. The partners agreed on tasks like the qualification of engineers, skilled workers and administrators, the distribution of better information for investors, and co-operation of landlords and utilities in joint energy saving targets. After the creation of a common platform for the partners of the initiative, an exchange of information and contacts is organized, and innovative projects in the real estate sector will be initiated, supported and promoted.

Initiative for Climate Protection & Job Creation in Berlin-Brandenburg

Lutz Mez
Energie & Arbeit e.V., Berlin

Slide 1

Outline

- Concept
- Potentials in the real estate sector
- Tasks
- Levels for action
- Partners of the initiative
- Projects

Energie & Arbeit e.V.

Slide 2

Concept

- Huge energy saving potentials in the region Berlin-Brandenburg
- Many years of experience with additional employment and education by energetic rehabilitation of buildings (KEBAB)
- Energetic rehabilitation creates additional jobs, reduces CO_2 emissions and increases living comfort
- Formal foundation of the initiative in February 2003

Energie & Arbeit e.V.

Slide 3

Potentials in the real estate sector

- 50,000 unemployed in the building & construction sector of Berlin-Brandenburg
- 750,000 un-modernised flats
- 2001: energetic modernisation of 12,000 units
- TARGET: 48,000 additional energetic modernised units
- Additional investment: 500 Mio. €/a
- Creation of 15,000 additional jobs

Energie & Arbeit e.V.

Slide 4

Tasks

- Qualification of engineers, skilled workers and administrators
- Better information for investors to realise energetic and economic efficient energy saving
- Owners of buildings and the utilities have to co-operate in energy saving targets
- New actors necessary for sustainable operation of buildings with the tasks energy management, cost and energy controlling

Energie & Arbeit e.V.

Slide 5

Levels for action

- Creation of a common platform for the partners of the initiative
- Exchange of information and contacts
- Initiation, support and promotion of innovative projects in the real estate sector

Energie & Arbeit e.V.

Slide 6

Partners of the initiative

- DGB Berlin-Brandenburg (trade union umbrella organisation of the region)
- Association of housing companies and co-operatives
- Association of the Landlords
- Employer's associations of the construction sector
- Chamber of Architects and Engineers
- Associations of skilled workers (Handwerkskammern)

Energie & Arbeit e.V.

Slide 7

Projects

- **The Initiative will initiate, promote and support many different projects:**

- Energetic rehabilitation of private buildings
- Energetic optimisation of public buildings
- Use of renewable energy sources
- Qualification and employment of skilled workers
- Qualification of architects and engineers
- Development of new working methods for craftsmen
- Development of new job areas
- Consulting of investors
- Tender for innovative projects
- ...and many other projects

Energie & Arbeit e.V.

Slide 8

Analysis of Building Renovation Projects in Latvia: Energy, Climate and Socioeconomic Aspect

Prof. Dr. Dagnija Blumberga
Riga Technical University

Dr. Andra Blumberga • Marika Blumberga
Ekodoma, Ltd

Different energy efficiency pilot projects in buildings in Latvia have been implemented in the framework of international programs. Energy efficiency measures could be classified by taking into account several important indicators: energy savings, investments, financing and climate issues, import of technologies and employment. All of them are important. However they had to be optimized both from building owners and state side.

Amount of energy savings. Analysis of energy efficiency projects implemented in dwelling buildings in Latvia shows that reduction of energy consumption in average is in range of 20 to 80 kWh/m^2 year.

Amount of investments. Experience in Latvia shows that investments could be in large range:

- from small number (0,15 to 1,5 Euro/m^2) in case of organization of information flow to change attitude of inhabitants and use of energy managers in buildings
- up to 140 Euro/m^2 in case of complete renovation of buildings: installation of thermal insulation and heat substations, reconstruction of heating system and hot water system etc.

Investments in energy efficiency projects increase the value of building because of reduction of costs of energy. However large investments have to be optimized and economically justified because of increase of payments in case of loan. This paper will pay specific attention and analysis of an energy efficiency project implemented in the framework of a German - Latvian bilateral project in Riga a dwelling building placed at Ozolciema street. This pilot project emphasizes the problem of large investments (140 Euro/m^2). Results, which are obtained in this case, show that annual reduction of energy consumption is in the range of 70 to 80 kWh/m^2 year. Similar results are reached in other energy efficiency projects in buildings in Kegums and Kuldiga by use of 4 to 5 times smaller investments.

Implementations of energy efficiency measures show the necessity to analyze the results from other aspects too:

- reduction of influence to global climate changes;
- increase of employment for implementation of energy efficiency projects (including energy audits and installation companies);
- changes in import component and development of new technologies for production of thermal insulation material by local producers.

The analysis of those aspects indicates an added value of energy efficiency projects in buildings.

Analysis of Building Renovation Projects in Latvia. Energy, Climate and Socioeconomic Aspects

Dr. Dagnija Blumberga, Riga Technical University

Slide 1

Experience of EE projects

- PSO programme.EE in school and dwelling buildings. Social monitoring
- MUNEE programme. Energy audits in buildings in Valmiera. Social monitoring
- Energy audits in buildings in different cities by use of computer model "Ekomaja©"
- Analysis of data of EE projects in buildings

Slide 2

EE in buildings. Targets.

- Inhabitants
  - Energy bills (Savings & Investments)
- Government
  - Socioeconomical (Import & Employment)
  - Standards and norms
  - Climate and environmental
- Society
  - Global climate
  - Energy resources

Slide 3

Criteria for EE projects in buildings

- Savings ⇒ max
- Investment ⇒ min
- Payback time ⇒ min
- New working places ⇒ max
- Import ⇒ min
- Use of energy resources ⇒ min
- Impact to climate ⇒ min
- External costs ⇒ min

Slide 4

Aim of EE projects

Low energy
&
low cost building

Is it possible for reconstruction projects or only for new buildings?

Slide 5

Benchmarking

- Reduction from
  - 250 kWh/m^2.year
  - 180 kWh/m^2.year
  - 140 kWh/m^2.year
  - 100 kWh/m^2.year
- to
  - 80 kWh/m^2.year ?
  - 60 kWh/m^2.year ?
  - 45 kWh/m^2.year ?

Slide 6

Analysis of results of 5 EE projects implemented

Specific investments

- Riga 36.000 Ls/5700m^2 = 6,32 Ls/m^2
- Riga 320.000/4000 = 80 Ls/m^2
- Limbazi 14.000/1000 = 14 Ls/m^2
- Kegums 41.400 /2800 = 14.8 Ls/m^2
- Kuldiga 63.000 /3050 =20.66 Ls/m^2

Exchange rate 1 Euro = 0.62 Ls

Slide 7

Kuldiga EE project

Slide 8

- Type 103
- 60 apartments
- Area 3050 m^2
- No hot water supply from district heating system

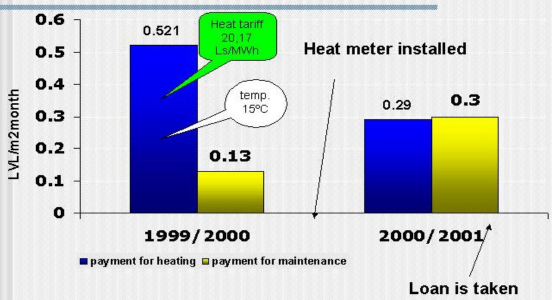
Slide 9

Foundation of housing cooperative

- Founded in 1999;
- 18 members in 1999;
- 28 members in 2003;
- Selected the 2-nd type of maintenance;
- All members of HC vote positive for EE measures and bank loan;
- Based on bank's requirement (at least 75% of total number of apartment owners shall vote positive for implementation of EE measures and bank loan) the second voting round was prepared and 90% voted positive.

Slide 10

Maintenance and heating costs before implementation of EE project



Slide 11

The loan

- 63 000 LVL
- 12 years
- Interest rate: 10% (since 2002: 7,5%)
- Latvian Mortgage bank
- Monthly payment: 767 LVL/month (since 2002: 710 LVL/month)
- Motivation for loan:
  - To decrease the bill for heating,
  - To increase the room temperature;
  - To improve the visual look of building.

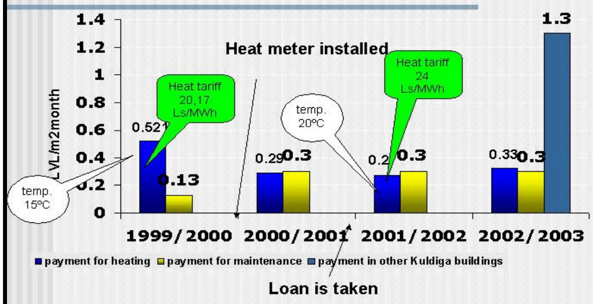
Slide 12

What was done for 63000 LVL

- Heat insulation of roof (20 cm);
- Heat insulation of external walls (8 cm);
- Heat insulation of basement ceiling (5 cm);
- Replaced part of the windows;
- Reconstruction of staircases;
- Reconstruction of draught lobbies;
- Replaced main electrical cables

Slide 13

Maintenance and heating costs



Slide 14

Actual cash flow (June, 2001-October, 2003)

	June-Dec,2001	2002	Jan-Oct,2003
heating, Ls/m2year	0.81	2.07	1.32
total, Ls/year	2471	6314	4026
maintenance, Ls/m2 year	2.1	3.6	2.7
total, Ls/year	6405	10980	8235
income, Ls/year	**8876**	**17294**	**12261**
loan and interest payment, Ls/year	5369	8862	6390
heating, Ls/year	2471	6314	4026
salaries, Ls/year	560	960	720
waste, Ls/year	350	600	450
taxes, Ls/year	70	240	180
rent of carpets, Ls/year	56	96	72
costs total, Ls/year	**8876**	**17072**	**11838**
Ls/year	**0**	**222**	**423**

Slide 15

Conclusions. Kuldiga EE project

- The energy consumption has decreased;
- Payment for heating and maintenance has not increased while heat tariff has increased;
- The comfort in the apartments has increased;
- The real estate value in the building has increased

Slide 16

Riga EE pilot project

Slide 17

Pilot project "Energy Initiative Riga"

- Introduce Latvian building sector with energy efficiency measures by use of experience and "know how" made by city of Berlin during modernization and refurbishment of residential buildings.
- Started August 1998. Inauguration: October 2001

Slide 18

Objectives of project

- realization of energy saving measures within a joint German Latvian cooperation project;
- reduction of heating expenses;
- improvement of living condition;
- achievement of EU climate standards;
- development of feasible approach for the realization of energy saving measures in Latvian housing sector

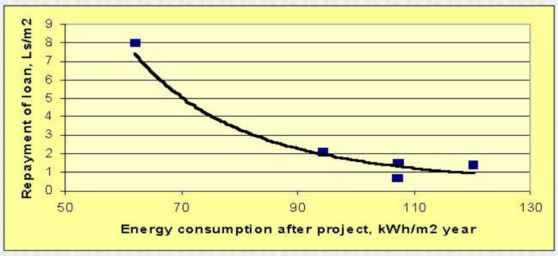
Slide 19

Pilot project

- Construction year of building 1990
- Number of flats 72
- Heated area 4017 m2
- Heated area 55,79m2/flat
- Floors/Stairwells 9/2
- Connection to DH system
- Cooking: natural gas

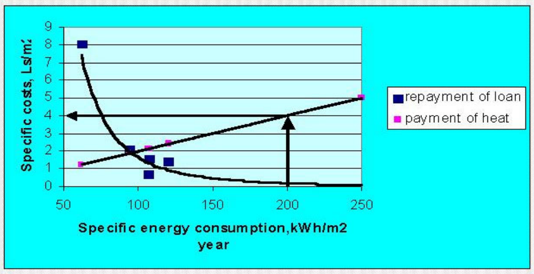
Slide 20

Regression analysis of 5 EE project data



Slide 21

Optimisation of costs of 5 EE projects



Slide 22

Conclusions. Riga pilot project

- Reached lowest energy consumption after project (66kWh/m^{2}year)
- Invested large ammount of money exceeded 5 – 10 times
- Added value – socio-economic effect, reduced climate effect
- External costs have to be taken into account

Slide 23

Climate change issues

- The consequences of given CO_2 target is reached
- The cost-effectivness of such technology is 30...500 Ls/t CO_2
- Effects of greenhouse gas emission trading is significant to cover part of investments

Slide 24

External costs

- Evaluation or measurement of socio-environmental damages provoked by energy production and consumption:
  - What damages should be included
  - What methodology should be used
  - Which comparison could be made among technologies
  - Etc.

Slide 25

External costs

- Analysis of effect to human health
- Life cycle analysis
  - inventory analysis
  - impact analysis
  - damage analysis
  - assessment
  - mitigation proposals

Slide 26

How to cover external costs

- Subsidies and grants
- Taxes
- The use in cost benefit analysis
- Etc.

Slide 27

Continuation of EE projects in buildings in Latvia

- German governmental project in 30 buildings in Latvia
- Loans of municipalities and commercial banks
- EC Directive "Energy Performance in buildings". Implementation in Latvia
  - Conception of Energy Auditing in Latvia
  - Regulation of Cabinet of Ministers "Basic rules for energy consumption in buildings" Draft is prepared

Slide 28

Employment Effects of Building Renovation Projects

Prof. Dr. Adam Guła
Faculty of Fuels and Energy, AGH University of Science and Technology, Cracow
Polish Foundation for Energy Efficiency, Centre in Cracow

Maciej Surówka • Mariusz Filipowicz
Faculty of Fuels and Energy, AGH University of Science and Technology, Cracow

Abstract

The presentation describes both good and bad experience gathered over 10 years by the Krakow Centre of the Polish Foundation for Energy Efficiency in its work on promotion of heat saving undertakings in buildings. The approach we focus on was developed in Poland in two projects sponsored by USAID: in 1992-1994 in Krakow and 1997-2000 in six Polish cities, as well as in a GEF-sponsored project in Podhale in Southern Poland in 2000-2002.

Apart from the data concerning heat savings and employment impacts gathered in the aforementioned projects, results of indoor air quality measurements performed recently in several schools by the team of the Faculty of Fuels and Energy of AGH are also presented. They show how the effects of the thermal improvements, implemented without consideration of the whole set of factors may sometimes only deteriorate the overall indoor comfort of the users of the premises.

This often happens when abundant "soft" money for thermal improvements is easily available. In this context the financial support scheme introduced by the Thermal Modernization Act of 1998 for thermal retrofitting of buildings and its recent amendments are also discussed.

Introduction

Experience shows that energy is wasted mainly where there is no money to invest in energy conservation. However, there exist measures that allow building administrators or users to substantially reduce heat losses in buildings at relatively low cost. At the same time, application of such measures does not require highly skilled labor and may create jobs, especially for people, who do not possess any special skills. Additionally, such jobs are usually for local people. Therefore, they may benefit the unemployment ridden communities as a whole by alleviating social problems. At the same time, living standards of many families can be improved by increasing the thermal comfort of their residences which, otherwise, they could not afford. Unfortunately, in Poland the common practice of building administrators or owners, as well as of local governments in charge of public buildings, is to wait for money that would be sufficient to implement more (often much more) costly solutions. These are widely advertised by companies offering services, such as, e.g., window replacement or installation of expensive controls. Such investments are certainly welcome, however, waiting for money usually takes a long time, during which the energy and related financial losses also accumulate. Additionally, the opportunity of giving work to people who need it is lost; also many families continue living in under heated flats or students learning in under heated schools. The problem is what can be done right now with the actually available funds, and what are the advantages or disadvantages of undertaking (or not undertaking) some feasible works.

In Poland one very often observes that, once some money becomes available, investments supposed to bring heat savings are carried out the wrong way round. They begin with very costly investments with a long payback period, while simpler, effective and less expensive measures are ignored.

To replace or to repair

For the sake of illustration we shall concentrate below on the problem of window carpentry, which - considering its very often bad condition - is a significant source of heat losses in most of Polish municipalities. The individual residents, administrators of housing estates or municipal authorities face a dilemma *"to repair or to install new windows".* The latter solution is, as a rule, too expensive for an overwhelming majority of Polish families and municipal administrations. The answer is rather obvious: the decision should depend on how bad are the window frames and whether they can be cost-effectively repaired, and - on the other hand - on the state of one's finances. In Poland it is very popular to say: *I am too poor to be able to afford half-measures* and it is, indeed, often the basis for taking decisions without much further consideration. In principle this *cliché* is quite true. However, one should also consider if one is not too poor to afford wasting money for heat losses. In Poland the attitude is rather to wait until enough money is accumulated or solicited, because people are somehow not aware of the fact that, meantime, the financial losses also accumulate. The motivation for waiting is expectation that finally a grant or substantial subsidy will be obtained under the label of "energy saving". This is of course taxpayers' money, which is always welcome. Apart from the individually owned houses or flats, it very often leads to an attitude: *"the worse the better".* Nails are hammered into the frames, windows are neither maintained or painted, nor even properly closed, which leads to further warping. Paradoxically, if windows were repaired, those who take decisions would not be impressed by their bad condition and the chance to obtain assistance would decrease. The experience gained during the projects implemented by the FEWE team provided abundant evidence to support this observation.

There are also other factors which are practically never considered when the decision is made. Typically, buildings in Poland are not equipped with systems of forced ventilation. Therefore, window joinery must not be air-tight, as the exchange of air is indispensable for users Typical new windows on sale in Poland are completely air-tight when closed. Potentially, this is a dangerous drawback rather than an advantage, especially in residences equipped with gas. The fact that some of the windows are equipped with micro-openings is insufficient, as people may tend to forget to use them or not to use them deliberately to save heat.

The installation of modern super-tight windows may also bring about an energy effect opposite to the desired one, if it is not coupled with an investment in regulating devices. It was observed that after the replacement of ill fitting joinery with new ones, consumption of heat increased. The reason was lack of temperature control system, which could not be installed, because all money had been spent on new windows. Consequently, the only way to regulate the temperature was to open the windows. This in turn led to an infiltration of air and cooling of the rooms which was much higher than in the case of "regulation" by poorly fitting joinery.

In order to make rough estimates let us assume that one exchange of the volume of air in a room per hour is recommended in typical inhabited apartments. Old, poorly fitting windows are characterized by a higher rate of exchange: two or more exchanges per hour under winter weather conditions. Before the decision about windows is made one should compare the heat losses through air exchange (infiltration) and conduction (transmission through the window panes).

Let us consider a typical living room with a surface of 20 square meters and with a typical window with a surface of 2 square meters. It is easy to calculate that with an outside temperature of $-20^{o}C$ and an inside temperature of $+20^{o}C$, the infiltration of cold air causing one exchange of air volume per hour takes up ca. 2.9 MJ of thermal energy. Therefore, each unnecessary exchange of one volume of air takes up approximately 3 MJ of energy, two exchanges take up 6 MJ, etc. Meanwhile, it is equally easy to calculate that the losses caused by the heat conduction of our window with the typical value $U=2.0\ W/m^2K$, with the same temperature difference, amount to 0.56 MJ/hour. It means that even if we replaced the window with a new one, with glass that does not conduct any heat at all (and of course such a window does not exist), the energy conservation that we would achieve would amount to only 19% of the savings obtained if we reduced the air infiltration from two exchanges per hour to the necessary one. In practice, even if we calculate $U=1.1\ W/m^2K$, for a real window as is found in the best commercial windows, the losses through conduction will amount to only 8.5% of the losses through infiltration in comparison with an actual window with $U=2.0\ W/m^2K$. If, however, we assume that we reduce the number of air exchanges from three to one, which is obtainable by means of professional window weatherproofing, the proportion goes down to 4.25%! As it can be easily proved this proportion does not depend on the temperature differences assumed for illustration in the above calculation.

In other words window replacement only to decrease window conduction losses would only make sense in a situation where the repair would cost more than the replacement, which is rather uncommon, or - paradoxically - if the joinery is in a good state and there is no unnecessary infiltration. However, it is hard, indeed, to justify the replacement of the old joinery if it is in good condition. Unfortunately, it is very often the case. One reason is that the decision-makers have long forgotten the basic rules of physics, the other being the marketing power of installers and manufacturers of new, usually plastic, windows.

It should be noticed however, that recently, more and more often, the donor institutions or ESCOs decline supporting window replacements on the grounds of heat savings. Justifiably, it is argued that such investments serve rather the purpose of easier cleaning and opening. If these aspects are not taken into account the **professional** draught-proofing of joinery coupled with the filling in of cracks between window frames and walls will achieve the desired level of air-tightness. The bigger problem is rather to avoid excessive air-tightness than a lack of it. **Thus, as far the elimination of excessive air infiltration is concerned, the replacement and draught-proofing of joinery basically bring about the same energy (hence financial) effects.**

The experience of the projects executed by FEWE allowed us to assess approximate average costs for repair and draught-proofing. The estimates are presented in the table below as an average expenditure in USD for renovation and draught-proofing of one square meter of a window surface in a particular group of windows characterized by the level of damage (1=slightly damaged, 2=moderately damaged, 3=significantly damaged, 4=very damaged). Typical painting costs are also included. (1 USD is assumed to be 4 PLN).

As it is seen, except for badly damaged joinery, installation of new windows is significantly more expensive. The numbers are updated to the present prices of new windows which have decreased by ca. 25% over the past 5 years (having now more or less leveled off). Even though it is seen that replacement of a typical traditional double pane window of categories, 3, 2 and 1 (which could still be repaired and are very often replaced even for category #1) are respectively ca 2, 3 and 4 times more expensive per unit area. Therefore, the dilemma that municipal or housing administrations really face is whether they should now replace the windows in one block of flats or school or should they repair them in two, three or, perhaps, even four buildings achieving practically the same heat saving effect.

Type of window	Type of investment	Damage level			
		1	2	3	4
Box windows	Draught-proofing of one wing pair	20	42	58	105
Traditional double-pane windows	Draught-proofing and hermetization of the inter-panel space	24	38	52	66
New windows	Replacement	90-110			

The employment impacts

In 1992-94 Polish engineers and technicians were trained by the American experts and technicians led by Mr. Lawrence Markel and George Reeves who demonstrated the strategy implemented in the USA when the financial resources set aside for energy saving are limited. The works carried out in one of the Kraków housing estates showed that simple and inexpensive operations lead to heat savings of several (7-15%) per cent with a payback period of about 3 to 4 years [1]. Let us enumerate the most important ones:

- repair and draught-proofing of window frames and doors;
- elimination of redundant glass surfaces, particularly glass brick ones;
- insulation of outside walls identified through the audit as having considerable heat losses;
- insulation of the ceilings above the top floor;
- installation of **simple** temperature controls;
- numerous other low cost operations possible to define by an experienced specialist.

However, in order for such operations to bring the results expected (savings with low investment costs), several conditions must be fulfilled:

- professional assessment of potential energy savings and their relation to the costs,
- professional definition of the hierarchy of work;
- a professional standard of work
- organizing operations in such a way that the costs are affected by the economies of scale, i.e. organization of the operations by large units (housing co-operatives, local government authorities, education authorities, etc.) allowing also wholesale purchase of materials at reduced prices.

A strategy recommending mainly easy, low-budget operations seems to be very simplistic. However, the outcome of the Kraków project proves that even simple and inexpensive solutions may be surprisingly effective Technicians trained by the Americans were able to repair windows sentenced to technical death by residents or school headmasters. The Krakow project was followed by another one implemented over the period October 1997 to August 2000 by the Polish Foundation for Energy Efficiency (FEWE) Centre in Kraków. The project covered six towns of different size. The aim of the project was to demonstrate what should be the approach to thermal energy conservation in buildings in the situation of limited financial resources. The USAID grant amounted to

USD 546,000 and was supplemented with an additional grant from the Global Environment Facility (GEF) amounting to USD 25,000. The total financial input on the part of the participating towns was above USD 190,000.

The resources put into the project permitted the carrying out of demonstration work in twelve buildings, including five multi-family blocks of flats and seven public buildings (schools, medical center, kindergarten), achieving high thermal energy savings at low cost. A particularly successful restoration was conducted in one of the buildings in Nowy Sącz. It was awarded the title 'Modernization of Year 1999' in the fourth edition of the competition held by The Polish Office of Housing and City Development and the Polish Association of Architects.

Below we illustrate the results of the USAID project in six cities by describing the effects of the application of one of the a low cost measures: the professional repair and draught-proofing of window frames. Table 2 presents the results that can be achieved *on a whole town scale* by applying only the professional repair and draught-proofing of window frames. The table shows: (a) the potential thermal energy conservation, (PEC), and (b) the potential financial savings (PFS) resulting from (a). Moreover, the table includes (c) the potential of creation of new jobs (PNJ) that would be necessary to implement the low-budget thermal improvements on a whole town scale. The potential is shown by the number of years necessary for the implementation of such a program by one qualified worker (person-years, PY). For instance, in Białystok, the repair of window frames alone would guarantee jobs to 100 unemployed people for almost 12 years or to 200 unemployed for about 6 years and would bring with it a long-term saving of about PLN 50 million a year. The figures quoted are based on a thorough statistical survey done in the framework of the project in the six cities. To account for uncertainties figures are close to the minimum achievable.

Town	PEC [TJ/year]	PFS [1000 UDS/year]	PNJ	Population of the town [1000].	Reduction CO_2 [1000 t/year]
Krapkowice	240.3	1 502	**151**	20	**34.8**
Olsztynek	63.7	398	**45**	14	**9.2**
Lubań	71.8	449	**73**	24	**10.7**
Trzcianka	107.6	673	**99**	18	**16.0**
Nowy Sącz	579.7	3 623	**469**	84	**86.3**
Białystok	1 953.6	12 210	**1 164**	284	**290.8**

Barriers

Below we enumerate barriers to a wide adoption of the approach described above. As the experience gathered by FEWE shows the drastic and omnipresent lack of money often goes hand in hand with the failure to acknowledge and take advantage of the opportunities for using the money much more effectively in limiting energy costs. This situation results from:

- lack of awareness among representatives of the administration at various levels, concerning effective methods of achieving energy savings not demanding high expenditure
- the deeply-rooted conviction that the use of simple methods, such as sealing up the frames, should be left to the residents themselves, and that the administration is on a different level of decision-making;
- the conviction that these methods are ineffective. This attitude results mainly from the fact that up till now such works were carried out at a domestic level, in a non-professional way, without the use of appropriate materials and tools. This led to some improvements being hard to notice and the consolidation of the above mentioned conviction;
- lack of local potential to carry out professional standard work in the small companies offering services in the field.
- Additional barriers identified during and after the project are perhaps even more important:
- the counter-action aimed at discrediting the low cost measures at local decision-making level taken by the manufacturers and installers of new windows, whose lobbying capacity and opportunities are far greater than those of small companies or individual technicians offering the low-cost services.
- the counter-action at the municipal level or - at least - a destructive reluctance to support a low-cost, city-wide action, of the local suppliers of heat energy
- the rules of creating public budgets that classify repairs under operational costs, while replacements as investment. The maintenance funds are as a rule very scarce, while the investment may sometimes more easily succeed. In fact, new windows look nicer and make the tenants, schoolmasters of parents of students more happy, which is particularly important considering the election campaigns.

- last but not least, the aforementioned paradox, that efforts to properly maintain window joinery are counter-productive from the point of view of obtaining financial support to install new windows.

These barriers can be overcome only by a combination of a national and local government level action, which would require a more common understanding of the physics of heat savings among the local counselors and administrators, abolishment of subsidies to non-energy investments labeled as energy saving ones, and support to SMEs offering the low cost heat saving services, in particular in the marketing of them.

The ventilation problem

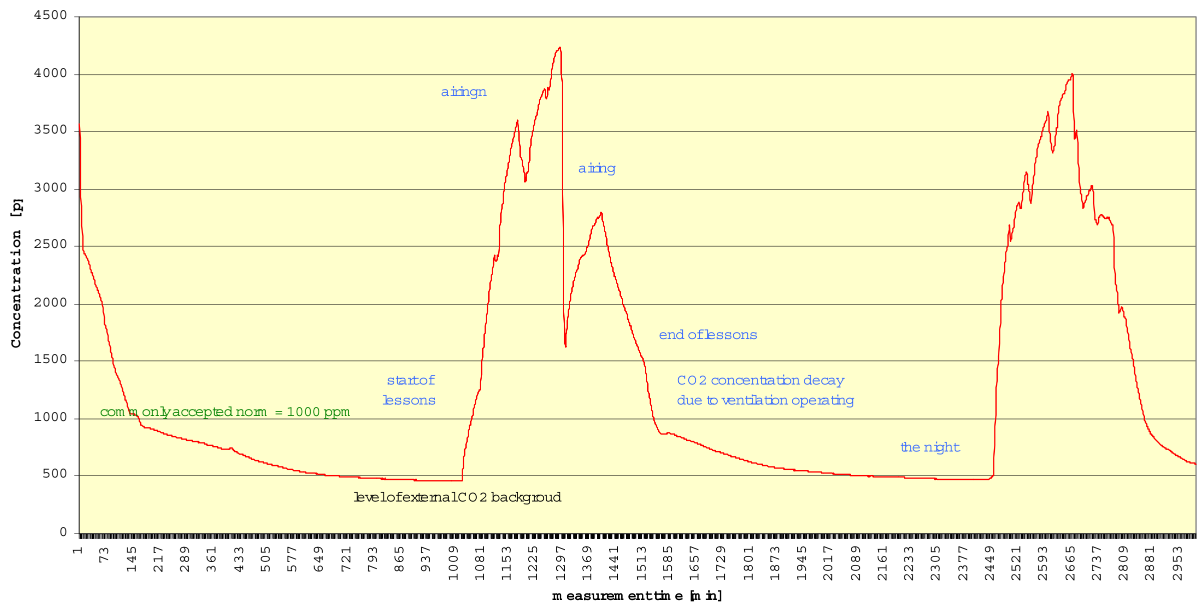
In order to illustrate how serious are the problems of ventilation in many (perhaps most of) the Polish buildings we present results obtained by the team of AGH in measurements performed within the GEF project „Integrated Approach to Wood Waste Use for Space Heating in Poland”. The Project was designed and developed by the Krakow Centre of the Polish Foundation for Energy Efficiency in close co-operation with the Faculty of Fuels and Energy of AGH. The idea was to promote the approach where fuel switch from coal to biomass will be coupled with thermal improvements of buildings to be connected to the biomass heat source. In this way the effective replacement of fossil fuels is enhanced, as the heat saved can be delivered to additional buildings.

The project has been located in sub-Carpathian Central South part of Poland in the region of Podhale (Communes Jordanow and Bystra-Sidzian). Part of the 950 000 USD granted by GEF was earmarked for performing energy audits of the buildings envisaged for connection to the grid. The team of the Faculty of Fuels and Energy of AGH contributed to the project by performing measurements of the air exchange rate in several buildings selected for the project. The measurements were done using two methods: a CO_2 probe and gaseous chromatography method.

For buildings such as: detached houses, multi-family residential and public buildings (schools) the minimum flux of external ventilation air is given by the Polish Norm PN-83 B-03430/Az3:2000. This norm stipulates that for rooms in which people stay even temporarily the influx of external air should not be less than 20 m3/h for each person. However, according to Polish Norm PN-B-03406:1994 which determines the methodology of heat demand calculations for rooms of less than 600 m3 volume, it is assumed that the required air exchange ratio is one exchange of the full volume per hour (1/h). For rooms ventilated more intensively during period of low temperatures, external air flux should also be limited to 1/h. This value is in practice accepted as sufficient, despite some inconsistency between the different norms.

The measurements for the GEF project were performed in three typical Polish school buildings, which do not have forced ventilation systems. Figure 1 shows an example of results of measurements performed in the Secondary School in Jordanów.

Figure 1: CO_2 concentration in a class room of the Secondary School in Jordanow.



The vertical axis shows the carbon dioxide concentration expressed in units of ppm. The horizontal axis is time in minutes counted from the start of the measurements. The maximum CO_2 concentration level considered as admissible is 1000 ppm. A few characteristic phases are visible in the figure :

- During the night the concentration is quite constant (the are no sources of CO_2 emissions) and somewhat greater than the external ambient background level of ca. 400 ppm.
- With the start of lessons the concentration is rapidly growing and quickly exceeds the level of 1000 ppm.
- During the whole lesson period the concentration remains above the threshold and is controlled mainly by opening the windows during breaks.
- With the end of lessons the concentration falls rapidly again.

It is seen very clearly that limiting CO_2 concentration (and associated them bio-impurites) in typical Polish schools is a serious problem, while the headlong drive to install the new air-tight windows very likely only deteriorates the conditions. The results of the measurements are presented in table 3.

It is seen that the numbers fall far below those recommended by the norms. One should note here that high concentrations of carbon dioxide are believed to be responsible for headaches, general fatigue, decreased concentration and information absorption ability, which are particularly important for schoolchildren

Results of CO_2 measurements

Building	C_{max} [ppm]	$C_{śr}$ [ppm]	*n* [1/h]	τ [h]	*V* [m^3/h]
Kindergarten in Jordanów	1519	1082	1.0	1	9-10
Secondary School Jordanów	4239	2500	0.3-0.4	2.5-3	2-3
Individual flat	1569	1020	0.5	2	7-14
Kindergarten in Sidzina	3809	2569	0.12	8	1
Elementary school Bystra	2686	1422	0.5-0.6	1.5-2	2

The notation used is the following:
Cmax- maximum observed CO_2 concentration,
Cśr – average CO_2 concentration during lesson period,
n – air exchange rate ,
τ - time constant of air exchange,
V – volume of ventilation air for one person.

The support for Thermal Modernization Act

In December 1998 the Polish Parliament approved the Act aimed at supporting heat saving investments in buildings. The goals set were threefold:

- Decreasing the use of heat energy delivered for space heating and hot water
- Decreasing the grid losses
- Partial elimination of conventional (i.e. coal-fired) heat sources by replacing them with the so-called unconventional sources, including renewable ones.

The Act envisaged supporting regular commercial loans granted by banks by covering the abolishment of 25% of the loan once the investment has been successfully finished. The money would come from a special Thermal Modernization Fund (TMF) fed mainly by the State budget. A minimum 20% own contribution is required and an energy audit must be presented, verified by an auditor from the list of authorized energy auditors. The first few years have revealed several essential drawbacks of the Act. Notably:

- Lack of eligibility of such building as hotels or student dormitories.
- The ceiling on the Pay-Back Time was set at 7 years
- 75% of the loan had to be paid back before the 25% premium could be granted.

There was also an intrinsic inconsistency: On one hand a short payback time was required and on the other, the minimum heat savings to be achieved for granting the 25% loan abolishment were set at 25%. It was clear that such savings, as a rule, require quite expensive investments having significantly longer PBT. Indeed, the scheme turned out to be practically useless. Only very few applications for the TMF support were submitted.

As a consequence the Act was modified in 2001, with the aim of removing the above mentioned drawbacks.

- The saving ceiling was lowered down to 15% provided that between 1985 and 2001 improvement of the heating system in the building had been done (upgraded or new, more efficient boiler, temperature controls, pipes washed)
- For other buildings the ceiling of 25% has been kept. However the savings can now be achieved jointly by heating system and envelope improvements.
- For buildings where only the heating system is improved the ceiling is now 10%.

As one can see, the irrationally high ceiling of 25% still applies, if only envelope improvements are planned. This evidently excludes the low cost measures advocated in Poland, i.a. by FEWE. (It should be noted that the low cost approach is dynamically developed in countries like Armenia, Moldova and Georgia with the USAID assistance).

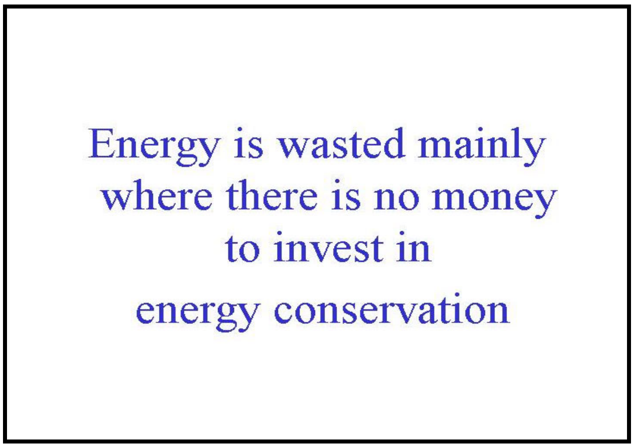
A possible explanation is that the legislators yielded to the interests of banks which prefer dealing with larger sums of money. This is only common and understandable, and this is why we believe that if the energy saving potential (especially the short term one) is to be better exploited, and other benefits associated with energy saving programs, notably job creation, are to be consumed, a national level action is needed.

Acknowledgements

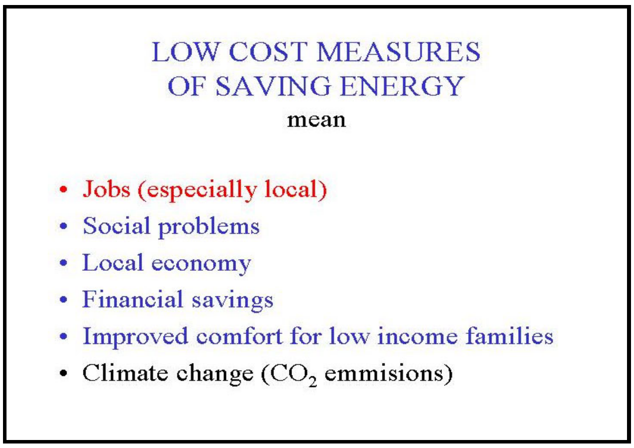
The authors acknowledge the contribution to this work of their colleagues, notably, Dr Jerzy Sowa for providing the CO_2 probe for the measurement, and extremely valuable discussions, Stanislaw Porada, and Mrs. Elzbieta Gula who made results of their air exchange rate measurements available; to Mr. Jacek Markiewicz for his contribution to the USAID projects; we also thank Mr. Arkadiusz Figorski and Mr. Artur Wyrwa for discussions and assistance.

The paper has been prepared within the statutory funding of the Faculty of Fuels and Energy of AGH # 11.11.210.64

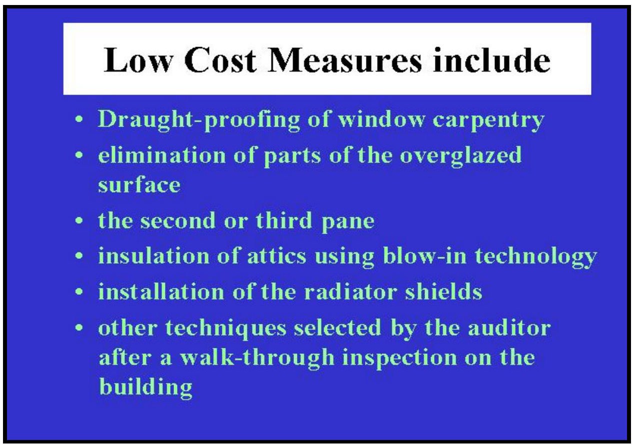
Slide 1



Slide 2



Slide 3



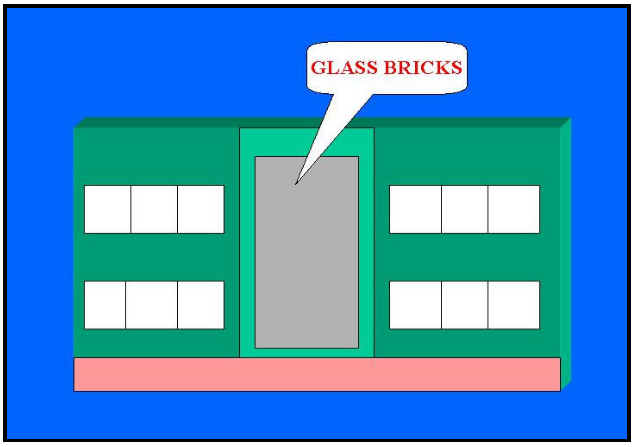
Slide 4

Polish Foundation for Energy Efficiency
Centre in Kraków
1992-2002

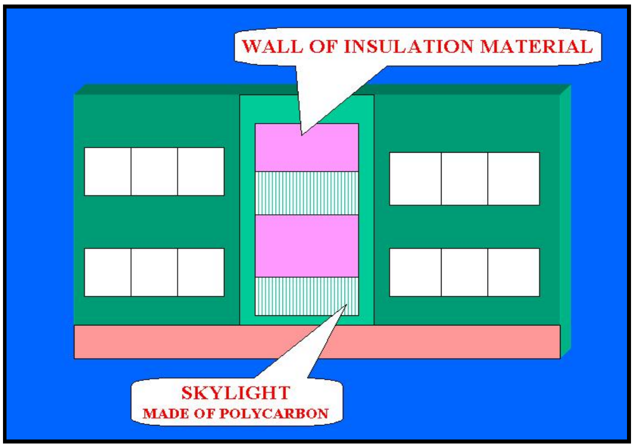
Projects

1. 4 multifamily buildings in Krakow (USAID) 1992-1994
2. 6 multifamily buildings in Krakow, 1994-1995
3. Handicaped People Centre in Pilka, 1996
4. 3 Schools in Kiev, Ukraine (USAID) 1996-1997
5. Residential buildings in Handlova, Slovakia (USAID) 1996
6. Sanatoria in Truskavets, Ukraine (USAID) 1997-1998
7. Many small projects in different cities, 1995-2002
8. 40 Public buildings in Podhale (GEF) 1999-
9. USAID Projects, 1997-2000 in six Polish Cities: Krapkowice, Olsztynek, Lubań, Trzcianka, Nowy Sącz, Białystok

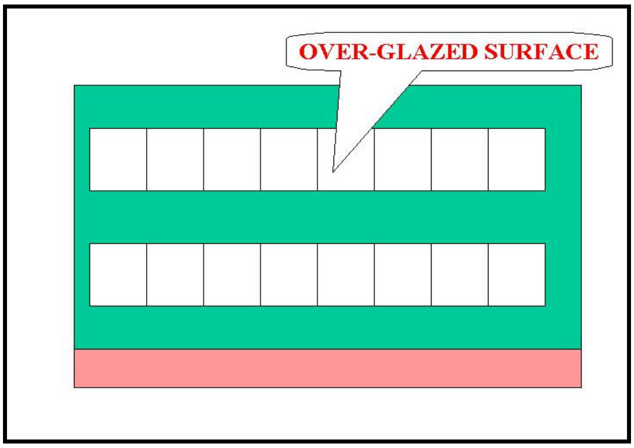
Slide 5



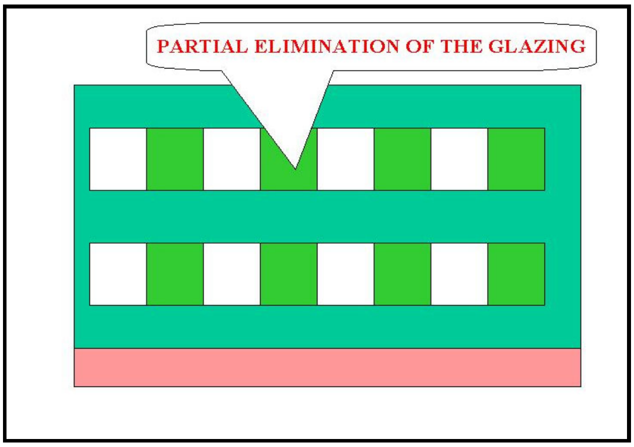
Slide 6



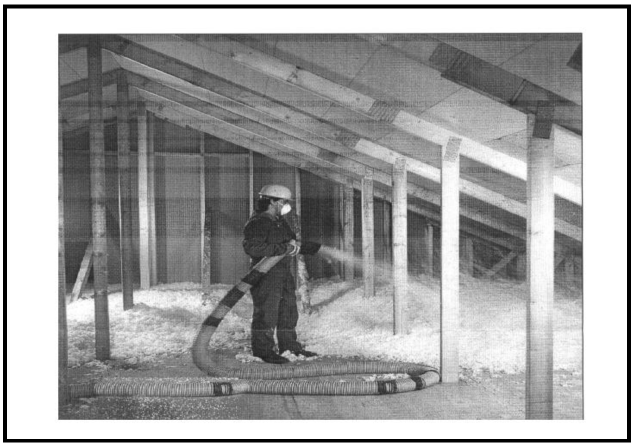
Slide 7



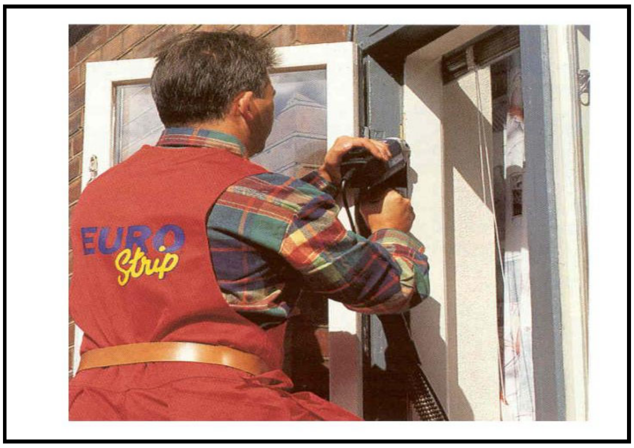
Slide 8



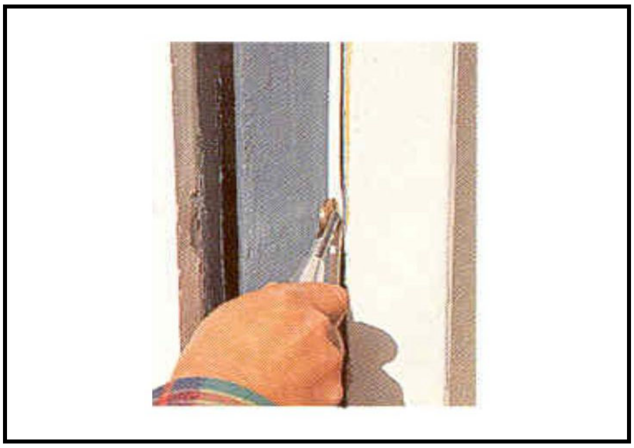
Slide 9



Slide 10



Slide 11



Slide 12

COMPARINSON OF HEAT LOSSES THROUGH THE WINDOW

by

- INFILTRATION OF AIR
- TRANSMISION AND RADIATION

Slide 13

DATA FOR CALCULATION:

Let us assume:

area of the room	$S=20\ m^2$
hight of the room	$h=2{,}8\ m$
surface of the window	$s=2{,}5\ m^2$
heat transfer factor	$U=2{,}6\ W/\ m^2K$
outside temperature	$t_e=-10°C$
indoor temperature	$t_i=+20\ °C$
temperature difference	$\Delta T=30\ K$

Slide 14

Thermorenovation

let us consider two possibilities :

draught-proofing:

giving reduction of air infiltration from two to one exchanges per hour

changing for window for a new one

(the same reduction of infiltration + reduction heat transfer from $U=2.6\ W/m^2K$ to $1.3\ W/m^2K$)

Slide 15

Heat losses by infiltration

- **Heat losses by removing mass of air *m***

$$Q_{\inf} = mc_w\Delta T$$

where:

- c_w – specific heat under constant pressure: $c_w = 1kJ/(kg\ K)$
- m – mass of air in the room, $m=\rho Sh=72\ kg$
- ρ - density of air $\rho\ = 1.29\ kg/m^3$

which gives for $\Delta T = 30$ K:

$$Q_{\inf} = m\cdot c_w\cdot\Delta T = 72kg\cdot 1kJ/(kgK)\cdot 30K = 2167200J \approx 2.2MJ$$

Slide 16

Heat loses by transmition:

- **power losses through the window:**

$$P_{rad} = s\cdot U\cdot\Delta T = 2.5\,m^2\cdot 2.6W/m^2K\cdot 30\,K = 195W$$

- **during 1 hour ($\Delta t = 3600$ s) heat losses**

$$Q_{rad} = P_{rad}\Delta t = 702\,000\,J = 0.70\,MJ$$

Slide 17

The ratio of heat losses by transmission and infiltration

$$\frac{\Delta Q_{rad}}{\Delta Q_{\inf}} = \frac{3600\,[s]\cdot s\cdot\Delta U\cdot\Delta T}{\Delta N\cdot S\cdot h\cdot c_w\cdot\Delta T} = \frac{3600\,[s]\cdot s\cdot\Delta U}{\Delta N\cdot S\cdot h}$$

- where:
- ΔN – reduction of the number of air exchanges (per hour) $\mathbf{\Delta N = N-1}$, ΔU – reduction of U value by changing the glazing $\mathbf{\Delta U = U_{old} - U_{new}}$

Please note that (of course) the ratiodoes not depend on the difference of temperatures

Slide 18

For:
$N=2$
$U_{old} = 2.6\ W/m^2/K$,
$U_{new} = 0.0\ W/m^2/K$,

$$\frac{\Delta Q_{rad}}{\Delta Q_{\inf}} = 33{,}4\%$$

For:
$N=2$
$U_{old} = 2.0\ W/m^2/K$,
$U_{new} = 1.3\ W/m^2/K$,

$$\frac{\Delta Q_{rad}}{\Delta Q_{\inf}} = 8.8\%$$

Slide 19

Renovation vs. Replacement

Type of window	Type of investment	Damage level			
		1	2	3	4
Box windows	Draught-proofing of one wing pair	20	42	58	105
Traditional double-pane windows	Draught-proofing and hermetization of the inter-panel space	24	38	52	66
New windows	Replacement	90-110	90-110	90-110	90-110

Slide 20

Results that can be achieved *on a whole town scale* by applying only the professional repair and draught-proofing of window frames

Town	PEC [TJ/year]	PFS [thousand UDS/year]	PNJ	Population of the town [thousands].	Reduction CO_2 [1000 t/year]
Krapkowice	240.3	1 502	**151**	20	**34.8**
Olsztynek	63.7	398	**45**	14	**9.2**
Lubań	71.8	449	**73**	24	**10.7**
Trzcianka	107.6	673	**99**	18	**16.0**
Nowy Sącz	579.7	3 623	**469**	84	**86.3**
Białystok	1 953.6	12 210	**1 164**	284	**290.8**

Slide 21

Wanting for assistance

Losses accumulate

The worse the better

Replacement:

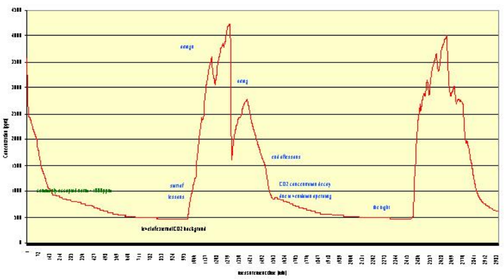
marketing power

election impact

Slide 22

CO_2 concentration in school class-room

(Admitted level is 1000 ppm!)



Slide 23

Results of CO_2 measurements

(Admitted level is 1000 ppm!)

Building	C_{max} [ppm]	$C_{śr}$ [ppm]	n [1/h]	τ [h]	V [m³/h]
Kindergarten in Jordanów	1519	1082	1.0	1	9-10
Secondary School Jordanów	4239	2500	0.3-0.4	2.5-3	2-3
Individual flat	1569	1020	0.5	2	7 - 14
Kindergarten in Sidzina	3809	2569	0.12	8	1
Elementary school Bystra	2686	1422	0.5-0.6	1.5-2	2

Slide 24

Thermal Modernisation Act 1998

- Commercial Loan with 25% abolishment
- Energy Audit Required
- 20% own contribution
- 25% saving threshold
- Payback time 7 years

Modified 2001

- Payback time 10 years
- 10% - if only the heating system improved
- 15% - if the HS modernised in 1998-2001
- 25% - other cases,

(now including savings by system improvements)

High cost still favoured!

Slide 25

Developing and Implementing a Uniform German Certificate for Buildings

Felicitas Kraus
Deutsche Energie Agentur GmbH (dena)

Dena is Germany´s first national energy agency and is owned by the German government represented by the Federal Ministries of Economics/Labor, Environment/Nature Conservancy/Nuclear Safety and Transport/Building/Housing and Germany´s leading promotional bank, the Kreditanstalt für Wiederaufbau (KfW) one half each. Its statute is to support efficient and environmentally sound energy production and consumption by disseminating information as well as developing, implementing and evaluating programs and projects. Within its business fields Renewable Energies, Climate Protection, Energy Efficiency and Energy Efficiency in Buildings, dena advises national decision makers and promotes international cooperation.

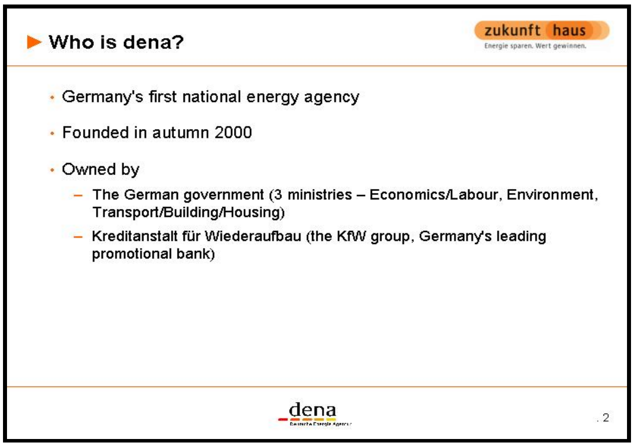
dena´s "Energiepass" for Germany

A standardized, simple and user-friendly energy certificate for existing buildings – mandatory in Germany only for new built and substantially modernized buildings so far – is a decisive means of making energy consumption understandable to owners and tenants. Moreover, dena´s "Energiepass" for Germany will be used as a marketing instrument by the housing industry and will stimulate investment in older buildings on the basis of establishing standardized, reliable technical methods for the calculation of existing buildings´ energy consumption.

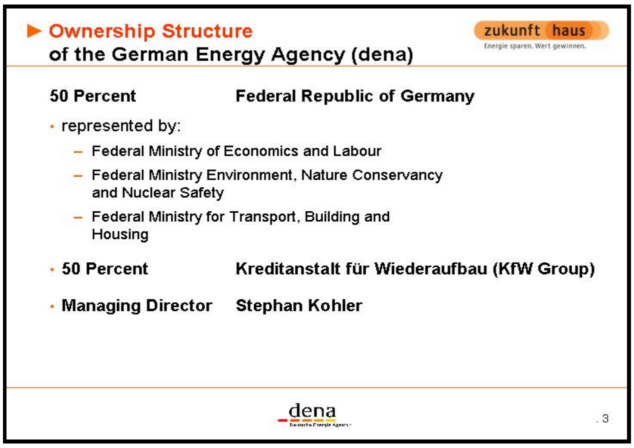
The first strategic step towards implementation is an optimization of dena´s "Energiepass" form prototype (with two different "labels": nine categories (EU label) and a color scheme with reference values) in a field test integrating all relevant market partners, who have to fulfill certain requirements for participation (like collaboration in the evaluation, minimum number of energy certificates issued, etc.).

An independent science institute will evaluate the field test in terms of market acceptance and usefulness of the "Energiepass" as a marketing tool as well as under technical and economic viewpoints like the comparison of calculated and measured consumption values or costs of certification. The results will be introduced in the national legislation to enforce the EU Energy Performance of Buildings Directive. The whole process is being flanked by a consumer campaign establishing energy efficiency as a sign of quality in the housing market.

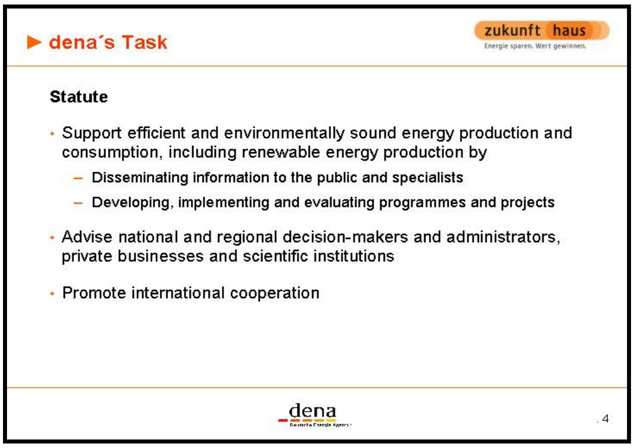
Slide 1



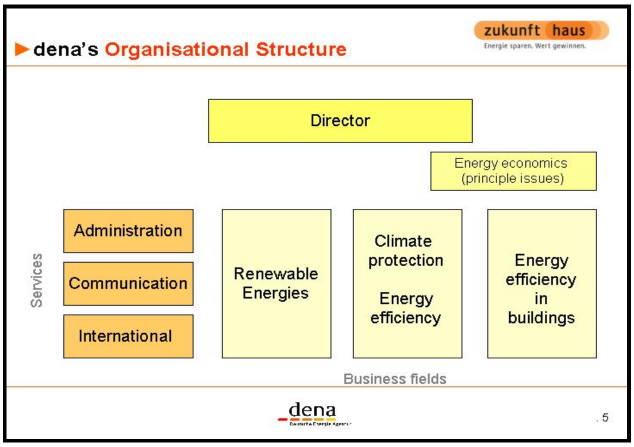
Slide 2



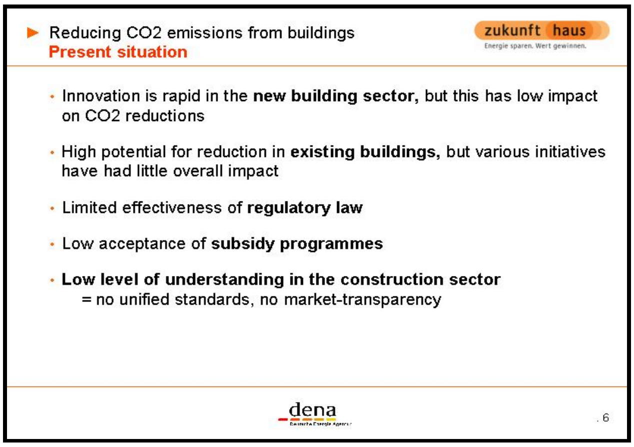
Slide 3



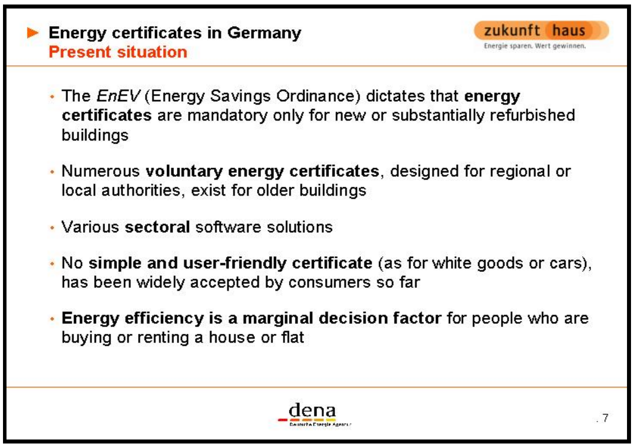
Slide 4



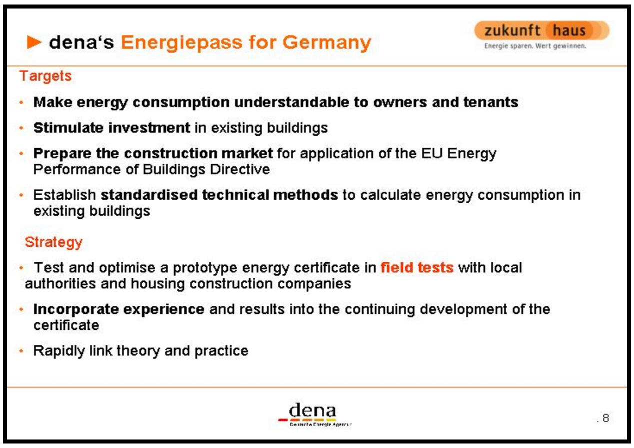
Slide 5



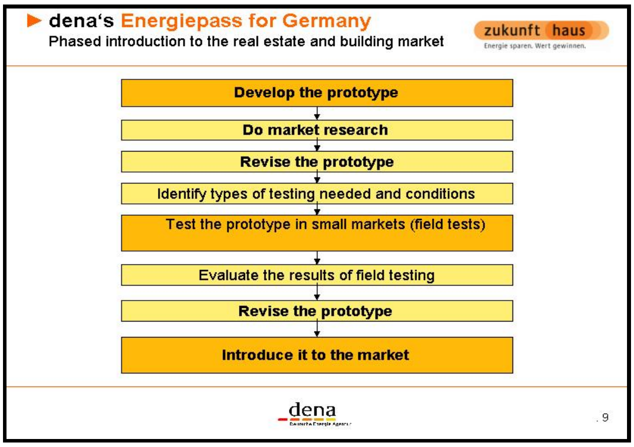
Slide 6



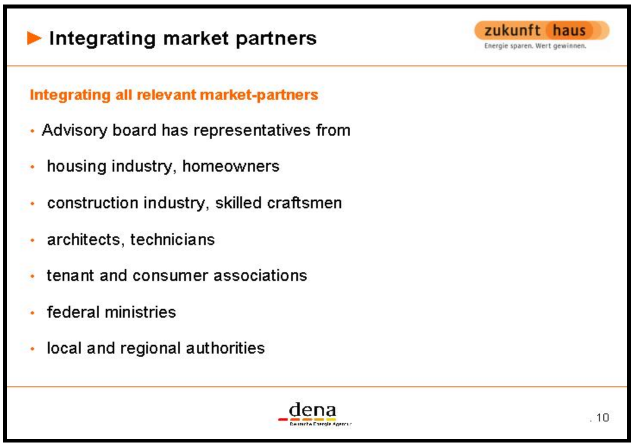
Slide 7



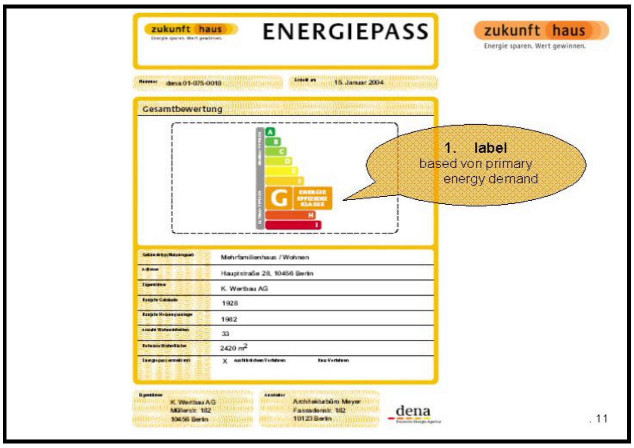
Slide 8



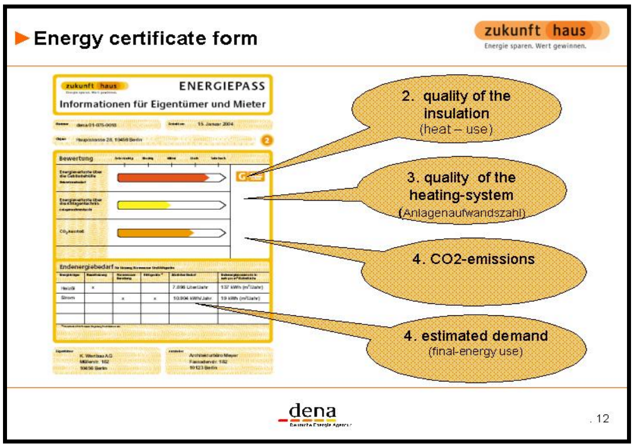
Slide 9



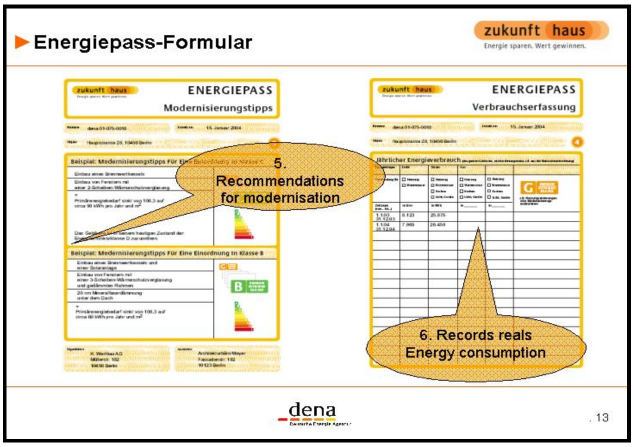
Slide 10



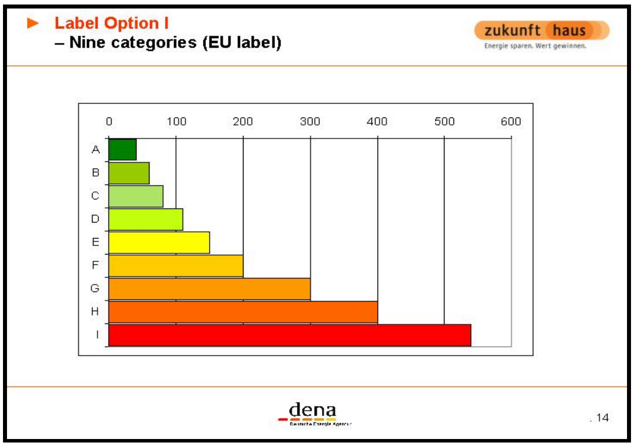
Slide 11



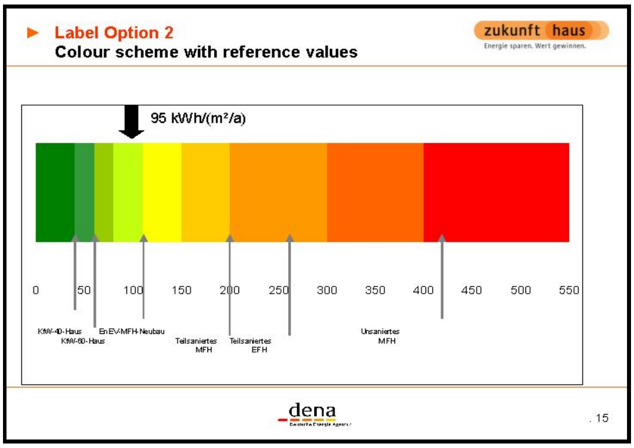
Slide 12



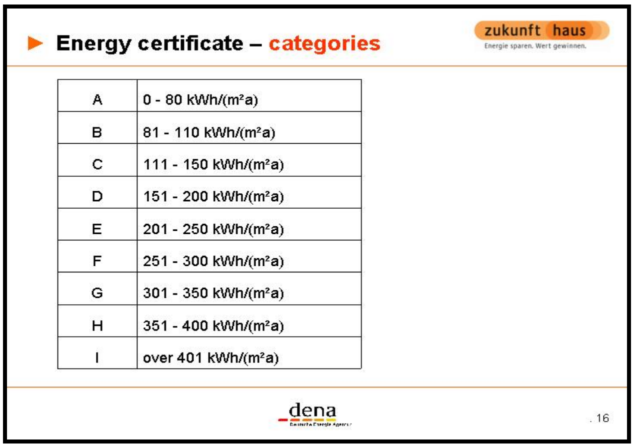
Slide 13



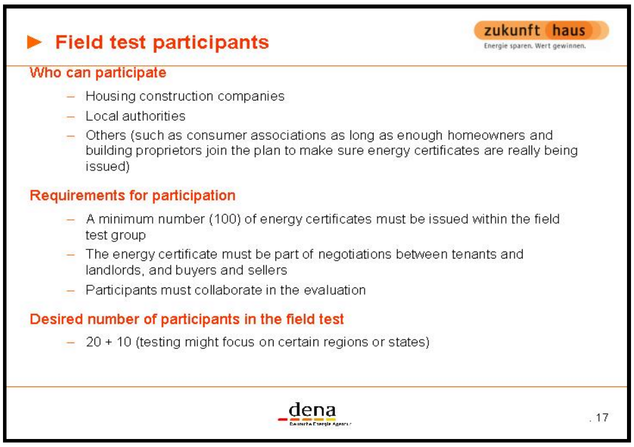
Slide 14



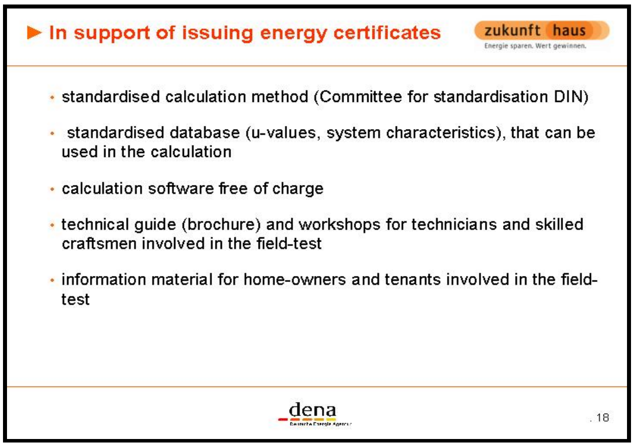
Slide 15



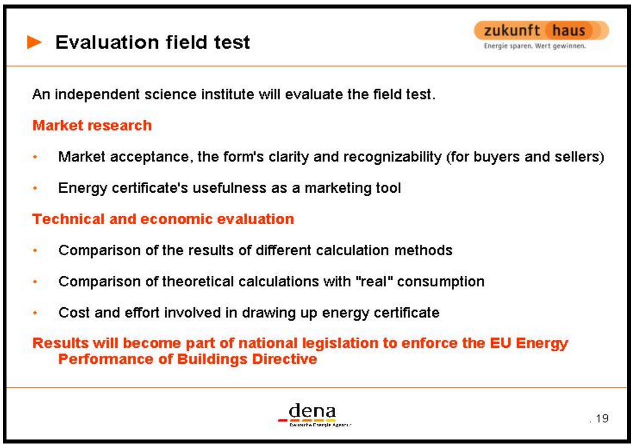
Slide 16



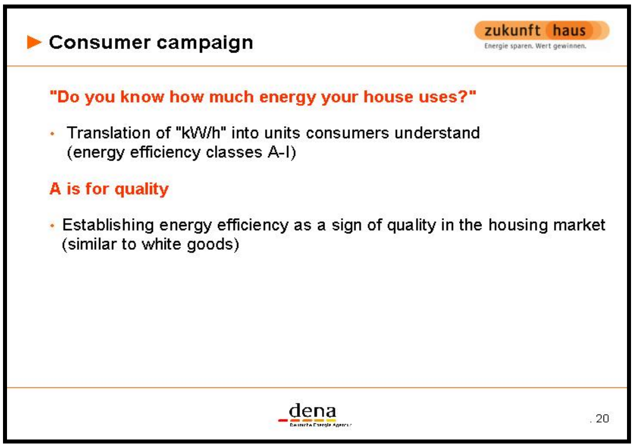
Slide 17



Slide 18



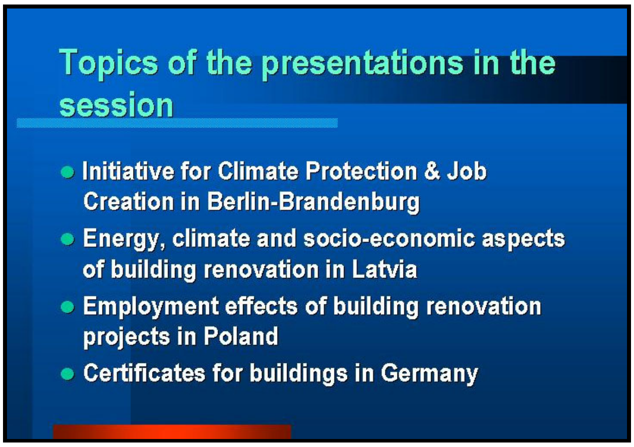
Slide 19



Slide 20

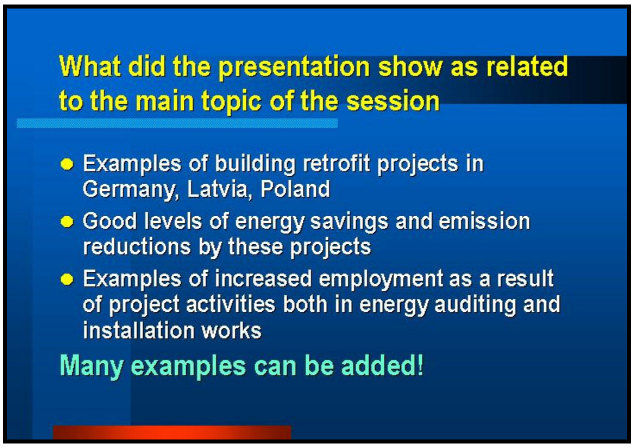
Discussant Notes: Session Building Renovation and Employment Effects

Valia Peeva
Center for Energy Efficiency (EnEffect), Sofia



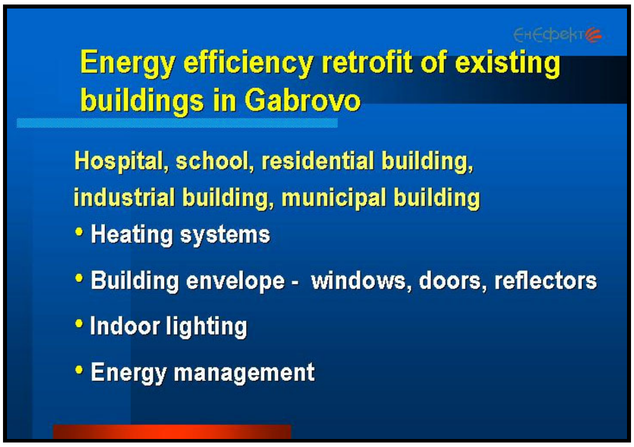
Slide 1

Slide 2



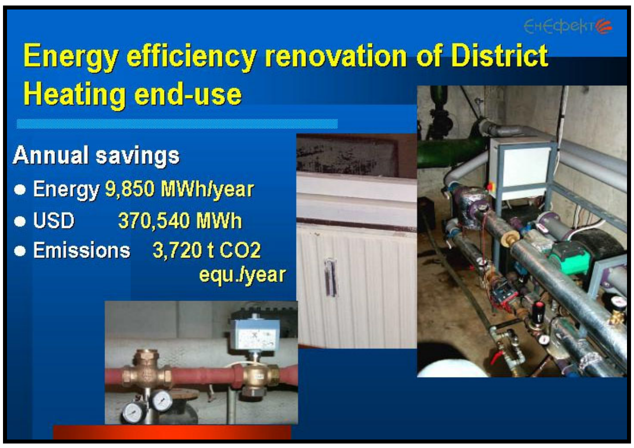
Slide 3

Slide 4

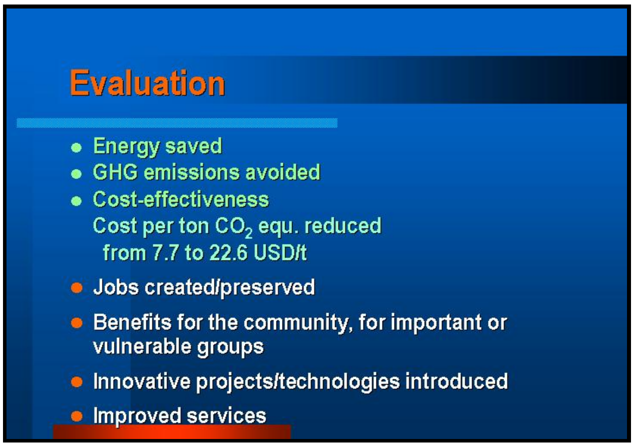


Slide 5

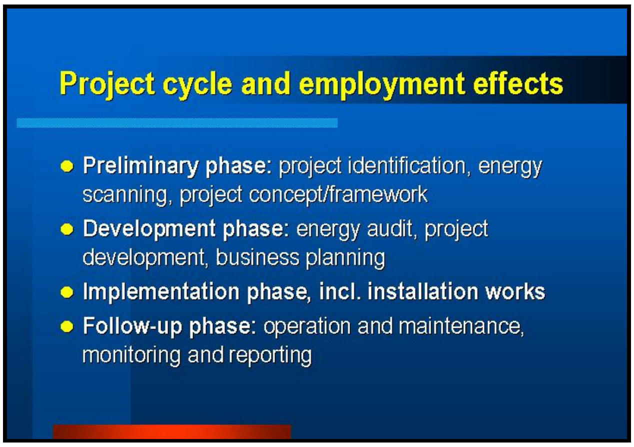
Slide 6



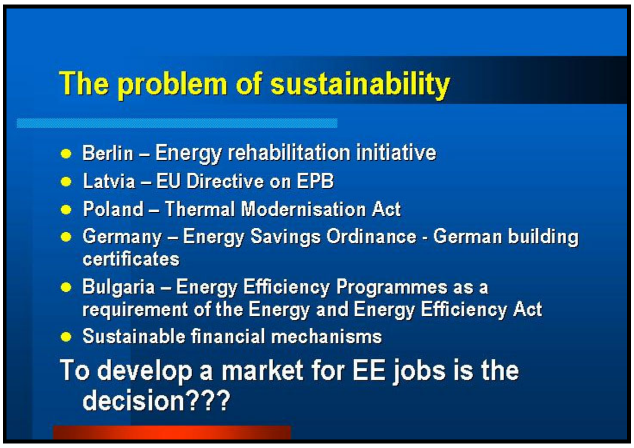
Slide 7



Slide 8

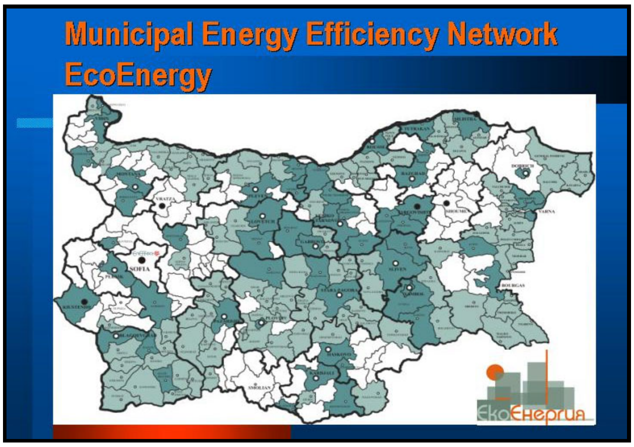


Slide 9

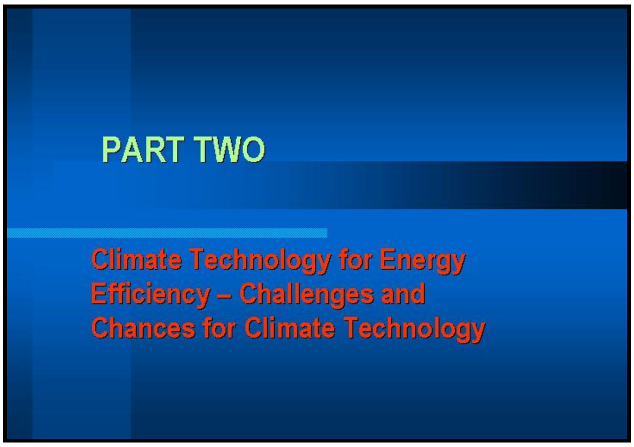


Slide 10

Slide 11

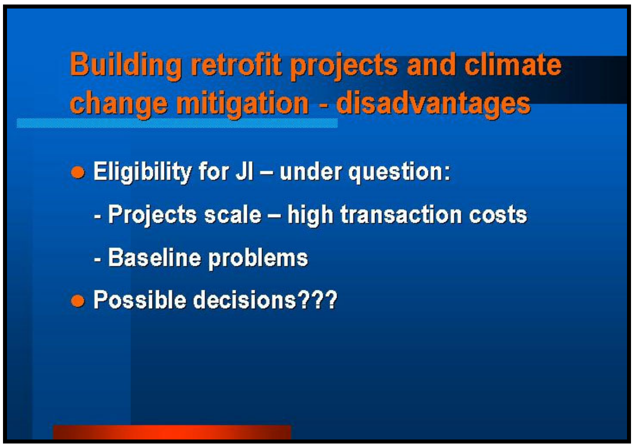


Slide 12



Slide 13

Slide 14



Slide 15

Country Reports

Country Report: Albania

Ermira Fida
Ministry of Environment of Albania • Climate Change Unit

Edmond Hido, PhD
Albania-EU Energy Efficiency Centre

1 Status of energy sector in Albania

From a peak of 3.3 million tons of oil equivalent (MTOE) in 1989 (when all the Albanian economy operated in its full capacity), the primary *energy supply* in Albania dropped by more than 50% or to 1.5 MTOE in 1992. Since then, the primary energy supply has remained relatively constant around the level of 1.6-1.7 MTOE. Due to the collapse of industries and the increasing energy consumption by households, in particular the increase of the demand for electricity, the household sector now occupies a growing share of the *energy consumption*: more than 1/3 of the total energy demand and 56% of the electricity demand. Another pronounced trend is that a growing share of the each individual household's energy consumption is directed towards space heating, probably as much as 30-40% and at national level some 60% of the space heating demand is covered by electricity.

Some of main problems, point out through historic development analysis and possible tendencies for Albanian energy sector are:

- Increase of the electricity consumption by households consumers during the transition period has led to high levels of technical and non-technical losses and reduction of security of supply;
- Lack of electricity price liberalization has led to its massive use for different services in the household and service sectors (space heating and cooking);
- Lack and relatively high prices of other alternative energy sources forced the consumers to focus more on the electricity use;
- Very low efficiency energy use;
- Low per capita of energy consumption and high energy intensity.
- Growth rate in the consumption of diesel and gasoline especially in transports is much higher than what can be accommodated by the supply of domestic oil by-products affecting so the increase of import.
- Production of oil and gas has declined rapidly due to the lack of funds, necessary technical discipline the natural decline of exploitable sources and efforts to increase oil production in the existing and new sources through production sharing agreements have not yet been successful;
- Generation of electricity is dominated by the hydropower output while the thermal based generation has remained stable around 100 GWh per year. During the period 2000-2002 there was a sensitive decline of the electricity production due to drought seasons;
- Supply structure of primary energy sources is becoming less and less diversified due to the increasing role of oil, hydro and fuel woods energy supplies compared to coal and natural gas.

Up to 1985 Albania had a very energy intensive economy, where the energy use per economic output was slightly higher than the average for the CEE countries. This level again was almost 5 times higher than the average level of the EU countries. The per capita energy consumption in Albania was, however, approximately only 1/3 of the level indicated by the EU average and the average of the CEE countries. During the following 10 years until 1994, Albania's situation changed radically (and there is a continue in same direction during the period of 1995-2000). The energy intensity was reduced by some 50 % but the per capita energy consumption was reduced even more, to only 1/3 of the 1985-level. By 1994, Albania's energy situation and macro economic performance was that much closer to the North African region (Morocco, Algeria, Tunisia, Libya and Egypt) than the former communist countries and certainly the EU average.

Albania is largely self sufficient in *energy resources* and in most years (up to 1989) has been a net exporter of electricity and refinery oil by products. Albania is rich with energy resources: oil, gas, coal, wood, peat, and hydro-energy etc, which contribute in different ways to meet energy demands in the country.

Oil reserves in our country, despite predomination of normal technologies of oil exploitation, still conserve relatively high oil resources, which may be extracted applying the enhanced oil recovery.

Gas sources in our country have incurred drastic decline since year 1985 reaching the minimum after ‘90 as a consequence of lack of the investments in the existing gas fields and non-discovering of new reserves.

Coal is one of largest energy sources of Albania and it is spread in four main basins. The forecasted coal reserves are around 226.49 Mtoe. In general, our coal basins have coal with low net calorific value and thin mineral layer that causes a higher cost for energy unit compared to imported coal. These problems led closing down of many coal mines in the country.

Albania has a major *hydropower* potential of which only 35% so far is being exploited. Hydropower capacity installed up to 2002 is 1446 MW. The country’s needs for electricity are met mainly by the hydro power plants (HPPs) and, in a small scale, by the thermal power plants (TPPs). The hydro power plants provide about 95% of the produced electricity, while the rest is produced by thermal power plants.

Biomass can be classified in four major categories: woods or wood residues from various wood processing industries; vegetation residues (stems, seeds etc.) after completion of their production cycle, which are not used in other economic sectors; energetic plants (woods) cultivated to be burned as biomass, and animal residues (bones, skins, manure), which are not used in other economic sectors. According to some approximately estimations, the agriculture residues in Albania in the year 2001 were around 130 [toe/year].

Active exploitation of *solar* energy is achieved in systems that absorb this kind of energy through flat collectors. Hot water can be used for space heating, when its temperature is high, but it is used largely for Domestic Hot Water (DHW) needs. Nowadays, this technology has resulted as the most viable for exploitation of solar energy.

Wind energy is another potential possibility to exploit for electricity generation. In most of the countries, installment of windmills have a common concern, that of not having continuous measurement of the wind speed and long-lasting along several years. For this reason, various companies that are willing to invest in this sector has difficulties to take a decision whether it is feasible to invest in a certain area without these necessary data. Pre-feasibility studies, have shown the highest wind speed zones and too much more longer period are those on the Seashore Lowland.

Potential of municipal *solid wastes* as fuel is given primarily through their ingredients, calorific value, moisture content and non-combustible quantity municipal. The forecasted energy resources from solid urban wastes in our country for the year 2002 are 1.783 Mtoe and by 2050 will be around 9.517 Mtoe. Solid wasted could be used to produce energy, but must be highlight that their cost is too much higher than other traditional energetic fuels.

As per the *geothermal* reserves it must not be used profitably to the aim of energetic point of view, as their thermal potential is too much low (maximum temperature is about 20-33^{0}C)

2 Recent developments in energy efficiency and climate change mitigation policies

2.1 Legislation framework

A legislative framework on energy in Albania comprises a relatively large number of different pieces of legislation at present. However, it has to be emphasized that until today there is no existent umbrella law that covers the primary objectives of the Albanian energy policy and basic principles for the whole energy sector in long-term. Albania also lacks legislation in the field of renewable energy sources, as well as energy conservation. However, the Albanian Government has indicated a willing for preparing the Energy Law, as well as Energy Efficiency Law. Specific energy related legislation, not covered elsewhere, includes the Law on Electricity and the Law on Regulation of Power Sector.

<u>Law on Electricity</u>: The Law on Electricity, No. 7962 of July 1995, specifies the conditions of the activity in the power sector and the rights and duties of all physical and legal persons involved in one of these activities. It also legislates the relationship between consumers and suppliers in terms of their basic duties and obligations. The Law provides for operational and technical management of power network as well as for connections to the grid and measurements of electricity.

<u>Law on Regulation of Power Sector</u>: The Law on Regulation of Power Sector, No. 7970 of July 1995, assumes the establishment of Regulatory Body (ERE) in the power sector and defines its duties. According to this law, ERE is responsible for tariff regulation and licensing in the power sector.

Law on Energy Conservation in Buildings: This law, No. 8937 of September 2002, defines that designing and construction of buildings should meet the necessary technical parameters for conservation, saving and efficient use of energy. All buildings that will be constructed (after this law enters in force), shall observe the normative volumetric coefficient of thermal losses (Gv), which means that thermal losses should be limited, as well as provide for a thermal installation for central or district heating.

Governmental Decree for Energy Building Code: The Energy Building Code was elaborated since 1998 from the National Energy Agency in collaboration with the Albania-EU Energy Efficiency Centre and the other institutions of the sector. The Governmental Decree, No. 38 of January 2003 approves it as "Norms, Rules and Conditions for Design & Construction, Production & Conservation of Heat in Buildings".

Law on Power Sector: The Law on Power Sector, No. 9072 of May 2003, abolishes the above two laws and combine them in one. This law assures the conditions of electricity supply to the consumers, efficient functioning of electricity market and adjust better the Power Sector to the condition of market economy. The overall aims of the Law on Power Sector are to enhance the economic effectiveness and the quality of services for power generation, transmission and distribution and provides a transparent and comprehensive legal framework for the mentioned activities.

Governmental Decree for Strategy of Energy: The Governmental Decree, No. 424 of June 2003, approves the National Strategy of Energy until 2015. According to this decree, the Ministry of Industry and Energy and the National Agency of Energy are appointed to update this strategy every two years.

Draft Law on Energy Policy: The Law on Energy Policy has a special focus on promoting Energy Efficiency and Energy Conservation, creation of an Energy Efficiency Fund, Energy Efficiency Labeling, and promoting an Energy Audits Schemes. This law it is expected to be approved during the second half of this year.

2.2 National Energy Strategy

A National Strategy for Energy has been drafted and approved in June 2003 by the Government of Albania according to Decision of the Council of Ministers, No. 424 dated. 26.06.2003. The National Energy Strategy primarily *aims* at the restructuring of the energy sector based on market economy principles and developing a modern energy policy.

The strategy for the development of energy sector is a document that analyses and recommends the future changes, by the year 2015 that must be undertaken in the Republic of Albania, in order to increase the security of the energy supply and the optimization of the energy resources to meet the demand and achieve the sustainable development. The specific objectives of the strategy of energy are:

- Establish of an efficient energy sector from the financial and technical point of view;
- Increase of the security and reliability of the energy supply in general and electricity in particular, in national and regional levels;
- Establish of an effective institutional and regulatory framework;
- Increase of the energy efficiency in the production and use of energy resources aiming a minimal environmental pollution;
- Optimization of the supply system with energy sources based on the least cost planning principle and minimal environmental pollution.

The analysis and forecasts for the development of the energy sector as per energy supply and demand is performed through the development of two scenarios – *passive* scenario and *active* scenario. These two scenarios are developed by using a general model of energy, already adopted for the Albanian conditions, namely LEAP[1] software (**L**ong **E**nergy **Al**ternative **P**lanning), which ensures necessary analyses and give recommendations close to the Albanian reality. The soft illustrates the different scenarios till 2015 and the consequences of the energy policy and external effects related to them.

[1] LEAP (Long-range Energy Alternative Planning) which is a scenario-based integrated energy environment modeling system designed and disseminated by the Boston Center of the Stockholm Environment Institute. Its methodology is based on a comprehensive accounting of how energy is consumed, converted and produced in a given region or economy under a range of alternative assumptions on population, economic development, technology, price and so on.

Figure 1: Forecast of energy demand and energy saving (ktoe)

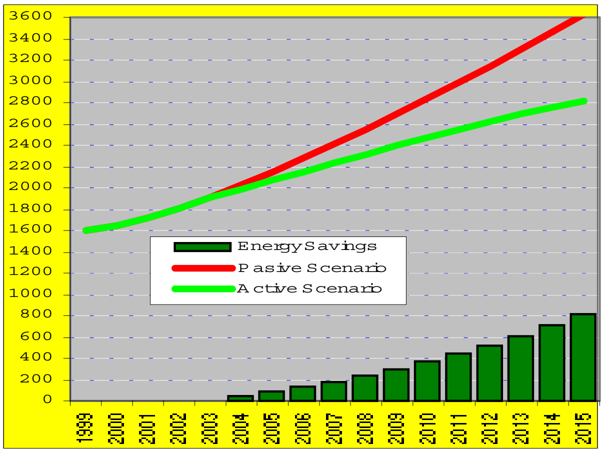


Figure 2: Forecast of electricity demand and electricity saving (GWh)

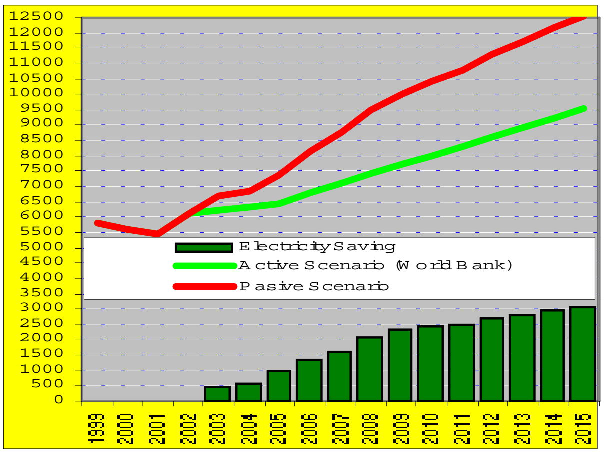


Figure 3: Electricity saving in each sector according to active scenario compared to passive scenario - GWh

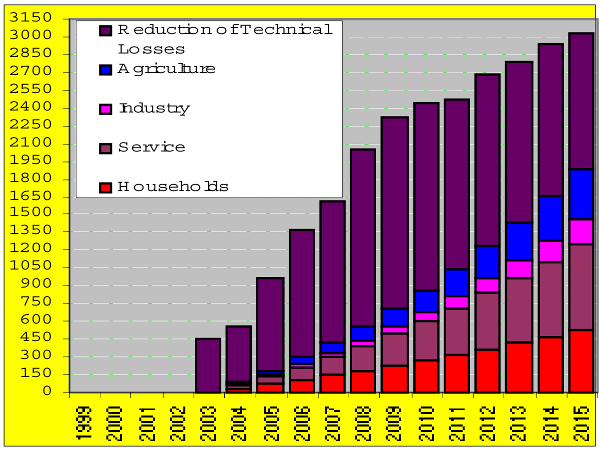
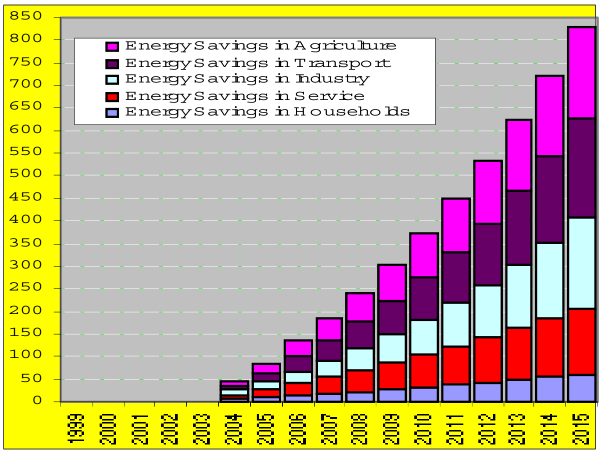


Figure 4: Energy saving in each sector according to active scenario compared to passive scenario (ktoe)



Figures 1 and 2 provide two scenarios for total energy demand in general and for the electricity. As per the electricity demand, according to the active scenario by the year 2015, the energy savings are expected to be around 22.48% of the total energy consumption. The contribution in these savings by 2015 shall come from transport sector with 27.28%, industry with 24.58%, agriculture with 24.67%, service with 17.86% and residential sector with 7.4% of the total savings, respectively.

Figure 4 shows electricity savings according to different energy efficiency measures and analysis show a level of electricity savings of 3056 GWh in 2015, with the main contribution from reduction of technical losses followed by savings in service, residential and industry. As per the CO_2 emissions released by the energy sector the analysis shows that according to the active scenario a reduction of 4 million ton CO_2 will occur as a result of implementation of all energy efficiency measures and increase in a greater amount of the use of renewable energy sources.

Figure 5 shows the reduction potential of CO_2.The analysis demonstrates that the development of energy sector according to the Passive Scenario will lead to a growth of the energy consumption per capita by 38.1% (an advantage), but in the same time it will increase significantly the energy intensity by 14.1% (a disadvantage) in year 2015. The trend of both above indicators according to the Active Scenario is in the right direction because by 2015 the value of energy intensity is expected to be 20.01% lower than in 2005 (an advantage) and the value of energy consumption per capita is expected to be increased by 16.5% compare to year 2005 (an advantage as well).

Therefore, all actions should be undertaken in order to that the Albanian energy system must be developed according to the Active Scenario. In other words, the Albanian economy will consume less energy to produce the same output unit becoming more competitive and gaining more markets, creating more jobs and providing a higher welfare.

Figure 5: CO_2 emission for each scenario and their reduction based on LEAP (1000 ton)

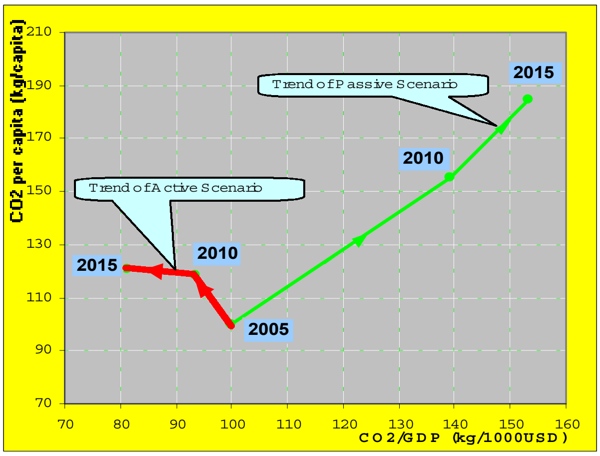
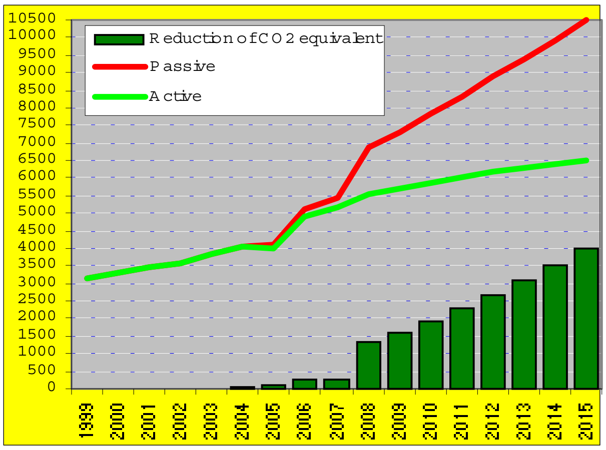
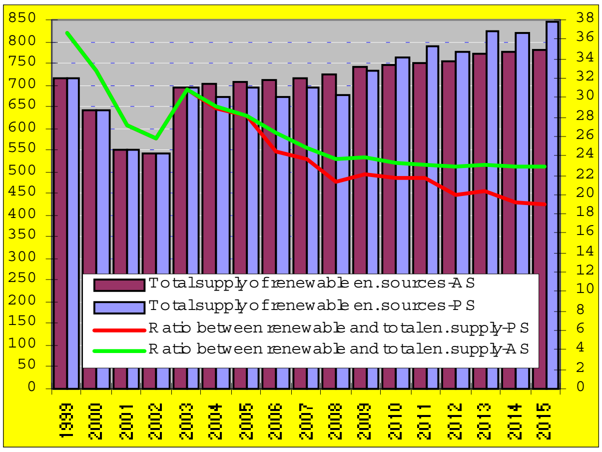


Figure 6: Trend of emission intensity and emission per capita according to the passive and active scenarios



The trade deficit will be reduced as well enabling the use of financial means for different investments in the Albanian economy. The analysis shows that both indicators (CO_2 emissions per capita and that per produced GDP) increase for the Passive Scenario demonstrating that this scenario is unacceptable from environment point of view. By year 2015, the emissions per capita are expected to increase by 84.8% while the CO_2/GDP indicator is expected to increase by 53.4% compare to year 2005. As regards the Active Scenario, a development toward the right direction is expected, accompanied with a decrease of CO_2/GDP indicator by 19.3% and an increase of CO_2/capita indicator by 20.5% compare to year 2005. The increase of the second indicator is not a positive sign, but it should be underlined that the emissions decrease by 64.3% compare to the Passive Scenario. As per the renewable energy, by 2015, according to the active scenario (figure 7) it is expected a higher ratio of renewable versus the total energy supply.

Figure 7: Renewable energy supply versus the total energy supply - active and passive scenario



A basket of measures to be undertaken which increase the energy efficiency in all consumption sectors are considered and analyzed from the cost-benefit point of view as follows:

- Substitution of electricity for space heating and cooking with LPG and other alternatives;
- Thermal insulation of existing stock of public buildings based in a new building code;
- Promotion of solar energy use for hot water supply in households and services;
- Promotion of the central heating and district heating and CHP in services, industry and households;
- Promotion of the efficient lighting in households, services and industry;
- Substitution of coal, fuel wood, residual fuel oil with heavy fuel oil in boilers/furnaces;
- Increase of energy efficiency for existing stock of boilers/furnaces in industry and services;
- Improvement of power factor in industrial enterprises;
- Promotion of public transport;
- Increase of energy efficiency in agriculture sector in general and irrigation in particular;
- Raise of the public awareness for the efficient use of energy in services, households, industry, transport and agriculture sector.

2.3 National Climate Change Mitigation Strategy

Although Albania has no emission reduction targets under the Convention, as a non-Annex I Party to the UNFCCC, attempts to address the Climate Change issues are made. In Albania, up to 2002, no comprehensive national policy to address climate changes has been adopted. During the period of political and economic transformation of the society and the development of a new state, a range of acts, regulations and measures, *indirectly* related to GHG emission reduction are developed and even adopted.

Albania has addressed the mitigation and adaptation measures through the National Climate Change Strategy, which consists on a set of priorities for action in order to integrate the climate change concerns into other economic development plans. This strategy is elaborated in the frame of the Albania's First National Communication to the Conference of Parties of the United Nations Framework Convention on Climate Change funded by the Global Environment Facility. It must be pointed out that the passive and active scenario of the National Energy Strategy corresponds respectively to the baseline and abatement scenario of the greenhouse gas emissions.

According to the First National Communication, Albania is a relatively low net emitter of greenhouse gases, with a relatively low CO_2 emissions per capita. The main reason of that low level of emissions is explained due to the fact that 95 % of electricity is generated by hydro sources. Based on the predictions for future emissions, it is expected that by 2020 the emissions total to be raised more than 5 times. The abatement scenario of emissions foresees the introduction and implementation of different options mainly focused on energy saving and energy efficiency measures.

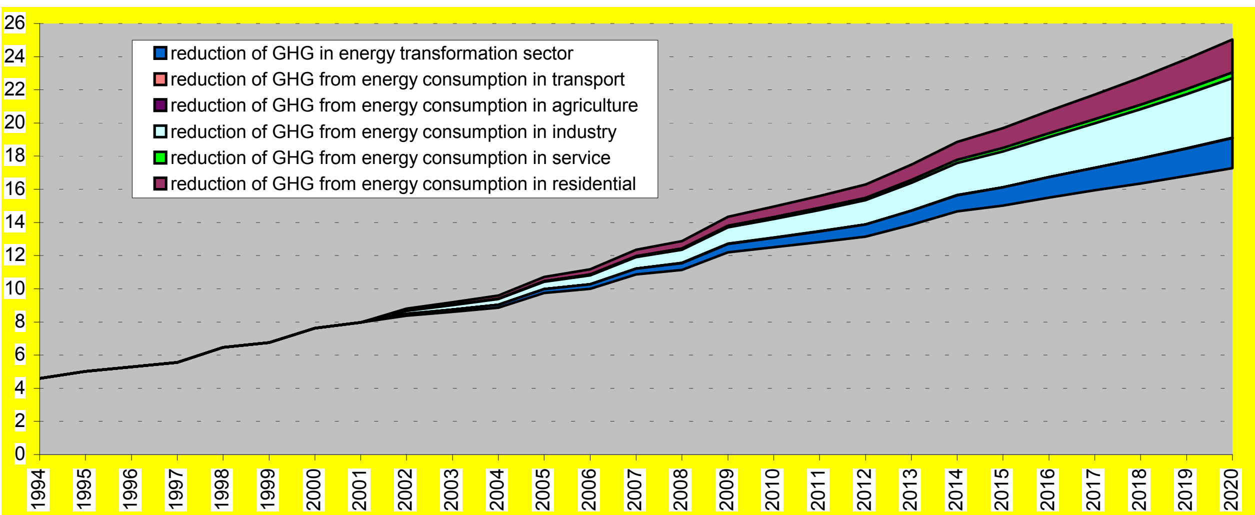
A basket of 25 greenhouse gas mitigation measures for energy and transport sector is proposed in the frame of this study, which are then analyzed in the terms of the cost and benefit. Even the rate of penetration is calculated. These measures are addressed in the National Climate Change Action Plan, which is a part of the revised National Environmental Action Plan already adopted by the Government of Albania in 2002. The methodology for scenario development was the same as for the National Energy Strategy – LEAP.

Referring to the greenhouse gas emissions baseline scenario, it is expected that most of CO_2 emissions will be released from the energy and transport activities, which in 2020 will account for 83% of the total. Concerning energy consumption side, the abatement greenhouse gas emissions scenario assumes the gradual implementation of energy efficiency measures in the household, industry, service and transport sector.

Concerning the energy supply side, the share of renewable sources in Albania has contributed about 18-22% in primary energy balance. This is very high compared to many other countries, because electricity generation in Albania is based in hydro energy. However, in the greenhouse gas emissions abatement scenario, more hydropower plants will be introduced, compared with baseline scenario, while the share of renewable energies is expecting to be increased even by e bigger penetration of solar energy.

Estimates show the abatement measures introduced in industry (figure 8) are forecasted to have the biggest impact on reduction of GHG emission from six economic sectors taken into consideration. The industry is then followed by household and energy transformation sector. This conclusion shows once more that introducing measures in demand side management gives more results in the abatement of GHG emissions than measures introduced in supply side (energy transformation sector).

Figure 8: All energy measures for abatement of GHG in CO_2 eq. from energy consumption sectors and energy transformation sector (Million ton)



3 Best practice policies and measures

The following are some small projects finalized or in pipeline considered as good practices in the area of energy efficiency in Albania

3.1 Renewable energies in schools

During the year 1997 and 1998, the Albania-EU Energy Efficiency Centre (EEC) and the Albania Education Development Program (AEDP) have undertaken a common project for the installation of Solar Water Heating Systems in two model schools in Albania. During their construction, new materials such as good thermal insulation materials, PVC and duralumin double-glazed windows are used, and new technologies such are fully automatic central heating systems, solar water heating systems and etc. will be applied. In this framework, the EEC has taken the initiative to prepare the project proposal and the contract for the installation of the Solar Water Heating Systems, and then the negotiations with AEDP were undertaken.

The project

In the Lapraka Junior High School a forced convection collective Solar Water Heating System was installed. This system has a solar collector area of 18 m^2 and a hot water storage tank volume of 1,000 liters. In Rrogozhina Junior High School a free (thermosyphon) convection collective Solar Water Heating System was installed. This system has a solar collector area of 12 m^2 and a hot water storage tank volume of 600 liters.

The investment and equipment

The total costs of this project were about 24,500 USD. It is agreed that EEC and AEDP financially support, by 50 % each, the costs of purchase and installation of the Solar Water Heating Systems. Furthermore, EEC also offered, free of charge, its technical support, and project management and supervision.

The solar collector and hot water storage tank are products of Siemens - Germany. Both the Solar Water Heating Systems are closed looped systems and are equipped with anti-freeze liquid, circulating pump, timer switch, immersion thermo regulator, etc.

The achieved results

In order to save energy also during the winter season, the Solar Water Heating Systems were connected with the Boiler House of the respective school. The Solar Water Heating Systems have provided the domestic hot water for toilets of the schools and a few showers of their gymnasiums.

3.2 Renewable energy in enterprises

During the years 1998 and 1999, EEC and three Small and Medium Size Enterprises have undertaken a common project for the installation of Solar Water Heating Systems in these businesses of different sectors in Albania. In addition to the previous experience that EEC has gained with the solar panel systems installations, this project was also a contribution in this direction and its aim was to subsidize the installation of solar panel systems in the above small businesses.

The project

EEC has visited some private businesses in the biggest cities of Albania such as Tirana, Durres, Kavaja, Fier, Pogradec and Lushnja, which were searching ways to reduce their electricity bills. From the discussions with the businesses, resulted that the best sites for the installation of solar panel systems were Tirana, Fieri and Durresi. In each business, a forced convection collective Solar Water Heating System was installed. Each Solar Water Heating System has a solar collector area of 8 m^2 and a hot water storage tank volume of 420 liters.

The investment and equipment

The total costs of this project were about 28,000 USD. It was agreed that EEC and the Small and Medium Size Enterprises financially support, by 50 % each, the costs of purchasing and installing the Solar Water Heating Systems. Furthermore, EEC also offered, free of charge, its technical support, and project management and supervision.

The solar collector and hot water storage tank are products of Siemens - Germany. Both the Solar Water Heating Systems are closed looped systems and are equipped with anti-freeze liquid.

The achieved results

The utilization of these Solar Water Heating Systems has reduced the energy consumption and has provided the technological hot water for the needs of the businesses.

3.3 Installation of photovoltaic systems in villages

The improvements in electricity security of supply and living conditions, environment protection, poverty reduction, and business promotion are some of the targets of the project "Photovoltaic Use for Water Supply to Rural Areas in Albania". The project was initiated, designed and implemented by Albania-EU Energy Efficiency Centre (EEC). This project introduces in Albania the use of photovoltaic technology for Water Pumping for Irrigation and Domestic Purposes. It is aimed to make present, to different public institutions and villages, the first concrete example for resolving in a sustainable way the severe problem of electricity and water supply in Albania.

The project

The project consists on two components that reflect two of the main promising fields of photovoltaic use in Albania. In the rural area of Albania, with problems of water and electricity supply, EEC and its partners have realized:

- Potable water supply through boreholes solar pumping for the village of Stravec.
- Irrigation water supply by pumping water through boreholes for the village of Hysgjokaj.

The investment and equipment

The total costs of this project were about 74,800 USD. The funds for project investments were provided as grant by the Offices of UNDP (GEF/SGP) and OSCE in Tirana. Furthermore, the communities have provided about 15 % of the total costs and also EEC has contributed with about 10 % of the total costs.

The photovoltaic panels and other auxiliary devices are products of Helios Technology - Italy while the pumps are products of Grundfos - Denmark. Both the Photovoltaic Systems are equipped with control unit, charge regulator, and the necessary fittings and accessories.

The achieved results

Both components have been implemented in co-operation with local administration and benefiting community of involved villages. Since April 2003, the PV systems are running without any problem and providing potable and irrigation water for the needs of the villages. This project has improved the electricity security of supply and living conditions, as well as has reduced the poverty and promoted the agriculture businesses in the involved communities.

3.4 Energy efficiency in enterprises

During 1995 - 1997, the staff of EEC has conducted 47 short Energy Surveys and 4 extended Energy Surveys and Audits in various sectors of the Albanian economy such as industry, hospitals, hotels and large office buildings. A program of Energy Surveys and Audits was financed in the framework of SYNERGY Program in 1998. This program was the continuation of the development of the Energy Consultancies in Albania. During this year, EEC has introduced a scheme for co-financed Energy Surveys and Audits. This scheme was opened to support and create professional organizations and different groups such as university-based teams that are encouraged to establish themselves as Independent Energy Consultants.

The project

From 17 businesses already visited only the 8 businesses were selected as suitable for conducting an Energy Survey and Audit. As the Energy Surveys and Audits are a new technique in Albania, an important role of EEC was to provide training and to ensure uniform quality of the work of all the consultant groups involved in this program. EEC has selected 8 Energy Consultants who has been trained and, in addition to the experts of EEC, have contributed for the implementation of such Energy Surveys and Audits Program. Two forms of training were given to the Energy Consultants. The first form of training was a formal introduction to the guidelines of how to conduct an Energy Survey and Audit. For this, a general draft report or a methodology, which was used during the energy survey and audits, was prepared. Then, a Training Seminar for the training of selected private Energy Consultants was organized. The second form of training was the on-job training of all consultant groups as they undertake the respective energy survey and audit included in the scheme.

The investment and equipment

This program was financed in the framework of SYNERGY Program for the year 1998 and the total costs were about 30,200 USD. During this program, EEC has introduced a scheme for co-financed Energy Surveys and Audits and the contribution from the enterprises (the client) was about 20 % of the total costs. EEC maintains a stock of instruments and equipment that was available for hire by the Energy Consultants engaged in this program. EEC is considering purchasing some more measuring instruments that will help to cover the requirements of the energy survey and audit working teams.

The achieved results

The Energy Surveys and Audits Program is being promoted through EEC's usual channels such as Newsletter, direct mail, Public Information Campaigns and Seminars. EEC has monitored the success of this program by visiting the businesses two or three months after their surveys and so EEC has learned the opinion of the businesses on the service that they have received. In particular EEC is investigating the actions taken by the businesses, as the result of the energy surveys and audits conducted in them, in order to lower their energy consumption and reduce the GHG emissions.

3.5 Introducing CHP schemes in hospitals and university campus

District Heating (DH) and Combined Heat and Power (CHP) in the EU countries are recognized to be one of the most important measures to save energy in the densely populated urban areas in Europe. The newest technological development is implemented and there is demonstrated an efficient institutional and financial set-up, which is important for the implementation of energy efficient least cost DH and CHP schemes. It is also recognized that there is a huge potential for developing DH and CHP systems in the new democracies in CEEC. Although Albania is situated in a warm climate zone, there is in fact a region with very cold climate and in districts a densely building structure, which is a natural market for DH and CHP. There are more than 20 DH and 7 CHP in Albania and there is according to preliminary investigations a market for a further development. However the CHP and DH sector in Albania needs rehabilitation and suitable adaptations in equipment and operating methods in order to reduce further damage to heating and generating units and to utilize the potential for energy efficient and reliable heat and electricity supply.

The project

The overall objective of the project is to increase security of supply and energy efficiency of electricity and heat production in Albania. Another objective is to enable the Albanian National Agency of Energy (NAE) to take decisions regarding potential pilot projects within DH & CHP and to develop feasibility studies for potential pilot projects in Albania. The project, focused on two sites in Tirana, University Hospital Center "Mother Teresa" - the biggest hospital in Albania and Student City, consists of:

- Energy Survey and Audit on Energy and Water Consumption for both Sites;
- Pre-feasibility Study for both Sites;
- Selection of the most feasible Site;
- Review of Possible Financing Sources for the implementation of the project;
- Feasibility Study for the selected Site;
- Tariff Study for Electricity and Heat;
- Contracting and Implementing Issues.

The investment

This project is financed by UNOPS Office in Copenhagen and is implemented, during 2001-2002, by Dansk Energi Management A/S of Denmark in close collaboration with EEC. The total costs of this project were about 170,000 USD. If other funds will be available, EEC intends to carry out similar study also for the other big hospitals and university campus in Albania.

The achieved results

The main outputs of this project are the completed Feasibility Study for the selected Site, Tariff Study for Electricity and Heat, and the Contracting and Implementing Issues. Now, EEC, NAE and the Ministry of Industry and Energy are seeking for funds to implement the installation of a CHP scheme in the University Hospital Center "Mother Teresa".

3.6 Energy planning and energy efficiency in local level - District of Korca

The availability of energy supply in Albania is one of the key limitations on economic growth and poverty reduction. Electricity and other forms of energy are key inputs to support economic growth, income generation and job creation, industrial activities, commerce, services, communications and transport. During the Albanian transition period, the chronically shortage in power supply has taken forms of sharp crisis especially during the winter periods. Energy efficiency issues are currently incorporated in a number of strategies and action plans. However, while strategies and plans are being finalized and fine-tuned, it is of great importance to pilot energy efficiency activities and capacity building for improving the management of energy sources at the local level.

The project

The project aims at supporting local level management of energy resources and propose ways of improving energy availability. Some of the activities under this project are:

- Evaluation of energetic situation in district of Korca,
- Identification of local energy sources and energy efficiency measures including renovation of the buildings,

- Feasibility studies for the implementation of energy efficiency measures in the public building stock,
- Evaluation of GHG emissions without considering/considering energy efficiency measures,
- Pilot implementation of energy efficiency measures in selected public buildings,
- Improving guidance and capacity building in the energy planning and energy efficiency within the local government level and the communities.

The investment

This project is financed by UNDP Office in Tirana and the total costs are about 150,000 USD.

The expected results

The project has started in June 2003 and EEC is implementing this project in collaboration with Korca Local Authorities. The project will also promote the local management in other regions in Albania.

3.7 Thermal insulation of buildings

The main objective of this project is to insulate the inside of exterior walls and treat window and exterior door frames to conserve the use of electricity for cooling and heating within existing private housing and public facilities throughout Albania. Reducing the use of electricity for cooling and heating in turn should reduce the amount of imported electricity.

The project

In the first phase, EEC will conduct a market research to measure the demand in the country for installation of insulation in the old stock of buildings. The market research will be conducted through a questionnaire. The process should involve a sample of one thousand households, representatives of 5 cities such as Korca, Elbasan, Tirana, Shkodra, and Durres, and of 6 different types of buildings. The sample should also represent all levels of households' incomes. In the second phase, EEC will promote and publicize the project and the potential energy conservation that could be achieved. Independent contractors will install high resistance insulation on the inside of exterior walls and treat window and exterior door frames to conserve the use of electricity.

The investment

This project will be financed by USAID Office in Tirana and will start in October 2003.

4 Climate change Mitigation and the use of flexible mechanisms: State of the art

The main responsibility in the implementation process of climate change action plan belongs to the Ministry of Environment as the governmental body responsible for environmental issues and policy in the Republic of Albania.

The establishment of Inter-ministerial Climate Change Committee is the main step towards the implementation process of the climate change action plan. The action plan should be reviewed on regular basis, taking into account and monitoring the following indicators:

- new economic development plans for the economic sectors
- changes in legal framework,
- the state-of-art data on climate change,
- the environmental strategy
- future developments of the UNFCCC and negotiating process
- eligibility of funds from convention financial mechanisms and other international sources
- amount the funds allocated for the implementation of the program,
- level of public awareness on environmental policy.

The greenhouse gas abatement reduction policy is focused primarily on the energy sector, as the main source category of emissions, which also has large abatement potential. As concluded by the abatement analysis the measures to be introduced in the energy sector consist in the increase of energy efficiency, increase and improvement of energy savings, use of economic, regulatory and legal instruments for energy efficiency and saving. Development of a sustainable transport is the focus of the measures to be introduced in the transport sector.

Since 1998, a Climate Change Unit is established under the Ministry of Environment. Its main mission is to assist the Government of Albania in meeting the commitments under the UNFCCC. The scope of this unit is to produce National Communications, build national capacities in the area of climate change, develop national strategies for climate change mitigation, participate in different climate change projects. Despite of the attempts to address the climate concerns into other sectoral development, which succeeded with the National Energy Strategy other line Ministries are not so active in this area. Lack of awareness in climate change issues and their consequences remains as the main reason.

5 Make the Kyoto mechanisms work

The Ministry of Environment is also the Focal Point for the UNFCCC where Albania is a non-Annex I Party, since January 1995. Albania is not yet a Party to the Kyoto Protocol. Recently the Ministry of Environment has started the procedures for the ratification of the Kyoto Protocol. This is a need imposed by the National Climate Change Strategy and the National Energy Strategy for using the Flexible Mechanism of CDM. In order to make the Kyoto Mechanisms work, the Ministry of Environment of Albania is making the attempts to join the Kyoto Protocol by the end of 2003. Attempts have been made with Canadian CIDA for ensuring financial support in the area of capacity building for processing CDP projects.

Albania has not participated in the pilot phase of the Activities Implemented Jointly. The GEF projects for the National Communication is the first one in the filed of climate change done in Albania. Another project funded by GEF, for the assessment of the Technology Needs for Climate Change Mitigation is under the development. The assessment is made taking into consideration the Millennium Development Goals[2], Climate Mitigation potential, Market potential, Social impact etc. The basket of 25 cost-efficient abatement measures identified and analyzed under the First National Communication of Albania is evaluated and screened. Afterwards a package of project proposals is developed for the top five measures. The measures are focused on:

- Introducing of Combined Heat and Power Plants in Public Buildings and Private Buildings (Hotels etc) in service/industry sector
- Introducing of thermal insulation of households/service (public buildings) which use fuel wood, LPG, electricity and kerosene as energy source for meeting space heating demand;
- Introducing solar water heaters instead of electric boilers in households/service sector;
- Introducing public passenger transport with buses and trains instead of cars and mini buses;
- Improvement of power factor in industrial & service consumers;
- Introducing mini-hydro power plants instead diesel generators;
- Improvements of efficient boilers which use coal/oil coke/residual fuel oil/heavy fuel oil as fuel;

These measures covers e considerable reduction potential of emissions thus they can serve as priorities for the application of CDM projects once the Kyoto Protocol will be ratified by Albania. The assessment of the technologies covers also the barriers related to financing, legal and institutional framework, information and public awareness These projects belong to the way ahead for the climate mitigation.

Links / References / Documents

http://www.unfccc.int
http://www.ccalb.int
http://www.seib.org/leap
http://unfccc.int/resource/docs/natc/albnc1.pdf
http://www.eec.org.al

Albania’s First National Communication, Tirana 2002.

National Energy Strategy, Albania, Tirana 2003.

Photovoltaic Use for Water Supply to Rural Areas in Albania, June 2002.

Feasibility Study on Heat and Power-Albania, October 2002.

Handbook: Energy and Water Management, March 2003.

Energy Planning and Energy Efficiency in Korca District, May 2003.

[1] The Millennium Development Goals are a series of internationally agreed targets to be met by 2015, covering key areas such as poverty, hunger, health, education and environmental sustainability. Governments and international agencies around the world have jointly committed themselves to poverty eradication, through these Millennium Development Goals (MDGs), adopted at the UN Millennium Assembly in 2000.

Country Report: Armenia

A. H. Gabrielyan
D. L. Harutyunyan
UNDP/GEF "Armenia – country study on climate change" project

A. V. Pasoyan
Armenian Branch of Alliance to Save Energy

S. Shatvoryan
M. K. Vermishev
OPET-Armenia

Socio-economic situation and energy sector in Armenia

Box 1. Country Profile

The Republic of Armenia has an area of 29,800 km^2. The capital of the country is Yerevan. Armenia is a typical mountainous country about 90% of its territory is over 1000m above sea level.

The population of Armenia is 3.8 mio (according to the preliminary results of 2001 census the current population is 3.2 mio); including 67% urban and 33% rural. Armenia has almost no indigenous fuel and energy resources: the main local source is hydro power, half of which is presently being used. The fuel demand is almost completely being compensated through import.

In Armenia, as well as in other CIS countries, the transition to market economy was accompanied by deep economic recession. The situation was further exacerbated due to the factors related to the resource capacity and economic branch structure, as well as the 1988 earthquake and economic blockade.

After sharp economical recession of 1991-1993 (about 70% of the economy was not functioning compared to 1989), during 1994-2000 period the country's gross domestic product (GDP) indicated stable growth of average 5.4%. In 2002 the structure of GDP was: industry – 20.4%, construction – 12.8%, agriculture – 23.7%, services – 33.5%. GDP per capita was 623 USD, GDP per capita by purchasing power parity – 3,312 USD.

Regardless of the economic growth from 1994, the GHG emissions stabilized on apparently low level. The trends of GDP growth and greenhouse gas (GHG) emissions for 1990-2000 are presented on figure 1.

Figure 1: Trends for GDP and CO_2 emissions in Armenia, 1990-2000

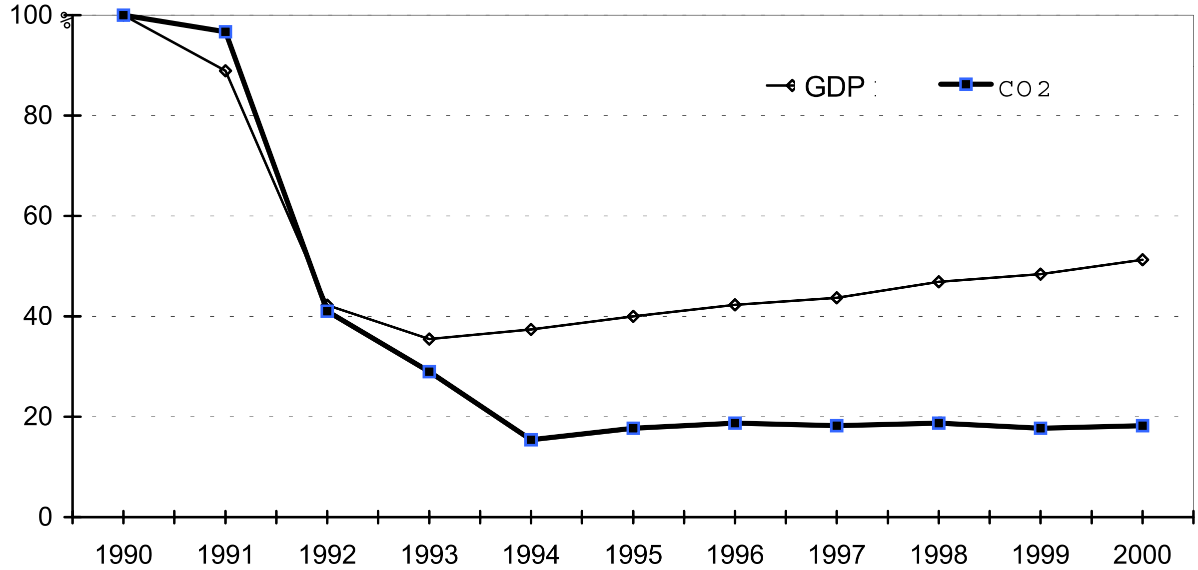
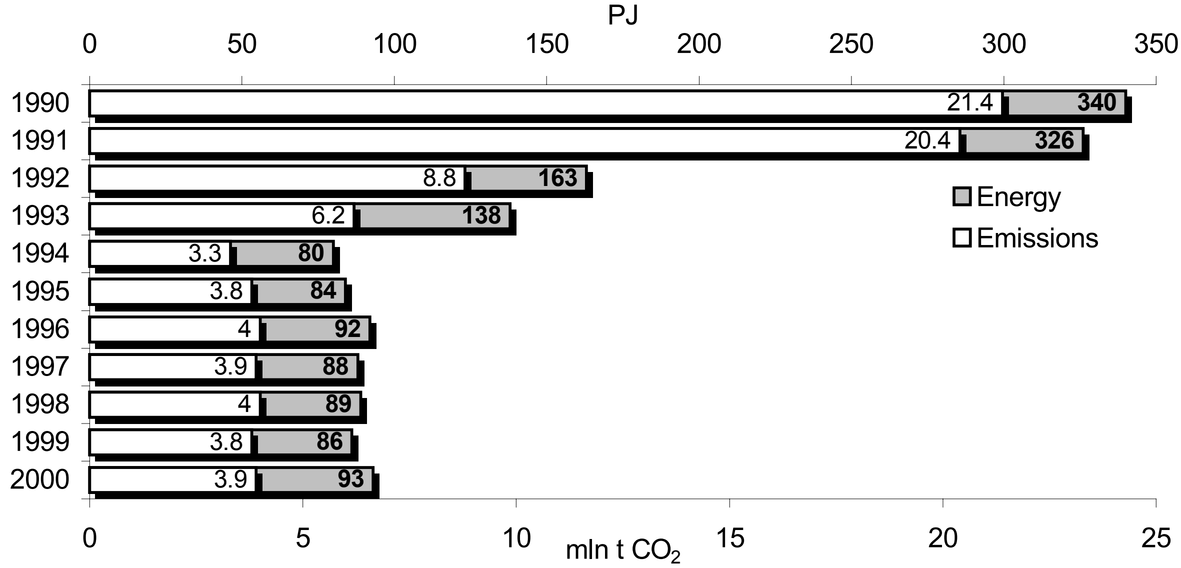


Figure 2: Dynamics of energy production and CO_2 emissions from energy sector



The same pattern is observed in dynamics of energy production and CO_2 emissions from energy sector (see figure 2). The current rate of emissions from fossil fuel combustion processes comprise 82% of all emissions from the "Energy" sector (*by definitions of IPCC for GHG Inventories also includes fugitive emissions*) and 68% of total GHG emissions. The emissions by main GHGs in Armenia are: carbon dioxide – 68.2%, methane – 29.8%, and nitrous oxide – 2%.

Electricity is currently generated through thermal, hydropower, and nuclear resources, with no significant utilization of renewable energy sources such as wind, geothermal, or solar. In 2001-2002 Armenia produced 5.7 -5.9 billion kWh; including generated from thermal power plants (TPPs) - 45%, nuclear power plant (NPP) – 33.9% and hydro power plants (HPPs) – 21.1%.

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

GHG reduction potential

The carbon intensity of GDP - the main indicator of efficiency of energy consumption - is significantly higher in Armenia compared to European countries, which indicates rather high potential for energy conservation and GHG reduction (see figure 3.).

Measures for energy conservation and GHG emission reduction

The following measures have been identified with most potential for reduction of fossil fuel consumption and consequently – the GHG emission levels:

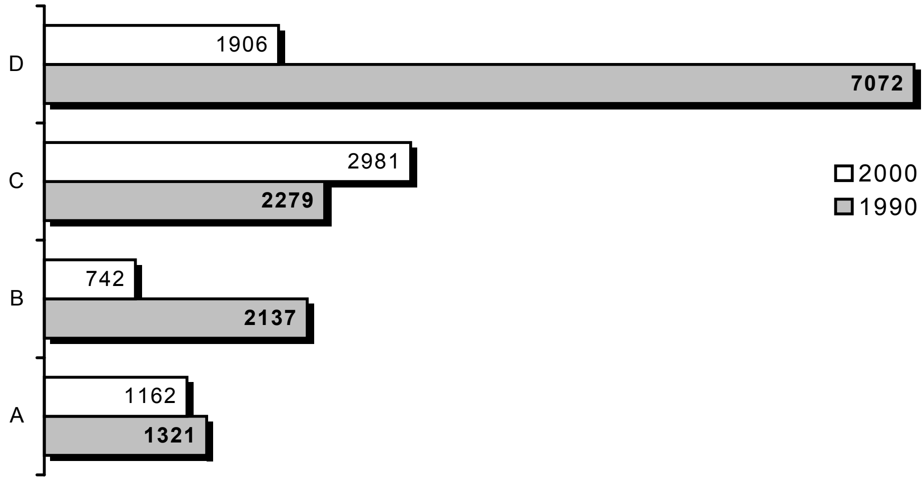
- Modernization of generating capacities;
- Reduction of energy loses during transportation and distribution;
- Improving the system of control and regulation of energy consumption;
- Energy conservation on end-use consumption level; and
- Development of new hydro resources and alternatives resources of energy.

Armenia has large potential for energy conservation, which can be considered as internal energy resource. The main potential is in the sectors of electricity and heat power generation, municipal heat supply, and transport. The technical potential for GHG reduction in case of realization of energy conservation is estimated as 19.55 mio t CO_2 for the period of 2000-2020, including 0.85 mio t from utilization of renewable energy resources.

Barriers to technology transfer and overcoming recommendations

There are number of different types of barriers for technology transfer and realization of priority projects: economic, financial, institutional, organizational, legal and awareness barriers. The key barriers identified for Armenia are the weak financial sector and lack of capital, the high operational costs, the low solvency of potential consumers, the low demand for environmentally sound technologies, the weak institutional system and low awareness of stakeholders (see table 1.)

Figure 3: Selected indices of energy consumption and GHG emissions in Armenia, 1990, 2000



Attraction of foreign investments is an important prerequisite for insuring the necessary rate of economic development of Armenia. Implementation of reforms and economic stability allowed Armenia to attract support from international financial institutions, bilateral donors and direct foreign investments. The large-scale privatization also promotes the investment opportunities. It is also important to mention the liberal trading regime, with simplified differentiated tariff on import, absence of tariffs on export and no barriers on the trade volumes and turnover, and no limitations on currency import. In 2002 Armenia became the 145th member of WTO.

Energy efficiency and renewable policy reform

In recent years the Armenian Government places strong emphasis on policy reform in the energy sector. The draft National Energy Sector Development Strategy, which is presently being finalized by the Ministry of Energy of RoA, emphasizes the following directions:

- smooth operation of electricity generation facilities;
- upgrading of electric transmission/distribution networks;
- rehabilitation of parallel operation, development and expansion schemes with the neighboring countries;
- full rehabilitation and modernization of gas supply;
- upgrading and expansion of underground gas storage facilities and construction of natural gas supply second pipeline;
- intensification of oil and natural gas investigative efforts;
- construction of combined cycle steam-and-gas facilities;
- rehabilitation, modernization and creation of heat supply systems;
- implementation of national, targeted energy saving programs; and
- creating favorable conditions for the introduction of energy efficient technologies.

Parallel with the development of the strategy, the Armenian Branch of Alliance to Save Energy (ASE), under its USAID-funded Municipal Network for Energy Efficiency Program, established the Armenian Energy Efficiency Council (AEEC), bringing together ministry officials, NGOs, energy businesses and donors, to develop a forum for discussion and consensus on national energy policy. The key objectives of the Council were identifying priority issues in the energy sector and coming up with recommendations for addressing those issues pertaining to energy saving, energy efficiency (EE) and renewable energy (RE). The key objectives of the EE policy reform were formulated as: (a) strengthening the economic and energy independence; (b) raising the economic and energy security; (c) increasing energy system security; (d) creation and development of new capacities; and (e) reduction of anthropogenic impacts on the environment.

The draft Law on Energy Saving and Renewable Energy and the sub legislative acts' package is presently at the final drafting stage and includes tax, customs and financial incentives-based mechanisms for the promotion of energy saving and renewable energy applications. The designed incentives, within the framework of the active legislation of RoA will be provided based on energy audit conclusions and correspondence with national energy efficiency indicators – two instruments yet to be developed once the law is adopted. The legal package also includes amendments to the RoA Law on Licensing and Profit tax.

One of the transitional clauses of the draft law provides that the Government of RoA shall adopt a program for the implementation of economic cooperation mechanisms of the Kyoto Protocol, particularly the Clean Development Mechanisms in the country.

Table 1: Barriers to technology transfer and suggested measures for overcoming those barriers

Barriers	Possible solutions
Economical and financial	
Limited state resources	State support for provision of grants and soft loans, attraction of foreign investments, creation of favorable business environment
National banks are not participating in technology transfer, high interest rates of credits, short pay back requirements	Reduction of interest rates, increase of the fixed capital of the banks due to improvement of economic situation, creation of new financing schemes by establishing revolving or special purpose funds.
Low solvency of companies and population	Undertaking organizational and technical measures to control and regulate energy consumption, increase of income of population in marked high rates of economical growth. Creation of national standards for energy efficiency together with financial incentives for encouraging technology transfer.
Organizational and legal	
Absence of national standards of energy consumption.	Developing standards and norms for energy consumption and efficiency of technological equipment.
Absence of incentives for development of renewable energy resources due to low profit on invested capital.	Accounting the costs for avoided GHG and pollutants emissions in the cost of energy. Undertaking the incentive creating policy for renewable energy resources development ES by the Natural Monopoly Regulation Commission
Absence of energy conservation and renewable energy laws	Adoption of law on of energy saving and renewable energy
Absence of coordination in technology assessment and transfers.	Creation of national interdepartmental center for coordination, management and consulting on activities aimed to transfer of environmentally sound technologies in the frames of UNFCCC and Kyoto Protocol.
Informational	
Lack of information on energy efficiency and environmental safety of the applied technological equipment.	Strengthening sectoral structures and control on the sectoral information. Diversification of information dissemination tools.
Barriers for stakeholders to access the necessary information on new technologies.	Development of system of specialized information services and now-how.
Investors are not informed on potential technological market in the country.	Development of measures for undertaking assessment of needs and feasibility studies for targeted investors and organization of cooperation.
Law awareness of governmental structures, companies and public on energy efficiency and climate change issues.	Development of continuous awareness and training on the problems of the climate change, as well as mitigation and adaptation measures
Individual	
Lack of trained specialists for project development, validation and assessment of project baselines particularly under CDM	Development of measures for training qualified staff

2 Brief overview of current practices and measures

Heating: The heat sector has one of the largest potentials for energy efficiency improvement and reduction of significant environmental externalities due to the collapse of the district heating systems in early 90s and the present heavy reliance on wood and electricity for residential heating purposes. This section of the report will focus on the most promising developments in the heating sector which represent replicable examples of energy saving, institutional solutions, financing schemes and GHG emission reduction.

In the heating sector, after the Government of the RoA adopted the Urban Heating Strategy developed under the World Bank Urban Heating project, the Ministry of Finance and Economy project implementation unit is trying to strengthen the condominiums and housing associations for implementation of decentralized heating projects under soft loan financing and set up a flexible lending mechanism for condominium-driven residential heating projects.

From 1999 the UNDP/GEF preparatory phase project aimed on elaboration of full size project for “Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply”, identified and produced recommendations to overcome the numerous barriers encountered in the process of restoring municipal heat-supply and raising its energy efficiency choosing the most rational option of heat supply development strategy, which will be based on an economic and environmental analysis was finalized in 2002. The full size proposal was elaborated in 2002 and in May 2003 the GEF Council approved the 2.95 mio USD funds for “Armenia – Improving the Energy Efficiency of Municipal Heating and Hot Water Supply” Program.

The project is aimed to reduce the GHG emissions resulting from the current heat and hot water supply practices in Armenian cities by laying the foundation for the sustainable development of heat and hot water supply services in those cities while taking into account global environmental impacts. The proposed capacity building and other technical assistance activities will complement, and will be implemented in close co-operation with, the activities of the other donors including the World Bank/IDA funded Urban Heating Project, the Government of Netherlands funded Industrial District Heating Development project and the envisaged USAID funded activities in the field of energy and environment.

A joint donor effort was undertaken during the 2001-2002 heating season for implementation of pilot project and was co-financed by the WB and UNDP/GEF. Heat energy consumption meters and regulation devices such as ultrasonic heat energy meter, hot water flow-meter, differential pressure regulators, rising pipe regulating valves were installed in 3 buildings which were selected in 2 municipalities. Radiator thermostatic valves and allocators were installed in the apartments. In addition, general weatherization works were implemented in the building, including installation and renovation of the entrance doors and windows. As a result, the required technical basis was created, which consequently was applied for a monitoring effort during 2002-2003 heating season.

The project was aimed to support the organization of heat supply through the condominium institution at the initial stage of strategy implementation based on collective agreement and to create premise for the independent operation of the boiler house by the condominium in the future. A trilateral treaty on cooperation was signed by the co-financing parties (UNDP/GEF, USAID and WB) for the implementation of the second phase of this project. The monitoring revealed the poor quality of district heat supplied, high level of illegal discharges and the building-level technical problems, that result in low efficiency of the heat supplied.

The above project was analyzing the existing heat supply systems. Meanwhile, in many locations where heating system has fully collapsed, the only alternative is either wide-scale capital renovation or small, decentralized heating systems through either individual commercial service contracting or through housing associations.

In 2002 **Eco-Engineering Co**. has made the first attempt of private commercial heat supply to multi-apartment buildings under Dutch Government PSO grant. In the frames of pilot projects was renovated the building heat supply networks and communications. The three listed pilot projects are efforts to find the optimal institutional arrangements and identify the barriers for rehabilitating more efficient and environmentally friendly heat supply in the Armenian cities, while switching from wood and electricity to natural gas for heating purposes.

South-Therm ESCO, under AEAI/USAID grant, is presently implementing rehabilitation of heat supply to a multi-apartment building with individual apartment-level heat service contracts (for project information, *see Box 2).*

Box 2

Heat Supply Pilot Project, AEAI/USAID

***Implementing Company**:* South-Therm ESCO
Start date: November 2002
Project Cost: 68,000 USD cost shared by South-Therm ESCO
***Boiler house capacity**:* 1,200 kWh
***Activities**:* Leasing and conversion of existing thermal heat substation into a boiler house. Installation of 2 gas-fired boilers (1.2MW each) and EE devices Renovation of heat distribution and internal network.

For commercial purposes, the premises of the boiler house will be also used for car wash and laundry for the neighboring community. The project established a new commercial relationship between the supplier-ESCO and residents. About 80% of residents signed this commitment. As a result, the residents will have heating in the coming 2003/2004 winter heating season. Installation of effective control and metering systems (heat allocators and thermo-regulating valves) will enable citizens to control their consumption and indoor temperature, and pay only for heat that they actually consumed. In the future, they will be also provided with hot water for domestic use.

There is no doubt that residents will only benefit from the project. Switching the heating from electricity to less expensive natural gas for heating purposes will help them to substantially cut their energy bills. South-Therm is developing proposal for applying for WB loan for adding one more building into the system.

Biogas: Under the contract with AEAI and funded by the USAID SolarEn LLC designed, manufactured and presently is commissioning 25m^3 digester methane-tank system at “Agroservice“ dairy in Yerevan. The designed capacity of the plant is from 40 to 50 m^3 methane per day (capacity of 14 kW) for hot water and heat supply. Technological parameters of the system such as biomass temperature and generated gas pressure in digester, mixers’ operation time, pressure in gas holder, etc. are controlled automatically. The control board has also manual mode and is equipped by light and alarm warning. *See Box 3* for project benefits.

Box 3

Biogas plant project benefits

The installation of the biogas digester at the farm has a number of benefits for large and medium-sized farms:

Economic benefits. The use of methane at Agro Service will yield annual savings of natural gas equivalent to 828 USD per year. In addition, the sale of fertilizers produced as a result of biomass digestion at Agro Service will approximately yield an additional income up to 4 950 USD for the farmer.

Environmental benefits. Utilization of animal manure will result in cleaner area, soil and water.

Agricultural benefits. As a by-product, utilization of biomass produces environmentally safe and clean fertilizer to replace expensive organic fertilizers.

Conventional energy sources are not affordable, particularly for rural communities of Armenia. Therefore, the installation of biogas systems can help to solve heating and hot water production problems for rural farmers who can utilize locally available agricultural resource such as animal manure and organic wastes. Generally, production of biogas can have good perspectives in Armenia. The agricultural sector of the country has about 340 000 farmers, most of which (about 60 %) are engaged in live-stock breeding.

Table 2: Other projects and activities in the field of energy efficiency and renewable energy implemented since 2001 in Armenia

PA Consulting Group/ USAID	
"*Yerevan and Gumri Municipalities' Energy Consumption Assessment", 2000-2003*	Analysis of energy use by two major municipalities in Armenia, after Armenia has ceased providing direct subsidies to energy users by discounting the applicable tariffs. Recommendations provided.
"Fuel Substitution" pilot project	The energy saving benefits of fuel substitution (changing from electric to natural gas), primarily for heating purposes was evaluated. The project involved 114 apartments and 33 private homes.
TACIS / Tempus State Engineering University of Armenia, (SEUA)	
"Energy Saving and Management", 001-2002	One SEUA room was completely equipped with computer equipment to conduct lectures with presentations on computers and using software on energy saving issues. A group of 10 advanced students of SEUA with background in energy was selected to listen the lectures of foreign experts on: Technical English; Engineering economics; Economics of utilization of electrical energy; Mathematical methods and models; Energy management; Non-traditional RES. The manuals with lectures printed.
SolarEn LLC, 2000	
Private manufacturing, project development and consulting company focusing on clean energy. SolarEn's staff has over a quarter–century experience in solar and wind energy engineering, and projects development and implementation. Presently, SolarEn employs 25 persons. SolarEn's activities in solar energy engineering include flat plate solar collectors designing and manufacturing (SECO solar collector), solar water heating systems sizing, assembling and installation, photovoltaic (PV) system design and installation, and technical consulting in solar engineering. SolarEn's SECO collector has been tested in Germany and received ISO-9806 and EN-12975 certificates. The quality of SECO collectors correspond to the international standards. As a matter of fact, in case of SECO collector sale in Germany the consumer can apply for subsidies provided by the German government. Three separate companies were span-off from SolarEn in 2002-2003. Wind Zod CJSC has been established for 50 MW utility scale wind farm project development and management. H_2ECOnomy CJSC conducts research, commercial development and manufacturing of fuel cell and balance of system components. M-Possible CJSC is an IT group that develops entertainment software for wireless applications. Finally, in 2003 by the decision of Business Initiative Directions International Organization SolarEn has been nominated for Century Quality Era Award as recognition of company's contribution and commitment to quality (QC 100 Total Quality Management).	
"Air cooling system for the American University of Armenia in Yerevan", 2000 U/InterCopernicus fund)	Manufacturing and installation of the largest in Armenia 50 kW solar water heating system that includes 64 m^2 solar collector array on the roof of American University of Armenia, 3 tons insulated tank for hot water (heated up to 90C° during the day), heat exchangers, piping and other components of balance of plant.
"Armenia Wind Atlas" 2002-2003	SolarEn participated in the development of wind resource atlas for Armenia in cooperation with the National Renewable Energy Laboratory of the USA. The two-year project was funded by the USAID. SolarEn provided its experience in monitoring equipment installation, O&M, data acquisition and processing. The project identified target regions with adequate wind resource. This should pave a way for the development of privately owned independent power projects using wind energy sources in Armenia. Independent power projects will be essential to attract private capital to fund the power sector's investment and meet the country goal.
ArmNedSun (ECOFYS/ECONOSTO/FACET)	
"Introduction of Solar Water Heaters in Armenia", 2000-2002	"SunEnergy" JV established by ZEN International (Netherlands) and "Technocom" (Armenia). Market research was conducted and business plans were developed for marketing solar water heaters in Armenia. Through the implementation of 15 demonstration projects the efficiency of the adapted solar water heaters and the benefits they can produce in Armenia's specific conditions were demonstrated. The results recorded a 60% saving in the annual heat consumption. In order to put the solar energy on the political agenda promotional and awareness campaigns will be carried out, and government institutions will be lobbied. Production of SWH started.
UNDP/GEF/ARM/98/G41/A/1G/99	
"Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply , 1999-2002	Identified and produced recommendations to overcome barriers encountered in the process of restoring municipal heat-supply and raising its energy efficiency, and to develop overcoming measures. Moreover, it aims at choosing the most rational option of heat supply development strategy, which will be based on an economic and environmental analysis, and preparing a large-scale technical assistance project.
Advanced Engineering Associates International (USAID)	
"Energy Efficiency, Demand Side Management and Renewable Energy Resources", 2001-2003	Program was aimed at creating a market demand for EE and RE services providers, employment for EE and RE services providers, strengthening ESCO's as an instrument for meeting this demand. In the frames of project were implemented 10 pilot projects with various heating alternatives: rehabilitation of the building of the Natural Monopolies Regulatory Commission of the Republic of Armenia (RoA), implemented in cooperation with World Bank; installation of heating, ventilation and air conditioning systems in one of the condominiums of Kanaker-Zeytun community for 14 private buildings, etc. AEAI further implements rehabilitation of heating systems and implementation of weatherization and other EE measures in three sites of Yerevan city: Nork Marash Medical Center, Pushkin School and Energy Institute. The solar collectors to be installed in Medical Center to provide the hospital with hot water are produced locally by Technokom Company.

Alliance to Save Energy (USAID*)*	
"Municipal Network for Energy Efficiency Program , 2001-ongoing	Main objectives: establishing the Armenian Energy Efficiency Council, technical assistance to the Ministry of Energy of RoA in drafting the Law on Energy Saving and Renewable Energy of Armenia, energy efficiency trainings and awareness campaign for condominiums, municipal officials and National Assembly staff in cooperation with other partners.
World Bank/ Ministry of Finance and Economy of RA	
"Urban Heating and Support for Multi-Apartment Building Management Bodies, 2001-ongoing (after adoption of the Urban Heating Strategy by the Government of RoA (Govt. Decree 1384) a PPF $1mln borrowed).	Improving the business environment by reducing administrative barriers to investment and new entry, especially of foreign firms; building effective public-private consultative mechanisms, and enforcing a level playing field for new and existing companies; strengthening public sector management and reducing corruption, so as to improve the provision of public services and the conditions for private sector growth; streamlining public administration, including the civil service and key regulatory agencies, and advancing judicial reform; and rebuilding human and physical capital, with an emphasis on ensuring additional financing of school education, basic health, and infrastructure maintenance, and improving the targeting of expenditures for social protection and education.

Caucasus region OPET Network

The program launched in Armenia in 1999, implemented by Energy Strategy Center - Armenian partner for the OPET Caucasus consortium of three energy centers from Armenia, Azerbaijan and Georgia.

Up to 2003 eight releases of the National Quarterly Newsletter were published and disseminated among the target group in Armenia; more than 5000 visits were registered in the National OPET web site (*www.opet-armenia.am)* contained extensive information about the program activities; a public purposed electronic "Wind Energy Handbook" and a brochure "The Modern Energy Technologies" (in Armenian) were published. In 2002 TV-programs on renewable energy potential of Armenia, energy efficiency in the urban transport and small hydro energy in Armenia have been produced.

Information about the potential investment projects for new small HPPs has been disseminated via OPET Network, the information was presented also at the several OPET conferences in Romania, 2002, France, 2002.

The workshop "Energy Efficiency and Pollution in Urban Public Transport" was organized in Yerevan, in June, 2002. The target group was represented by more than 30 people from the local transport authorities of Yerevan municipality, energy and nature protection authorities, international funding organizations, NGOs, specialists. The study stated that due to institutional, managerial, technological and structural reasons common for all the three South Caucasian countries, additional 2.5 mio t CO_2 have been emitted in the region during the last ten-year period.

At the two business development workshops organized in Tbilisi (February, 2001 and March, 2002) investment projects on wind energy, as well as solar and geothermal energy use in buildings have been presented by the Armenian party.

Renewable Energy Conference, 27th of June, 2003. The conference "Renewable Energy in Armenia - Reality and Perspectives" has been held in Yerevan. The event was organized jointly by IREX, USAID and UNDP/GEF programs in Armenia. More than 80 specialists representing the government authorities, private sector, international organizations, embassies, scientists from Armenia and foreign countries have participated at the conference. The papers presented at the conference will be published in the end of September, 2003.

3 Climate mitigation policy and use of the flexible mechanisms

Armenia being non-Annex I party to the UN Framework Convention on Climate Change has no direct obligation to limit its GHG emissions. However, the national strategy on GHG emission mitigation [1], states that the country could undertake voluntary obligations on their limitation with assistance from developed countries within the frames of corresponding mechanisms for implementation of the Convention. The concept is based on the idea that GHG emissions reduction does not contradict, but comply with sustainable social economic development of the country.

In December 2002 the National Assembly of Armenia has ratified the Kyoto Protocol, becoming 108th party to join the Protocol.

Armenia together with several countries of the Former Soviet Union is continues the discussions to take voluntary obligations for limitation of GHG emissions by getting access to flexibility mechanisms of the Kyoto Protocol – the Emissions Trading and Joint Implementation (JI) envisaged for coopera-

[1] Formulated in the First National Communication of Armenia, submitted to the Conference of Parties to the Convention in 1998

tion between developed countries included in the Annex I to the Convention.

However, along with serious problem to be tackled in the negotiation process, it is necessary to study the potential of emissions reduction in different sectors of economy considering the hard-to-predict economic and social development.

Hence, at the current stage of international development in frames of GHG emissions reduction, it is more realistic for Armenia to pursue implementation of projects under the Clean Development Mechanism (CDM).

At present a request is submitted by Ministry of Nature Protection to the Ministry of Foreign Affairs of RA to nominate it as a Designated National Authority for the CDM. The CDM Interagency Commission and a Center for Technology Transfer mainly for CDM projects are in the process of elaboration and negotiation to be established.

There are a number of spheres in Armenia with large potential for implementation of emission reduction projects, first of all in the energy sector. It is stipulated by present high energy intensity of nearly all branches of national economy both generation and end-use. There is large GHG emission reduction potential in heat supply sector, where the main sources used today are the electricity produced in TPPs and wood from scarce local forest resources. GHG emissions reduction may be most substantial in case of wide application of combined heat and power generation.

The “Tokyo Electric Power Services” Co, LTD and Kawasaki Heavy Industries LTD, Mitsui &Co., LTD (Japan) with «Yerevan TPP SCSC » have developed a project on reconstruction of the old thermal power plant into a modern cogeneration plant with 206.3 MW electric power capacity and 111 Gcal/h heat capacity. The annual reduction of fuel is equivalent to 276 thous. toe and has 352 thous. tons of annual CO_2 reduction potential -. The project was submitted to Japanese Government for 140 mio USD environmental soft loan.

The biomass utilization under CDM projects is not sufficiently studied. However there is a certain potential for using livestock waste and municipal wastewater treatment facilities for biogas production. The capacity of natural forest resources is practically negligible. However, there is a possibility to implement fuel wood production projects on artificial plantations.

At present pre-feasibility studies for four potential CDM projects are undertaken by international assistance:

- Introduction of Co-Generation System into District Heating System in Yerevan. (NEDO, Japan);
- Utilization of Methane Gas at Landfill Disposal (NEDO, Japan);
- Energy generation from sludge from Yerevan Waste Water Treatment Plant (preliminary assessment);
- Small hydropower plant “Arpachay” (HydroEnergia Co Ltd./Armenia, Ecofys BV/Netherlands).

4 Making the Kyoto mechanisms work: Challenges ahead

For implementation of CDM projects in Armenia there is strong evidence of importance to develop national capacity. This process should be systemic, participatory and can be certainly supported by international assistance.

There is strong need for non-biased, professional and comprehensive review of the in-country capacity and for developing a targeted national program for implementation of CDM projects. However, it should be taken into consideration, that today CDM proposals from recipient developing countries exceed their demand from developed countries, which have ratified the Kyoto Protocol. Hence, Armenia has to implement strong and well-directed national policy to be competitive.

Country Report: Azerbaijan

Elmir Akhmedov
Issa Aliyev
Center of Climate Change and Ozone

The Republic of Azerbaijan is an independent country in the Caucasus region of western Asia. Azerbaijan has a total area of 86,000 km² and shares borders with the Russian Federation on the north, Georgia on the northwest, Armenia on the west, Iran on the south and the Caspian Sea on the east. And the population is about 8.1 million.

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

The economy of Azerbaijan Republic

Main sectors of economy of Azerbaijan are the fuel and energy industry, mechanical engineering and metallurgy, chemical and oil-chemical, light and food-processing industry and also agriculture. Azerbaijan is one of the oldest oil producing regions in the world. Oil wealth is one of the main strategic reserves of our republic nowadays. There are more than a billion tons of oil in the entrails of Azerbaijan, and 800 million m3 of gas in accordance with the prognoses of the scientists. 1.325 mil tons of oil were extracted during last 150 years, 400 million tons from that quantity were extracted from the bottom of the sea after 1949. The necessity of increasing oil and gas extraction to overcome the economic difficulties appeared after gaining independence.

In 2001, Azerbaijan's nominal GDP was 5.7bilion US$, exceeding the previous year by 9.9 percent. During the period of independence, two trends explain the GDP's dynamics. Initially, the GDP fell by approximately 15 percent on average each year between 1992 and 1995. This negative trend has been stopped, and economic growth has been achieved since 1995. As compared to previous years, the GDP increased by 1.3 percent in 1996; by 5.8 percent in 1997; by 10 percent in 1998; by 7.4percent in 1999; and by 11.4 percent in 2000, which represents the highest rate since Azerbaijan became independent. These statistic indices indicate that Azerbaijan's economic growth over the last five years has been sustainable.

Figure 1: GDP as compared to previous year, percentages

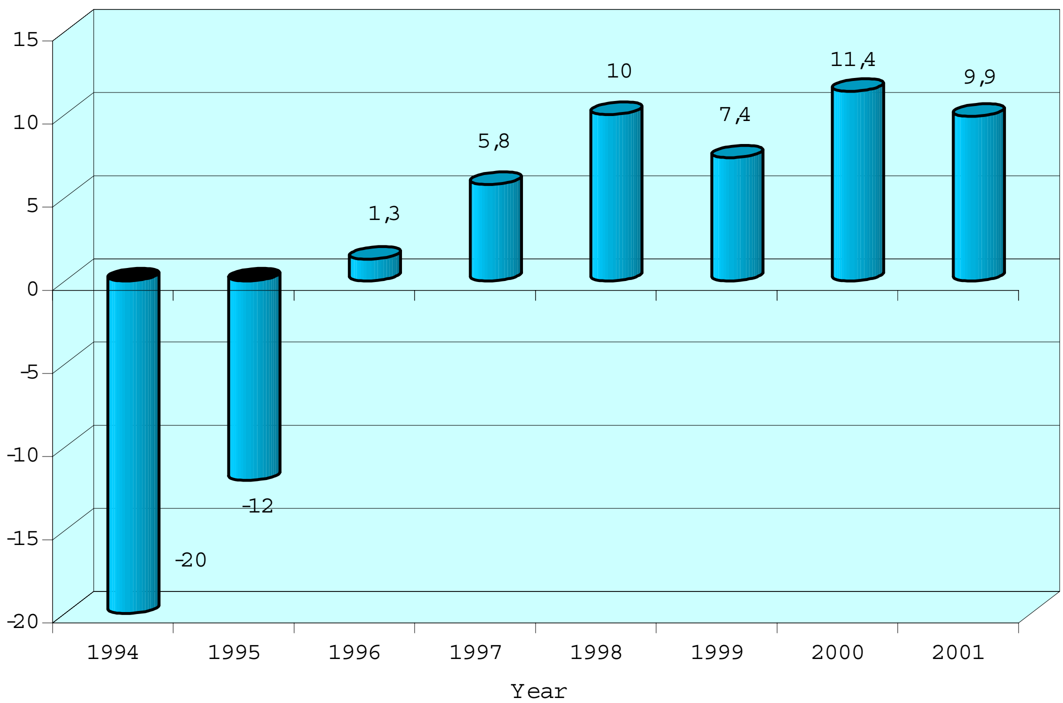


Figure 2: Private sector share of GDP, percentages

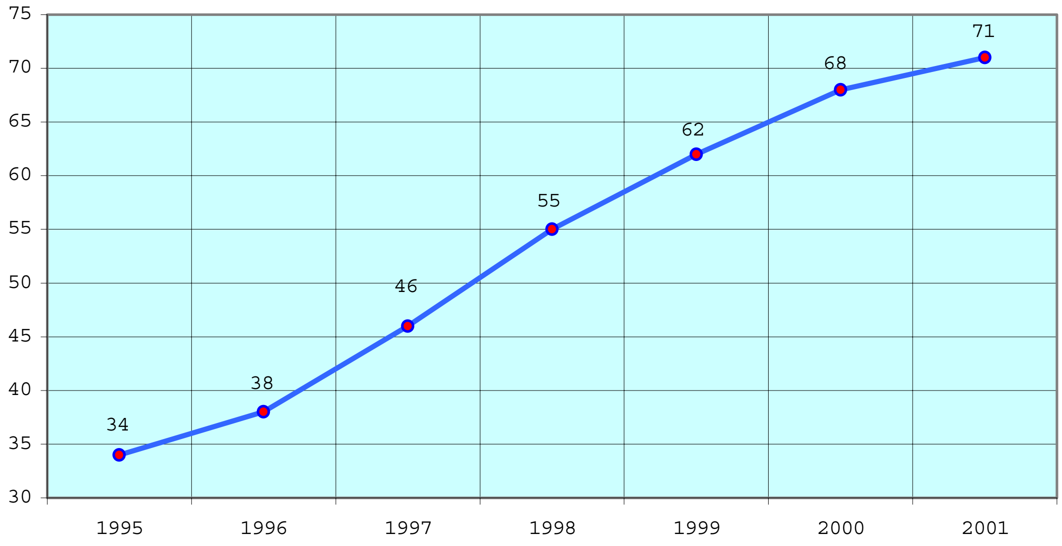


Figure 3: GDP by sector, 2001

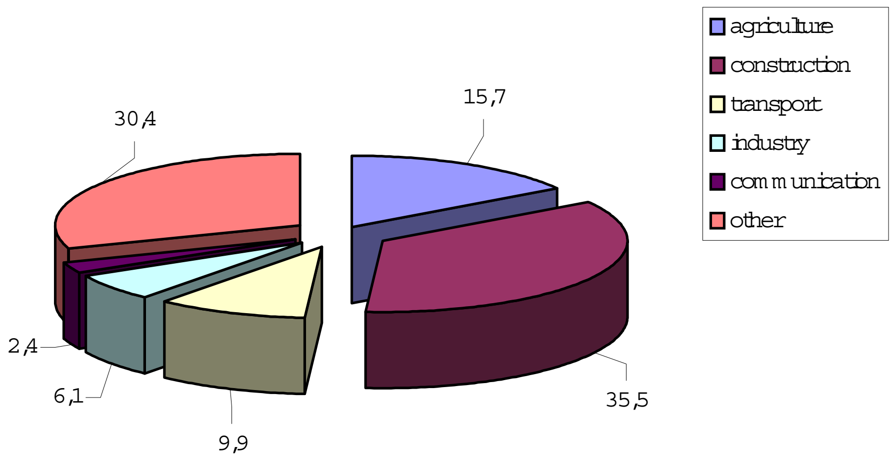
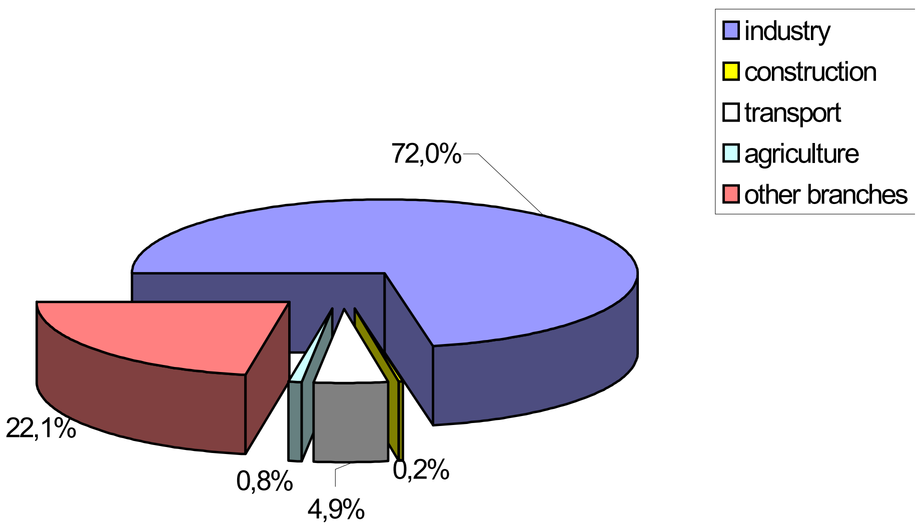


Figure 4: Consumption of fuel-energy resources by branches in 2001



In recent years, private sector has become an important contributor to economic growth. The private sector's contribution to GDP in 2001 increased by 2.1times (71 percent) as compared to 34 percent in 1995.This trend is further evidence of the direct impact of structural changes in the national economic growth.

Energy efficiency in Azerbaijan

Azerbaijan's power sector has installed generating capacity of approximately 5.1 gigawatts (GW), consisting of eight thermal plants (accounting for roughly 80% of generating capacity) and six hydroelectric plants, all of which are owned by the state. Both electric generation and consumption have been relatively flat since independence, with generation totaling 18.2 billion kilowatt-hours (kWh) in 2001, and consumption of 16.6 B. kWh. The country's economic contraction during the mid-1990s, along with systemic problems--such as prices capped below market rates and frequent non-payment by customers--have left Azerbaijan's power sector without sufficient capital to upgrade aging power-generation facilities.

About half of the turbo-generators and boilers have been in use for more than 40 years and the results are high fuel consumption, low thermal efficiency and a high level of emissions. Energy efficiency and environmental adequacy of the power sector need to be improved.

Table 1: Energy Efficiency

Years	1990	1995	2000	2001
Energy (PJ)	714	550	490	473
GDP(billion)US$	7.20	2.89	4.07	5.20
E/GDP	99,2	190,3	120,4	91,0
C/E 1,000ton/ PJ	60,58	56,31	*57,63	53,0
Note: * for that year we have used more residual fuel oil (80%) than gas, the reason was a lack of gas resources in Azerbaijan.				

Table 2: Sectoral energy efficiency for the year of 2001

Sectors	Energy Pj	GDP $ US Billion	Energy efficiency Mj / $US
Construction	1.60	2.024	0.79
Agricultural	6.40	0.895	7.15
Transport	39.18	0.564	69.47
Industry	574.84	0.348	1651.84
Others	176.69	1.870	94.49
Total	799.50	5.700	140.26

As you see the most effective sector on sectoral energy efficiency is the construction. There are grate successes in building sector since 1996. It is especially more evident in Baku (capital of Azerbaijan). Now days it is common to use less power-consuming materials and the most modern methods in building sectors. New buildings are taller, more modern, and larger than those built during Soviet Union times. The new buildings are providing with most modern heating and cooling systems, which use less energy. Instead of small wooden windows and doors are replaced with large plastic windows and doors in new buildings. It is proposed to replace contestant lamps with compact fluorestat lamps. Old house supplies were replaced with more modern ones.

Climate change mitigation policies

In order to solve our national problems on energy efficiency, from 1999 we have started to make some progresses on energy sectors and looking forward to make better successes on energy sectors.

Combined-cycle gas-turbine units need to be improved in order to enhance the fuel efficiency of thermal power plants. Realizing that. Azerbaijan will not be able to finance such a massive upgrade program itself, which is estimated at $2.5 billion, it seeks potential foreign investors to jointly undertake these projects.

In accordance with the Government plan for development of the energy sector by 2008, some projects to upgrade the existing facilities have been completed and others are under way.

The international donor community has undertaken several projects to restore and add new capacity to Azerbaijan's power sector, including a $53 million loan by the World Bank to complete the construction of Yenikand hydroelectric plant, which completed in May 2000. At the moment the power of the station is 125MWt.With the upgrading this hydro station, we get 200 millions KWh and also makes opportunity to economy 82,000ton fuel per year.

And the European Bank for Reconstruction and Development's roughly $21 million loan (in conjunction with the Islamic Development Bank and the European Union) for the reconstruction of the 360-MW Mingechaur hydroelectric station on the Kura River completed in 2000, which resulted in economize on 72,000t fuel per year.

In early 2003, Azerbaijan's newly completed Severnaya power plant began operation with the help of Japanese companies Mitsui and Mitsubishi. The 400-MW gas-fired unit provided power mainly to the Absheron peninsula, and help to raise Azeri electricity generation in 2003 by 6% over 2002 levels. Main objective of the project was to increase capacity of the most important power plant of the Absheron peninsula by installing a 400 MW Gas-Steam Energy Unit to replace the existing 150 MW steam unit. Press reports indicate that Azerenergy is considering numerous plans to develop the country's distribution network and increase its generation capacity. And also in this power plant residual fuel oil has been replaced into gas.

Another project is designed for the installation of two gas turbine units, each with 50 MW capacity, to replace the outdated equipment in the Baku Co-generation Plant No.1. This upgrade will meet the energy requirements of the industrial plants in the area, including the oil refinery, and the heating demands of the residential areas. The project is estimated at US$ 80 million.1

While state electric company Azerenergy has a monopoly on power generation, the country's national electricity network is divided into five regional grids--Baku; Nakhchivan; North (Sumqayit); South (Ali Bayramli); and West (Ganja--each of which has been opened to foreign investors via open joint stock companies. According to press reports, further privatization and foreign involvement is being considered.

2 Best practice policies and measures yielding ancillary socio-economic benefits

Azerbaijan is a country which is rich of natural resources. Azerbaijan's population can live very rich with it's own resources. Unfortunately during the Soviet Union we were not free to use our sources and Azerbaijan experienced a number of environmental problems associated with the command economy. As a major producer of industrial and agricultural products with a relatively small population, Azerbaijan still remains one of the poorest former republics. Recent damage was sustained in the occupied territories and to their natural resources during the conflict over Nagorno-Karabakh. The occupation of territories also crated a flow of refugees, who now live in inappropriate conditions that are harmful to their own health as well as to the environment that they live in. Due to the lack of electricity and other energy sources, particularly in areas outside of Baku and its suburbs, refugees have relied on the increased use of wood and natural fuels, resulting in deforestation.

Macroeconomic stabilization and positive growth of industrial and agricultural output, in addition to several recent structural adjustment programs, have created a foundation from which pressing environmental issues may be addressed. The Ministry of Ecology and Natural Resources was established in 2001.

The decline in the level of emissions from the 1990 is explained by the collapse of the economy in the initial years of independence, not from the use of friendlier technologies or approaches. More recently, the level of emissions has begun to increase as the economy expands.

The content of emissions from major emission sources is indicative of the considerable continued discharge of greenhouse and ozone-depleting gases, in relation to a comparatively low industrial output. When comparing the volume and the content of the waste with the volume of the produced product, the need to introduce different technologies becomes very apparent.

Renewable energy technology

Besides of energy efficiency, use of renewable energy technologies, which also effective on climate change mitigation policies. Due to its' geographical position and climatic conditions and peculiarities of economic structure Azerbaijan is a promising country in terms of renewable energy sources application prospects. Besides the energy sources of rivers the "renewable energy" category includes the solar, wind, geothermal and biomass energy.

Solar energy

Usage of solar energy is considered logical in the regions with entering solar radiation of over 120 kW-hour/m^3 per year. In many regions of Azerbaijan the volume of entering solar radiation makes up 1600-1800 kW-hour/m^3 while average annual duration of solar radiance is 2200 to 2600 hours there with the radiation level of 3-6 kW/m^3. These figures show that the practical use of solar energy is economically justified for our republic. That is because location of solar stations conforms to the principle saying that "the closer the energy source is, the more efficient and economic its' usage becomes".

Use of solar energy in Azerbaijan is preferable in the sectors such as heating and hot water supply, air conditioning, industry, communications and transport. Relative simplicity of the usage of solar energy enables mass construction of standard small power plants with capacity of 50 to 3000 kW.

It is estimated that saving of one thousand of CFT is possible if we practice the usage of solar energy through construction of solar collectors with total area of 10.000 m^3.

Implementation of a project providing for practicing the usage of solar energy would allow saving of 0.13 millions of CFT of fuel and reduction of CO_2 emissions by 232.000 tons after ten years.

In order to develop the solar energy production in Azerbaijan there was proposed the pilot project “Usage of Solar Energy for Hot Water Supply”.

Wind energy

In Azerbaijan there are quite favorable climatic conditions for development of wind energy production. Winds with the strength of three to five m/sec. prevail in the foothills and lowlands of a country. Strength of winds in coastal regions varies between 6 and 8-20 m/sec. In the Apsheron peninsula – besides predominant North – there are also northwest and South winds observed. With all that the probability of wind strength gradation between 9 and 20 m/sec. is 30%.

Perspectives in terms of wind energy production is the Apsheron peninsula, coastal area nearby the “Nizovaya Pristan” meteorological station, Sumgait zone, Jiloy Island, Oil Rocks, Puta, Svinoy and Sara islands. Attractiveness of these areas is predetermined by the average annual strength of winds, which is 5.5-8.0 m/sec. there. Moreover the fact that the winds are blowing 250 days a year in Azerbaijan makes it unreasonable to ignore the wind energy production opportunities.

Joint Stock Company “Azerenergy” together with Japan Company “Tomen” is currently working over the project providing for construction of wind energy station with capacity of 30 MW. This station will be located on the Southwest Apsheron – in Qobustan. The projected wind station will consist of 50 wind turbines by 110-150 meters distant from each other. Capacity of each turbine will be 800 kW. Construction of a wind energy station is expected to start and complete within the course of 2001. Anticipated budget of a project is 30-40 millions of dollars. In two years the outlay of a project will be covered and running the station will become profitable.

Technical potential of wind energy in Azerbaijan allows increasing the production capacity up to 800 MW. With that capacity given it is possible to produce 4 billions of kW-hour of electrical energy. Practicing the wind energy production would considerably contribute to development of the national power production sector. That is because the production of wind energy will make up 17% of a baseline total electrical energy production. Taking into account the energy development baseline, the introduction of wind energy would lead to saving of 2.4 millions of CFT of fuel and reduction of CO_2 emissions 220,000 tons per year.

Bio-energy

Biomass is a sustainable renewable energy source, which could be used for production of electricity and other energy resources.

Used in the present energy systems – biomass contains the residues of wood, food and agricultural products. In the future economies developing profitable energy types such as wood and grass will considerably extend the biomass supply.

Biomass may be considered a neutral alternative for electrical energy production as it comes to the carbon emission. In spite of the fact that biomass produces carbonic acid gas during combustion, its’ equivalent volume is being adsorbed from the air while growing the biomass itself. Thus the biomass re-circulates the atmospheric carbon and minimizes the impact of global heating.

Azerbaijan is a region with poor forestry. An average share of wooded areas makes up about 11% here that are by 2.5 to 3 times lower than the internationally accepted norm. Calorific value of forests’ wood is 6 to 12 TJ/thds.m^3. Average calorific value of the solid biomass makes up 18.4 TJ/thds.m^3 of tons.

3 Climate change mitigation and the use of the flexible mechanisms: State-of-the-art

In order to save potential of development of this field was created Climate Change and Ozone Center under the Ministry of Ecology and Natural Resources in 2001.

There are four divisions in our center. They are:

CHG inventory, Climate, GHG mitigation and adaptation and Ozone. There are 19 persons in our office.

In 2002 we have already prepared up our national Climate Program. However, our government did not accept it, yet. The program includes work improvement of the hydrometeorological stations and controls on receiving exact information and improvement of transfer systems. Besides of those, climate changes assessment and mitigation plans are also included into this program. There are also the plans of afforestation, soil cleaning, application of new technologies and use of alternative energy sources. The main reason of it's implementation is financial problem. In order to solve this problem the Ministry of Ecology and Natural Resources and also at the same time Azerbaijan government collaborate with America, England, Japan, Germany, Netherlands and Canadian governments. We have the positive experience with Canadian development agency in the field of capacity building.

4 Making the Kyoto mechanisms work: Challenges ahead

In the 1995 Parliament of Azerbaijan ratified the UNFCCC. In 1997 under the decree of President of Azerbaijan the State Commission on Climate Change was created under a management of vice-premiere. Azerbaijan Republic ratified Kyoto Protocol in 2000. Besides of this, Ministry of Ecology and Natural Resources has crated Commission over Convention on Climate Change in order to regulate issues under the Convention on Climate Change. Different experts from main sectors of economy were involved to the commission.

During 1998 and 2000 years Azerbaijan presented it's First Nation Communication to a Conference of the Parties of UNFCCC. That document served as the first stage of climate change studies in Azerbaijan and helped with solution of the following objectives:

- Preparation of the Greenhouse Gases Emission and Sinks inventory covering the period of 1990 through 1994
- Development of emission forecasts and mitigation activities;
- Assessment of vulnerability and climate change impacts and adaptation activities.

After that in 2000-2001 years was made phase2 of First National Communication that titled " Capacity Improvement Activities on Climate Change in the Priority Sectors of Economy of Azerbaijan". Phase2 is the continuation and constituent part of the First National Communications.

Current document is aimed at solution of the following tasks:

- Identification of technology needs for capacity improvement in the priority sectors of Azerbaijan economy; study of technology acquisition and introduction opportunities; assessment and preparation of projects
- Capacity development for participation at the Systematical Observations Network
- Implementation of additional researches of vulnerability and adaptation of fish resources and deserting processes to climate change.

According to the Convention Azerbaijan is considered non-annex1 country. That is why we can only work on CDM projects under the Kyoto Protocol. Canadian Development Agency and Center on Climate Change and Ozone have signed Memorandum for implementation of CDM projects.

According to the Memorandum Canadian Development Agency has to organize training courses for development of CDM projects in Azerbaijan. There is already organized four seminars. As a result of these seminars we improved our knowledge on project preparation and we proposed 14 projects. Five out of 14 were selected as demonstrative projects. The Most of projects includes an information about generation of energy from alternative sources (wind, solar, Biomass, mini. HPPs).

We hope that by the beginning of next year, those 5 projects will be implemented under the financial support of Canadian Development Agency.

References / Documents / Links

Azerbaijan Human Development Report 2000-2002

Initial National Communication of Azerbaijan Republic Under Nations Framework Convention on Climate Change

Fact Book of Azerbaijan 2002

Country Report: Belarus

Sergei Prokazov
Committee for Energy Efficiency

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

The Republic of Belarus is extremely poor in fossil fuels. Fuel import accounts for 80 per cent of total fuel consumption in the country. Fuel is brought in from Russia. Besides, Belarus imports 20 percent of electric power from Russia and Lithuania. In fuel energy balance of Belarus the greatest share belongs to natural gas (that is 60 per cent of gross fuel energy resources consumption and 67 per cent of total fuel consumption), the share of refined oil is 11% and 12,5% respectively, the share of furnace fuel oil is 7,2% and 8,3 respectively. Total fuel energy resources consumption during the last years can be characterized as rather stable. In 2001 and 2002 it didn't exceed 25 mio tons of oil equivalent (toe). Moreover, according to the official data there has been constant growth of GDP (gross domestic product) lately. Thus the growth of GDP in 2001 and 2002 with regard to 1998 was 14,6% and 20% respectively. Further growth of GDP in the nearest future is planned by the Government of the country within the Program of socio-economic development of the Republic of Belarus. Oil production in Belarus is 1850 thousand tons per year that is 14% of total consumption. The rest of oil is imported from Russia. Oil is processed into furnace fuel oil, diesel fuel and different kinds of petrol. More that 50% of these oil products is exported which is essential for the national economy.

Thus the low rate of domestic fossil fuel presence and the necessity of sustainable development are preconditions for increasing energy consumption efficiency and renewable energy resources development.

According to the economic and ecological criteria biomass utilization for energy production purposes is one of the most relevant and important energy development tendencies for Belarus. In 2001 Committee for Energy Efficiency together with UNDP developed the Strategy of wide-ranging wood fuel use in Belarus. Forestry area in Belarus is 9,2 mio. Hectares that is 44% of its territory. Growing stock is 1,2 billion m^3, the annual average shoot of wood is 25 mio m^3. Wood fuel use for energy purposes in different periods was:

- 713 toe in 1998
- 757 toe in 1999
- 785 toe in 2000
- 887 toe in 2001
- 941 toe in 2002

Wood fuel use for energy production purposes is carried out in two directions, they are transferring functioning equipment on wood, chips and sawdust fuel and introduction of new equipment working on wood bio-fuel. However the amount of biomass use for energy purposes is far from the economically efficient one. Economic potential of its use is about 2,4-2,8 toe. The disadvantage of using wood fuel is the fact that it is used for heat power production only, not for electric power production. Greater part of wood fuel used is firewood procured by the countryside population.

In general biomass utilization for energy purposes in 2002 was as follows:

- Wood 783,7 thsnd toe
- Waste wood 158,0 thsnd toe
- Waste plant growing 41,9 thsnd toe
- Lignin 7,0 thsnd toe
  (wood waste product of hydrolysis production)

Biogas use potential is 115 thousand toe. At the moment biogas is not used in the country that is connected with economic problems of farming producers and absence of their interest in biogas use given other fuels. Waste plant growing is used on 4%, lignin is used on 15%.

The Government of the country finds the problem of increasing renewable energy resources use extremely important. In 2002 The Program of increasing the use of domestic fuels and renewable energy resources in Belarus was accepted. According to this Program by the end of 2006 it is expected to increase biomass use by 200 thousand toe, other renewables and secondary energy resources use by 90 thousand toe.

The most interesting trends of the Program are as follows:

1. Introduction of pilot mini heat and power stations (ranging 0,7-6 MW) working on domestic fuels in every region of Belarus;
2. Introduction of energy technological module with using lignin as basic fuel in hydrolysis plant;
3. Elaboration of business plans, introduction and putting into operation wind power plants with the help of foreign investment resources;
4. Use of fast growing woods for energy production purposes;
5. Designing and construction of turbo-expander plants.

Active work on introduction of mini heat and power stations on the basis of existing boiler plants with the use of steam-turbine, steam-gas and gas-turbine plants has been done in Belarus. 19 turbo-generators with total electric power of 21 MW were introduced in 2000-2002.

This spring the Government of the country approved the Plan of putting into operation electric power generating equipment based on steam-turbine, gas-turbine and steam-gas plants during 2003-2005. According to this Plan a number of plants with total electric power of 53,5 MW, 40 MW and 73,2 MW is going to be introduced in 2003, 2004 and 2005 respectively.

Great attention has been given lately to increasing energy efficiency of building exploitation in Belarus. In particular, according to the decision of the Government residential buildings consisted of more than 80 apartments must be equipped with devices of group count of water and heat power consumption and systems of heat power supply regulation by November, 1, 2003. The residential buildings with less number of flats should be equipped with such devices by the end of 2005. Such economic sanctions as fines will be applied to those owners of residential buildings which won't fulfill this task.

In 2003 a regulation concerning the measures of increasing efficiency of hosing exploitation, municipal and social-and-recreational buildings exploitation and defense of utilities consumer rights was adopted by the Government. The regulation defines the scale of heat modernization of the buildings, that is 610 thousand m^2 in 2003, 719,5 thousand m^2 during 2003-2006 and 6365 thousand m^2 during 2007-2015. Besides an official demand concerning the equipment of heat supply systems with preliminary isolated pipes and individual heating stations during building, reconstruction and capital repairs of hosing came into force on January, 1, 2003. Moreover, starting from 2003 instrumental control of the enclosure quality on the point of heat loss must be carried out during final acceptance of buildings. Energy saving potential in the housing sector is estimated as 1,4 mio toe. It should be noted that payback time of thermo renovation measures is rather long, it may be from 5 to 20 years and even more depending on a kind of the measures, which is connected with rather low heat power tariffs for population. That is why thermo renovation was local and this trend wasn't considered as an energy saving priority.

The Government of the country has been paying great attention to the problem of increasing energy efficiency of all sectors of national economy. In the end of 2002 a regulation concerning additional measures on economical and efficient use of fuel energy resources was adopted. The regulation implies 3 mio toe reduction of total fuel and energy consumption (which is equal to 8,5 mio tons of CO_2) by 2005. To reach this goal a sum of 920 billion Belarusian rubles (that is about 460 mio. USD) is provided for. The financing sources are as follows:

1. Capital base of enterprises and organizations including finances of special funds "energy and resources saving";
2. A part of finances provided by innovation funds of some Ministries and Concerns;
3. Finances of Committee for energy efficiency;
4. Bank loans;
5. Republican and regional budget finances;
6. Finances of international financing organizations.

Such great attention given to energy saving problems in Belarus is caused by economic and ecological reasons.

2 Best practice policies and measures yielding ancillary socio-economic benefits

Ultimately all energy saving policy that has been carried out in Belarus for the last ten years is aimed at gaining not only economical and ecological benefits but social benefits as well. By the way, any economic benefits imply social ones already. In Belarus there is state statistical reporting of the results of energy saving measures implementation, which is done by all organizations and enterprises. According to the information on the year 2002 fuel energy resources saving in the country is estimated as 443 thousand toe or 36,1 mio USD. It is exactly on this sum the cost of products produced, work and services done was diminished. It facilitated the reduction of inflation level and gave the opportunity to invest the money saved into the development and modernization of industry, which led to the creation of new jobs, reduction of unemployment level and reduction, to some extent, of republican and regional budget expenses (for organizations with budget financing). In its turn this money was used for financing social programs.

The project of Social Infrastructure Modernization in the Republic of Belarus is considered to be one of the most socio-oriented projects in the field of increasing energy efficiency. This project is being implemented now within the agreement between the World Bank and the Republic of Belarus. A loan of 22,6 mio USD was granted to Belarus to implement the project. The Belarusian contribution is 17,8 mio USD. The project's goal is the reduction of fuel energy resources consumption on the social area objects of the country, namely schools, kindergartens, hospitals and homes for old people. More than 500 social area objects will be involved in this project. In particular, the project's implementation includes the following activities:

- Boiler plant reconstruction and their transfer on biomass fuel;
- Thermal insulation of the roof and walls;
- Reconstruction or replacement of the windows;
- Electricity lightning modernization;
- Heat consumption automatization;
- Reconstruction of utilities and heating systems.

More than 900 objects were examined during the preparation process, those with most efficient measures were selected. The World Bank granted a sum of 1 mio USD in advance for the preparation of the full-scale project of social infrastructure modernization. This money was used for introduction of energy efficiency measures on 40 different objects in the country. Heat consumption was automated in all 40 cases, artificial lightning system was modernized in 8 cases, enclosure thermo renovation was carried out in 4 cases. One boiler plant was transformed to use biomass fuel and 2 boiler plant were totally reconstructed. According to the results of monitoring being carried out after the introduction of energy efficiency measures significant positive effect was achieved. Thus heat power economy on 20 objects situated in Minsk was estimated as 2 370 Gcal per heating season. The payback time is 2 years.

Except economic benefits considerable social benefits were gained, such as:

- Heat comfort was improved in a number of schools and kindergartens, the number of cases of pupils' and their teachers' being ill diminished. According to the monitoring data the sickness rate in average is twice lower now;
- The lightning system was considerably improved and now it corresponds to the sanitary demands;
- The flickering of old lightning lamps of low efficiency, which is harmful for the eyes, was eliminated.

It should be noted that the lightning system of most of the objects didn't correspond sanitary demands. Moreover, the emission of harmful substances by heat supply resources was reduced, which made the environment healthier.

Energy saving measures on all other objects are supposed to be implemented by 2007 according to the work schedule.

Committee for energy efficiency is responsible for the control over the work done within this project.

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

United Nations Framework Convention on Climate Change was approved by the Decree of the President of the Republic of Belarus № 177 on April, 10, 2000. Belarus is included in Annex I of the Convention. As Belarus is a country with economy in transition a certain level of flexibility concerning meeting obligations under the Convention is provided to it. Ministry of natural resources and environment protection was determined as a public body responsible for meeting the obligations. Besides, an interagency working group on meeting the obligations was created, a draft project of National climatic program was developed. Serious work on GHG emissions inventory has been done in the country.

As the Republic of Belarus wasn't present at the third Convention of the Parties in Kyoto, it wasn't included in the list of countries with established commitments on GHG emissions reduction (Annex B of the Kyoto Protocol). At present free quota on GHG emissions in the country is about 35-40 mln. tons of CO_2. It means that Belarus could be a significant seller of GHG emissions quotas.

According to the data of GHG Cadastres of different countries energy sector together with fuel using plants of other sectors are responsible for 70-90 per cent of GHG emissions. Thus any activity aimed at GHG emissions reduction first of all includes energy saving and renewable energy resources development.

Committee for energy efficiency develops projects aimed at GHG emissions reduction. A number of such products has been submitted to Global Environment Facility, Prototype Carbon Fund and UNDP. It is due to the Committee's activity a request on a large-scale investment project with a 5 mio USD budget got into the Prototype Carbon Fund portfolio on 2002. However taking into account the fact that Belarus is not included into Annex B this money can't be received until the problem of establishing quantitative commitments on GHG emissions reduction (that is joining Annex B of the Kyoto Protocol) for Belarus is positively solved.

Hence, unfortunately to us at present Belarus can not take part in Joint implementation projects and projects of Prototype Carbon Fund.

Considering Belarus's great interest in the implementation of GHG emissions quota trading / assignation mechanisms, UNDP and UN ECE (economic commission for Europe) initiated the development of the project aimed at removing barriers to including Belarus in Annex B of the Kyoto Protocol and its joining the Kyoto Protocol to UNFCCC. The project is being implemented at the moment and should be over by the end of 2003.

Compared to 1990 there was significant change in the fuel consumption structure of Belarus. The share of black oil for example decreased from 37,5% in 1990 to 8,3% in 2002, while the share of natural gas increased from 30,3% in 1990 to 66,5% in 2002. It should be noted that the share of natural gas is still increasing.

These tendencies namely: fuel energy consumption reduction, the increase of natural gas share and the reduction of GDP energy intensity, which has been annually achieved since 1995, had positive effect on dynamics of GHG emissions reduction in Belarus.

According to the last estimation actual amount of GHG emissions in Belarus is about 55-60 million tons of CO_2 equivalent, which is considerably lower than in 1990. First of all this reduction is caused by serious energy saving activity in the country, which led to significant nearly 40% reduction of GDP energy intensity. Lately GDP increase has not been accompanied by the increase of fuel energy resources consumption.

The amount of GHG emissions in base year 1990 was about 130 mio tons of CO_2 equivalent. That is approximately 1% of GHG emissions of the countries included in Annex I of UNFCCC and approximately 3,1% of GHG emissions of the countries with economy in transition also included in Annex I. Such countries as Hungary and the Czech Republic. As for Russia these numbers are 13% and 38% respectively.

4 Making the Kyoto mechanisms work: Challenges ahead

The position and priorities of the Government of Belarus concerning the use of flexibility mechanisms under the Kyoto protocol are not clearly defined at the present, as there is no political resolution with respect to the problem of joining the Protocol. The expectant position is mostly determined by two factors: the lack of definite assurance concerning the viability of the Kyoto agreement and undeveloped internal political, economic, institutional and scientific preconditions.

However, two projects aimed at removing some of the existing barriers are being implemented at the present. Two more projects are being elaborated. Their main task is to elaborate the position of Belarus concerning the process of joining the Kyoto Protocol and to facilitate this process. They are also aimed at GHG emissions reduction and climate change mitigation.

As I have already mentioned in my report, the interagency working group on implementation of UNFCCC was created. This group includes the representatives of various ministries, institutions and organizations involved in climate change and deals with corresponding problems related to UNFCCC and the Kyoto Protocol, climate change mitigation, GHG emissions inventory and reduction. Considering the staff of this group and their professional skills making competent decisions should be expected as a result of its work. But on the other hand organizational base of this group doesn't let make such decisions.

The institutional base for creation of a competent steering body on climate change problems and implementation of corresponding procedures (let's call it Governmental commission) is being developed within the Project called "Feasibility study on opportunities for Belarus to join the Kyoto Protocol".

First steps have been made towards the creation of National GHG institution within the most competent public body in the field of GHG inventory, that is Belarusian scientific and research center “Ecologia” of Ministry of natural resources and environment protection. This institution is supposed to process and accompany Joint implementation (JI) projects on their initial phase. However, there is serious want of developing institutional opportunities and finding financing resources to facilitate the full-scale activity of the institution mentioned above.

There is a well-developed implementation mechanism for projects in the field of energy efficiency and renewable energy resources development. During the last 10 years such a policy has been implemented by Committee for energy efficiency which possesses sufficient authorities, normative and methodical base, financing sources and instruments. Moreover there is advanced scientific and technological base for implementation of projects concerning the problem of increasing GHG sinks. Thus the prospects of JI projects implementation are rather encouraging.

Unfortunately, investment environment in Belarus in general doesn’t let us speak of great probable interest of countries included in Annex 2 of UNFCCC concerning implementation of JI projects in Belarus.

In Belarus there is serious want of support of international financing institutions with regard to the problem of creating institutional and economic preconditions for elaboration of the system aimed at JI projects implementation and quota trading, appropriate informing of interested organizations responsible for making decisions in certain areas, establishing bilateral and multilateral international contacts aimed at solving of the problems mentioned above.

References / Documents / Links

Main tendencies of energy saving policy for 2001-2005 period and till 2015;

Republican program on energy efficiency for 2001-2005 period. (Approved by the Council of Ministers Regulation № 56 from 16/01/2001);

United Nations Framework Convention on climate change (UNFCCC);

The Kyoto Protocol to UNFCCC;

President’s Decree № 177 from 10/04/2000;

Council of Ministers Regulations № 56 from 16/01/2001, № 1820 from 27/12/2002 and № 45 from 17/01/2003.

Country Report: Bulgaria

Nikolay Nikolov
Energy Efficiency Agency (EEA)

1 Main information

- **Full country name:** Republic of Bulgaria
- **Area:** 110,912 sq km
- **Population** 8 million
- **Capital city:** Sofia (pop 1.3 million)
- **People:** 85% Bulgarian, 8.5% Turkish, 2.6% Roma, 2.5% Macedonian
- **Language:** Bulgarian. Turkish and Romany are spoken by minorities.
- **Religion:** 85% Bulgarian Orthodox, 13% Muslim
- **Government:** Democracy
- **President:** Georgi Parvanov
- **Prime Minister:** Simeon Saxe-Coburgotski
- **GDP:** US$ 34.9 billion
- **GDP per head:** US$1 510
- **Annual growth:** 2.5%
- **Inflation:** 11.4%
- **Major industries:** Food processing, machine and metal building, electronics, chemicals, textiles, ferrous and non-ferrous metals
- **Major trading partners:** Italy, Germany, Turkey, Greece, Russia, USA
- **Member of EU:** no

2 The Energy Efficiency Agency (EEA)

is an executive Agency of the Ministry of Energy and Energy Resources (MEER), according to the enforced in November 2001 Energy and Energy Efficiency Law (EEEL). The basic EEA activities cover the broad spectrum of energy efficiency (EE) and renewable energy sources (RES) programs, projects and measures in all public sectors, in every aspect of life. The Agency develops and implements the EE and RES programs and projects, creates and supports the respective national informational data base, renders institutional and expert assistance and support to ministers and heads of administrations and governments at central and local level, as well as to all institutions and organizations (NGOs inclusive) regarding the efficient and renewable energy usage and the environment preservation. According to EEEL, the EEA has important responsibilities on training and information for separate experts and target groups, as well as for the large public on different energy effective and renewable technologies, energy audits and investigations and EE and RES international programs and projects. The EEA is legally authorized to carry out own economic activities in relation to different stages of designing, preparation, constancy, implementation and dissemination of the best practices on all above mentioned tasks and activities.

3 Recent developments regarding sectoral energy efficiency and climate change policies

PRIORITY NATIONAL TARGET is the sustainable economic growth, based on: modern functioning energy sector, secured energy supply, environmental protection, use of energy saving potential, use of RES potential. The main aspects of the national energy policy are the stable energy development, the security for energy in Bulgaria, the insured energy supply for the consumers with minimum expenses, the rational and effective use of fuels and energy in the cycle “ generation – end use” and the reduction of specific energy consumption for unit of GDP – competitive products and services.

ENERGY EFFICIENCY AND USE OF RES are important part from the total energy policy and part of the alternative in the energy sector, because they guaranteed sustainable economic development, improve new technologies, generate benefits for the end users, give possibility for regulation and management of energy consumption, improve the information of the society and change the motivation and manner of thought of the people. Main target of the energy efficiency and renewable energy sources policy are:

- REDUCTION OF GDP ENERGY INTENSITY via various energy efficiency measures, by introduction of the high technologies for effective use of energy and renewable energy sources;
- IMPROVEMENT and protection of environment by promotion and construction of alternative environmental energy sources, which allow for suitable treatment of various types of waste and reduction of the harmful emissions in the atmosphere;
- IMPROVEMENT of energy independence in the country and for the establishment of conditions for market relationships in the energy sector.

Legal and Regulation Framework for the EE and RES Policy

- The Energy and energy efficiency law ;
- The Government' program;
- The Accession Partnership Project – accession criteria, Chapter " Energy";
- The Energy strategy ;
- The Energy and fuels prices ;
- The new legislation ;
- The New Energy Law ;
- The new EE Law ;
- The secondary legislation – regulations.

The main abstracts from the legislation, relating the EE and use of RES are:

1. Energy and Energy Efficiency Law (EEEL) :
- The purchase of electric energy from RES is under long term contracts
- The generation of el. energy from RES with power of up to 5 MW and for thermal energy production does not require license;
- The purchase of electric energy , generated from RES with power up to 10 MW obligatory is purchased by the electric energy distribution company,
- The purchase of electric energy from RES is in a preferential price.
2. The **Law for Waters** / Art. 47/ gives the right for exclusive right for water usage on water – which is exclusively state property, via concessions, for spa waters and for hydro geothermal energy. The concession for use of water sites and the water economic systems and equipments – public property is delivered also for the construction of new hydro technical, hydro irrigation and sewerages equipments
3. The **Concession Law** / Art. 4 / allows for the issue of concessions fro biological, mineral and energy resources on the continental shelf and is an excessive economic zone for theirs studies, elaboration, output and usage.

4 Best practice policies and measures yielding ancillary socio-economic benefits

The main measurements of the energy efficiency and renewable energy sources policy are following:

- Reduction of total state expenses and facilitation of national economy;
- Improvement of competitiveness of goods manufacturers on the local and external market via reduction of their energy costs;
- Establishment of new market conditions for manufacturers and companies for installation and service of energy efficient equipments, systems and technologies;
- Opening of new working places and increased employment;
- Facilitation of neutralization to certain degree the increased energy prices for the household and other energy consumers;
- Reduction of harmful gas emissions resulted in the catastrophic effect of global warming and also delay in the process of exhausted natural energy resources;
- Reduction of the strategic dependence of the country on the energy supplies.

The Energy efficiency Agency developed an three years energy saving plan with the following compass: it foresees a number of measures and programs in all sectors of the public and economic life in the country with common parameters:

- Investments 762 mio leva;
- Saved fuels 202 Ktoe/year;
- Saved electric energy 753 949 MWh/year;
- Saved thermal energy 1 020 580 MWh/year;
- Saved el. energy powers 151 MW;
- Annual economic effect 217 mio leva;
- Saved emissions 1 318 KT/year.

The Energy efficiency Agency developed also a National program for RES with the following compass and aim:

- Perspectives for development of RES – to reach a relative share of 8% from the total energy balance by the year 2010.
- The execution of the National RES program will lead to the realization of more than 920 small investment projects and the achievement of the following parameters:

- Electric power installed 302 MW;
- Thermal power installed 1 488 MW;
- El. energy saved 1 602 128 MWh/year ;
- Thermal energy saved 6 973 467 MWh/year;
- Saved emissions CO2 4 373 000 t/year;
- Total value 1 647 mio US$

5 Climate change mitigation and the use of the flexible mechanisms: State of the art

The main measures to realize projects and programs on EE, RES and use of the flexible mechanisms for reduction of GHG are:

- Improvement of legislation ;
- Opening of energy market and establishment of business climate ;
- Expanding of euro integration in energy policy area- harmonization with this one of EU;
- Insurance of investments – via investment plans of municipalities, private sector, international programs, etc.;
- Integration of Bulgarian energy market with the European, incl. RES market;
- Insurance of free trade and investments;
- Development of technologies for RES during the next 5 years ;
- Opening of more than 2 000 working places per year;
- Information delivery to the society;
- Campaigns for use of RES;
- Training at schools, universities, municipalities;
- Execution of Kyoto commitments .

In this field very important is the new energy efficiency law, which contain the following basic moments:

- More clear definition of EE as national priority during the execution of the state policy and the state commitments and support;
- Reglementations of processes for use of standards and labeling, expertise and audits as important administrative-economic instruments for improvement of EE;
- Elaboration and adoption by the Council of Ministers of a long term program and annual programs for EE;
- Elaboration of regulations for ESCO companies;
- Legalization of energy saving stimulation – proposals for amendments to the State budget law - new regulations, that will facilitate the budget structures at the payment of energy efficiency services on behalf of the savings;
- Legalization of establishment of fund EE – for financing activities on improvement of EE and extension of RES use

Establishment of mechanism for collection and expending of means for projects and programs on EE in order to encourage the investment process.

6 Making the Kyoto mechanisms work: Challenges ahead

The National policy on climate change and Kyoto Mechanisms in Bulgaria has the following main points:

- Bulgaria has signed and ratified the Kyoto Protocol
- Bulgaria has elaborated 3 National communications on climate change - at the moment we are about 50% below our obligations for emission reduction according the Kyoto Protocol witch is a very good starting point for the development on the Kyoto mechanisms.
- Bulgaria has singed Memorandum of understanding regarding Bilateral cooperation for the realization of Joint Implementation Projects with Netherlands, Austria, Switzerland, and very soon we will have another one also with Denmark.
- Bulgaria has a National action Plan on climate change since the year 2000, which contains a lot of measures for each governmental organizations - Ministries, Agencies etc. for reducing the greenhouse gas emissions.
- Bulgaria has a Joint implementation unit since 2000, which is working at the moment under the umbrella of our Ministry of environment and water.
- Bulgaria has a steering committee on the Mechanisms of Joint implementation with representatives from the governmental organizations, working in the field on climate change. The steering comity discusses project proposals and approves these one, that are suitable for JI.
- For pity there is no awarded project on JI but at the moment there are 3 projects in the short list and we hope that they will be approved.
- CDM Mechanism is not possible for Bulgaria, because Bulgaria is not a developing country.
- We will also participate in the “Emission trading” mechanisms after 2008, because we have a big quantity of emissions, which we can sell .

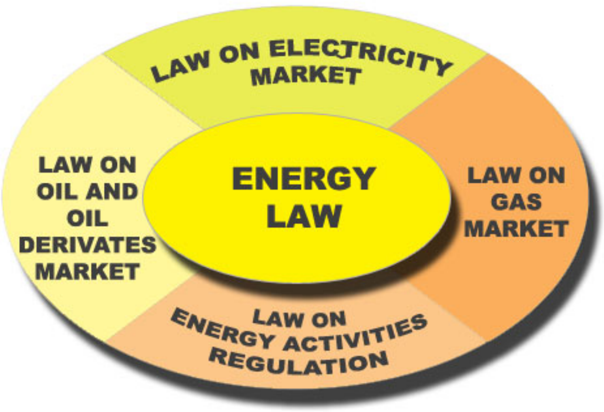
Country Report: Croatia

Hrvoje Petrić
Energy Institute Hrvoje Požar, Zagreb

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

On 19 July 2001 the Croatian Parliament passed the set of the energy laws, which includes the *Energy Law, Law on Electricity Market, Law on Oil and Oil Derivatives Market, Law on Gas Market* and *Law on Energy Activities Regulation* (figure 1). These laws open the way to the future development of the energy market.

Figure 1: Set of Energy Laws



Under the Energy Law, the basic act setting the energy policies and plans for energy development in the Republic of Croatia is the *Energy Development Strategy*. The Croatian Parliament approved the Energy Development Strategy on February 2002. On the basis of this document the Government will bring, until the end of 2003, the *Strategy Implementation Program*, which will determine the measures, activity proponents and dynamics of realization. The Energy Development Strategy has energy, economic, legal, organizational, institutional and educational dimensions, and its primary goal is to prepare the Croatian energy sector for smooth and efficient integration into the European Union.

The Strategy proposes the model of energy sector development which is adjusted to the needs and specificities of Croatia, considering various solutions worked out in the developed countries. The energy strategy envisages five general characteristics of the future energy system: (1) increasingly determined by users' needs; (2) varied and use a range of energy sources and technologies available, which depends on local conditions and capacities; (3) increasingly decentralized; (4) more attention will be paid to energy efficiency; (5) move forward to the use of clean energy products and technologies is expected.

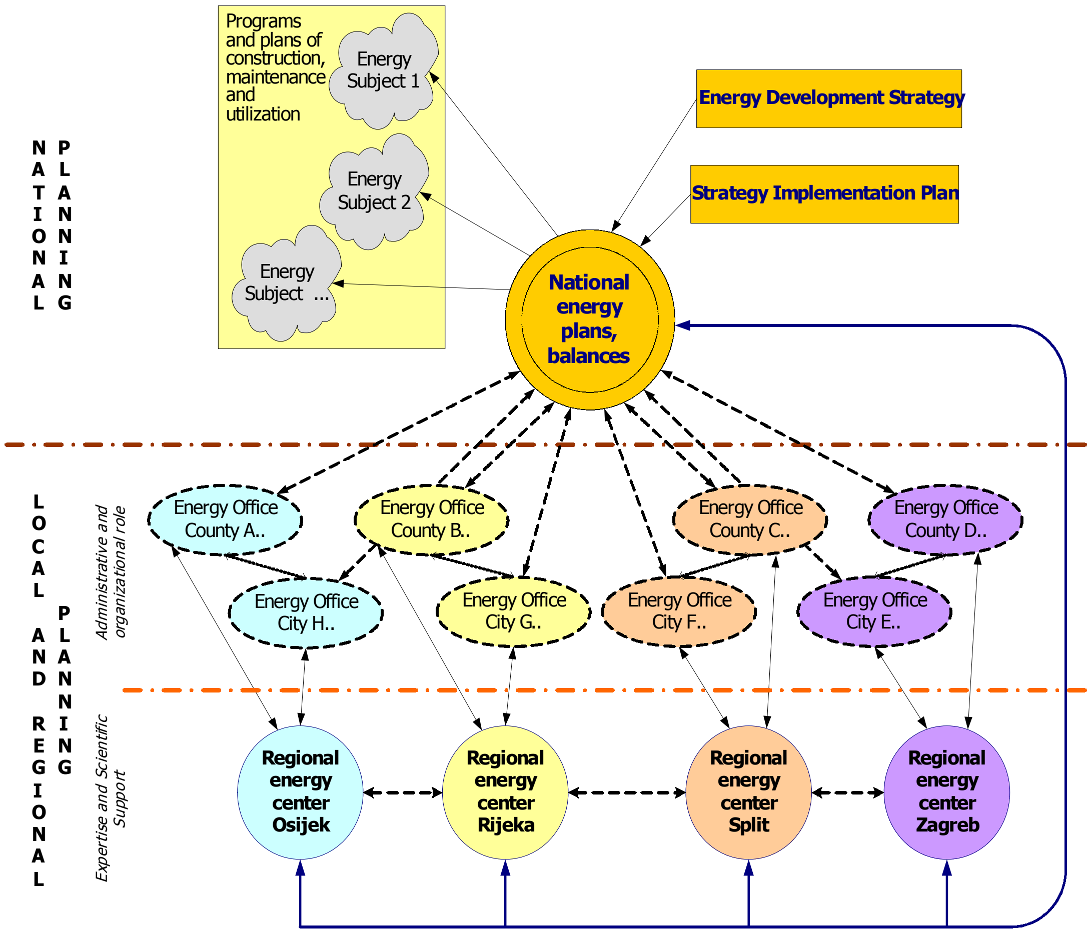
Due to the development of the market, the planning becomes increasingly important in the process of addressing the problems emerging from rapid changes in the energy sector and environment protection. The national level planning activity derives from the fact that government is responsible for appropriate functioning of the energy sector, which by its nature is a public sector regardless of the growing energy marketing. The Government of the Republic of Croatia and the Ministry of Economy have the main role in setting long term fundaments of the energy policy and in adopting and implementing the relevant regulation to ensure safety of supply and environmental protection.

Regional planning is set as one of key prerequisites of well balanced and appropriate development which should creates firm fundaments to decentralization. The Energy Law prescribes that local and regional self-government units are obliged to plan needs and ways of energy provision, in accordance with the Strategy and the Implementation Program. The local and regional self-government units are also responsible for adopting programs of efficient use of energy at the local level.

Figure 2 gives an overview of the planning process and implementation of energy efficiency measures on national and local level, according to the Energy Law and the Energy Development Strategy.

Methodological approach to the energy planning is Integrated Resource Planning (IRP), in order to obtain several economic effects of which the most important ones are savings in capital investments in energy sector, allowing this capital to be directed in profitable economic activities (such as tourism, etc.), and reduction of NO_xious substances emission into atmosphere in the process of energy generation and consumption.

Figure 2: Planning and implementation of measures in the energy sector



The organized care about energy efficiency is carried out through the National Energy Programs - KUEN$_{building}$, MIEE, KOGEN, KUEN$_{cts}$ and TRANCRO. They cover all relevant energy consumption areas, within which it is possible to undertake activities with the aim to improve efficient use of energy. Then again, the systematic care regarding renewable sources is carried out via National Energy Programs BIOEN, ENWIND, GEOEN, MAHE and SUNEN. Leading role in the National Energy Programs belong to the Energy Institute Hrvoje Požar and the Ministry of Economy.

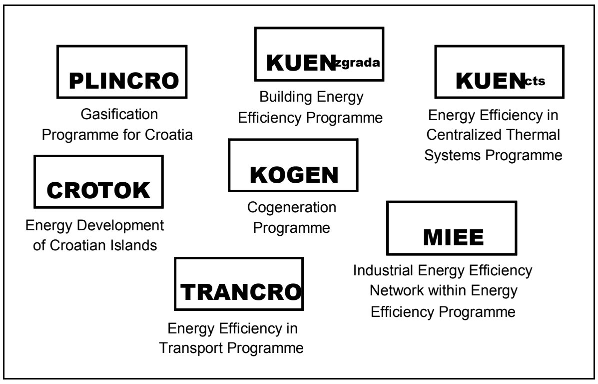
At the present point in implementation of these projects, the current situation in Croatia has been examined, especially the situation in terms of legislation and economy, the problems and impediments to future development have been identified, other countries' experiences have been examined, and future activities, the way of their implementation and their dynamics have been proposed.

Several pilot projects have been initiated in order to monitor and verify the energy, economic and ecological conditions for projects' implementation. During the work on the pilot projects it will be possible to identify and/or confirm where the problems and impediments lay, so that all projects' effects and impacts on the energy sector and overall economy can be analyzed on the basis of particular cases.

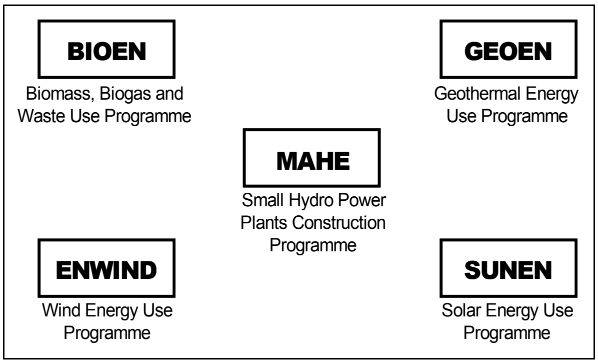
The basic aim of energy efficiency implementation within the building construction program KUEN$_{building}$ is to reduce energy needs by procedures in designing, construction and use of new buildings and settlements, and to create favorable microclimate parameters of the buildings. Energy conservation at the moment is most promoted in residential and commercial buildings according to the *Construction Law* from 1999 and the *Regulation for Thermal Insulation* and necessity for energy savings in all types of building in Croatia.

Analyses show that until 2030 new houses will make only one third of the residential fund in Croatia (houses built after 1995). That is why the regulation of thermal insulation of newly built apartments will solve only part of problems related to energy for house heating. The major part of the consumption will take place in apartments built so far, in which it is expected to see the increase of space heated in a quality way (today only 40% of the housing surface). The main goal of energy efficiency improvements in this sector is to enhance thermal insulation in already built apartments.

Figure 3: Basic energy efficiency …



… and renewables policies



Since it involves significant financial resources, the Government works on incentive policies and organizes their implementation through energy programs. The Strategy sets as a goal of thermal insulation in newly built houses a norm of 100 kWh/m^2 in 1998, 75 kWh/m^2 in 2010 and 50 kWh/m^2 in 2020. A common long term goal of marking and standardizing, DSM measures and general technical advance is a yearly (linear) reduction of non-heat electric energy use in household appliances by 0.7 per cent .

Towns and counties should be also obliged to take care about cost-efficient energy consumption in facilities they own (public buildings). Actual system of managing public facilities is inadequate or sometimes not set up at all. Therefore idea is to introduce the system of continuous monitoring of consumption in individual facilities, compare their specific consumption with other similar facilities (benchmarking), and finally of by the system of demand forecast, taking necessary measures if deviations in consumption appear to be bigger than standard. The appropriate tools for implementation of these measures will be set and actually proposal for public buildings is ESCO approach.

In industry and services sectors, the energy efficiency strategy should establish the organized structure within the framework of the MIEE Program. The legal background of energy efficiency should be prescribed until the end of 2003 by the *Rules on Efficient Energy Use*. The Rules will stipulate the classification of customers into several categories: industry, non-commercial services sector, commercial sector, transportation, and households. As well, until the end of 2003, the Minister will prescribe, through the *Rules on Energy Labeling*, the shape and content of a label depending on the type of product with respect to energy consumption, minimum energy efficiency requirements for a product, and which products must carry the label with energy efficiency data. Manufacturers and importers of various products that consume energy will be obliged to indicate in a technical product specification a type of fuel or energy used under normal working conditions.

Out of 460 MW$_e$ of actually installed power of cogeneration plants, one third (65%) are public district heating plants and the rest are industrial plants. Analyses show that this is only about 30% of true potential for cogeneration in Croatia. Therefore in the area of cogeneration (KOGEN Program), the main goal is to stimulate construction and use of cogeneration plants in all those facilities where technological and economic conditions allow. The realization of this Program primarily includes creation of favorable legal, financial and technical and technological framework for cogenerations. Actually the cogeneration is recognized in the Energy Law and Law on Electricity Market through the *Rules on Eligible Producer Status* that should be prescribed in 2003 by the Minister of Economy. Besides, the proposal is to update the Energy Law with the rules or sub-law on cogeneration, according to proposed EU directive on the promotion of cogeneration based on a useful heat demand in the internal energy market. More significant growth of small scale cogeneration plants is expected in the following years, particular small scale in service sector (63 MW$_e$ or 18% of potential in 2020) and industry (400 MW$_e$ in 2020). Actual technical potential of micro-cogeneration is estimated at the level of 150 MW$_e$, but more significant development is not expected before 2010.

Croatia, as a country of high forest potential (44% of total land forest territory) with important role of agriculture and many wood processing plants, has large amounts of various biomass materials which can be used for energy generation. According to various scenarios it is expected that in 2030 technical potentials of biomass will be between 50 and 80 PJ. So far, only a small quantity of available biomass has been used, mainly in a non-energy efficient way, namely for house heating, and biomass has not had an important place in the energy policy. As the BIOEN program has shown, energy from biomass and waste could provide at least 15% of total primary energy until 2020. This goal should be realized by initiating demonstration projects, by creating market and conditions for use of biomass energy (regulations, taxes, subsidies, etc.), by involving industry and economic operators, by education and encouraging research and international cooperation.

Wind energy, as an ecologically acceptable and available domestic resource is an unused energy source. The carrying capacity of so far examined locations (29) has been estimated at a minimum of 200 MW in wind plants, while technical potential of electricity generation is estimated to about 800 GWh a year. Since the technological progress, component standardization and economy of scale, constantly lower production price of wind generated electricity, a share of commercially built wind plants could be higher than predicted. Today a clear commercial interest exist in Croatia for about 130 MW of wind plants and over 10 projects are in different stages of preparation (80 MW). However, a crucial impetus to this development will be putting in place a stable regulation framework with clearly defined obligations of energy market players, strategic commitment of the state in regard to renewable sources and a uniform incentive system.

Croatia has a geothermal gradient much higher than the European average with total potential of the discovered deposits 39 MW_t and 48 MW_e. Exploitation of geothermal energy will be connected to overall exploitation of the existing wells developed mainly for oil and gas production and owned by INA - national oil and gas company. In potential increase of geothermal energy use in services sector, the rise in utilization factor on already exploited and new locations is foreseen with the rise of utilization levels in 2030, from 400 to 720 TJ a year. As shown in the GEOEN Program, when it comes to geothermal energy it is necessary to create conditions to increase the use of geothermal energy in the existing facilities. An appropriate and comprehensive marketing campaign should raise interest of the private business community and local community for the use of geothermal energy, which would result in better energy efficiency of the whole energy sector.

Based on studies and project documentation on small water flows in Croatia made so far, it was concluded that the technically usable potential for small hydro power plants is about 177 MW on 699 locations. It is necessary to stress that due to ecological requirements a part of examined locations will be treated as inappropriate for energy exploitation. It is also realistic to expect that a certain number of locations will be excluded from further consideration due to poor financial prospects. The basic aim of the MAHE Program is a plan of constructing small hydro power plants, removing all impediments, as well as putting in place all conditions for increased construction of small hydro power plants. As it has been envisaged that all facilities be completely privately owned it is indispensable to make the relevant legal procedures transparent and simple for potential investors, both in terms of projecting, construction and favorable credits for such projects. In order to stimulate the construction some pilot projects have been started for potential locations of small hydro power plants and the documentation required to begin construction has been made.

The aim of the SUNEN Program in the Croatia's coast until 2020 is to ensure a large portion (about 80%) of total needed energy for sanitary hot water preparation in households and tourist industry is obtained from the primary solar energy. It is expected that by 2030 at latest solar energy will have a much larger share in meeting heat demand for heating and cooling in the coastal Croatia. This mainly refers to hybrid solar heat plants, which use LPG or natural gas as a backup fuel, and where an economic share of solar energy can be expected to reach up to 50 per cent of total heat final consumption.

Also, the Energy Law proclaimed use of renewable energy resources as the interest of the Republic of Croatia. Detail framework for renewable implementation will be given by the *Rules on Use of Renewable Energy Resources*, which should be prescribed by the Minister of Economy until the end of 2003. The rules will stipulate which renewable energy resources will be used for energy generation, their type, technology, possibilities of their use, as well as the incentives. Besides, the renewables are recognized in the previous mentioned Rules on Eligible Producer Status.

Furthermore, this summer the *Fund for Environment Protection and Energy Efficiency* has passed the parliament discussion and it is expected that the fund will be established until the end of 2003. The fund will have direct influence on promotion and financing of energy efficiency and renewables.

In the Republic of Croatia, environmental protection policy falls within the competence of the Ministry of Environmental Protection and Physical Planning. The State Directorate for Water is in charge of water conservation. Regarding climate change specifically, the most important legislation is the following: *Environmental Protection Law, Air Quality Protection Law, Ordinance on Emissions Limits for Stationary Combustion Sources, Waste Law, Rules on Handling Hazardous Waste and Rules on Environmental Impact Assessment.*

2 Best practice policies and measures yielding ancillary socio-economic benefits

In addition to advantages of the biomass fuel, which are equal to other renewable sources (environment, green house gases, energy independence, import reduction, etc.) other social-economic positive effects of the biomass should be stressed. According to BIOEN Program, conducted researches potential effects of biomass energy are creation of 5000 direct jobs until 2015, or, up to total of 60000 potential jobs (direct, indirect and induced employment). The other important feature is the fact that financial means are kept within the local community, regional economy receives more impetus, etc.

Within the BIOEN Program and international collaboration as a result of Task 29 of IEA Bio-energy, the analysis of social-economic benefits of biomass is preparing. Task 29 of IEA Bio-energy included exchange of results and information among the normally discrete research areas of social, economic, techno-engineering / engineering-economic and environmental issues. The Task provided a platform for integration of research among those areas (table 1). As a result, a wider, system–oriented and multi-criteria-based view of the issues connected to production and utilization of biomass for energy activities has evolved from this successful collaborative effort. Some concrete outcomes are a number of reports and studies as well as a book of proceedings from Task workshops.

Task 29 collaborated with several other Tasks, e.g. by organizing joint workshops that were documented by joint proceedings. These activities also contributed to the development of a more integrated knowledge base. As well as the positive experience of synergistic effects of the multidisciplinary collaboration within Task 29, it is believed that this concept should be developed further. Important effects would include increased opportunities to share and exchange model components, technical information and linkages with other IEA Bio-energy Tasks.

The current proposal for a new Task builds on the achievements of Task 29. It is designed to capitalize on the present body of knowledge, and to continue to add to it and develop it further drawing in new expertise sometimes generated by the action itself. The aim is an enhanced transfer of holistic, integrated knowledge and technical information which is believed to be of substantial value to local communities, scientists and decision makers in the field of biomass production and utilization and energy planning.

Table 1: Issues associated with local bio-energy production

Dimension	Benefit	
Social	Increased Standard of Living Environment Health Education	Social Cohesion and Stability Migration effects (mitigating rural population) Regional development Rural diversification
Macro Level	Security of Supply/ Risk Diversification Regional Growth	Reduced Regional Trade Balance Export Potential
Supply Side	Increased Productivity Enhanced Competitiveness	Labor and Population Mobility (induced effects) Improved infrastructure
Demand Side	Employment Income and Wealth Creation	Induced Investment Support of Related Industries
Institutional Aspects	Democratic decision processes Participatory problem solving	Local problem solving.

The Task will deal with: stakeholder involvement, local income, public acceptance, local NGO involvement, long-term support (e.g., rental of credits), technology transfer, technology diffusion, distribution of benefits, fuel substitution aspects, policy aspects, education and capacity building, definition of collateral effects, market development in relation to timber and non-timber products markets (e.g. shift of income or changing in financial sources for sustainable development), institutional development, the nature and role of local and co-operative ESCOs in propagating community actions, and other means relevant to secure long-term success and to minimize leakage and maximize additionality of projects. An integrated approach will be taken to investigation and sharing of knowledge on these separate aspects. Typically, socio-economic implications are measured in terms of economic indices, such as employment and monetary gains, but in effect the analysis relates to a number of aspects which include social, cultural, institutional, and environmental issues. The problem lies in the fact that these latter elements are not always tractable to quantitative analysis and, therefore, have been precluded from the majority of impact assessments in the past, even though at the local level they may be very significant.

In many ways the social implications arising from local bio-energy investment represents the ‘woolly’ end of impact studies, nevertheless they can be broken down into two categories: those relating to an increased standard of living and those that contribute to increased social cohesion and stability.

In economic terms the ‘standard of living’ refers to a household’s consumption level, or its level of monetary income. However, other factors contribute to a person’s standard of living but which have no immediate economic value. These include such factors as education, employment opportunities, the surrounding environment and healthcare, and, accordingly, they should be given equal consideration.

Moreover, the introduction of an net employment and income-generating source, such as bio-energy production, could help to stem adverse social and cohesion trends (high levels of unemployment, rural depopulation, etc.). It is evident that rural areas in some countries are suffering from significant levels of outward migration, which mitigates against population stability. Consequently, given bio-energy’s propensity for rural locations, the deployment of bio-energy plants may have positive effects upon rural labor markets by, firstly, introducing direct employment and, secondly, by supporting related industries and the employment therein (e.g., the farming community and local/regional renewable energy technology providers, installers and service providers).

Finally, it is often possible to achieve significant and sustained development of local initiatives given genuine local involvement of key stakeholders. The emergence and cultivation of local champions is an essential area for study.

The increased use of bio-energy, which exhibits both a broad geographical distribution and diversity of feedstock, could secure long-run access to energy supplies at relatively constant costs for the foreseeable future. Moreover, the use of indigenous resources implies that much of the expenditure on energy provision is retained locally and is re-circulated within the local/regional economy. Similarly, by securing a heat-and-power supply system based on indigenous and renewable resources, exposure to international fuel price fluctuations and input fuel requirements are minimized, thus reducing the risk of rising costs of production, transport, etc., further enhancing the goal of sustainable development by increased energy efficiency.

Supply side effects are rather subjective in regional impact studies, as they are commonly deemed to be those impacts, which are the result of improvements in the competitive position of the region, including its attractiveness to inward investment.

Demand side effects constitute the focal point of majority of socio-economic impact studies and are concentrated upon for several reasons. Most notably, they are relatively easy to define and their scale can be quantified with reasonable accuracy. Moreover, the economic impact is the most important for regional developers and decision makers.

Considerable effort should be made to determine the extent and direction of capital flows both within the region under analysis and, more importantly, out of the specified region. If this ‘leakage’ element is ignored, then it gives rise to misleading spurious predictions about future employment and income gains. Furthermore, consideration should be given to the duration of the impacts, and only then can a tentative evaluation of the wider effects pertaining to some, or all, of the other factors be attempted.

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

Croatia is a country that is particularly vulnerable to the impact of climate change due to its 5,800 km long coastline with 1185 islands, and its fragile agriculture and forestry with their social and economic significance. There is also the potential influence on hydrology, water resources, mainland and coastal ecosystems. Therefore, Croatia has cause for concern and is motivated to take an active part in international efforts aimed at finding practical solutions to climate change.

The inventory of emitted air pollutants has been carried out in Croatia since 1990 following the obligations of the Long Range Trans-boundary Air Pollution Convention (LRTAP) implemented by the United Nations European Economy Commission (UNECE). The determination of greenhouse gases emission has become a basic obligation according to the United Nations Framework Convention on Climate Change (UNFCCC) because of its climatic impact. There is also obligatory emission declaration following the Croatian Air Protection Low.

The Republic of Croatia became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in 1996, by parliamentary Decree on Ratification. Pursuant to that Decree, the Republic of Croatia has under Article 22 of the Convention undertaken the commitments outlined in Annex I as a country undergoing the transition process to a market economy. Croatia has thus committed itself to maintain greenhouse gas emissions at their 1990 levels.

The Republic of Croatia is also a signatory of the Kyoto Protocol. Upon its entering into force and its ratification by Parliament, Croatia will commit to reduce its emissions of greenhouse gases by 5 percent in relation to the base year, over the commitment period from 2008 to 2012. The Convention allows a certain degree of flexibility for countries with economies in transition meeting their commitments, including the choice of the reference year for greenhouse gas emission levels (Article 4.6 of the Convention). With regard to this, the Republic of Croatia cites some specific circumstances and proposals.

The emission of greenhouse gases (GHG) from Croatian territory is very low, one of the lowest among the Annex I parties to the Convention. Croatia is facing some problems in determining the emissions of greenhouse gases, since no reliable data existed until 1992, when Croatia gained its independence. Up to the year 1992, the 19 area of former Yugoslavia functioned as an integral economic and energy market and the territorial allocation of activities couldn't be properly carried out. Due to the problems with determining emissions, especially in the energy sector that generates the majority of greenhouse gas emissions, in the First National Communication of the Republic of Croatia to the UNFCCC, the emission in Croatia until the year 1992 has partly been determined on the basis of data available for former Yugoslavia. According such estimation, in the reference year 1990, the Republic of Croatia had an emission of 39.4 Mt $eqCO_2$, i.e. 8.24 t $eqCO_2$/capita.

On the such methodology which were used by Croatia for the base year estimation, neighborhood countries put their reservation. Further negotiations regarding Croatian base year determination in Bonn end up with Conclusion by witch Croatia is invited to submit inventories of all GHG emissions, including data from 1990 or earlier year to the latest inventory year available as well as projections of its GHG emissions which should be prepared using the IPCC methodology and UNFCCC guidelines for the preparation of the national communications by parties included in Annex I to the Convention. Croatia

International negotiations on Croatia's request have been going on for three years now, and Croatia expects this issue to be finally solved by a resolution to be passed at the COP9 Conference of Parties under UNFCCC Convention.

As there is no base year defined for Croatia, this is an obstacle in the implementation of policies and introduction of specific measures for the reduction of GHG emissions as established in the First National Communication.

The Kyoto target which prescribes for Croatia 5 percent emission reduction related to the IPCC standard base year emission, is very demanding and feasible only with high costs that exceed Croatia's economic ability at this moment.

One of the main Convention principles is to assure sustainable development along with commitments for reducing GHG emission, having in mind that economic development is essential for adopting the measures to address climate change. For Croatia in its transition period of striving to joint EU with tight schedule, any new unbalanced burden could slow down the positive trend.

During the entire 1990-1995 period, emissions declined by approximately 45 percent, and the most dramatic reduction has been noted between 1991 and 1992 (26 percent). The decrease continues after 1992 at a somewhat slower pace, to reach its minimum in 1994, while the mild increase in emissions was recorded during the last year analyzed. Such emission trends are a direct consequence of the specific situation in the Republic of Croatia during the 1991-1995 period, when wartime events and separation from the former Yugoslavia influenced the overall situation. The general decrease in business activities and energy demand was felt throughout the country. Further, with the entire economy in transition, some energy-intensive industries experienced a downturn in production or phased out certain programs, which was considerably reflected in greenhouse gas emissions.

Projections show that Croatia will exceed Kyoto target in 2005. The range of mitigation scenarios shows that it is not possible to reach the strict Kyoto target, even with maximum mitigation scenarios.

Some very new developments in industry will additionally increase GHG emission, like considerable increase of emission in cement industry due to fuel switch from oil and gas to coal, start-up of aluminum plant, start-up of steel factory plant and unexpected increase of emissions from central natural gas processing plant.

Croatia is currently making great efforts to start with implementation of mitigation measures. New energy law promotes energy efficiency and use of renewables. Projects for renewables and energy efficiency in public, service sector and households are starting up with total planed budget of more than 50 ml. USD, with GEF grant contribution of 15 ml. USD.

The very new scenarios and projections which are under preparation will be based on the realistic measures which can be achievable in that short time till the 2008 and in accordance with existed Energy strategy. Also, cost estimate study for the implementation of the measures will be performed as well effects which measures implementation will have on the economical growth and firms competition.

The National Communication (reviewed and approved in 2002) has set a goal to establish a national program to mitigate climate changes. The program will build on the existing system developed within the project of preparation of national communication. The system is composed of the following entities: the Ministry of Environmental Protection and Physical Planning (in charge the overall program realization), the National Commission for Climate Change (the advisory body that will supervise and assess program results), the Executive Co-ordination Committee (program implementation), the Scientific and Technical Advisory Body of the Program (assistance in resolving the technical and methodological problems), working groups, projects and subprograms for specific work tasks relating to climate change issue assignments and links with other programs and projects.

The proposed model networks a number of existing institutions; the need for permanently employed staff in state institutions is minimal and the model can easily be adjusted if required. In the future specific areas that require permanent personnel and involve routine works, as well as the operative management of the program, will be assigned to the Environmental Protection Agency (established in 2002). The program is organized into two parts: the Capacity Building Program and the Implementation Program.

A total of 39 measures have been identified for reductions in all emission sectors. The potentials identified for reductions represent target values; in some cases, these are maximum feasible values, while in some others these are realistic capabilities. If the quantitative targets are disregarded for a moment, each sector and subject that contributes to the emissions of greenhouse gasses should demonstrate progress, that is start to develop and implement projects. The basic criterion for the selection of priority activities, measures and the appropriate implementation instruments, was the cost-effectiveness of a particular measure.

Successful promotional activities and a number of public appearances have been conducted during the development of the National Communication. Representatives from non-governmental organizations have participated in the development process within national workshops. The Communication was open to public debate for a period of was available on the Web site of the Ministry. The issue of education and public awareness has been identified as one of the key elements in the action plan to mitigate climate change, so a comprehensive program of minimal actions to be carried out over next two years has been developed.

The costs associated with the climate program development over the first three years are estimated at US$1.5 - 3 million. A system that will enable the full implementation of the proposed measures should be thoroughly developed during this period. Cost estimates show that emission reduction by 20 percent in relation to the base scenario, which assumes implementation of nearly all currently analyzed measures, could reach to US$ 120 million per year in the year 2010. There are four envisaged basic sources for program funding: the national budget, the taxation of greenhouse gas emissions, commercial bank loans, and international financial and technical aid. The initial phases of the implementation of the program will require substantial international support. Hopefully, the GEF program financing mechanisms will continue to be a valuable source of support.

The Croatia's Kyoto mechanism implementation strategy depends on how the base year issue will be resolved for Croatia. At this moment, when the baseline year for Croatia has still not been determined, Croatia should be very careful with possible JI arrangements. The emission reduction costs need to be taken into consideration, and they indicate that the cost of the most of the measures is more than 10 USD/tCO_2eq. Possible JI projects should be connected with the measures that have other positive and currently favored effects, such as waste management, forestry measures, industrial measures that contribute to the production increase and introduction of new technologies, agricultural measures, and the bio-energy projects. So far, the JI projects should be used to encourage implementation of the measures, to cover different types of measures and demonstration projects on which valuable experience could be gained.

However, no significant exchange of the ERUs has been permitted. Thus, it is necessary to adopt new knowledge shortly and prepare technical documentation to support the decision-making process. It is of particular importance to determine the baselines for determination of the ERUs is recommended. The project preparation, verification and implementation procedure needs to involve domestic professional capacities to the maximum extent. It should be born in mind that a wrongly determined ERU credit will "become due" in 2008, since that is the year in which the assigned (sold) emission is added to the Croatian quota, so the "blown up" ERU today might damage the integrity of the planned "domestic" measures.

Considering the implementation of the CDM, Croatia might be interested in investment in the countries, which are not parties to the Annex I. Croatia's position is that the major portion of the emission reduction could be achieved with the domestic measures, and the ratio between the domestic and Kyoto mechanism measures is still the matter of negotiations under the Kyoto process. One of the priorities is determination of the baselines and stipulation of rules for approval, evaluation, verification and monitoring of JI projects. The emission trading market should be monitored for strategic reasons, particularly regarding creation of the common EU electricity market. So, it is useful that HEP has already got involved in international pilot programs, such as EWP.

4 Making the Kyoto mechanisms work: Challenges ahead

So far, Croatia has met its commitments under the Convention, since emissions of greenhouse gases are below the 1990 level. The principal long-term objective of Croatia set under the National Communication in terms of climate issues is to mitigate climate change in accordance with the general principles of the Convention and undertaken commitments in such a way as to enable sustainable economic development.

Croatia has not, for the time being, set a quantitative target for the reduction of greenhouse gas emissions. The possibilities and implications of meeting the Convention and the Kyoto Protocol commitments have been analyzed for the first time during the development of the National Communication, and the described actions have represented the first framework action plan for the mitigation of climate change. The Kyoto Protocol sets the reduction of greenhouse gas emission by 5 percent in relation to the reference year for Croatia. In respect of the general principles of the Convention, the set objective is unfair to Croatia. Unfortunately, at the time of the Kyoto negotiations Croatia had no available data on emissions and did not consider possibilities for their reduction. Consequently, Croatia was in no position to negotiate an objective consistent with its specific circumstances and capabilities.

The priority steps that will have to be urgently executed are the establishment of a firm financing mechanism via emission taxes (within the in 2003 established previous mentioned Environmental protection and energy efficiency fund) and establishing the program through adequate political decisions.

In order to build capacities for the implementation of the program, a number of activities should be executed in the next ten years like the development of operative and sector plans, background studies for legislation and projects, emission monitoring systems, knowledge on policy planning and measures, the implementation of a public awareness campaign program and so on. Capacity building should not slow down the implementation process, so the activities that have already started should be supported to the maximum degree and the parallel work of identifying and developing new projects should continue. Demonstration and pilot projects should be launched in order to encourage the operations of the program. For that purpose, incentives to support national energy programs and other measures within industry, forestry and agriculture, should be developed.

The mode of assigning commitments to individual industrial branches and specific emission sources should be developed. Education, information dissemination and the promotion of public awareness should be continuous and performed with the active participation of non-governmental organizations. In the establishment of a stimulating environment for the implementation of measures, it is crucial to increase the interest of the banking sector to stimulate investment in the projects aimed at mitigating climate change. Therefore, the long-term objectives and state incentives provided for the successful implementation of measures should be transparent and the stability in the energy market should be assured.

Since numerous problems and solutions are rooted in local activities, the participation and co-operation of local communities represents one of the key factors in meeting the program's objectives. The stimulation of Local Agenda 21 projects is planned as well as the start of a shared national program.

The first National Communication has been prepared on the basis of existing data and knowledge, with minimal additional analysis or numerical calculations for estimation of impacts. Further research is especially necessary regarding the flooding of coast, the impact on hydrology systems and water resources, as well as impact on cultivation of plants and forestry. The existing observation and measurements on climate should be organized and the methods of Global Climate Observation System (GCOS) investigated to a greater degree.

Until the year 2000, due to political instability and open issues across the region, Croatia was politically and economically isolated and has had limited access to EU funds; only available funds being those within the scope of UN mechanisms (GEF and others) and the World Bank. Considering the primary political goal to join the European Union, as well as climate, geographical and economic similitude, Croatia will, in its international relations, direct its co-operative practices towards the EU member states, neighboring countries and those countries undergoing the process of transition to a market economy. In order to fulfill its commitments, Croatia needs a significant amount of international assist, both the financial and technical (know-how and skills associated with specialized technology).

References / Documents / Links

Croatia in the 21st Century – Energy Development Strategy, Office for Development Strategy of the Republic of Croatia, Zagreb, 2002

Energy Law, Law on Electricity Market, Law on Oil and Oil Derivatives Market, Law on Gas Market and Law on Energy Activities Regulation, Official Gazette of the Republic of Croatia issue no. 68 of 27 July 2001

Task 29: Socio-Economic Aspects of Bio-energy Systems, Energy Institute Hrvoje Požar, Zagreb, 2002

The First National Communication of the Republic of Croatia to the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environmental Protection and Physical Planning, Zagreb, December 2001

www.mingo.hr, www.mzopu.hr, www.iea-bioenergy-task29.hr

Country Report: Czech Republic

Tomáš Chmelík
Ministry of Environment of the Czech Republic

1 Strategy and policies in the energy sector in the Czech Republic

There are no doubts that policies in the area of energy and climate are closely inter-linked. The energy sector remains, despite the improvement made in the past, one of the dominant sources of environmental pollution including the greenhouse gasses. Therefore it is not surprising that measures aiming the reduction of greenhouse gasses are mostly targeted to the production and consumption of energy, focusing on the potential of introduction of new environmentally (and climate) friendly technologies, support of renewable sources of energy and energy savings.

The basic principles of the latest developments in the strategy and policies of the Czech Republic in relation to the energy sector can be described as:

- Full liberalization of the energy prices; restructuring and privatization of the state-owned energy generation, transmission and distribution enterprises.
- Promotion and stimulation of safer, efficient and environmentally-friendly energy generation; encouragement of energy conservation throughout the country.
- Expansion and diversification of the connections to the international oil, gas and electricity transmission networks; improvement of the domestic production of primary energy sources.
- Reorganization of the public sector so it can better implement long- and short term energy-related policies and measures.
- Harmonization of the national energy standards with those from the European Union as a means towards the integration with the energy market of the Union.

On January 1st, 2001, a new energy regulatory authority became functional with the mission of determining customer rates in the sort term and opening up the grid to third-party access in the long term. The plans were that in 2002 customers with electricity usage of or greater than 40 GWh/year would be able to choose their supplier and negotiate electricity rates; in 2003 the minimum consumption needed to gain competitive pricing becomes 31 GWh/year; and by 2006 all customers will be able to choose their electricity supplier.

The scheme for the access to the natural gas network will be similar, with the largest customers getting access first - in 2005, 28% of the natural gas transmission system capacity will be opened to third party access. In 2008, third party access will be extended to include 33% of natural gas transmission. At the same time, it is expected that the Czech gas pipeline company will remove its subsidies to customers in 2003.

The installed electricity generating capacity in Czech Republic in year 2001 was as follow (in GWe, except for "other renewables"): conventional thermal (coal, oil and natural gas) – 11.47; nuclear – 2.76; hydroelectric – 0.95, other renewables – 1.5 MWe. The electricity generated in the country that same year was (in bln. KWh): from hydropower – 2.0; from conventional thermal – 53.3; from nuclear – 14, from other renewables – 0.7.

The Czech Republic shows a noticeable commitment to promote utilization of renewable energy sources, and to further stimulate energy efficiency and conservation. The Energy Policy (which was expressed by the Energy Act amendment in year 2000 and the Energy Management Act from the same year) adopted by the government in 2000 contains indicative target for reaching 5-6% of total power energy supply from renewable energy by 2010, and 8-10% by 2020.

Currently, the share of renewable energy in the total energy production in the country is: from hydro - about 3 % and from other renewables – 1%. The potential for utilization of other renewable sources is given below:

- *Wind* - Czech Republic has a good potential for wind energy development and local manufacturing of parts, components or whole units. Currently, a few wind projects are in the process of approval and securing the necessary financing, some of which is expected to come from Czech sources.
- *Solar* – according to latest estimations, the Czech Republic has installed solar collectors totaling an area of 100,000 m^2. Yet the conditions for development of that type of energy are considered to be modest.

- *Geothermal* – the potential for usage of geothermal power in the country varies from fair to good (only in selected areas).
- *Biomass* – several studies have shown that biomass is the best exploitable renewable resource in the Czech Republic. At present, only one-tenth of this potential (which is believed to be in the amount of 6 million tons of dry mass per year) is being used.
- *Hydro* – the hydropower potential currently utilizable in the existing small hydroelectric power stations amounts to approx. 30 % (about 500 GWh/year).

Between 1991 and 1999, nearly *500 projects for utilization of hydropower, biomass, wind, and biogas* were supported with CZK 273 million in the form of subsidies (17 % of total investment cost) for building total renewable capacity of 46 MWe and 13 MWt.

- *The State Environmental Fund* (SEF) supports investment projects and projects to use renewable energy sources, as well as education and consulting in the area of renewable energy sources utilization. The focus of the support from SEF is on the environmental effects from the projects. The SEF also supports measures related to energy savings beyond the framework of the State Program to Support Energy Savings and the Use of Renewable Energy Sources.
- The Czech Ministry of Industry has committed CZK 300 million for renewable energy and energy saving projects.
- Exemption from excise tax for bio-diesel fuel (methanol from rape seeds).
- Five-year tax relief on income and property for investment in small hydropower below 1 MW.
- Low VAT rate (5% instead of 22%) for small installations (hydropower 0.1 MW, wind 0.075 MW, all solar and biomass units).
- Exemption from property tax in a period of 5 years for conversion of building heating systems from solid fuels to RE.
- Reduced VAT rate of 5% paid by end consumers of biomass fuel and heat.

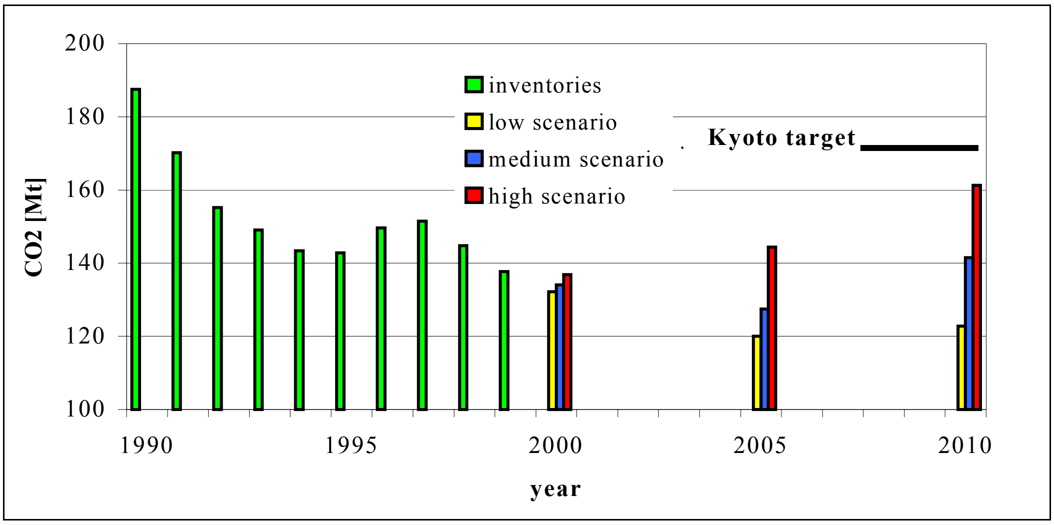
2 Selected policies and measures in the sector of renewable sources of energy and energy efficiency

- In July 1998, the Czech Government approved a draft for the new inter-sectoral coordinated *State Program to Support Energy Savings and the Use of Renewable Energy Sources*. This program - officially announced in 1999 - covers all sectors of the national economy and integrates the individual sectoral programs from the previous years.
- *The Energy Act* (amended several times since 1994, the latest one from 2001) gives the right of operators of installations for combined production of electricity and heat, and installations for use of renewable energy sources and waste combustion to preferential access to the distribution networks.
- *The Act on Energy Management* from 2000 establishes the obligation for each of the 14 regions in the country to prepare within five years a regional energy concept in order to create conditions for efficient use of energy. This Act is the law instrument that legislatively defines and establishes the National Program of Efficient Energy Management, and Utilization of Renewable and Secondary Energy Sources.
- Currently, a *National Program for Efficient Energy Management and Use of Renewable and Secondary Energy Sources* is under preparation, pursuant to the Act on Energy Management from 2000. This Program is to include targets related to decreasing energy consumption and the use of renewable and secondary energy sources in accordance with economic and social needs that observe the principles of sustainable development and protection of the environment.
- By now, the *EU Renewable Energy Directive* has been transposed into the Czech legal framework mostly through setting differentiated prices for the energy generated from renewable sources, and through entitling the operators of RES installations to guaranteed access to the grid. In 2002, the Energy Regulatory Authority set these purchase rates for electricity from RES: CZK 1.5/kWh for small hydropower; 2.5 for biomass, 3 for wind and 6 for photovoltaic.

3 Climate change policy in the Czech Republic

The development of greenhouse gasses emissions in the Czech Republic in nineties of the last century makes a good position of the country for fulfillment of reduction target of the Kyoto Protocol. The current emissions of greenhouse gasses are approximately one quarter below 1990 levels, which is a base year for the Kyoto target of 8 per cent reduction for the first commitment period 2008-2012. According to scenarios made within the preparation of the third national communication to UNFCCC (Prague, 2001), the Kyoto target will not be threaten even in case of a high growth (see figure 1). Also the national target for reduction of emissions of greenhouse gasses, which is set by the Czech environmental policy at the level of 20 per cent reduction of emissions in 2005, compared to 1990, will be fulfilled without problems.

Figure 1: Inventories and updated BAU projection scenarios for 2000 - 2010



Source: CHMI and SRCI, Phare Project, 2000
Note: estimated GHG emission in 2000: 141,8 Mt

However, the following background factors need to be taken into account for discussion of the position of the Czech Republic:

1. Construction of the Kyoto target
   Firstly, it is crucial to look at the reasons standing behind the massive reduction of greenhouse gasses emissions in early nineties. These are usually the years when transformation of the economy from centrally planned economy towards market one started in number of formerly communistic states. This process was followed by important changes in structure and operation of the economy as a whole, which fell into a decline or recession afterwards, followed by the same development of the emissions (however, the implementation of new environmental legislation, investment and other improvements also contributed to this development and should not be overlooked). Thus consider the position of the country only on the basis of the absolute figures about the emissions could lead to misinterpretation of the carbon intensity of the economy. The future growth is also a point of consideration.
2. Energy and carbon intensity of the Czech economy
   Secondly, despite the good development of emissions data in absolute terms, the Czech Republic still remains energy and carbon intensive economy. The figures about relative emissions per inhabitant or per unit of GDP show, that Czech Republic is relatively far behind the EU average. If the future commitments will be constructed on the relative basis, the transitional countries will suddenly be in serious problems. The same goes in case of the absolute targets, but different base year.
3. Limited experience with regulation of GHG
   Thirdly, the greenhouse gasses were not the point of regulation in Czech Republic in previous years (as were for example emissions of SO_2 and NO_x). Even if national inventories are made according to UNFCCC rules, there is a limited access to information about emissions on the installation level, which is a key point for potential regulation. The necessary administrative and organizational structures are not in place (or are limited), so to introduce effective policies for reduction of greenhouse gasses is more difficult.

The existing environmental policy already reflects a broad spectrum of measures related to energy savings and penetration of renewable sources of energy which both have a reduction of greenhouse gasses as one of the effects. On the other hand an early fulfillment of the Kyoto target is from this point a partially a limiting factor, because there is no clear target to aim the climate change policy at.

Another problematic point is a lack of coordination and cooperation among different ministries and departments. As already mentioned above, the climate change is not strictly the environmental issue, but a complex of different issues going across the economy as a whole. This means that for combating of climate change the various instruments have to be used and more likely in coordinated manner. Subsidies for renewables, energy taxes, transport policies, technological requirements, agricultural policies etc. all together contribute – both as a main or side effect – to reduction of greenhouse gasses. The only strategy related to climate change, which could give the climate change policy a framework, was prepared in 1994 and its content was not until now being actualized, so it does not reflect the latest development (UNFCCC, EU enlargement) and especially the chapter dealing with instruments for reduction of greenhouse gasses required a major revision. This revised strategy is now being finalized and it is expected to be presented to government for approval by the end of this year.

The important step was a recent establishment of a Climate Change unit, where the key activities related to climate change would be centralized and coordinated. For purposes of discussion of climate change issues with experts from other units from the Ministry of environment there was a special working group established, which serves as an advisory body for the minister and has a number of duties. For discussion of important documents on inter-ministerial level there was also a Climate Change commission established, where the members are representatives of key ministries, which have relation to climate change (industry and trade, agriculture, regional development, foreign affairs) together with representatives of Czech Parliament. This group meets much less frequently and is used for discussion of strategic documents or decisions only.

4 Kyoto flexible mechanisms

The current position of the Czech Republic (Annex I country) and its status of emissions define the position to these mechanisms when only JI (from the position of a host country) and ET are considered. As the procedures and modalities for Article 17 emissions trading were not elaborated on as detailed level by UNFCCC as the other two, the interest was focused more on project based mechanisms (JI), where also the factual realization can start before the first commitment period. However, the preparation of the framework for article 17 emissions trading, working on the principle of the recycling the revenue from the sale of the limited amount of AAUs (so called project-based emissions trading) started and initial proposals will be put for the consideration in upcoming weeks and is discussed in a different part of this paper.

Joint Implementation

The Czech Republic started to gain experience with such projects in the initial phase called Activities Implemented Jointly (AIJ). There were in total five AIJ projects realized, covering different areas (afforestation, use of renewables, energy utilization). As the experience of cooperation between investor and host country was sufficient, there started to be a lost of interest of investors in additional AIJ projects, followed by an increasing interest in turning into a crediting phase (JI). The Ministry of environment announced a start of a JI phase in January 2002. At the same time a preparation of a more detailed methodology for project submission and approval was started and the first version of this methodology was published in May 2002.

The initial interest of the Ministry of environment was to use JI as an additional financial source mainly for those projects, which always have problems with financing. This was the reason why the priority areas included utilization of renewable energy sources and energy savings in public (municipal) sector. The idea was also to prioritize small scale projects which are always facing problems with getting additional sources of financing. However other types of projects were not automatically excluded from consideration. The methodical guideline defined both administrative procedure of project submission and its evaluation and documents required for assessment. For evaluation of projects the capacities of Czech Energy Agency and State Environmental Fund are used, because both these agencies already have experience in evaluating of similar projects.

5 Practical experience with Joint Implementation

The methodical guideline was considered as a big step forward, because it clearly defined the scope of the JI in Czech Republic and gave the guidance for potential projects. However, during the practical application of the methodical guidelines a number of problems were faced. Among them the following ones the key ones:

- The project realizators criticized the amount and detail of the documentation required for submission. This included information both about the project itself (technical specification of the project with estimation of its environmental effects) and about the realizator as well. After some consultations it was agreed to reduce the number of documents to be required (the whole methodology is under revision now), but still the Ministry requires relatively detailed information about the project and about the project realizator. This in fact means that project has to be in a certain stage of development, but it is required project not to be physically started (its construction). The reason for such approach is that the Ministry of environment wants to evaluate the quality of the project before the official agreement on transfer of emission reductions is made.

- On the other hand this approach is problematic in case of small-scale projects. As the administrative costs connected to preparation of JI project are relatively high, it is reasonable to make projects only above a certain size in terms of emission reductions achieved. This threshold limits small projects, which the Ministry of environments would like to promote, from submission on a single basis. The solution could be a grouping of projects into a portfolio of number of small installations of the same type (with the same baseline). Unfortunately, in case of such portfolio it becomes very difficult to fulfill the requirement that the project was not physically started, because it is almost impossible to have a reasonable number (for example 15 or 20) projects at the same stage of development. The same problem is the flexibility of portfolio – a possibility to replace the failed project by another one of the same type. The approach to portfolio projects is currently discussed and will receive a separate special treatment.

- The role of the private sector in JI is also unclear at this stage. As the JI is designed as a Kyoto instrument, it is a mechanism between Parties. The role of the private sector can be important, but still the position of both Parties has to be clearly defined. For such purposes the Czech Republic supports agreement on so called Memorandum of Understanding, signed by relevant governmental representatives to define a framework for concrete JI projects. The international dimension of transfer of credits also requires adequate type of agreement between Parties. According to rules of Czech government the person signing such agreements need a special authorization from the government. As this authorization must be explicit (cannot be for example derived from the governmental decision about the Convention or Protocol), it requires a preparation of a special document to be discussed by the government. This document is now under preparation and should result in authorization of the minister of environment to sign agreements on transfer of credits to another Party. This complication just pointed out the problem of a legal matter – the flexible mechanisms represent a relatively new approach to international cooperation and have to be adequately reflected in national legislation. In case of Czech Republic some further adjustments to current legislation will have to be made.

- Quickly after the JI phase started there was a demand for projects coming from both neighboring states and from overseas. In such a case it is difficult for potential investor to find his counterpart (project realizator) directly. The Czech government was asked whether it can submit or offer some projects for JI, but as there is no register of such projects operated in Czech Republic, it is difficult even for us to identify the projects. For such a purpose we are considering the support for establishment of a platform, where both supply and demand for projects could be presented and both partners could easily find each other. There are some proposals, such as independently operated registry of projects or project office, which could also help with preparation of necessary documentation (under the methodical supervision of the Ministry of environment) and which could be financed by a small share (in terms of per cent) of the value of the credits to be transferred, but these ideas must be concretized.

Partially separate treatment of projects was selected in case of Prototype Carbon Fund of the World Bank (PCF WB). The arrangement in the Czech Republic is that there was a Host Country Agreement signed on the level of the government and following this, two other agreements will be signed with the Czech Energy Agency and State Environmental Fund, which will work as implementing agencies and will be submitting concrete projects for approval. The PCF activities have also a significant learning effect.

In case of Joint Implementation the crucial question is whether this mechanism fulfilled its expectations and really serves as an additional and valuable source of financing of projects with considerable environmental effects. Unfortunately the answer is not easy and from the experience in the Czech Republic the JI seems to be slightly confusing approach.

At the beginning it was widely believed, that sell of the emission reductions resulting from projects could be the right source of additional financing, which can turn financially difficult projects into a better shape and would result in a growing interest from project realizators. Unfortunately three major factors make carbon financing not as perfect as it seemed at the beginning.

JI procedures- too complicated?

The first is a complicated procedure and international requirements for JI. The project realizators (in case of Czech Republic for example municipalities) have difficulties to understand all requirements set by UNFCCC. Independent validation and further verification requires involvement of accredited bodies (mostly consulting firms or persons from abroad) and all this significantly contributes to very high administrative costs connected to preparation of the project. It finally results in no interest in small projects, where the costs of the project are often higher that the revenue from credits. Also the question of additionality is often discussed, because the potential in countries like Czech Republic is due to technological and environmental progress already limited and if the requirement of additionality is applied too strictly, this potential in fact becomes very close to zero.

Price – strong incentive?

The second important factor is a price. Generally said, the carbon financing does not help to solve the problem with financing of the installation, because the investment costs are so high that carbon financing represents an insignificant share on total costs (only in case of some specific projects, such as landfill gas, the ratio between investment and potential revenue is relatively good) and thus no surprise that project realizator is simply paying attention to financial sources on the basis of its importance. The bigger potential seems to be within the industry, but as this sector will be partially covered by the new EU emissions trading directive, this could lead to interaction of these two instruments.

Revenue availability

Another important factor is that revenue is often not available in advance (some programs offer advance payments), but on delivery basis. This in reality means that project realizator has to finance the project from non-carbon sources anyway and can get some additional revenue afterwards. Whether this is the right way how to boost the projects is really a question.

All this together lead to confusion both from the side of potential project realizators, which often feel that the whole process is complicated, expensive, risky (legal treatment of agreements, coverage of risks) for the price they are getting, but also from the side of investor countries which do not see a significant progress in works and ask for more cooperation. The criticism also focuses on the role of consultants which profit from project preparation and from the advantage that they are internationally much better known (and stronger) than local companies, which are in number of cases able to deliver similar outputs for much lower price.

Project based emissions trading – a solution?

One of the potential solutions (together with following the Track I approach as soon as possible) could be a so called "fund financing" or "project based emissions trading", which is an approach where instead of following complicated JI rules and transfer of ERUs the adequate amount of AAUs is sold on the basis of Article 17 emissions trading and the revenue is used to financially support projects delivering emission reductions. If the host country has a necessary institutional structures for such a purpose (which is in case of Czech Republic a State Environmental Fund for example, which is currently supporting projects in various areas by grants or soft loans), it could help to solve a number of problems, including support of small scale projects, because they would not have to be considered at once as a uniform portfolio. This option is going to be seriously discussed in near future in Czech Republic.

6 EU emissions trading – a challenge?

Emissions trading represent an economic instrument, which is often supported by economists as being the cost effective approach in reaching the given target. In the Czech Republic there is no (aside of a few theoretical studies) experience with emissions trading yet, which can be one of the reasons for reserved position of some businesses and population.

From this point of view the approach the EU has taken by preparation of the EU wide emissions trading on the level of companies (installations) represents a real challenge for not only the current member states, but for accession countries of course as well. However, the position of EU emissions trading within the environmental policy is not easy.

The first key point is the current position of the Czech Republic in greenhouse gasses emissions. This point was already discussed above, but actually represents a background on which all discussions about the EU directive will be made. It is necessary to understand that position of current EU member states is different from the position of the most of the accession countries (including the Czech Republic). In the EU the level of emissions that has to be achieved was already agreed and there is a consensus on this target. Then it is understandable that the governments are searching for instruments for reaching this target. They prepare complex Climate Change policies, combine various instruments and even if they are facing both practical and political problems in its enforcement, there is a kind of understanding that target should be reached.

Emission surplus – an issue for consideration?

As was described above, this is not the case of country with emissions surplus. The only consensus already agreed is in case of Czech Republic the Kyoto target and national target, which are both already, met and will probably be not threaten. To achieve consensus on additional target, such as relative target (as described at the beginning) is extremely difficult, especially if country is facing such a difficult stage such as EU entry. The EU emissions trading has thus a more complicated position then in current member states, because was designed to achieve a certain target. It does not solve the situation when the target is already met (from the economic point of view there is no scarcity). The natural question of the corporate representative will be why he should be interested in entering such a scheme if he does not need to reduce the emissions and in case he has (he gets a target below his current emissions), why (if the country is already in compliance).

This means that introduction of EU trading scheme should be supported by some logical arguments other than that it has to be implemented anyway because it is a part of the EU legislation. The crucial point here is that the EU proposal does not allow the distribution of the emission surplus down to individual installations (over-allocation), because it does face problems with strict state aid rules. So even if companies would probably welcome this option (in fact the reduction of emissions was caused by a decrease of their production), they will be allowed to be allocated up to the amount needed or including some expected growth.

Another complication in understanding the scheme is that it is necessary to differentiate between Kyoto flexible mechanisms and EU emissions trading (the EU scheme is from this point of view a domestic instrument) – for a non-experienced audience there is a lot of misunderstanding and misinterpretation and at the end it all represents a kind of nonsense.

The Ministry of environment was aware about the EU directive and tried to follow its development, but as only an accession country was not able to influence its preparation. At the finalization of the directive there is a little space for presenting comments, but as the directive is now almost ready (discussed in European Parliament) this represents more less a formal rule. The positive thing was that some experts of accession countries were already involved in some European Commission working groups on climate change issues, and participation of a Czech expert proved to be very valuable for discussions in Czech Republic and defining our position.

Position of the industry

The key factor will be a position of the industry. As was already mentioned above, their position will be depending on how advantageous the scheme will be for them. Their reserved position might be based on the doubts whether the emissions trading does not represent another "hidden" instrument for regulation.

The often-presented reason for interest of firms from accession countries in participation in the EU scheme is that their abatement costs are below the EU level and so they can reduce emissions and sell the reductions. This is a logical argument, but is based on several assumptions. The first is that abatement costs are lower than in the EU, which is probably true, but as there are no data available, it is difficult to estimate the difference. The important factor will be of course a price.

The positive factor is that no need to reduce emissions at the moment could be an advantage in terms of testing the trading. As this instrument was never used in Czech Republic before, there is no experience of installations of taking the responsibility for developing strategies of emissions reduction with a possibility to buy or sell emissions on the market. Entering the EU scheme in the early stage could, together with the incentive based on the difference of abatement costs, help firms to get used this instrument, communicate with the firms or market intermediaries and develop strategies for optimalization of abatement costs. This is the advantage the EU firms do not have – they will be required to reduce emissions from the very beginning.

For the Ministry of environment this approach represents a potential way how to get industry interested in entering the scheme and supports rather the cooperation than opposition. For such a purpose the Ministry of environment established an emissions trading group consisting mainly of corporate representatives, where the implementation of the directive will be discussed in much detailed manner. This discussion is trying to reach two targets – firstly to communicate with firms during the implementation phase and cooperate with them on solving factual problems and secondly to become informed about their reservations or comments which then can be used for defining governmental position and can be even used with discussions with the European Commission. The same intensification of the discussion will be needed in case of other relevant ministries or stakeholders. The series of workshops and information sources is planned for such purpose.

Implementation of the scheme

Once the political agreement is achieved, or more probably in parallel, the factual problems connected with implementation will have to be solved. Agreement on the philosophy of the trading is one side of the coin, practical implementation the other. Similarly to current member states the Czech Republic will have to solve issues such as administrative and institutional arrangement of the trading, data quality and availability, legal matters, position of the trading among other instruments, allocation etc. Here the problem can appear due to limited time for such amount of potential problems to be solved. Following the description of the general situation, the accession countries (the Czech Republic is no difference) allocate a limited number of resources for such works, so instead of whole teams working on climate change and emissions trading in some EU member states these issues are here under the responsibility of one or two people. This is another explanation of a slow progress in this field.

On the other hand it has to be said that number of issues has been already at least touched within the research made so far. In the Czech Republic one of the advantages is that there is already a relatively detailed system of monitoring of individual installations in place. It was introduced for a different purpose than greenhouse gasses (classical pollutants, fuel statistics), but information about greenhouse gasses data can be derived from the data. The Czech Republic has recently conducted a study focused on issue of registries and within this study went bit beyond its initial scope and discussed potential improvements in data collection to make them more consistent and reliable for climate change purposes. Some other findings can be derived from a study made for OECD in 2001, which focused on domestic emissions trading with greenhouse gasses. It is expected that other studies, also together with assistance from other countries, will be covering various issues of the scheme so they support the government in its implementation. The representatives of the Ministry of environment are also in a closer contact with partners from other countries, such as Germany, Austria or the UK, and are sharing the experience. This cooperation proved to be very helpful in number of areas.

References / Documents / Links

Energy Sector Overview – Czech Republic, background material for Renewable Energy and Energy Efficiency Partnership (REEEP), Regional Environmental Centre (REC), Szentendre, 2003.

State Program to Support Energy Savings and the Use of Renewable Energy Sources, Prague 2002.

The Energy Act, Prague, 2001.

Third National Communication of the Czech Republic to the UNFCCC, Prague, 2001.

State Environmental Policy, Prague, 2001.

Chmelík, T.: Obchodovatelná emisní povolení – východiska možností využití pro snižování emisí skleníkových plynů v rámci Evropské unie (Tradeable Emission Permits – Perspectives of its Use for Reduction of Greenhouse Gasses Emissions in the EU). In: Environmentální ekonomie, politika a vnější vztahy České republiky, Sborník příspěvků semináře doktorandských studentů „u kulatého stolu“, (Environmental economy, policy and external relations of the Czech Republic, publication of papers from workshop of Ph.D. students) University of Economics, Prague, 2001.

Chmelík, T.: Prospects for emissions trading – the case of the Czech Republic. In: 3rd annual Emissions Trading conference proceedings, Euromoney Energy Events, London, 2003.

Chmelík, T.: Rules and priorities for Joint Implementation Projects in the Czech Republic. In: EEBW (Energy Efficiency Business Week) conference proceedings, SEVEn, Prague 2002.

Jílková, J.: Daně, dotace a obchodovatelná povolení – nástroje ochrany ovzduší a klimatu (Taxes, subsidies and tradeable permits – instruments of air and climate protection), IREAS, Prague, 2003.

Country Report: Estonia

Dr. Tiit Kallaste
Estonian Institute for Sustainable Development, SEI-Tallinn

Dr. Villu Vares
Estonian Energy Research Institute at Tallinn Technical University

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

Nowadays Estonian energy strategy and policy is based on the following documents:

- *Sustainable Development Act*;
- *The Estonian National Environmental Strategy;*
- *National Environmental Action Plan (NEAP)*, approved by the Government in May 1998; the NEAP for 2001 - 2003 was approved in 2001;
- *National Program on Reduction of Pollutant Emissions from Large Combustion Plants* (for 1999 -2003);
- *The Long-term National Development Plan for the Fuel and Energy Sector*, adopted by the Parliament in 1998, updating is ongoing;
- *Energy Conservation Target Program*, adopted by the Government in 2000;
- *Implementation Plan for the Energy Conservation Target Program*, adopted by the Government in 2001;
- *Development Plan for Housing Sector* (2003-2008);
- *Act on State Program on Greenhouse Gases Emission Reduction for the years 2003-2012*. (in Parliament)

Sustainable Development Act sets the most general principles for sustainable development and therefore forms the basis for formulation of national and regional policies and programs also in energy sector.

The Estonian National Environmental Strategy, approved by the Parliament already in 1997, is the basic document for the policy-making process in the field of environment. The strategy envisages, among other priorities, the following goals:

- to reduce the environmental impact of the energy sector;
- to direct energy policies towards energy efficiency technology development programs;
- more extensive use of renewable energy resources and reduction of greenhouse gas emissions.

In the *National Environmental Action Plan (NEAP)*, adopted by the Government in May 1998, there are defined concrete conceptual, legislation, organizational, educational, training and also investment measures for reaching the objectives set in the *National Environmental Strategy*. To take into account changes in Estonian economy and to specify the needed actions, the *Ministry of Environment* organized the revision and updating of the first NEAP. As an outcome of this process, the NEAP for 2001 - 2003 was prepared. In June 2001 the document was approved by the Government. The implementation process of the NEAP is in progress.

In July 2000, the Government issued an order approving the *National Program on Reduction of Pollutant Emissions from Large Combustion Plants (for 1999 - 2003)*, which is approximating the *EU Directive 88/609/EEC*. According to the Program emissions of pollutants from large combustion plants should be reduced substantially each year.

At present, for updating the energy policy goals of Estonia, the *Ministry of Economic Affairs and Communications* has started the process of drafting new *Long-term Development Plan of the Energy and Fuel Sector*. The draft plan was presented to the Government in the first half of 2003.

Regarding the direct strategy documents on energy efficiency, in January 2000 the *Energy Conservation Target Program* was adopted by the Government. The Program had the following general objectives:

- ensuring the security of supply for the end-user at an optimum price of energy;
- decreasing environmental impacts;
- harmonizing the economic development and reduction of regional differences.

Implementation Plan was followed after the *Energy Conservation Target Program (IPECTP)*. In March 2001 the implementation plan was approved by the Government. Both the program and the implementation plan cover the period 2001-2005. Among concrete objectives targeted to energy efficiency, there is a provision ensuring the decrease of the emission of carbon dioxide by 8% as compared with the year

1990, i.e. according to the Kyoto Protocol, by increasing the efficiency of energy production and transportation by using environmentally friendly fuels and by reducing energy consumption in all sectors and households.

Implementation Plan for the Energy Conservation Target Program includes ten projects for increasing the energy efficiency. The main attention is just now paid to the following projects.

- Development and implementation of program on economically viable exploitation of biological fuels, other renewable energy sources and peat in energy production.
- Development of methods for energy certification of buildings.
- Development of methods for conducting energy audits in industrial enterprises.
- Analysis of methods of measurement of energy consumption and their link with energy consumption and consumer behavior.
- Training on energy saving.

In February 2003 the *Development Plan for Housing Sector (2003-2008)* was approved by the Government. If compared to the previous similar strategy document, the *Development Plan for Housing Sector up to 2010*, the newer document provides more detailed plans for state policy in the field of national housing policy, concentrating on combining of state support with market forces in this field. Regrettably, the issues of energy performance of buildings are not considered in these documents.

Conclusions on strategy documents

Energy conservation policy in Estonia has had different targets during last decade. In the beginning of 1990'ies the main emphasize has been on more efficient use of fuels and conversion from imported fuels to indigenous ones, mainly to biomass and peat. During the next provisional period the main attention has been on increasing of efficiency in heat production and distribution processes. During last couple of years the efficient end-use of energy has been gradually more and more prioritized.

Climate change issues are under the consideration together with energy conservation and efficient energy use issues in the *State Program on Greenhouse Gases Emission Reduction for the years 2003-2012.* A comprehensive set of detailed measures, majority of which are addressed within energy sector, has been worked out in the Climate Program. The implementation is foreseen in close connection with the Kyoto Protocol objectives.

2 Best practice policies and measures yielding ancillary socio-economic benefits

EU policy on energy efficiency in buildings and corresponding plans and activities in Estonia

The recent policy developments in Estonia have been concentrated on accession to the EU and the requirements this brings about for the energy sector. The approximation of EU legislation in all fields is in its very final phase. In the end of July 2002, the energy chapter of accession negotiations was provisionally closed.

Regarding to direct issues of energy efficiency, on 27 August 2002 the Government approved *Memorandum of Understanding* to participate in the Community program SAVE for the year 2002 and furthermore.

From the year 2003 Estonia accelerates the harmonization process with EU directives in energy efficiency field. As Estonia already fulfils main requirements of the SAVE directive, much more attention has to be directed to the requirements of directive on energy performance of buildings, particularly:

- setting up the energy performance requirements and the general framework for calculation methodology of energy performance of buildings;
- the application of minimum requirements on the energy performance of new buildings and of large existing buildings that are subject to major renovation;
- energy certification of buildings;
- ensuring qualified and/or accredited experts to carry out the energy audits.

As to energy performance calculations for buildings, there has been prepared the voluntary *Standard of Republic of Estonia Calculation of Energy Use for Buildings (EVS 829:2003)*.

Table 1: The upper limit for thermal losses (U-values), W/(m² ◇ ºC)

Building element	Requirements				
	Estonia, before 1999	Estonia, after 1999	Latvia	Sweden	Finland
Walls	0.28	0.16-0.2	0.5	0.22	0.28
Roofs	0.22	0.16	0.5	0.2	0.22
Windows	2.1	1.9	2.4	1.85	1.5

The table above shows a comparison between the heat performance requirements for new buildings in Estonia (constructed before 1999 and after 1999) and compared with the similar values in Latvia, Sweden and Finland.

The table shows that the heat performance values in Estonia for new buildings are at the same level as the Nordic countries (Sweden and Finland), and Estonia has considerable stronger values than in Latvia. On the other hand the heat performance values are voluntary in Estonia in contradiction to Latvia and the Nordic countries, which have mandatory requirements.

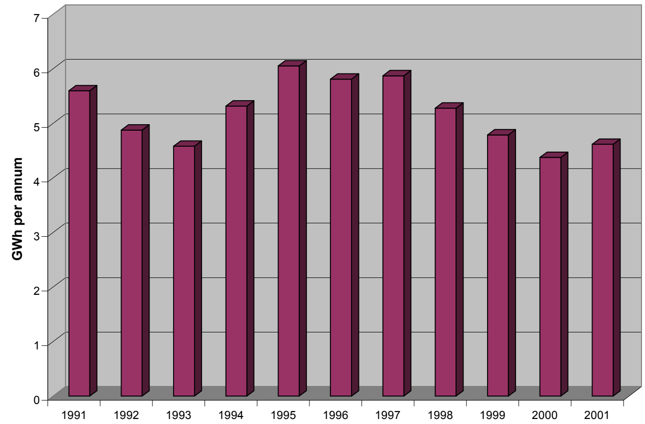
In Estonia, there are no obligations for the building owner to make energy audits, and an available database on real energy consumption of buildings doesn't exist. In spite of this, a lot of energy audits have been carried out as well in public (mainly municipal) and residential buildings.

Data on total heat consumption in residential and public buildings are available from official energy statistics (see figure 1). From the middle of nineties a number of residential buildings have been renovated for reduction of heating bills, and as a result to these activities, energy consumption in households has a strong tendency to decrease from the year 1998 (data are not corrected by annual degree days). Specific energy consumption in renovated multi family residential buildings has been significantly reduced and a typical value is now about 230-270 kWh/m^2 per year.

Estonian *Ministry of Economic Affairs and Communication (MoEAC)* has been initiated some projects to introduce requirements of EU directive on energy performance building and to prepare measures for implementation of them.

Estonian Energy Research Institute (OPET Estonia) in co-operation with MoEAC has to disseminate information on EU directive of energy performance of buildings and specify the main new duties for local municipalities, for building owners, construction companies and state institutions according to the directive requirements.

Figure 1: Heat consumption in households and public buildings



Development of methodology for energy audits, preparation of forms for building certificates, and ensuring qualified and/or accredited experts to carry out the energy audits are the main issues of Danish-Estonian Sector-Integrated Environmental Co-operation Program in the Field of Energy. In frame of the co-operation project 28 energy auditors has been educated. During the training session of auditors 10 test audits have been carried out. The project was financed by Danish Energy Authority.

In 2003 *Tallinn City Government* and *Tallinn Technical University* included new chapters into their co-operation program:

- preparation of energy certificates for municipality buildings
- setting up municipal database on energy consumption in municipal buildings and
- pilot energy audits in some municipal buildings.

In 2001 *Axovaatio OY/AX* (Finland) together with OPET Estonia prepared and published a brochure (63 pages) *Energy Audit Guide for Building*. In 2002 also a smaller booklet (4 pages) was published. Both publications are available in Estonian, Russian and English languages. The publication was financed by *Finnish Ministry of Environment*.

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

Governmental institutions

The day-to-day work in the field of climate change and abatement of GHG emissions is concentrated into two ministries[1], *The Ministry of Environment (MoE)* and The *Ministry of Economic Affairs and Communication*[2] *(MoEAC).* In the jurisdiction of the Ministry of Environment there is the *Estonian Institute of Meteorology and Hydrology* what is straightforwardly engaged in long-term climate monitoring. It has the permanent representative, who participates in the work of World Meteorological Organization and also in the work of Intergovernmental Panel of Climate Change. This links the work carried out in Estonia with the international climate related institutions and vice versa. Estonia will get a straight feedback from those authorities. *The Euro-integration Bureau in the Ministry of Foreign Affairs* is eventually involved to climate change related seminars and workshops, however, this is not continuous and regular.

The Ministry of Environment

For the development and implementation of climate policy in Estonia a Governmental Climate Committee was established in the Ministry of Environment in January 1995 which took it upon itself to consider greenhouse gases (GHG) emission reduction strategies and mechanisms for compliance with international requirements fixed by the UN FCCC and its Kyoto Protocol. The major task of the Committee was to prepare the national plans based on the UN FCCC directives and support the government to achieve the main targets set by climate programs. Committee is responsible for all work in the field of climate change mitigation domestically and internationally. The Committee nevertheless lacked an efficient working institution such as a Secretariat on JI implementation or a JI Project Preparation Facility, or any kind of a Steering Committee. Consequently, up to present time the Government is lacking the appropriate system of identification and verification of future Joint Implementation activities. The Ministry of Environment is the Designated Local Focal Point of UN FCCC and also for most of the international co-operation (except of BASREC Ad Hoc Group on Climate change) in the field of international climate cooperation.

For the time being the committee's responsibilities have been transferred to several other entities in the Ministry of the Environment, e.g. The Department of Foreign relations, also the Department of Environmental Management and -Technology.

The person responsible for reporting of AIJ project's results, has been designated at the end of 1990ies in this department. The main function of the post is to keep the records on AIJ and JI projects, which are currently in process, also to help the future JI projects to be selected out, verified and launched. This person (unit) is responsible for the yearly reporting on the GHG emission reduction as a result of AIJ projects to UN FCCC Secretariat. Still, the data processing is requested from the consultant.

As the Department of Environmental Management and Technology deals with the practical issues of all the aspects related with atmospheric environment, the AIJ and JI projects have been decided to place under the jurisdiction of this particular department. This unit is identified, also as a Designated Local Focal Point under the jurisdiction of the MoE. It works towards the fulfillment of Estonia's commitments concerning GHG emission reduction according to Kyoto Protocol requirements. The responsibility of Estonia as an Annex I party is also compiling regularly the National Communications under the UN Framework Convention on Climate Change. Up to present time Estonia has prepared and handled to UN FCCC Secretariat in Bonn three communications, the last – Third National Communication was prepared in November 2001. The Ministry of Environment is responsible for the coordination, compilation and publishing of this work.

The responsibility of the ministry is also keeping track on all international events like climate meetings, Conferences of Parties (COP) and technical sessions (SBSTA's), also representing country in the OECD Environmental Directorate in Annex I Expert Group meetings and workshops. The building up bilateral co-operation agreements also belongs to the duties of the Ministry of Environment. The Memorandum of Understanding is one out of many ways and forms to launch closer international climate change mitigation co-operation. Several MoU-s are in the process of preparation at present time. The most recent MoU was signed with the Government of The Netherlands on the 9th of Sept 2003.

---

1 In other ministries like, for example, the Ministry of Agriculture, there is an advisor in the field of environmental protection. His responsibility is to hold all the issues related to climate change issues as well. The Estonian practice is the advisors are participating in the governmental officials oriented activities like conferences and workshops on climate change to build up the capacity.

2 The Ministry of Economic Affairs and Ministry of Transportation and Communication were merged in 2002.

The Ministry of Economic Affairs and Communication

The Energy Policy Department within the Ministry of Economic Affairs and Communication (MoEAC) is responsible for energy and climate co-operation policy issues, including energy efficiency and thus, indirectly the reduction of GHG emissions. Measures to reduce CO_2 emissions by improving energy efficiency and to use wider renewable energy sources fall under the newly adopted (1.07.2003) Electricity Market Act in Estonia[1]. Energy Conservation Division within the MoEAC was established for coordinating the conservation of energy and the environmental protection in Estonia.

All the state level important strategic issues in the field of energy production and consumption are thus in the competence of the MoEAC. This concerns the large-scale heat and power production, which actually pose the biggest problems as for GHG emission. Also, the local level energy planning is coordinated by the same institution. The Energy Department manages the Energy Conservation Fund, which is an important institution in implementing the governmental policy in the field of energy efficiency and related climate issues. The Fund is used for financing of general studies on energy efficiency, also for financing of some small-scale pilot projects in energy saving. Still, financial resources of the Fund are rather limited.

There is recently established a special institutional unit in MoEAC dealing in direct way with climate issues related to energy – The Renewable Energy Division, which is a part of the Energy Policy Department. One of the major tasks in the division is the promotion of renewable energy based projects and to add the climate mitigation dimension to them. Also, the current work in the frame of Baltic Sea Region Energy Cooperation (BASREC) is in the sphere of responsibility of the Renewable Energy Division. The head of the division represents the MoEAC in the BASREC Ad Hoc Group on Climate Change.

The responsibility of the Renewable Energy Division is also the practical implementation of Kyoto Protocol and in particular the two major flexible mechanisms for GHG emission mitigation - *Joint Implementation and Emissions Trading*. The division performs those responsibilities in close co-operation with the Department of Environmental Management and Technology of the Ministry of Environment. There has been certain type of distribution of responsibilities in the field of climate change mitigation. IN particular, The MoE is more declined towards the international climate co-operation to participate in the UN FCCC meetings, COPs, SBSTA meetings, etc., to prepare international juridical texts and agreements, like Memorandum of Understanding etc. The MoEAC responsibilities are more towards the practical implementation of climate change projects via energy projects. It, still, have a strong component of international co-operation, in particular in the Baltic Sea Region Energy Cooperation.

Joint Implementation and AIJ issues

Joint Implementation is defined as the least cost GHG reduction activities between Parties to Convention in Annex I (those are the countries with GHG emission reduction targets).[2] There will be therefore the buyer country that has high emission reduction costs and a seller country, where the costs of reducing emissions is low. In so-doing the buyer country receive credits which may contribute to compliance with their targets. The concept of Joint Implementation has been incorporated into the Kyoto Protocol of the UN FCCC. In principle, it is argued, this should allow for greater cost-efficiency in meeting global targets, since abatement action can taken first, where it is least costly to do so.

To give a **definition of JI on the state level**, it could be the following. *Joint Implementation on state level means that a country (the investor country) where the costs of reducing GHG are assumed to be high, invests in emission-reducing measures in a country with lower reduction costs (the host country) and is credited, in whole or in part, for emission reductions in its own GHG accounts.* In principle, agreements on JI are a matter for the individual countries disturbed.

To **define JI on a company level** means, that companies may also be involved in finding JI projects or being responsible for transfers of technology, or as independent parties. *Companies are required to reduce emissions or pay taxes on emissions of GHG at home, but may be exempt from taxes if the company instead carries out emission-reducing measures in other countries. Companies will then be allowed to increase emissions at home provided that they reduce emissions in countries and regions where similar measures are less expensive. This* is called **the project level Joint Implementation.**

[1] It foresees the feed-in tariffs for electricity produced on the basis of wind, biomass, landfill biogas and hydro-energy. The tariff's rate is unfortunately tied to production cost of oil-shale based electricity via coefficient 1.80, which does not create any significant incentive for RES based power generation.

[2] Article 12 defines a CDM under which countries with targets (Annex I) may receive credits for funding JI projects which take place in countries without targets (known as non-Annex I countries).

There is also an option to use a wider definition of Joint Implementation. It may cover more general co-operation between two or more countries on measures to reduce GHG emissions where the costs are the lowest. In this type of JI it is not necessary to measure the effects of individual projects, but on national level. Possible measures to avoid GHG emissions might include support for institutional development, implementing economic reforms, apply financial instruments, etc. At the First Conference of Parties COP 1 in Berlin in 1995 the Parties decided to launch the pilot phase of Joint Implementation as the political and institutional situation among the parties to convention was not ready to practical implementation of accreditation of emission reductions between countries. The goals of such pilot phase projects are primarily; to the first, to gain experience of how trans-national measures and projects can gradually contribute towards effective reductions in total emissions and, second, to start building institutions and gaining the necessary experience to establish a framework for international co-operation in this field. *The pilot phase of Joint Implementation was titled Activities Implemented Jointly (AIJ) to differentiate it from the JI.* During AIJ no emission reduction accreditation, which is the main element of JI, was foreseen during the pilot (preparatory) phase.

The Joint Implementation pilot phase (AIJ)

Thanks to good geopolitical location Estonia has historically close relations to Finland and Sweden, many cultural, business, science etc. contacts were established in the beginning of 1990ies and particularly, shortly after regaining of Estonia's political independency in August 1991. Many activities in the energy sector with the neighboring Nordic countries, particularly with Sweden, started in the form of co-operation projects to mitigate GHG emissions through common energy conservation and energy efficiency projects shortly after the Rio Conference in 1992.

Sweden has been a pioneer with its *Environmentally Adapted Energy Systems* (EAES) Program among the parties to the UN FCCC in implementing a rather impressive number of AIJ projects in Baltic States, Poland and Russia as early as 1993. The Swedish Government initiated this program aimed at mitigating climate change through improvement of the energy systems in the form of energy efficiency measures and increased use of renewable energy sources. The EAES program was actually one of the very first state level programs aimed at the rapid and efficient implementation of the UN FCCC in the world. The EAES Program was designed to be in line with the AIJ criteria agreed upon at the first Conference of the Parties in Berlin in April 1995.

Estonia has participated in the Swedish agency NUTEK AIJ pilot projects from the very start. The program was financed by special allowances from the Swedish state budget. The total program budget over the period 1993–1997 was 295 million SEK, which is around 42 million US dollars, of which 230 million SEK or ~78% have been used to finance favorable investment loans and the rest has been used for consultancy in the whole region. These significant funds were allocated to develop various types of energy projects leading to cutting GHG emissions in above mentioned five countries with economies in transition. In 1998, the governments of Estonia and Sweden agreed on mutual co-operation on monitoring, reporting to Climate Secretariat and verification of the results of these projects.

The general direction of the EAES program laid down from the start comprises the following categories of projects:

- Conversion of heat production plants from fossil fuels to the local bio-fuels;
- Energy conservation in district heating systems;
- Energy efficiency in the end-use in buildings;
- Comprehensive projects, which combined all three above mentioned projects.

Objectives of first AIJ projects

For the first wave of AIJ projects certain objectives were set. They could be listed as the following: To

- limit the emissions of GHG to atmosphere in a most cost-effective way;
- provide loans to the AIJ projects at the local level for increasing the efficiency in production, distribution and consumption of preferably renewable energy for heating and power generation[1];
- facilitate a transformation to an ecologically sustainable energy system subject to the condition of the Climate Convention;
- build up climate related capacity at local, also at governmental level;
- contribute to realization of cost-effective climate measures by increased use of renewable energy sources both in heat and electricity production, also to decrease energy losses at distribution grids;

[1] The loan conditions are set extremely favourable for the host country enterprises or municipalities; the loans are long term with the payback period up to 10 years.

- change to more energy saving consumption patterns;
- develop experience of Joint Implementation so that the most important Kyoto flexible mechanism for Estonia can become an efficient tool in donor/host country international climate co-operation;
- develop a network for energy and climate co-operation in the Baltic Sea region based on Kyoto Protocol target for reduction of GHG emissions;
- contribute to increased awareness and knowledge in energy and climate field, aimed on decreasing the fossil fuel use;
- support socially, economically and environmentally sustainable transformation and development by increased efficiency in production, distribution and consumption of heat and electricity;
  initiate business co-operation between donor and host countries companies and municipalities.

In conclusion it could be said that majority of above mentioned objectives were succeeded. Special attention has been paid to capacity building at various levels in whole society. Publications, training sessions at county level, also at the governmental level has been successful. This all makes Estonian experience very valuable for further implementation of Joint Implementation projects.

4 Making the Kyoto mechanisms work: Challenges ahead

The management and coordination of the climate change work in the country still needs further strong improvement. In the frame of Estonian Climate program for years 2003-2012 the initiating of the central coordinating climate institution - Climate Secretariat, responsible for UN FCCC and Kyoto protocol implementation, is foreseen. The Climate Secretariat will be built up on the basis of at least four governmental institutions; the Ministry of Environment, the Ministry of Economic Affairs and Transportation, the Ministry of Foreign Affairs and the Euro-integration Bureau. The Secretariat will have the Expert Commission on implementation of UN FCCC and Kyoto Protocol - Joint Implementation and Emissions Trading, based on scientists, experts and consultants to assist the Secretariat in methodological, also in pragmatic issues related to implementation of Kyoto flexible mechanisms. The Commission has been adopted by government and started appropriate preparations already. The informal Interministerial Joint Implementation Steering Committee based on SEI-Tallinn has prepared the ground for The Climate Secretariat since 2000. It has introduced the closer cooperation between above mentioned governmental institutions and elaborated towards capacity building at the ministerial level, also building up the contacts between relevant ministries, entrepreneurs and international Joint Implementation programs like BASREC, ERUPT and PCF.

Estonia qualifies to the group of Annex I countries to UN FCCC, which means country has fixed its GHG emission reduction to the first commitment period, 2008–2012. Since the joining Kyoto Protocol the implementation of two relevant Kyoto flexible mechanisms – Joint Implementation and Emissions Trading foreseen in the protocol have been in the focus of the Ministry of the Environment and Ministry of Economic Affairs, Transportation and Communication. In the context of Joint Implementation Estonia is qualified to so called *host or recipient countries* as the country is currently in transition from centrally planned to market economy. Estonia belongs to the first group of countries planning to Join European Union, it may happen very probably in May 2004.

As for further plans Estonia is actively preparing to next Joint Implementation projects. The appropriate MoU with Finland is signed on the 17.12.2003 and the first two projects in the category of conversion of heat production plants from fossil fuels to the local bio-fuels have launched. The wind farm on Pakri peninsula is in the pipe-line.

Also Sweden has launched a Call for proposals for next Joint Implementation projects in summer 2003. Danish Energy Agency and Danish Environmental Agency have prepared ground for first JI projects in Estonia. Relevant studies have performed during 2002 and 2003. The MoU is under the preparation. The Netherlands governmental agency SENTER has keen interest towards cooperation via ERUPT program, the first contacts to introduce bilateral cooperation were initiated in 2000, in 2002 the first JI project - wind farm, was proposed to ERUPT by local developer. Further intensive cooperation is foreseen with The Netherlands.

To conclude, the long experience in cooperation with Nordic countries in the field of Joint Implementation has now shown the practical results. For the host country significant advantages are evident; most modern technology transfer, improvement of environmental and political aspects, new jobs created, mutually beneficial business and trade contacts enlivenment developed.

Emission Trading

The Estonian Government via the MoE and MoEAC is currently involved in active preparation of using the another flexible mechanism under the Kyoto Protocol - Emission Trading (ET). The EU Emission Trading Directive has been introduced to various levels of decision-makers. Estonia was included to the list of eight accession countries to pass the capacity building seminars performed by Centre for Clean Air Policy and Estonian Institute for Sustainable Development, SEI-Tallinn. There has been keen interest shown up by entrepreneurs and developers of renewable energy projects in Estonia. Further the MoE is focusing on practicalities related to practical implementation of new EU Emission Trading Scheme – the development of a National Allocation Plan and the GHG Emission Registry. The time-schedule for preparations to implement a new directive is very challenging, however, Estonia has a big potential as a seller of GHG tons due to power generation sector which is based in approximately 90% on extremely dirty (in the sense of CO_2, also dust and sulfur dioxide, heavy metals, etc.) emissions.

The International Energy Agency has performed the practical hands-on simulation in 2002 in Estonia, where the biggest actor in GHG emission, AS Eesti Energia (power utility company), took part in practicing realization of trading based on company's real data.

The list of interested enterprises, both private and state owned, have been compiled, the further capacity building is foreseen under several programs.

References / Documents / Links

Energy Conservation Target Program, adopted by the Government in 2000

Implementation Plan for the Energy Conservation Target Program, adopted by the Government in 2001

Development Plan for Housing Sector, adopted by Parliament in 2003

Council directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE)

Directive 2002/91/EC of the European Parliament and the Council of 16 December 2002 on the energy performance of buildings

Standard of Republic of Estonia: Calculation of energy use for buildings (EVS 829:2003).

EU SAVE Estonia (J. nr. 2136/00053-0009 and 2136/01053-0014). Progress Report, 2003. Rambøll (Denmark)

Joint Implementation as a Measure to Curb Climate Change – Nordic perspectives and priorities. TemaNord 1995:534. 98 p. Appendixes.

Kallaste, T. Joint Implementation Pilot Phase in Estonia. In: *Capacity for Climate Protection in Central and Eastern Europe. Activities Implemented Jointly (AIJ).* The Regional Environmental Center for Central and Eastern Europe, World Resources Institute. Szentendre, Hungary. June 2000. pp.21-31.

K.Begg, T.Kallaste, K.Leutgöb. Case study projects. Chpt.5. In: *Flexibility in Climate Policy. Making the Kyoto Mechanisms work.* Tim Jackson, Katie Begg, Stuart Parkinson (eds.). Earthscan Publications Ltd, London and Sterlin, VA. 2001. 237p.

Kallaste. T. (2001). Eesti kui ÜRO kliimamuutuste konventsiooni liikmesriik. Säästva Eesti Instituut. Tallinn, 119 lk. In Estonian. (Estonia as a Party to UN FCCC, SEI-Tallinn, Tallinn. 119pp).

K.Begg, G.Haq, M.Chadwick, T.Kallaste.Implementing Environmental Considerations for Joint Implementation and the Clean Development Mechanism. *Journal of Environmental Assessment Policy and Management.* Vol.3, No.1 (March 2001) pp.1-33.

Kallaste, T. (ed), (2002). Pakri Peninsula Wind Farm as a climate change mitigation pilot project in the frame of Joint Implementation. The Japanese Ministry of Environment, Overseas Environmental Cooperation Centre. Project report, soft-bound copy at SEI-Tallinn. SEI-Tallinn, 152p.

Kallaste, T. (ed), (2002). Co-generation of heat and power based on landfill gas capturing at Tallinn landfill. Project report to the Ministry of Environment, The Centre for Environmental Investments. Soft-bound copy at SEI-Tallinn. SEI-Tallinn. 106p.

Country Report: Georgia

Paata Janelidze
National Agency on Climate Change with the Ministry of Environment and Natural Resources Protection

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

Improvement of Energy Efficiency and increase of utilization of Renewable Energy in Georgia have great importance for development of National Economy and Climate Change Mitigation as well that is conditioned by the following factors:

- Energy imports bear heavily on the economy;
- Ineffective spending of energy resources still takes place, resulting from the improper use of energy saving technologies;
- Georgia has abundant renewable energy sources.

In spite of the fact that the words “improving of energy efficiency” are found nearly in every document but the mechanism of their implementation is not defined anywhere. It is said in recently adopted Economy Development and Poverty Reduction Program of Georgia that “The country’s dependence on energy imports especially in winter has safety issues attached. As a consequence it is necessary: to exercise an efficient approach to reduce electricity costs – introduction of energy saving technologies; to utilize renewable energy sources (bio gas, small power stations, wind, thermal water, solar energy). But in Georgia as in many other countries, there is a disparity, in which the measures and technologies promoted at the general policy level are not necessarily implemented in practice. For today the legislative framework for a positive resolution of these issues does not exist.

Completed, ongoing and planned projects aimed at Renewable Energy development are implemented mainly under international / bilateral assistance. Among them the KfW and GEF financed project ‘‘Georgia – Promoting the Use of Renewable Energy Resources for Local Energy Supply” should be mentioned, the start-up of which is expected by the end of 2003.

The objective of the project is to remove the key barriers to the increased utilization of local renewable energy resources. The initial focus will be on promoting the use of geothermal resources for heating and hot water supply and the use of small hydropower for local electricity production. After successful implementation of the first demonstration projects in these sectors, other renewable energy sources can also be incorporated. In addition, the activities are designed to be replicated in a regional context for countries in the Caucasus and in the broader CIS region.

The total costs of the proposed project were estimated at USD 12.85 million, of which the GEF is requested to cover the incremental costs of USD 4.3 million. Of this amount, USD 1.80 million is allocated for the technical assistance and USD 2.5 million for the establishment of a revolving Pilot Renewable Energy Fund and Credit Line managed by the KfW. This latter amount will be combined with the EURO 5.0 million donated by the Government of Germany to the Government of Georgia for the promotion of local renewable energy sources. The total amount of funds allocated for the establishment of the Pilot Renewable Energy Fund is therefore approximately USD 7.5 million, of which USD 0.5 million (out of the USD 2.5 million GEF contribution) will be reserved for the establishment and operational support of the Fund and USD 7 million for the actual capitalization of the Fund. Both the GEF and the German Government inputs to the Fund will be grants to the Government of Georgia, but with an obligation that the Government will continue to use the funds for supporting the renewable energy investments in Georgia on a revolving basis after the formal end of the project.

The total costs of the suggested first geothermal project have been estimated at USD 3.94 million, of which the Municipality of Tbilisi is expected to cover USD 1 million and the private sector some USD 0.4 million as an equity contribution to the project. The rest is proposed to be financed primarily by a soft loan (USD 2 million) through the Pilot Renewable Energy Fund. In addition, the GEF is requested to support the project with the grant estimated at USD 0.54 million to support the establishment of a metering and consumption based billing system. Supporting the establishment of a consumption based metering and billing system and the condominiums/home owner associations to facilitate heat and hot water supply contracts between the supplier and the consumers at the building level and sharing the costs of the first pilot project otherwise is also foreseen.

The total costs of the first 5-8 small hydropower projects have been estimated at USD 7 million, of which the local private sector equity contributions are foreseen to cover up to USD 2 million. The rest is proposed to be financed by a soft loan through the Pilot Renewable Energy Fund.

A specific working group will be created with an objective to develop and facilitate the adoption of a National Renewable Program to provide a coherent institutional, legal and regulatory framework for the long-term development of the Georgian renewable energy sector.

In addition to the social and environmental benefits resulting directly from the electricity, heat and/or hot water produced, the project is foreseen to have, among others, the following additional beneficiaries:

- Local small and medium size enterprises involved in renewable energy activities;
- Local population in the rural areas by the creation of new employment opportunities.

Another program is a four-year Georgia Energy Security Initiative (GESI) launched in March, 2003 by USAID. GESI consists of five main program components, including Credit Facility Development and Community Development Program. Credit Facility Development will explore and develop ways to provide financing to the private sector to spur energy project development to support business and economic development, including renewable energy, energy efficiency and other energy using technologies (e.g., a new industrial process). Community Development task endeavors to work with communities to develop energy alternatives and natural resource management practices that, in turn, will relieve pressure on forests and help stimulate economic growth. This task will examine various supply-side options for power generation in communities. Options to be considered include, but are not limited to: mini-hydro, biogas digesters, solar water heating, photovoltaic, small-scale wind energy, and geothermal.

Out of mentioned large programs there is a number of RE and EE projects implemented in specific sectors.

Under USAID funding PA Government Services – Georgia has already implemented the following projects:

- 20 kW micro hydropower plant in village Makho (Khelvachauri region, Ajara);
- 20 kW micro hydropower plant in village Sulori (Vani region, Imereti, western Georgia);
- 24 m^2 solar collectors in Bolnisi (southern Georgia);
- 150 kW mini hydropower plant in village Surebi (Guria, western Georgia).

There are no major biomass based energy production plants or bio-fuel production developments existing or foreseen in the nearest future. The only applications are 5-10 m^2 volume ambient temperature individual biogas installations built by farmers with the help of several enthusiasts from Bioenergia, Ltd, Konstruktori, Ltd. There are about 70 installations of this type already built.

In the framework of NATO Science for Piece Program the High Technology National Center of Georgia has developed an effective small-scale bio-energetic unit for the reprocessing of cattle breeding wastes, resulting in the production of biogas and electricity. Since 2000 seven units have been installed at small farms in different regions of Georgia. Biogas systems were constructed and successfully tested within the scope of the World Bank and USAID projects. In accordance with the Presidential decree # 878, 08.31.01 a plan has been developed for implementation and demonstration of 200 biogas plants in the mountainous regions of Georgia.

After successful implementation of the first units big interest have arisen. But the problem is that pilot units have been granted to the farmers and after completion of above mentioned projects there is no available funding for new candidates. Practically absence of supportive credit line for farmers makes development of biogas production problematic. Cooperation level between High Technology National Center, other companies active in this field and governmental structures is insufficient. Biogas program within the Ministry of Agriculture and Food is not developed yet, its adoption with corresponding budgetary funding will then need at least a year and implementation will start in 2005 earliest.

Recently the High Technology National Center of Georgia has got a financing from International Scientific-Technical Centre for the project "Development of Waste-less Biotechnological Cycle for Reprocessing of Municipal Solid Wastes" with power generation purposes.

2 Best practice policies and measures yielding ancillary socio-economic benefits

Residential sector represents a field with huge potential of energy efficiency improvement. Projects aimed at buildings renovation should demonstrate low-cost/no-cost simple energy efficiency measures for homes, community and municipal buildings. Unfortunately there are no operating energy utilities in this sector. Some private companies are installing heating systems for individual apartments and buildings. Some NGOs and among them Georgia Energy Brigades (GEB) provide advises, training and immediate relief for the population. GEB program involves the repair of doors and windows and weatherization with silicone strips to reduce heat losses and conserve energy in public buildings and low-income households. The GEB work hand in hand with local government and existing community, residents, environmental groups or local NGO already involved with the target populations, to ensure sustainability of the work once their own involvement is minimized or ended.

In 2003 GEB has implemented a project in a frame of community mobilization in East Georgia financed be Mercy Corps foundation. As a target group community of Internally Displaced Persons from Abkhazia had been chosen.

The project aimed to mobilize local community of IDPs' to solve jointly their own problems relating roofing and increasing energy efficiency of their dwellings themselves. Project also aimed to develop skills of community members in implementation of insulation and weatherization works; to make them familiar with energy efficiency and environmental issues. The community involves 18 Family, 72 persons (children, old and disable people included) and functioning kindergarten for orphanages (45 children and 16 persons of staff).

At the kick-off meeting the community members became familiar with aims, structure and budget of project and future plan of activities, task schedules and different responsibilities of community members. Then they were trained by experienced volunteers of GEB, after which they carried out all insulation works in their dwellings and in dwellings of disable community members as well.

During Implementation of the project, in a matter of mobilization of interested persons from other refugees' community and dissemination of leaflets amongst them the meeting at Ministry of Refugees and Placement was held. GEB informed representatives of other refugees' community on running project, energy efficiency issues and Georgian Energy Brigades programs, disseminated leaflets invited them to visit the building of renovated kindergarten to assess work implementation and get necessary skills.

With the purpose of widen dissemination information amongst refugees several meetings with "Assist Yourself" have been held. This NGO works on the matter of refugees' problems and issues monthly newspaper "Khidebi" (Bridges).

During project implementation GEB have established close relationship with different governmental organizations, private companies, NGOs that facilitated to awareness rising process among different stakeholders, among them Ministry of Refugees and Placement, Georgian Technical University, Municipality of Tbilisi - in decision on preparation for winter of municipal buildings to make consider insulation works, Ministry of Fuel and Energy etc.

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

Ministry of Environment and Natural Resources Protection is responsible for fulfillment Georgia's commitments to the UNFCCC and elaboration climate change policy as well. Ministry carries out day-to-day work through the National Agency on Climate Change (NACC).

First version of Climate Change Mitigation Policy was presented in the National Environmental Action Plan (NEAP), which was prepared under financial support of World Bank and adopted by the Presidential Decree #191 in 2000. Based on the results obtained during preparation of the Initial National Communication NEAP considers implementation of GHG mitigation policy and measures including:

- Improvement of energy efficiency in power generation, transmission and distribution and end use;
- Development of renewable energy sources;
- GHG abatement measures in transport sector;
- GHG abatement measures in industry.

Analyzing the first National Greenhouse Gas Inventory potential fields for climate change mitigation have been identified, mainly in energy sector, and a number of projects prepared by NACC under UNDP/GEF financing. Even though some of them had a significantly high internal rate of return, investors did not take them up. Non-economic project barriers – consisting of inadequate policies, institutions, legal framework, and lack of innovative and development oriented financial institutions, and human capacity were a major constraint to attracting foreign investment.

Mitigation projects based on biomass utilization including wastes are not developed at the necessary level, inter alia, due to the data gaps in Inventory. Started in June 2003 UNDP/GEF financed regional project "Capacity Building for Improving the Quality of Greenhouse Gas Inventories (Europe/CIS region)" will help participating countries and Georgia among them, to reduce uncertainties and improve the quality of inventories for subsequent National Communications (mobile combustion, solid waste treatment, enteric fermentation and fugitive emissions have been identified as the priority sectors) by strengthening institutional capacity to prepare inventories and establishing a trained, sustainable inventory team. This, in turn, will allow countries to improve national strategies for reducing greenhouse gas emissions.

Georgia as a Non-Annex I country is eligible for Clean Development Mechanism (CDM) because (1) it ratified Kyoto Protocol, (2) expressed its willingness to voluntarily participate in a CDM project activity and (3) specified Designated National Authority (National Agency on Climate Change with the Ministry of Environment and Natural Resources Protection). Since CDM activities at the international level have been launched recently (after COP-7) naturally Georgia has not established necessary institutional arrangements and capacity for CDM operation. Absence of effective capacity to competently address issues relating to project approval, coherently articulated national, sectoral and technological priorities and transparently defined sustainable development criteria, CDM processes will incur prohibitive transaction costs. These issues constitute, inter alia, the primary responsibility of the Designated National Authority (DNA), draft of regulations of which has been recently prepared and is currently being under consideration.

Duties of DNA among others will include:

- Building in-country capacity for participation in CDM;
- Creation of necessary legislative basis for launching CDM; operationizing;
- Development of potentially CDM projects, especially at the initial stage, and facilitating to creation of necessary investment environment;
- Monitoring of projects implemented in Georgia under CDM;
- Facilitating participation of Georgian representatives in international structures, expert groups etc.;
- Participation in preparation of Sustainable Development National Strategy.

Georgia is participating in the Project "Eastern Climate Change Network (ECCN)" supported under the European Commission's Synergy Program through the Energy Efficiency Centre Georgia (NGO). The main objectives of the ECCN are to:

- Increase energy supply security in the countries involved by improving the energy efficiency;
- Contribute to the implementation of the UNFCCC Kyoto Protocol in the participating countries;
- Establish the Eastern Climate Change Network on the basis of existing local Energy Centers and Agencies;
- Encourage the ECCN members' position in the fast growing market created by the Kyoto Protocol's flexibility mechanisms;
- Create and prepare a database of priority projects aimed at climate gas emission abatements in CEE and CIS countries;
- Transfer of know-how, information exchange and training to ensure the necessary local capacity building;
- Disseminate and promote formats and procedures for climate gas abatement certificates;
- Develop targeted twinning within the Network and with possible investors.

In the framework of the project EEC Georgia has prepared a number of project proposals:

- 20 MW wind farm in Poti region;
- 40 MW wind farm in Batumi region;
- Mobility management in Tbilisi main avenues;
- Introduction of high capacity buses &fuel switch;
- Mirashkhany green field SHP;
- Rehabilitation of Kabaly SHP;
- Tbilgaz - Rehabilitation of natural gas distribution system;
- 100 small biogas digesters in Akhaltsikhe region;
- DH pilot project (Saburtalo & Didi Digomi);
- Rikotula green field SHP;
- Improving electricity supply and social-economic conditions for Tbilisi population.

4 Making the Kyoto mechanisms work: Challenges ahead

Importance of participation in CDM is emphasized in above-mentioned Economy Development and Poverty Reduction Program of Georgia. It is said in chapter Strategic Priorities that “in conformity with the requirements of the Kyoto Protocol, efforts will be made to establish the Clean Development Mechanism”.

Georgia’s current priorities include strengthening its capacity for CDM, raising awareness on climate change and CDM issues, development of technical capacity to assess GHG reduction potential for the whole country as well as for different sectors of the economy. The government also would like to evaluate impact of strategic economic activities on GHG emissions and the country’s needs of GHG “allowances” for sustainable development of its economy as a background for decision making on transferring of the CERs.

For development and implementation climate change policy using CDM opportunity Georgia has to built necessary capacity including:

- Capacity on CDM including assistance in strengthening of Designated National Authority and to develop a portfolio of possible CDM projects;
- Local capacity in GHG emission modeling and assessment of sectoral mitigation potential;

First step activities will include:

- Interagency consultation process on CDM strategy, including a national awareness raising campaign targeting high-level decision makers and parliamentarians for the formulation of strategies and programs in climate change policy; The consultation process should result in the development of an action plan;
- Creation of a core group of local experts who will be able to identify CDM projects, prepare the project design document, develop and validate project baselines, and carry out verification and monitoring of projects. This is to be achieved through appropriate training and provision of methodologies, and through hands-on coaching of the experts so that they develop actual experience in each of these areas.

These activities will be resulted in the following outcomes:

- Action plan on setting up the CDM institutional infrastructure, including:
  - timetable, division of responsibilities of various sectoral ministries;
  - recommendations on the development of an internal infrastructure to handle CDM within sectoral ministries;
  - on-the-job training on CDM issues of officials at each relevant ministry, and business association;
  - recommendations on main criteria for selecting and approving CDM projects;
  - recommendations on baselines issues;
  - procedures for monitoring, verification, and certification of CDM projects
- Trained experts who can perform monitoring and verification of CDM projects;
- Potential CDM projects with preliminary project description and justification, including baseline and financial assessment.

Georgia is looking for multilateral, bilateral cooperation to build necessary capacity and participate as a host country in CDM. Ministry of Environment and Natural Resources Protection applied to the World Bank’s Prototype Carbon Fund to participate in its program, Government of Japan - to become the partner of the program to facilitate the CDM capacity building process in host countries.

Georgia has representative in CDM Executive Board (alternate from CEE region), Georgian expert is included in roster of experts for desk review of new baseline methodologies. However increased participation in CDM EB structures (corresponding panels, accreditation (assessment) teams, etc.) is desired [1].

Experience of CDM process shows that there are no Designated Operational Entities in CEE region, number of high-level experts in CDM is limited. Development of CDM projects with assistance of experts from developed countries, which are not necessarily familiar with the circumstances of specific countries and therefore need more time, will lead to increase of project costs. The same can be said regarding western DOE.

Another critical issue is determination and approval of baseline. Project developers can use approved (by Executive Board) baseline methodologies, but for the time being there is only 1 baseline methodology approved by the Meth Panel on baseline and monitoring methodologies of the EB out of 14 proposed [2]. Not approved baseline methodologies need changes or they are rejected. If the situation will not be changed, CDM project developers will face big problems regarding baselines.

Some of the listed goals can be achieved in the framework of recently announced TACIS project "*Technical assistance to* Armenia, Azerbaijan, Georgia and Moldova *with respect to their Global Climate Change commitments", which is expected to start in January 2004.* This project aims at assisting these countries with the development of the necessary institutional and technical capacity to comply with the UNFCCC and participate in the Kyoto Protocol and its Clean Development Mechanism. The governments of the beneficiary countries have identified several areas where additional assistance is needed: climate change awareness raising, technical and institutional assistance with the CDM infrastructure, adaptation and vulnerability issues, technology transfer, modeling of GHG emissions and evaluation of GHG mitigation options. All the identified areas require assistance with methodologies, training, and financial resources for implementation. Since the project cannot address all of the identified issues with the same level of effort, specific attention should be paid to the assistance with the CDM and public awareness.

References / Documents / Links

P.Janelidze, M.Shvangiradze. Activities of Georgia on the way to CDM. CTI Capacity Building Seminar From "Best Practice" Experiences to Policy Diffusion. Tutzing, Germany. 2002

The MathPanel Evaluation – How to get it right? Joint Implementation Quarterly. Vol. 9 – No. 2. July 2003

http://cdm.unfccc.int/EB/Panels/meth/
Meth Panel of CDM EB

http://www.eclimnet.com
ECCN project

http://www.tech-db.ru/istc/db/projects.nsf/htm/index.htm
NATO Science for Piece Program

http://www.nato.int/science/e/sfp-success2.htm
ISTC project G-891 "Development of Waste-less Biotechnological Cycle for Reprocessing of Municipal Solid Wastes"

Country Report: Hungary

Gábor Takács
Energy Club Hungary, Budapest

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

Renewables

The New Electricity Act[1] (2003) and its price setting decree[2] set green electricity purchasing obligation above 0,1 MW, and set relatively high fixed price (17,41 HUF/kwh=6,8 eurocent[3]). However, as there is no price differentiation in harmony with needs of different RES technologies, both biomass and wind became attractive for investments. So far only half a dozen wind turbines have been built, experts estimate that over 300 MWs are just about to ask for authorization. (About biomass: see JI chapter.)

Building renovation

The Széchenyi Plan (SZT)[4] was an important source for renewable and energy efficiency investments with a special focus on households. In 2001, out of the total 13,2 million, 5 million euros[5] were allocated for around 3800 household projects. In 2002 9,9 million euros were allocated to 7800 household projects out of the 13,2 million. For 2002 it could resulted in 286 TJ energy saving and 1,2 million euros/year. The rest of 2002 application received 3,2 million euros, saving 874 TJ and 4,1 million euros per annum[6].

In 2003 the program used up its annual budget of 14 million euros by July. 2370 projects were supported, out of which 2200 were households. Applications by the households were: energy loss capture measures, renewables. Main other categories of applications: public lighting, district heating (production/transport side), energy conservation of municipals, renewables, audit, awareness raising.

The eligible household projects were co-financed up to 30% of total costs. In spite of a relatively fast and easy decision making process and administration, the very long transfer period after the decision proved to be a significant problem for the non-household applicant. For households strict and costly rules became an obstacle.

Block house program:

In Hungary 14% of the 4 million apartments are blockhouses, built from the middle of the 60's on. Over 2 million people (20 % of the population) live in these apartments. At least 550 000 apartments need renovation. The problem is very complex due to wall heat loss, and insulation and heating systems being outdated. Most of these apartments are connected to outdated and expensive district heating systems. Experts estimate[7] that 5-26 % energy saving could be easily achieved in district heated buildings. In the fall of 2002 the government started to work on a 15-year long concept on block –house renovation[8]. 480 million euros would be needed per annum. The concept builds on self contribution, as well as new loan opportunities. It has not been accepted yet, and the elaboration was been slowed down since March 2003.

---

1 CXV Act of 2001: Hungarian Electricity Act (2001. évi CXV törvény a Villamosenergiáról)

2 No.56 GKM Decree of 2002 (29 December) on rules and prices for electricy production falling under purchasing obligation (56/2002 (XII.29) GKM rendelet az átvételi kötelezettség alá eső villamos energia átvételének szabályairól és árairól)

3 1 euro=255 HUF (august 2003) www.mnb.hu

4 National Development Program

5 2001 average: 1 euro=256 HUF

6 Energy Centre: Evaluation of the 2002 Energy Saving Program's result (2003) (Energia Központ: Gyors értékelés a 2002. évi Energiatakarékossági Program eredményeiről)

7 Kovatsics, István's presentation (EGI) at IFC HEECP2 workshop, 2002 (Kovacsits, István: IFC HEECP2 workshop, Pécs, 2002)

8 Prime Minister's Office, Governmental Deputy: Our Home in Europe/Pillars of the National Housing Program January 2003 (Miniszter Elnöki Hivatal Kormánymebízott: Otthon Európában/ a nemzeti lakásprogram pillérei)

2 Climate change mitigation and the use of the flexible Mechanisms: State of the art

Overview of climate change legislation

Climate change mitigation legislation is forming very slowly in Hungary. A Permanent -ministerial Committee on Sustainable Development Inter was founded in the early 90's[1], but despite of its name it completed ad hoc, mainly administrative tasks (like reports to the UN). The first step - after ratifying the UNFCCC[2] - was taken late in 2002 when the Hungarian Parliament decided on joining to the Kyoto Protocol (KP)[3]. However, while a climate change strategy was approved in 2000[4], the majority of it was cancelled in 2003 as none of the tasks listed in the strategy had been completed. By the same legal step[5] an Inter-ministerial Committee on Kyoto Mechanisms KM-TKB) was created to deal with all kind of climate change mitigation policies, with a special focus on Kyoto Mechanisms. So far this is the highest level governmental body dedicated to the Kyoto Mechanisms (KM). The third important part of the above mentioned Decree was a call to the "effected ministers to elaborate sectoral, long –term strategies in order to comply with the Protocol…".By 2003 August nothing public has yet happened.

Assessment of the development of the Hungarian climate mitigation legislation

Generally speaking we can say that development of the Hungarian climate change policy corresponds to the state of the country. Namely: creation of environmental legislation is driven by EU's requirements, but very slowly and lacks careful consideration. Business groups and companies react on changes in the external environment (Kyoto process, EU legislation, etc) faster than the public administration. (e.g. workshops on ETS, JI, etc are carried out by power plants, industrial energy consumers, and consultant companies, see also: JI part) Climate change related decisions within the administration are mainly lead by short term economic interest. So far there has not been any horizontal, overall review and long term planning or strategy carried out that sectors and ministries could base their climate change activities and legislation on. Energy sector is by far the most active green-house-gas emitting sector.

Kyoto Mechanism Inter-ministerial Committee (KM-TKB)

Members (with voting right) are the following:

- Ministry of Environment and Water (its state secretary is the chair)
- Ministry of Economic Affairs and Transport (its state secretary is the co-chair)
- Min. of Home Affairs
- Min. of Foreign Affairs
- Min. of Health, Social and Family Affairs,
- Min. of Agriculture and Rural Development,
- Min. of Finance
- Prime minister's Office

Green organizations can delegate one member with consultation but without voting right. The mandate of KM-TKB is to deal with the following issues: To

- coordinate governmental tasks related to the flexible mechanisms;
- estimate joint implementation (JI) project proposals,
- assist the formation of a Hungarian position on the EU's Emissions Trading System (EU ETS),
- elaborate and propose a regulation on joint implementation.

Assessment of the work of KM-TKB

The TKB holds meetings on an ad hoc basis if there are issues to be discussed. It does not have any decision making right, but plays an important coordination role. Its mandate should be clearly defined and broadened. The most active members are the Min. of Environment and Water (KvVM), and the Min. of Economic Affairs and Transport (GKM).

---

1 No. 1024 Governmental Resolv of 1993 (2nd April) on the Fundation of Permenant Committe on Sustainable Development (1024/1993 (IV.2.) Kormány határozat a Fenntartható Fejlődés Tárcaközi Állandó Bizottság megalkaításáról)

2 LXXXII Act of 1995 on the Announcement of the UNFCCC (1995. évi LXXXII. Törvény , az ENSZ Éghajlatváltozási Keretegyezményének kihirdetéséről)

3 No. 49 Resolve of Parliament of 2002 (19th July) on Accession to the Kyoto Protocoll (49/2002.(VII.19) OGY határozat, az ENSZ Éghajlatváltozási Keretegyezményben Részes Felek Konferenciájának 1997. évi harmadik ülésszakán elfogadott Kiotói Jegyzôkönyvhöz történô csatlakozásról)

4 No. 2206 Governmental Resolve of 2000 (13th September) on Hungarian Climate Change Strategy (withdrawn in 2003) (2206/2000/(IX.13) Kormányhatározat a klímavédelem magyarországi stratégiájáról)

5 No. 2045 Governmental Resolve of 2003 on the Fundation of Kyoto Mechanisms Related Inter-ministerial Commitee (2045/2003. (III.27) Korm. Határozat az ENSZ Éghajlatváltozási Keretegyezményben Részes Felek Konferenciájának 1997. évi harmadik ülésszakán elfogadott Kiotói Jegyzőkönyven meghatározott egyes feladatok végrehajtása érdekében tárcaközi bizottság felállításáról)

Before its formation decisions on whether to support JI projects[1] were made without any formal (!) consultation with the related ministries and interest groups - both endorsement and approval were issued almost automatically to projects presented. No official, written evaluation was prepared about the project proposals before the KvVM issued the letter of endorsements and approvals. Since its formation[2] the KM-TBK has dealt mainly with JI regulation and concrete projects. A JI regulation draft has been elaborated and accepted by the members, but it has not yet come into effect[3]. Decision making on new[4] JI project proposals has been being suspended until the regulation becomes into power. As a leading notion the GKM is very much supportive of projects attracting investments (that also helps to ease the pressure on the central budget) with no regard to environmental concerns, while the KvVM does not have the capacity to study and evaluate the projects.

This has led to a situation where short term economic interests dominate over long term economic[5], environmental[6] and international[7] interests.

KM related capacities

Capacities in the public administration to deal with Kyoto Mechanisms[8]:

- KvVM's permanent secretary of state is the chair of KM-TKB, the head of a department[9] is the secretary, two persons deals with climate change related issues, one of them exclusively.
- GKM's permanent secretary of state is the co-chair in the KM-TKB, one person at the department of energetic, and one at the minister's office full –time deals with Kyoto Protocol and EU- Emissions Trading Systems related issues, but not exclusively.
- In Min. of Foreign Affairs (KÜM) two persons deal (not exclusively) with climate change legislation of the EU and thus with Hungarian legislation as well.
- In Min. of Agriculture and Rural Development (FVM) one person deals (not exclusively) with sinks issues.

Other governmental bodies / agencies that have assignment / staff:

- In Hungarian Energy Office (MEHi)[10] two persons deal (not exclusively) with project based activities, EU's ETS, national allocation plan (NAP) preparation.
- In Institute of Environmental Management (KGI)[11]: Two persons working on inventory and will work on registry.
- In the Energy Centre (EKP)[12]: until September 2003 one person deals (not exclusively) with KM and EU ETS.

Consultants with assignment from governmental bodies

- System Expert Consulting Ltd.: Prepared the 3rd National Communication of Hungary to the UNFCCC.
- The Hungarian Centre for Environmental Economics (MAKK)[13]: Overview of EU ETS for the KvVM. Prepared proposals for the KvVM regarding the registry.

Capacity building activities[14] directly related to KM and EU ETS:

From the side of public administration or with its active participation four main events took place in the period of 2001-2003.

- In December 2001 HEO organized a "kick off" conference on JI with the participation of governmental officials, foreign and domestic investors, experts and effected groups[15]. Over 100 participants heard lectures and participated in the discussion on the second day.
- Just before this event there was an expert group meeting with intense, in depth discussions.
- In November 2002 HEO organized a carbon forum for the interested and effected groups on carbon finance. It was

1 By support of a JI project we mean the issue of letter of endorsment (Loe) and/or letter of approval (Loa).

2 May 2003

3 By 10th august 2003, however the deadline was 30th May 2003.

4 By "new" we mean: presented to the KvVM to get letter of endorsment after the fundation of the KM-TKB.

5 Selling „low hanging fruits" for immediate cash.

6 Real green –house-gas capture.

7 Endangering Hungary's compliance with the Kyoto Protocol commitments.

8 All the listed ministries delegate one person to the KM-TKB. We list here just the administrators that officialy have half or full time assignement to deal with climate change issues, or those that are active at these field.

9 Department of International Environmantal Politics (Nemzetközi Környezetpolitikai Főosztály)

10 HEO (www.eh.gov.hu) is the regulator of the energy sector. Consumer protection, regulation of market players and energy price preparation are its main roles. The price setting body is the GKM.

11 KGI (http://www.kvvm.hu/kgi) is a background institute of the KvVM.

12 EKP (www.energiakozpont.hu)is the Hungarian energy efficiency, environment and energy information agency. It is the administrator of energy efficiency and renewable funds.

13 MAKK (www.makk.hu) works as consultant for companies and for KvVM as well.

14 We list here only activities that are realed to public administration. We do not list here NGO activities, however they are numerous.

15 http://www.eh.gov.hu/magyar/indexf.htm

intended to be the beginning of simulation-game of a future carbon market and its effect on emitters.

- In March 2003 the second phase was held[1].
- In May 2003 the biggest lignite fired power plant, Matra, organized a forum on emissions trading. Presentations from all side, and round table discussion was organized with the participation of around 100 invitee.
- In June 2003 EU/Center for Clean Air Policy organized a two day long seminar on the EU ETS, hosted by the biggest electricity market role player, the electricity wholesaler MVM[2].

However the KvVM was an invited participant on all events, so far only one informal expert group meeting was organized by the Min. of Environment on the JI legislation with the participation of a dozen invited experts. The KvVM should play a much more active role.

Joint implementation projects- evaluation

Interests in JI has significantly increased since the second half of 2001. In 2002- august 2003 nine LOE (for all applications) and eight LOA were issued. Decisions on two projects are suspended, and one application was withdrawn. Seven projects were proposed to the Dutch Senter[3], two to Mitsubishi Co. and one to the World Bank's Prototype Carbon Fund.

Three of these project[4] are fuel switch from coal/lignite to biomass and natural gas. These three project will use 930 000 -1 030 000 tons of biomass (mainly wood, partly woodchips and some wood waste) annually in the period between 2004-2010. The electricity generation capacity on biomass basis will be under 50 MW in all the cases. Yearly ERU[5] that the power plants state in their project document total in 450-500 thousand CO_2 eq. per annum (2008-2010).

General evaluation and highlights of the biomass fuel switch projects:

Positive outcomes

- Expensive, uneconomic, dirty coal technologies will be changed.
- Demand for biomass will increase its price and probably its value as well.
- Renewable share in Hungary's electricity production will increase according to the Hungarian target set earlier in 1999[6] modified later[7]and the EU's target[8].
- Very good, intense learning experience for all parties. Companies (not only the three project developers) understand carbon finance much better.
- A Kyoto Mechanism was used.

Areas of concern

- Not the most advanced technologies will be transferred. Very simple changes will be carried out. The technology transfer function of JI is not exercised.
- None of the projects will utilize biomass with cogeneration technology. Burning biomass for electricity generation only is not the most efficient way.
- Coal/lignite use was based on domestic sources. All three project contains partial fuel switch to natural gas. 75% of natural gas is imported. In this way these projects increase sensitivity (natural gas fluctuation), while decreasing security of supply.
- All three projects would be financially feasible without carbon finance, due to relatively high feed in tariff[9], so additionality is highly doubtable. All the power plants have been acting under pressure to comply with SO_2 emission regulation set in 1998[10] and modified later[11] according to the EU's LCP directive[12]. Meeting with regulatory requirement cannot be additional action. Two out of the three were ongoing projects.
- Experiences gained by the pilot project were not used by the government. Increased business activities did not result in capacity increase in related ministries and governmental bodies. Regulation and guidelines have not been

---

1 http://www.eh.gov.hu/magyar/indexf.htm

2 MVM. Hungarian Electricity Works Co.

3 www.senter.nl

4 AES Borsod Power Plant at Kazincbarcika (Senter), Pannon Power Power Plant at Pécs (PCF), Bakonyi Power Plant at Ajka (Senter),

5 ERU: emission reduction unit achieved by the projects during the first commitment period

6 To double the electricity production by renewables to 50 PJ/year by 2010.

7 No. 1107 Governmental Resolve of 1999 (8th October) on energy saving and energy efficiency strategy to 2010 (1107/1999. (X. 8.) Kormány határozat 2010-ig terjedő energiatakarékossági és energiahtékonyság-növelési stratégiáról)

8 2001/77/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

9 No. 24 Decree of GKM of 2003 on on changes in Decree 56/2002 (24/2003 (IV.24) GKM rendelet a 56/2002 GKM rendelet módosításáról)

10 No. 22 Decree of KTM on Exceeding the Limit of Air Polluting Substances (22/1998. (XI. 26.) KTM rendelet a levegő szennyező anyagok határérték túllépéséről) / No. 21 Governmental Decree of 2001 (14th February) on Air Quality Protection (21/2001 (II.14) kormány rendelet a levegő védelméről

11 No. 10 Decree of KvVM (11th July) on Large Combustion Plants (10/2003 (VII.11) KvVM rendelet a nagy égetőművekről)

12 80/2001/EC LCP directive

elaborated. Decisions were made without careful, independent evaluation.

- The use of JI – carbon finance in this way is near to "harvesting low hanging fruits".
- Public hearing/consultation process' were not serious[1] in any of the cases.

Other, high level, climate change related legislation

The National Development Plan is being written in this year. Climate change related parts are the most doubtable ones according to the EU Commission's opinion, namely energy is not placed at a high enough level, as it should be a priority with bigger, fixed budget.

The other main challenge related to international funding is the need of co-financing. Necessary governmental sources have not been pointed, restructured according to the new priorities in the NFT.

The National Environmental Programs (NKP[2])for 2001-2003 and (NKP 2[3]) for 2003-2004 contain a climate change chapter. Without the NFT the sources are not secured. Generally speaking forming the concept, and allocating necessary sources is a very slow process.

3 Making the Kyoto mechanisms work: Challenges ahead

Governmental positions and priorities regarding KM

- So far no overall strategy or even guideline has been developed for the use of domestic P&Ms and KM, or on AAU and ERU utilization/banking. In 2002-2003 a version of an act on participation in KMs had been drafted, but finally not approved.
- Based on the above (JI chapter), it is clear that Hungary is willing to use all possibilities to attract foreign capital, especially in the case of the power sector that is under pressure[4]. As a result, there are far more JI project proposals than had been expected before 2001. If further proposals appear, guidelines should be elaborated and expert capacities should be employed for evaluation.
- August 2003 there has been no CDM project proposal presented. This is mainly due to the fact that there are just a few Hungarian companies (OTP Bank, MOL: Oil and Gas Co.) that are able to make foreign investments, but these are not interested in such opportunities. For this reason the administration does not deal with the issue and does have a position on it.
- EU ETS: Hungary has expressed its willingness NOT to join the EU ETS until 30th June 2006, however this position is being discussed within the government (between KvVM and GKM) and might result in a review of this position. The main arguments are as follows: EU did not take the accession countries' special position into account, the national allocation plan guideline is not ready, JI projects in Hungary.
- EU ETS and KM (JI/CDM) linking:
- The directive on linking the KMs and the EUs ETS and the Hungarian position is being discussed in august. No position has been reached as of 10th august.

Challenges ahead

- Due to changes in GHG inventory methodologies, Hungarian emissions must be recalculated. (This process is underway.)
- Emission scenarios should be developed. While there are intentions within both the KvVM and GKM to do this, excluding the review of the 3rd National Communication to the UNFCCC, no steps have yet been taken to do so. This process should be led by KvVM, with active participation of GKM, FVM, MEHi, the Energy Centre, companies and NGOs.
- Necessary, highly supported transport infrastructure development should be harmonized with climate change mitigation objectives.
- Hungary's automatic[5] compliance with the 6% GHG emission reduction commitment must be revised. Due to changed consumer behavior, transport emissions, very low level energy efficiency this "safe" position started to be highly doubtable from 2001 on.
- Development of the national allocation plan (NAP) should

1 By "serious" we mean: well prepared, advertised in time in a broad enough audience.

2 No. 2066 Governmental Resolve (5th April) on Operational Program of the National Environmental Program for 2001-2002 (2066/2001. (IV. 5.) Kormány határozat Nemzeti Környezetvédelmi Program 2001-2002. évi Intézkedési Terve)

3 No. 1117 Governmental Resolve (13th October) ont he Concept of the 2nd National Environmental Program (1117/2001 (X.13.) Kormány határozat A második Nemzeti Környezetvédelmi Program koncepciója)

4 Environmental regulation gests stricter, liberalisation process, serious accident in Paks Nuclear Power Plant, etc.

5 By „automatic" we mean: without significant domestic actions, due to the collapse of carbon intensive heavy industry back int he early 90's.

be commenced. So far no assignment has been given to any of the related bodies.

- From the above described biomass and other JI projects' point of view the linking of JI and EU ETS is crucial. This is extremely important for a correct and effective NAP.
- The National Development Plan, its operation programs and the 2nd national Environmental Program's energy efficiency, renewable and climate change related parts need further elaboration to increase coherence and to be eligible for funds and support. This is an important aspect regarding necessary domestic climate change mitigation actions and PAM.
- The National Housing Program and the Block House Program should be finalized and implemented with focus on energy conservation, efficiency, with special focus on district heating.

4 References / Documents / Links

2001/77/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

80/2001/EC LCP directive

CXV Act of 2001: Hungarian Electricity Act (2001. évi CXV törvény a Villamosenergiáról)

Energy Centre: Evaluation of the 2002 Energy Saving Program's result (2003) (Energia Központ: Gyors értékelés a 2002. évi Energiatakarékossági Program eredményeiről)

Kovatsics, István's presentation (EGI) at IFC HEECP2 workshop, 2002 (Kovacsits, István: IFC HEECP2 workshop, Pécs, 2002)

LXXXII Act of 1995 on the Announcement of the UNFCCC (1995. évi LXXXII. Törvény , az ENSZ Éghajlatváltozási Keretegyezményének kihirdetéséről)

No. 10 Decree of KvVM (11th July) on Large Combustion Plants (10/2003 (VII.11) KvVM rendelet a nagy égetőművekről)

No. 1024 Governmental Resolv of 1993 (2nd April) on the Fundation of Permenant Committe on Sustainable Development (1024/1993 (IV.2.) Kormány határozat a Fenntartható Fejlődés Tárcaközi Állandó Bizottság megalkaításáról)

No. 1107 Governmental Resolve of 1999 (8th October) on energy saving and energy efficiency strategy to 2010 (1107/1999. (X.8.) Kormány határozat 2010-ig terjedő energiatakarékossági és energiahtékonyság-növelési stratégiáról)

No. 1117 Governmental Resolve (13th October) ont he Concept of the 2nd National Environmental Program (1117/2001 (X.13.) Kormány határozat A második Nemzeti Környezetvédelmi Program koncepciója)

No. 2045 Governmental Resolve of 2003 on the Fundation of Kyoto Mechanisms Related Inter-ministerial Commitee (2045/2003. (III.27) Korm. Határozat az ENSZ Éghajlatváltozási Keretegyezményben Részes Felek Konferenciájának 1997. évi harmadik ülésszakán elfogadott Kiotói Jegyzőkönyven meghatározott egyes feladatok végrehajtása érdekében tárcaközi bizottság felállításáról)

No. 2066 Governmental Resolve (5th April) on Operational Program of the National Environmental Program for 2001-2002 (2066/2001.(IV.5.) Kormány határozat Nemzeti Környezetvédelmi Program 2001-2002. évi Intézkedési Terve)

No. 21 Governmental Decree of 2001 (14th February) on Air Quality Protection (21/2001 (II.14) kormány rendelet a levegő védelméről

No. 22 Decree of KTM on Exceeding the Limit of Air Polluting Substances (22/1998. (XI. 26.) KTM rendelet a levegő szennyező anyagok határérték túllépéséről)

No. 2206 Governmental Resolve of 2000 (13th September) on Hungarian Climate Change Strategy (withdrawn in 2003) (2206/2000/(IX.13) Kormányhatározat a klímavédelem magyarországi stratégiájáról)

No. 24 Decree of GKM of 2003 on on changes in Decree 56/2002 (24/2003 (IV.24) GKM rendelet a 56/2002 GKM rendelet módosításáról)

No. 49 Resolve of Parliament of 2002 (19th July) on Accession to the Kyoto Protocoll (49/2002.(VII.19) OGY határozat, az ENSZ Éghajlatváltozási Keretegyezményben Részes Felek Konferenciájának 1997. évi harmadik ülésszakán elfogadott Kiotói Jegyzôkönyvhöz történô csatlakozásról)

No.56 GKM Decree of 2002 (29 December) on rules and prices for electricy production falling under purchasing obligation (56/2002 (XII.29) GKM rendelet az átvételi kötelezettség alá eső villamos energia átvételének szabályairól és árairól)

Prime Minister's Office, Governmental Deputy: Our Home in Europe/Pillars of the National Housing Program January 2003 (Miniszter Elnöki Hivatal Kormánymebízott: Otthon Európában/ a nemzeti lakásprogram pillérei)

www.kvvm.hu Ministry of Environment and Water

www.gkm.hu Ministry of Economic Affairs and Transport

www.fvm.hu Ministry of Agriculture and Rural Development

www.kum.hu Ministry of Foreign Affairs

www.kvi.hu Institute for Environmental Mangement

www.eh.gov.hu Hungarian Energy Office

www.energiakozpont.hu Energy Centre

www.nfh.hu National Development Office

www.makk.hu Hungarian Centre for Environm. Economics

www.energiaklub.hu Energy Club Hungary

www.senter.nl Senter Internationaal

www.prototypecarbonfund.org World Bank Prototype Carbon Fund

www.aes.hu AES Borsod Power Plant - Kazincbarcika

www.pannonpower.hu Pannon Power Power Plant - Pécs

www.bakonyi.hu/folap.htm Bakonyi Power Plant -Ajka

Country Report: Republic of Kazakhstan

Dr. Kanat Baigarin
Climate Change Coordination Centre

Introduction

The positive outcomes of the COP7 and the Accords of Marrakech pave the way towards the implementation of the Kyoto Protocol and to the cost-effective international cooperation in the GHG emissions reduction. A significant progress has been achieved during last years in developing awareness, understanding and strategic approaches among developing countries and EIT on how to use the opportunity, which the KP flexible mechanisms provide.

Economies in transition (EITs) form heterogeneous group of countries in respect to their economic development and JI/IET potential. Past of centrally planned economy is the main common feature they have. Collapse of this economy in the first half of 90s caused economic depression and consequently decreased GHGs emissions (20% and more below 1990 reference levels). Since this time, the pace of economic recovery, overall economic performance expressed as GDP per capita, sectoral structure of economy, energy efficiency and other factors influencing GHGs emissions has developed very individually.

In Kazakhstan, a new Air Act, including GHGs emissions, has been adopted (2002), which should enable, beside others, to increase quality of national GHG emission inventories. All participants agreed that proper legal framework is extremely important and that in some cases establishing of such framework could be hampered by weak understanding of the Kyoto Protocol in Parliament.

More efficient information channels are therefore needed to enhance understanding of KP basics, including carbon market at decision-making level both in government and industry. This poor understanding also relates to decisions taken on KP mechanisms at Marrakech COP. Annex I countries must therefore have in place by 2007 their inventory systems meeting given quality criteria (quality assessment limited to the parts of the inventory pertaining to emissions of greenhouse gases from sources/ sector categories from Annex A to the Kyoto Protocol), they have to formulate their national JI guidelines including additional criteria, set up registries of transactions and submit supplementary information on assigned amount (any additions to, and subtractions from, assigned amount). They can also validate and certify ERUs generated at their territory, if they have national accreditation system in place, which is internationally recognized.

The group of EITs includes both JI and CDM countries; in medium-term prospective certain EIT countries like Kazakhstan even intend to become Annex I Party. It means that development of JI/IET options is very important for the whole group.

As a first step, all CDM and JI host countries that wish to do so should be able to mobilize adequate domestic and external human capacity and financial resources to assess the opportunities that the Kyoto mechanisms might represent.

1 Kazakhstan: Status of the economy

Kazakhstan possesses enormous untapped fossil fuel reserves as well as plentiful supplies of other minerals and metals. It also has considerable agricultural potential with its vast steppe lands accommodating both livestock and grain production. Kazakhstan's industrial sector rests on the extraction and processing of these natural resources and also on a relatively large machine building sector specializing in construction equipment, tractors, agricultural machinery, and some defense items.

The global challenges of development have predetermined the position of the world community that of uniting efforts in identifying ways for further sustainable development. Kazakhstan supports the above initiatives and pursues the policy based on the introduction of principles of sustainable development into state reforms.

In the ten years of independence, Kazakhstan has not seen its political stability threatened by political or ethnic conflicts. Kazakhstan was also the first country to voluntarily abandon nuclear weapons, which was a significant contribution to global security. Other measures undertaken within the framework of Central Asian cooperation focused on securing stability in the CIS region, such as the “Shanghai Cooperation Agreement” (the Republic of Kazakhstan, People’s Republic of China, the Republic of Kyrgyzstan, the Russian Federation, the Republic of Tajikistan, and the Republic of Uzbekistan) and the Conference on Cooperation and Trust Building Measures in Asia have laid the foundation for a policy of trust, partnership and stability on the vast Eurasian continent. As a result of domestic political reforms, Kazakhstan has built system, characteristic of the following:

- Division of governing powers into legislative, executive and judicial branches;
- Transition to general elections for the head of the state and the parliament
- Creation of infrastructure necessary for a market economy
- Formulation of legislation outlining the principles of a multi-party system
- Legal equality of all ethnic groups
- Reform of the pension system
- Declaration of freedom of speech, censorship banned, actively functioning independent media and NGO sectors.

In 1995, the Constitution of the Republic of Kazakhstan (RK) was adopted establishing new democratic principles for state building, and protecting of the basic rights of citizens. The economic system seems to have changes, with new budgetary and tax systems, the liberalization of prices and trade, reform of management systems and strategic planning approaches, which is reflected in the country’s Strategies and Action Plans. In table below general figures at 2000 are shown.

Table 1: General figures

Country Kazakhstan		
Population	Million	14.93
GDP	billion 90 US$	20.32
GDP (PPP)	billion 90 US$	69.37
Energy Prod.	Mtoe	64.67
Net Imports	Mtoe	-29.83
TPES	Mtoe	35.44
Elec. Cons.	TWH	42.37
CO_2 Emissions	Mt of CO_2	114.45

2 Status and perspectives of energy sector - The highest emitter of GHG emissions

Environment concerns of energy sector
Oil and gas supply

The economy of the Republic of Kazakhstan has traditionally been geared to the productions of hydrocarbons and mineral resources for shipment to Russia. Since the declaration of independence in 1991, Kazakhstan has undergone economic restructuring, privatization, institutional reforms and price liberalization. The country has also faced debt problems as the price of fuel imports moves towards world market levels but fortunately possesses sizeable oil and gas reserves. An overview of final energy consumption in recent years is provided in table 2.

Table 2: Final energy consumption by types of fuel, Mtoe

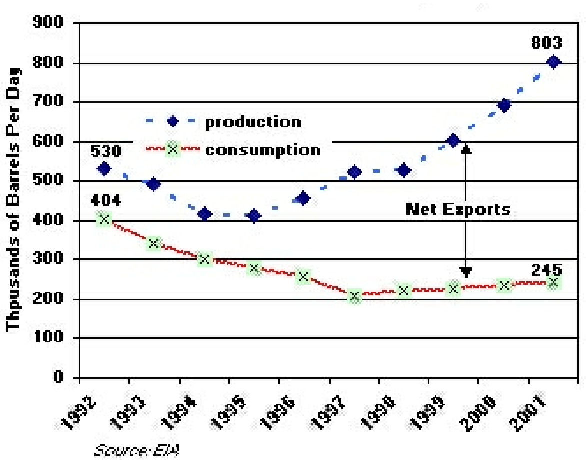
	1993	1994	1995	1996	1997	1999*
Total (Mtoe)	40.6	33.9	27.4	23.4	20.2	18.0
Petroleum products	33.7	31.6	29.9	33.3	34.7	36.1
Coal	35.5	38.9	32.1	30.3	30.2	25.0
Gas	15.0	15.0	21.5	19.2	17.8	18.9
Electricity	15.8	14.5	16.1	16.7	17.3	18.9

Sources: International Energy Agency
and (*) Energy Data Associates

Between 1993 and 1997, the share of coal remained in the range of 55-60 per cent of total primary energy supply and more or less paralleled the overall decrease in energy needs during this period. Indigenous coal production decreased from 5.2 Mtoe in 1993 to 32.0 Mtoe in 1997.

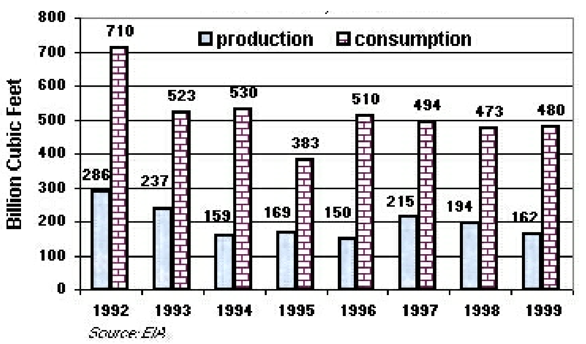
Currently, the giant Tengiz oil field and the Karachaganak gas condensate field in northwestern Kazakhstan represent two major projects for developing Kazakh hydrocarbon production. Amounting to about 25 per cent of the total primary energy supply, Kazakh oil and condensate output stood at 25.8 Mt in 1992, fell to 20.4 Mt in 1994, rose to 25.6 Mt in 1997 and reached 30.0 Mt in 1999 (an increase of 15.8 per cent compared with 1998. This last result met the national production target set by Kazmunaygaz, the State-owned oil company). The dynamics of oil production and consumption during last years is shown on figure 1.

Figure 1: Kazakh oil production and consumption



The share of natural gas in energy consumption increased from 15% in 1993/94 to about 20% over the period 1995-99 (figure 2). Indigenous production of natural gas totaled 9.8 Bcm in 1999, 18.9% in 1998.

Figure 2: Kazakh natural gas consumption and production



Gas production zones and gas markets are distant from each other and not well connected. The current Kazakh gas transportation network supplies to only two regions of moderate consumption: the southern market, Almaty (covering 52% of total demand), and western market supplying 32% of its needs. Only 13% of gas is taken by the north-eastern industrial region, which is currently supplied via Russian gas pipeline. Total primary supply of energy per unit of GDP is about 3.5 times higher than in Western Europe but the supply per capita is about 28% lower. Intensity of power consumption is 3 times higher in Kazakhstan than in traditional market economies.

Electricity generation. Heat supply.

Kazakhstan's electrical power industry is affected by the country's overall macroeconomic situation, ageing power generation facilities, financial difficulties (non-payment of electricity bills by industrial, residential and government consumers), and general inefficiency. Over the period 1990-1997, power consumption in the industrial sector decreased drastically: 27% in the fuel industry, 37% in non-ferrous metallurgy, 39% in ferrous metallurgy, 57% in machine building and 73% in the chemical and petrochemical industry. Between 1990 and 1999, total electricity consumption declined by 50%.

Currently the Kazakh power system is characterized by:

- An uneven distribution of production plants (80% of the electricity is generated in the northern region);
- Connection of the transmission and distribution networks with two Russian grids (north-west and north) and the Central Asian system in the south;
- A high proportion of power losses (15%) during transport due to the country's geographic features.

Supplying heat and hot water to commercial and residential customers as well as steam to industry using district heating systems in cities and towns is a very common practice in the CIS countries, where steam and hot water are usually produced in boiler-houses (HOB) or by CHS. Kazakhstan is no exception to the rule and, within the territory, there are 42 central heating systems (CHS) in operation, which are supplied with heat from 42 CHS and 24 big boiler houses. The total installed capacity is 29,000 Gcal/hour and the overall length of the associated network exceeds 5,000 km.

In 1990, total heat consumption amounted to 172 mio. Gcal. Central heating represented globally 49% of the total heat production, but this share reached 79% for the 25 most developed cities of the country. The economic crisis also affected heat production, which in 1995 totaled only 158.3 Gcal. Of this amount 40% was produced by CHS, 10% by boiler houses (i.e. 50% by central heating systems) and the remaining 50% by autonomous heating systems.

Table 3: Power and heat production 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Power Production, billion kWh	80.3	78.95	76.03	69.82	66.4	66.6	59	52	49.1	47.5	51.6	55.3
Heat production, million Gcal	59.2	58.7	58.9	63.8	97.6	82.9	76.6	63.1	66.9	63.3	65.5	62
Power Installed Capacity, GW	17.916	18.013	18.000	18.459	18.352	18.327	18.172	18.133	18.142	18.133	18.101	18.181

The share of the different fuels consumed by the heating sector varies significantly according to the region and the accessibility of the resources. It is expected that the share of coal in the future will be smaller and that the gas share will increase.

Renewable energy sources (RES) in Kazakhstan

Renewable energy in Kazakhstan is presented by hydro, solar, wind, hydrothermal and biomass energy. Their potential resources may cover present and potential needs of the country. RES application will provide for solving the following issues:

- Improvement of environmental conditions;
- Improvement of social conditions at small settlements unconnected to central power supply lines (in accordance with the latest data in Kazakhstan 20 thousand small non-electrified settlements);
- Substitution and saving organic fuels;

At the same time, RES have several disadvantages, such as irregular daily and seasonal generation, which cause necessity for application of duplicating sources and accumulation units. Thus the cost of this energy and accumulation units is rather high. But anyway RES can find their place on Kazakhstan's energy market. Measures to overcome barriers to renewable energy should include:

- Introduction of RES to energy market with acceptable prices, and creation of incentives for use of renewable energy;
- Introduction of changes into construction norms for buildings;
- Expansion of bio-fuel use for transport and energy units.

Hydro power

Kazakhstan's hydro potential is about 170 billion kWh a year. Most part of the water and water-energy resources is located in Eastern, South-Eastern and Southern regions. Out of theoretical potential of hydro energy (170 billion kWh), 62 billion kWh can technically be used for industrial needs. Hydro power plants are divided into large (over 30 MW), small (below 30 MW) and micro (up to 50kWh) plants. Large plants have several advantages as against small ones. Their energy is cheaper, they can regulate frequency and voltage and etc., but at the same time they cause more damage to the environment (flooding of large areas) and often conflict with other industries (fishery, transport, melioration and other). Small plants do not have these impacts. Investigation at 90 small plants showed that only 21 of them are operating (with total capacity of 78 MW) the others are destroyed. Out of 578 hydro power stations 38 are large and 540 are small plants.

Wind power

Today, wind-power engineering is being rapidly developed all over the world and is one of the main directions of energy saving and transfer to environmentally clean and renewable energy. Planned capacity of wind power units (WPU), for the last ten years, increased 9 times and amounted to 20000 MW. Prices for 1 kWh, for this period, decreased from 15-20 cents to 5-7 cents.

One of the main advantages of wind power is short time for WPU construction. Construction of WPU with capacity 1-2 MW, can be performed for 3-10 days, and WPU with capacity 10-50 MW can be constructed for 1-2 years.

Based on the existing data, we can assume that Kazakhstan has considerable wind power potential, especially at "Dzhungar Gate" and "Shelek Corridor" in Almaty Oblast. Wind speed in these regions is from 7 to 9 meters/second and from 5 to 9 meters/second, respectively. The preliminary assessments show that in "Dzhungar Gate" it is possible to construct WPUs with total capacity 1000 MW, in "Shelek corridor" this figure is a bit smaller. Closeness to existing electric power networks, good correlation of wind season with demand foe electric energy as well as local energy market makes construction of WPUs in these regions very attractive. It is necessary to note, that almost any part of Kazakhstan is suitable for construction of WPUs.

Notwithstanding large potential for wind energy in Kazakhstan it is practically not being used, but for some small WPUs, used for agricultural purposes. Based on the existing meteorological data, fist sites were chosen for WPUs construction (Electric Energy Development Program until 2030):

- Dzhungar WPU - 40 MW;
- Shelekskaya WPU -140 MW;
- Saryozekskaya WPU -140 MW;
- Alakolskaya WPU -140 MW;
- Karoyskaya WPU - 20 MW;
- Shengeldinskaya WPU - 20 MW;
- Kurdayskaya WPU - 20 MW.

Total capacity of these WPUs will be about 520 MW with annual production of 1,8 - 2 billion kWh. Investments will amount to 500 mio. USD.

Solar power

Kazakhstan is located between 42nd and 55th degrees of Northern latitude, and therefore can be considered as the northern country. This situation is generally considered as an advantage in relation to solar power. On the other hand, solar power resources in Kazakhstan are rather stable and suitable for use due to favorable climate conditions. Sunny hours amount to 2200-3000 hours a year and intensity of solar radiation is about - 1300-1800 kilowatt per square meter a year.

Heat solar power is a renewable energy source, the most simple for practical utilization, and the world experience shows its competitiveness with other energy sources.

Geothermal energy

Analysis of geothermal resources in Kazakhstan shows that their quality and potential for energy production is not large enough. Agricultural use of geothermal waters includes heating of open fields, greenhouses and the processes. Two geothermal wells near Zharkent have the biggest temperature potential in Kazakhstan. Temperature of geothermal water in these wells is about 96oC and may be used for heating purposes of the region. At present geothermal energy is not being used in Kazakhstan. But technical progress and available and perspective technologies for utilization of thermal waters may positively impact on future use of geothermal energy in Kazakhstan.

Biomass and biogas energy

Biomass — is total mass of forest plants, organic wastes from food processing, agriculture and other industries, such as food industry, spirit industry, meat industry and etc. Biomass in different forms is available almost in all regions of the country, but so far no prognosis can be made on energy and fuel production from biomass. Technologies of flammable gas and other chemicals production from biomass are not being used in Kazakhstan. At the same time these technologies are quite common in other countries of the world (Brazil, USA, China, India, EU countries and other) and probably in future will be applied in Kazakhstan.

Among biochemical technologies, the most interesting for Kazakhstan is microbiologic conversion with methane production, or so-called anaerobic fermentation. During anaerobic fermentation, along with biogas, an organic leftover is also being produced, which can be used as a very efficient fertilizer. In Kazakhstan this technology is very rarely being used due to large capital investments. Kazakhstan lacks forests, and therefore wood-processing industry, main supplier of biomass, is also not developed enough. Other industrial supplier of biomass, suitable for gas and electric energy production is rise straw. Kazakhstan produces large quantities of rise, but the production is being gradually decreased.

Therefore, practical absence of biomass sources for industrial production does not allow using this energy source for industrial purposes. But in perspective, it is necessary to consider biomass utilization for local needs and define the most appropriate technologies for different regions of Kazakhstan.

3 Process of the climate change mitigation and the use of the flexible mechanisms in Kazakhstan will give environmental protection opportunity

Kazakhstan ratified UN FCCC in 1995 and actively participates in FCCC implementation. In 1998, Kazakhstan issued the First National Communication; in 1999 signed the Kyoto Protocol. Kazakhstan, in accordance with Article 4, paragraph 2 (g) had notified the Depositary on 23 March 2000 that it intended to be bound by Article 4, paragraph 2 (a) and (b) of the Convention. As a result of negotiations with countries of the 77 Group and China, in 2001, at COP-7, in Morocco, a decision was taken about the status of the Republic of Kazakhstan in frames of the international negotiation process on global climate. The Conference further noted that the Depositary had informed the other signatories and Parties of that notification, and that, upon ratification of the Kyoto Protocol by Kazakhstan and its entry into force, Kazakhstan becomes a Party included in Annex I for the purposes of this Protocol in accordance with Article 1, paragraph 7 of the Protocol. The Conference of the Parties recognized that Kazakhstan will continue to be a Party not included in Annex I for purposes of the Convention. Thus, the international community agreed that Kazakhstan has potential to become a developed country and to contribute to Sustainable Development. This considerably raises the international image of Kazakhstan taking into consideration that the real status of other NIS countries (apart from Russia and Ukraine) is not defined yet. All parties recognize positive conditions in Kazakhstan for conducting institutional demonstration projects as well as GHG emissions projects with grant support from donor-countries and international organizations, and investments from Annex-1 countries.

Domestic activities

In April 2000 the Kazakh Government established the Inter-agency Commission (IAC) on Climate Change to ratify the Kyoto Protocol and gain UNFCCC implementation; Climate Change Coordination Centre (C4) was appointed as its working body. After recommendation of the IAC, the Ministry of Natural Resources and Environmental Protection (MNREP) developed methodology and procedures for annual inventory of GHG emissions and sinks, based on the international best practice. The inventories for 1990, 1992, 1994 and 2000 were reviewed by the IAC, and 1992 was defined as the base year. According to the Ministry's Report, total GHG emissions in 1990 amounted to 352 million tons of CO_2 equivalent, in 1992 – 324,6 mio. t., 1994 - 236 mio. t., 2000 - 152,5 mio. t. (46% comparing to the base year 1992), and in 2001- 154,7 mio. t. (48%).

In accordance with recommendations of international institutions and best practices "Guidelines for GHG Emission Reduction Project Preparation, Agreement and Approval by the Government of the Republic of Kazakhstan" was developed and approved by the MNREP's Order.

Consolidate activity on launching GHG emissions reduction projects was carried out to adopt flexible Kyoto mechanisms to the national circumstances, and to create legislative basis to attract foreign investments.

Benefits for Kazakhstan from ratification of the Kyoto Protocol

- Investment attractiveness of Kazakhstan will transfer from declarative to concrete form, and investments may grow up to 200-500 million USD per year for the environment protection projects in the field of preventing climatic changes and mitigating their effects as well as other pollutants;
- Implementation of these projects will have positive impact on the health of the population, creation of new work places, international image of the Republic, facilitate co-operation of Kazakhstan with developed countries and contribute to sustainable development;
- It is necessary to note that implementation of the Kyoto mechanisms will establish conditions for attracting investments and involving national funds, accumulated at different foundations.
- In case of CDM Kazakhstan can get new sound technologies for the carbon credits generated by the projects;
- In case of Joint Implementation, Kazakhstan can accumulate part of carbon credits or use GHG emission offsets;
- The accumulated carbon credits will ensure stable position of Kazakhstan at the energy market and economic safety of the country in the process of transition to a market economy.

Benefits for Kazakhstan from ratification of the Kyoto Protocol as an Annex-1 country

- Launching of JI projects on GHG emissions reduction. The country will benefit through establishing additional capacities in energy, industry and transport sector. Expected: technological benefits, due to retrofit installation of new and more efficient equipment; environmental benefits, because of introducing of renewable energy resources and mitigating contamination of the environment;
- Additional investments and incentives in energy-efficient economy, because enterprises will benefit from carbon credits and external investments in projects implementation;
- Projects will allow the Government to get additional funds to develop monitoring infrastructure on the national level;
- Government receives predictable and adequate financing for capacity building from donors and international organizations;
- Kazakhstan participates in GHG emissions trade;
- Direct investments in environmental protection projects;
- Accumulation of carbon credits and further participation in CO_2 market or use of the credits to protect the country's position on the energy market;
- Opportunities to implement programs on utilization of associated gas at oil fields.

4 Best practice policies and measures yielding ancillary socio-economic benefits

In order to test the project cycle procedure and national modalities on GHG emissions reduction activity IAC gave preliminary approval to two projects:

1. Harrikein Company project on utilization of the associated gas at Kumkol field with the expected GHG emissions reduction about 500 thousand tons per year (planned investments – about 35 million USD).
2. Model project on energy saving at Uralsk CHPS, performed by Japanese Government Company "NEDO" in cooperation with the Ministry of Energy and Mineral Resources of the Republic of Kazahstan (investments amount to 15 million USD).

Prototype Carbon Fund (PCF) and Government of the Netherlands expressed their interest in the first project. As for the second project, on June 20, 2002 in Astana, New Energy and Industrial Technology Development Organization (NEDO) of Japan signed Memorandum of Understanding with Ministry of Energy and Mineral Resources, Ministry of Environment Protection and Akimat of Western Kazakhstan Oblast. Under this document the parties launched the project on construction of the 25 MW gas-turbine power station in Uralsk. The project cost amounts to 15 million USD, to be provided by Japan. Kazakhstan will transfer to Japan the GHG emissions reduction units in the amount of 62 thousand tons of CO_2 per year, during the period (2008- 2012), generated by the project. It is necessary to underline, that this project's activity is considered as JI/CDM project, but not emission trading. The GHG emissions reduction will be covered by the external investments: (Japan, the Netherlands or WB), or the own investments of the company. Implementation of such kind of projects creates conditions and instruments for more stable operation of the energy enterprises, and development of favorable investment's climate, as well as stimulation of environment protection and GHG abatement projects.

Carbon Fund - as instrument to introduce flexible market Kyoto Protocol mechanisms in Kazakhstan

Instruments have been already created and are being operated in the world for application of effective mechanisms of JI and CDM on GHG emissions reduction on combat global warming. The most striking example is the World Bank Prototype Carbon Fund and its components. A number of countries with economies in transition is creating or has already created such structures, as for instance Russia and Latvia have it. The USA has launched in spring 2003 a Program on reduction and GHG emissions domestic trade with following expansion and inclusion into international trade of GHG emissions. In this connection 14 large companies of the North America such as American Electric Power, DuPont, Ford Motor Company, Motorola Inc. and other have joined into association and a large brokerage company Natsource is establishing a carbon 'bank'.

Preconditions for operation of these mechanisms have been created in Kazakhstan and two pilot projects have already being implemented, and it's high time to set up a projects realization system focused on GHG emissions reduction mobilizing external and internal reserves of gaining benefits by more economic way for the state in accordance with strategic aims for prosperity of Kazakhstan.

This chapter presents opportunities for integration of decisions, adapted in Marrakech and Delhi, to the economy of Kazakhstan through creation of an efficient system on GHG emissions reduction on the basis of projects by involving a wide range of interested parties by founding a Kazakhstan Carbon Fund (KCF).

Strategic aims of KCF

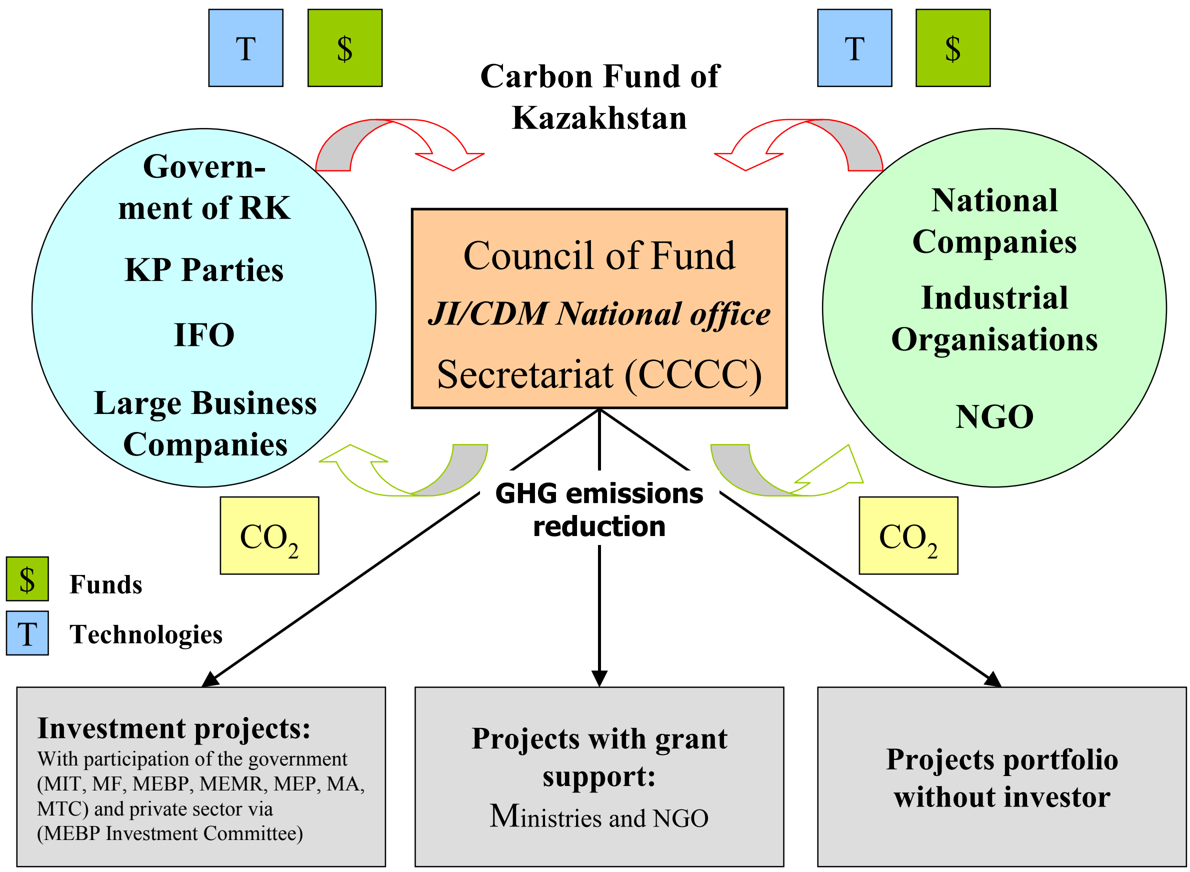
Based on the above mentioned the strategic aims of KCF are as follows:

1. To demonstrate how GHG emissions reduction resulted from projects realization are financially beneficial out of activity combining concern for the environment and a real contribution into the sustainable development of Kazakhstan and promote to decrease expenses for GHG emissions monitoring.
2. To support all interested sides including international and national companies, Convention Parties to better subsequent development of their policy trends, business development taking into account GHG emissions reduction by using JI/CDM market mechanisms, and
3. To demonstrate a leadership reputation among Central Asia countries as the country capable to work in partnership with public and private sectors for mobilization of new resources to solve global environmental issues via flexible market mechanisms.

Structure and management of the Kazakhstan Carbon Fund (KCF)

A scheme below depicts the Fund's structure (figure 3). This Fund will accumulate both financial and non-financial means for projects realization and GHG emissions reduction in the form of carbon credits like ERU/CER and AA. On the one hand it is supposed that the Fund's investors will be countries-donors, participants of the Convention, international financial institutes and companies, the Government of the Republic of Kazakhstan representing financial and non-financial resources, technologies. On the other hand – national companies, industrial and other organizations and enterprises, NGOs propose projects to be realized and final product as GHG emissions reduction, expressed in CO_2 equivalent.

Figure 3: Structure of Kazakhstan Carbon Fund



In fact, this inner system represents a mini market and GHG emissions reduction, that are the main goods for exchange and trade, meeting requirements of the Kyoto protocol. Participants of the process are investors from both sides sharing GHG emissions reduction resulted from projects that were certified and verified in accordance with agreements signed between sponsors and corresponding project applicants and at this the role of the Government of Kazakhstan will be regulating. Such mechanism in market conditions allows companies and countries-participants to mobilize additional resources from all sectors for obtaining as a result sustainable development and improving the environment in the global scale and to use them effectively for emissions reduction generated in JI/CMD projects in order to implement their commitments under UNFCCC and Kyoto protocol.

Carbon fund should assume a legal status with the Charter and Regulations developed. Aims and types of activities of the Fund can be as follows:

- Management of projects portfolio and actions focused on GHG emissions reduction including their preparation, implementation and maintenance;
- Development, maintenance and dissemination of information data base on GHG emissions reduction projects in energy and other sectors of the RK economy;
- Formation and management of the fund's rights (quotas) for GHG emissions;
- Participation in organizing and conducting GHG emissions and other NO_xious gases inventory;
- Organization and conducting independent audits of GHG emissions inventory outcomes and other NO_xious gases and GHG emissions reduction projects;
- Attraction and use of financial resources from various national, foreign and international sources in different types for functioning according to aims and other trends of the Fund's activity;

- Participation in financing in different forms of projects and actions according to aims and activity trends of the Fund;
- Development and use of different financing schemes for environmentally oriented projects and measures including those that are focused on GHG emissions reduction;
- Development and introduction of a concept, programs, action plans on GHG emissions reduction;
- Participation in developing normative and legal documents on registration rules, management, registration, control over GHG emissions and other gases in accordance with international standards and legislation of the Republic of Kazakhstan;
- Organization and implementation of scientific-methodical, research and engineering-technical works on decision of global, national and corporate environmental issues;
- Publishing and printing activity under the theme determined by the aim and activity trends of the Fund;
- Organization of conferences, seminars, exhibitions, presentations, social research, participation in international information exchange, creation and sale of software under the theme determined by the aim and activity trends of the Fund;
- Organization of personnel training, experience exchange, trainee periods, extension courses under the theme determined by the Fund's aim;
- Formulation and presentations of projects with Kazakhstan business position and the country on the whole by UNFCCC basic provisions and defense of their interests in the frames of international negotiation process;
- Implementation of consulting activity including research and production field;
- Organization and implementation of research, preparation of recommendations on production and introduction of advanced energy saving technologies including national, in Kazakhstan and abroad;
- Financial and other support to legal entities and citizens participating in realization of projects, initiatives and programs meeting the aims and activity trends of the Fund.

In accordance with the above mentioned it is proposed to start ratification process of the Kyoto Protocol in Kazakhstan in three steps:

1. Address Parliament with a proposal to ratify the Kyoto protocol, and submit all the necessary documentation (2003).
2. Determine quantity commitments of the Republic of Kazakhstan taking into consideration the sustainable development interests and economic safety (2003-2005).
3. Agree the quantified emissions limitation and reduction commitments of Kazakhstan with other Parties and ratify the Kyoto Protocol, entering its Annex B (2006).

Country Report: Latvia

Prof. Dr. Dagnija Blumberga
Dr. Marika Blumberga
Riga Technical University

1 Recent developments regarding building renovation sector

Institutional policy development

Experts have indicated several reasons why until the year 2000 in Latvia not enough attention was paid to the questions related to housing sector:

- One of the reasons was the lack of human and financial resources.
- Another important reason was the unclearness of institutional structure because different questions regarding housing were of competence of different ministries like Ministry of Welfare, Ministry of Economy, Ministry of Justice and Ministry of Environmental Protection and Regional Development.

In May 2000 the decision was made and it was decided that all the questions related to housing policy become of competence of Building department of Ministry of Environmental Protection and Regional Development [1].

As in 2002 new parliament was elected, new reforms started due to which Ministry of Environmental Protection and Regional Development was restructured and established Ministry of Environment and Ministry of Regional Development and Local Governments. Due to reform Ministry of Regional Development and Local Governments (established in February 2003) is responsible for development of housing sector but Building Department of Ministry of Economy is in charge for building sector.

Implementation of housing policy has been committed to two institutions: State Agency "Housing Agency" and Technical Unit. Housing Agency was created with the main objective to implement unitary state policy of housing sector. Technical Unit until establishment of Ministry of Regional Development and Local Governments was institution under supervision of Ministry of Finance. The main task of this organization is to lead Housing project (for more information about project see chapter 1.1.2.).

It is not clear now, which of two Ministries will be responsible for energy efficiency and energy auditing issues in Latvia.

Sectoral policy development

One of the latest political documents developed in Latvia regarding energy efficiency is National Energy Efficiency Strategy that was approved in the end of 2000 (November 21st) by Cabinet of Ministers. The main objective of the document is to set a group of energy efficiency measures for to reduce primary energy consumption per gross national product unit by 25% by 2010. As the main instruments how to reach this objective are mentioned administrative methods, like regulation of public sector prices and adequate investments in infrastructure enterprises, due to the fact that it will be difficult for Latvia to change priorities from social to economic, reallocating financial resources to energy production or consumption sectors. Document affirms that governmental energy efficiency strategy is based on: informing the public, implementation of respective standards and economic motivation. Mainly self financing energy efficiency improvement measures will be supported [2].

Another important document prepared regarding energy efficiency and building renovation is Subprogram "Improvement of Heat Efficiency in Buildings" in National Program on Construction developed by Building department of Ministry of Environmental Protection and Regional Development in 2001. The Program is a set of activities to be accomplished by the government in the area of construction. One of the subprograms included in the Program is Improvement of Heat Efficiency in Buildings. It comprises characterization of the existing situation, more accurate specification of opportunities to save energy resources in buildings, including public buildings and residential houses, analyses the necessary financial resources for raising energy efficiency in buildings and payoff period of the investment [3].

In September 20, 2003 Latvia will held a referendum for joining European Union. If the outcome will be positive, Latvia will have to adopt different EU directives. One of those will be Directive 2002/97/EC on the Energy performance of buildings that was approved on 16 December 2002.

Regarding that on 14 of May the first draft conception report was presented for public discussions. Conception was prepared by Danish consulting company Rambøll in cooperation with Latvian consultant and Building Department of Ministry of Environmental Protection and Regional Development. The objective of preparation of this conception was to provide all the necessary information for Cabinet of Ministers of Latvia to make decision about implementation of two EU directives: EU SAVE directive 93/76/EEC and Directive 2002/91/EC on Energy performance of buildings. Four different alternatives have been proposed how Latvia could implement energy auditing system for buildings (more information about benefits of the proposed auditing system is given in Chapter 2). Currently document is analyzed by different ministries and is not yet accepted.

At the moment Building Department of Ministry of Economy and State Housing Agency are developing documents for implementation of Directive 2002/91/EC on Energy Performance in buildings that would be already one more step forward after conception.

Financial instruments

According to the Housing Policy Framework Document where is stated one of the main tasks – development of mortgaging program and establishment of mechanism for reconstruction, renovation, construction, purchase by applying for long term lower interest rate loans – Cabinet of Ministers in 1997 approved a new conception Housing Construction, Renovation and Modernization Long-Term Lending Conception. In the document are determined the main principles of housing loans, prior tasks for establishment of lending system for mortgaged housing and promotion activities of these loans. Implementation of above mentioned conception was delayed due to the lack of financial support however on June 2000 Cabinet of Ministers approved Housing Development Lending Program, and the first phase begun in December 2001. During the first phase of this program two subprograms were initiated: Housing project and Pilot program of housing program. Housing project started in 2002 and is dealing with legislation, institutional development and establishment of guarantee system. The project is financed by World Bank and is realizing by Technical Unit in Ministry of Finances. It was planned to finish the project in 2004 however it looks that World Bank will cancel the project due to several reasons connected with organizational and financial issues.

In the framework of Housing project, study about energy efficiency and housing component in Latvia was elaborated. 6 tasks were set for developers of the report to be looked at and described:

Task 1 Breakdown of the Latvian Housing Stock, Energy Saving Potential and Investment Calculation

Task 2 Booklet Development

Task 3 Proposals for the Development of the Legal Framework to Introduce the Building Energy Audit in Latvia

Task 4 and 5. Development of Building Energy Audit Methodology and Execution of Case Studies

Task 6 Proposals for the Development of the Housing Monitoring System in Latvia

In the same time in the framework of Pilot program of Housing program different financing mechanisms for multi-apartment houses were developed and financial sources were searched as well as loans for renovation of multi-apartment houses, purchasing and reconstruction of apartments have been issued. Pilot program was implementing Latvian Mortgage Bank from 2001 to 1st quarter of 2003. The second phase of Housing Development Lending Program started in the end of October 2002 with the objective to improve lending system and facilitate development of balanced segment of different housing to the EU standards [4].

2 Best practice policies and measures yielding ancillary socio-economic benefits

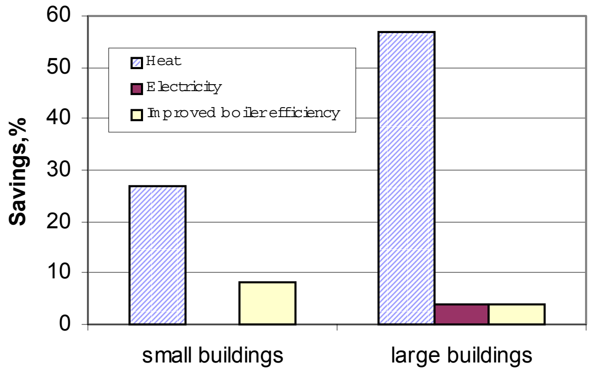
In this chapter are described main benefits that will be achieved due to implementation of the auditing system in Latvia. The data have been taken from the conception document [5] developed by Danish consulting company Rambøll in cooperation with Latvian consultant and Building Department of Ministry of Environmental Protection and Regional Development however it has not been approved yet.

Four models for the energy audit schemes are proposed in this document. Models for energy audit schemes are based on assumption: all models need to be completed in two phases: phase 1: 2004-2008; phase 2: 2009-2013.

- Model A: All buildings in phase one
- Model B: Large buildings in phase one
- Model C: As model A + integration of boiler inspection with energy auditing of large buildings in phase one
- Model D: Voluntary energy auditing of large buildings in phase one

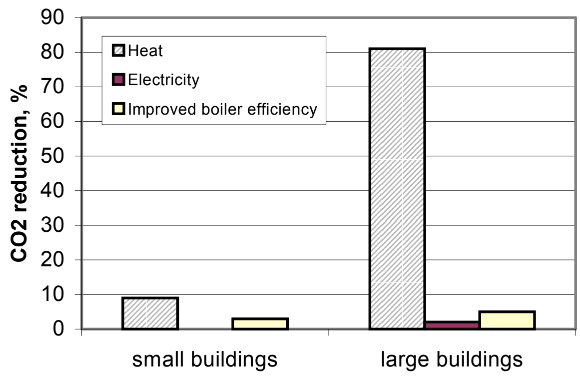
Effect analyses for the implementation of energy audits in different buildings shows that three types of savings have to be taken into account: heat energy savings, improvement of energy efficiency of boilers and electricity savings and the proportion between them in small buildings and large buildings is shown in figure 1.

Figure 1: Savings of energy in case of energy efficiency measures in buildings



If to continue analysis of effects of energy performance in buildings of Latvia, different picture is obtained for CO_2 reductions in case of implementation of energy efficiency measures in buildings of Latvia (see figure 2). Reason of difference between percentage of savings and CO_2 reduction is because of high potential of use of biomass in small buildings.

Figure 2: CO_2 reductions in case of implementation of energy performance in buildings in Latvia



An analysis shows that during implementation of one of alternatives mentioned above, which has to be taken into account, larger potential for fuel savings and CO_2 reductions is in large (multi-storey) buildings. Analysis of effects is continued by calculations of socio-economic indicators, investments, employment indicators as well as tax revenues (see table 1).

Table 1: Effects of energy performance in buildings in Latvia

	Units 1 € = 0.62 Ls	Model A or B	Model C	Model D
Socio-economic				
Total investments	MLVL	346	432	35
NPV of changes in costs, total	MLVL	-551	-684	-55
Total saved CO_2 emissions	1000t/year	338	414	34
Total extra CO_2 reduction costs	LVL/t CO_2	-154	-156	-152
Job creation				
Total salary costs in Latvia	MLVL	121	151	12
Average salary	LVL/year	3200	3200	3200
Extra job creation	Person years	37800	47300	3800
Tax revenue				
Income tax revenue	MLVL	56	70	6
VAT	MLVL	62	78	6
Total revenue for state	MLVL	118	147	12

According to results of calculation in case of selection of Model A or Model B investments could be in range of 346 million LVL. It will create following advantages:

- Savings equal to 551 million LVL;
- 38 000 new jobs;
- Total tax revenue will be 118 million LVL.

Better results (savings, employment, taxes) could be reached by use of Model C, but it needs higher investments.

3 Climate change mitigation and the use of the flexible mechanisms

The main institution in Latvia that is appointed as responsible for climate change mitigation is Ministry of Environment (previous Ministry of Environmental Protection and Regional Development). Department of Environmental Protection under the Ministry is in charge for preparation of National Communication and other legislative documents concerning climate change issues. Latvian Environmental Agency, which is under supervision of Ministry of Environment, is assigned as main institution that should annually report to the Conference of the Parties about GHG emissions and removals in Latvia.

Other institutions that are dealing with the climate change are State Hydrometeorology Board, Ministry of Economy, Ministry of Finance and Energy Department of the Latvian Development Agency [3].

Actual climate change mitigation programs and policies in Latvia

The main actual climate change mitigation program in Latvia is Climate Change Reduction Policy Plan that was developed in 1997-1998. As this plan is outdated, Ministry of Environment until 15 December 2003 should prepare a new Climate Change Reduction Policy Plan [6].

Still GHG emission mitigation in Latvia is not the primary goal of policies and measures but rather a side effect. This means that the Action Program for emission mitigation has not yet been developed and adopted in Latvia [3].

However Latvia in 2002 ratified Kyoto Protocol to the UNFCCC and later this year Ministry of Environmental Protection and Regional Development developed and the Cabinet of Ministers of Latvia approved Joint Implementation Strategy [7] where the position of Latvia and the main tasks and mechanisms of work of institutions, activities, deadlines and responsible institutions are stated.

The Regulation of the Cabinet of Ministers nominated Ministry of Environment as responsible institution for the implementation of the Strategy. The Ministry has set up the Joint Implementation Commission as well as established Joint Implementation Group. The Strategy of Joint Implementation for 2002–2012 includes sections as follows:

- Goals, objectives and expected results of JI strategy;
- Activities to implement the set goals and objectives;
- Activities, deadlines and responsible institutions;
- Financing needed for implementation of activities;
- Procedure of submission and evaluation of the report;
- Two annexes with comparison between two tracks as well as definitions.

For Action plan for JI strategy implementation see table 2.

Table 2: Action plan for JI activities

Activity	**Deadline**
Development of regulations on the JI Commission and submission to the cabinet of ministers	December 20th, 2002
Submission of the Ordinance of the Prime minister on establishment of the JI Commission to the Cabinet of Ministers	December 20th, 2002
Development and approval of Regulations on the JI Group	July 1st, 2003
Establishment of the JI Group	July 1st, 2003
Appointing of the contact point on JI issues	July 1st, 2003
Preparing guidelines for JI approval, monitoring and verification	October 1st, 2003
Translation of guidelines for preparation of annual reports on JI	November 1st, 2003
Creation of the web page	December 1st, 2003
Preparation of guidelines for project based emissions trading	May 1st, 2004
Supervision of projects	January 1st, 2003 – December 31st, 2012
Information report to the Cabinet of Ministers on implementation of activities laid down in the JI Strategy (2002-2012) as defined in UNFCCC Kyoto protocol	July 1st.2004 and further each year up to July 1st, 2012
Estimation of the assigned amounts and creation of the national system of estimation of GHG emissions and removals	January 1st, 2006
Creation of GHG registry	December 31st, 2006
Verification of JI documentation	January 1st, 2008 – December 31st, 2012
Reports on JI to the UNFCCC Secretariat	January 1st, 2008 – December 31st, 2012
Issue of ERU certification, ERU accounting and transfer	January 1st, 2008 – December 31st, 2012
Information report to the cabinet of Ministers projects implemented in scope of the JI Strategy (2002-2012) as defined in UNFCCC Kyoto protocol	July 1st, 2009 and further each year up to July 1st, 2012

Promising approaches and achievements in the field of capacity building were discussed in workshop with representatives from EU and Center for Clean Air Policy about project “Increase of legal capacity in emissions trading area in EU candidate countries” [8,11].

Experience of AIJ projects

27 AIJ (Activities Implemented Jointly – pilot phase for Joint Implementation) projects out of 72 in Central and East European countries have been implemented in Latvia. The joint projects with Sweden, Germany and Netherlands were realized covering following areas:

- Creation of new renewable energy sources using wind energy and biomass (16 projects);
- Rational use of environmentally adapted fuel in small capacity cogeneration plants (2 projects);
- Raising efficiency in energy transmission by reconstructing centralized district heating network (5 projects);
- Improvement of the final energy consumption efficiency by heat insulation of public buildings and introducing heat consumption regulation (4 projects) [3].

Implementation of these projects has given great influence during preparation of Joint Implementation Strategy.

Local experts in Latvia have gained experience during evaluation of projects in framework of Swedish Governmental Program “Environmentally adapted energy systems in the Baltic States and Eastern Europe” (EAES). Expertise of the first projects showed difficulties to obtain reliable data. Very important fact is that Latvian experts had a chance to learn about monitoring, verification and reporting of AIJ projects and this experience could be used very well for implementation of JI projects [9].

Planned JI projects and potential implementation risks

In the Joint Implementation Concept Latvia has declared which projects would be the greatest interest:

- Increase of energy efficiency:
  - Insulation of buildings;
  - Reconstruction of boiler houses and district heating networks;
  - Energy saving in industrial sector;
  - Improvement of public transport system.
- Use of renewable energy sources:
  - Collection of biogas in the landfills and further use of it;
  - Collection of biogas in the farms and further use of it;
  - Production and use of bio-fuel;
  - Use of wind, solar and geothermal energy sources.
- Installation of cogeneration units.
- Increase of CO_2 removals:
  - Targeted afforestation of abandoned agricultural land;
  - Increasing of forest productivity [10].

Ministry of Environment has indicated two main risks that should be taken into account in implementation of JI projects:

- Base scenario is not been calculated correct and therefore Latvia will have to deliver to the investor in period from 2008 to 2012 more ERU than it was practically gained during the project.
- Institutional gaps and lack of experience could lead to inequality during the discussions with project developers and investors could use the cheapest emission reduction options and leave the most expensive long-term projects to Latvia [10].

4 Making the Kyoto mechanisms work: Challenges ahead

Priorities of the government regarding the use of the three flexible mechanisms envisaged by the Kyoto Protocol

In the Joint Implementation Concept, Latvia has clearly stated that is CDM mechanism for Latvia is not necessary due to the fact that the level of GHG emissions in Latvia has greatly dropped comparing with 1990 [10].

Regarding Joint Implementation, Latvia has announced strong position for participation in JI projects (more detailed information is given in Chapter 3).

As Latvia could join EU in May 2004, Latvia will have to adopt EU Directive on Emission Trading and has initiated the preparation of National Allocation Plan. In the beginning of 2003 a study about emission trading and the possibilities for Latvia to participate in it was published. Until end of September Ministry of Environment is planning to finish preparation of amendments to the Law on Pollution, where issues regarding emission trading will be stated.

One of the main problems in Latvia for initiation of application of Flexible Mechanisms is lacking of administrative capacity in environmental institutions. The other problem stated by Ministry of Environment is the assignation of new functions for existing environmental institutions that would lead to more work and therefore lack of resources (specialists and equipment).

References / Documents / Links

[1] Mājokļu un īres normatīvo aktu un institucionālās struktūras pilnveidošanas koncepcija (Framework Document on Improvement of Regulatory Enactments on and Institutional Structure for Housing and Rents). Cabinet of Ministers. October 4, 2001.

[2] National Energy Efficiency Strategy. Ministry of Economy. Riga, 2000.

[3] Third National Communication of the Republic of Latvia under United Nations Framework Convention on Climate Change. Ministry of Environmental Protection and Regional Development. Riga, 2001.

[4] Mājokļu attīstības kreditēšanas programma (II posms) (Housing Development Lending Program (II phase)). Cabinet of Ministers. September 17, 2002.

[5] Conception Document – Implementation in Latvia of the EU-SAVE Directive 93/76/EEC and the EU Directive on Energy Performance in Buildings. Project. Rambøll, February 2003.

[6] Instruction of Prime Minister No.210 „Par darba grupu Ženēvas konvencijas par robežšķērsojošo gaisa piesārņošanu lielos attālumos pamatnostādņu un klimata pārmaiņu samazināšanas politikas plāna projekta izstrādei". 27 June 2002.

[7] Joint Implementation Strategy. Regulation of the Cabinet of Ministers No. 653. December, 2002

[8] Latvia and Emission Trading. Riga. Vides projekti. 2003

[9] A.Blumberga, D.Blumberga, I.Kass. The experiences of AIJ projects in Latvia. Basic information. Monitoring. Reporting. Evaluation. Paper in conference „Reports on AIJ projects and contributions to the discussion of the Kyoto mechanisms".

[10] Joint Implementation Concept as Defined in the Kyoto Protocol to the UN Framework Convention on Climate Change (2002-2012) approved by Cabinet of Ministers on April 30, 2002.

[11] EU Directive GHG Emission Trading //Materials of workshop. Riga May 15th, 2003

[12] The EU Emissions Trading Scheme: How to develop a National Allocation Plan //Workshop Brussels. April 1st, 2003

Country Report: Lithuania

Vytautas Krušinskas
Ministry of Environment

Dr. Kęstutis Buinevičius
Kaunas University of Technology

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

The strategy of environmental protection of Lithuania lists key provisions that shall be implemented in a drive to ensure sustainable development. The following environmental protection objectives are set for the sector of industry: orientation to the manufacturing producing less waste, less polluting the environment, saving natural and power resources and producing ecologically clean products, encouragement of manufacturing and use of packaging of multiple use and materials of multiple use, reprocessing of secondary raw materials and safe management of waste (harmful in particular), manufacturing of environmental protection equipment. The action plan, included in the strategy of environmental protection and envisioning the reduction of emissions of NO_x, SO_2, CO_2, volatile organic compounds from stationary and mobile sources, specifies that the companies shall regularly install advanced technologies not requiring any particular expenses, as well as design, manufacture and introduce technologies for neutralization of volatile organic compounds, treatment equipment and control the use thereof.

Policy of energy development. At present Lithuania is undergoing important reforms in the sphere of power plant structure. Further privatization of energetic sector, decommissioning of the Ignalina Nuclear Power Plant, reconstruction of the Lithuanian Power Plant working on fossil fuels, alongside with implementation of new modern technologies of renewable energy, hydrogen energy and fuel cells will be significant factors having a great importance not only in power engineering of our country, but also in economics, ecology and to a certain extent in studies, research and education. Selection of a term of exploitation of the Ignalina nuclear power station will have the essential impact on the development of power system of the state within the upcoming decade. Upon adoption of a decision on the date and terms of ultimate shutdown of the second reactor of the Ignalina nuclear power station a comprehensive technical audit of all power stations of Lithuania shall be carried out, including evaluation of the real situation and determination of factual term of further exploitation thereof; a detailed analysis of variants of modernization of operating power stations of Lithuania shall follow. Currently available information and the results of a technical-economic analysis lead to the conclusion that after the shutdown of both reactors of the Ignalina nuclear power station the least expenditures on the development and functioning of the power system and higher reliability of power supply could be assured through the modernization of the electric power station of Lithuania, which is the main source of power, as well as through additional installation of gas turbines, smoke treatment installations and striving to use fuel of at least two types, through modernization of thermal electric power stations in Vilnius and Kaunas, a hydroelectric power station of Kaunas, and through the erection of several new thermal electric power stations, the capacity of which would depend on the real rate of growth of power demand. If the prices of organic fuel were high in future, construction of high capacity new power stations – a combined cycle gas turbine power station and new thermal power stations – would be more expedient. Upon modernization of operating heating power stations current thermal electric power stations would be the source of manufacturing of the cheapest power, and the share of power produced thereby (including the output of new thermal electric power stations) would grow to 35-45 percent in the total balance of power by 2015-2020. The objective to integrate into the power system of the West highlights the need to lie a powerful link with Poland, which would create a possibility to export the surplus of power to the West and would also help to integrate into the European power market and boost the reliability of power supply.

Policy of construction development. Adjustment of activities and functions of various ministries or institutions under ministries in the sphere of construction. Creation of the system of legal acts and normative documents regulating the business of construction, harmonized with the EU requirements with consideration of the best practice of the world. Assurance of better correspondence of the structure of residential fund and the quality thereof to the needs of various layers of residents. Support of renovation of old accommodation, complex modernization of houses erected prior to more than 20 years. Provision of financial support for the arrangement of abandoned and ownerless constructions. Development of social accommodation construction for residents with low income. Attraction of international financial resources for the financing of accommodation, social accommodation, incomplete construction, modernization of buildings. Search and application of more efficient crediting means that would develop the market of accommodation crediting. Encouragement of Lithuanian construction companies to receive certificates issued by the institutions accredited by the European Union. Adoption of the EU construction standards, modernization of testing laboratories for the construction products with the aim to make the laboratories technically capable to execute tests in compliance with the EU requirements. Application of energetically efficient technologies producing the least pollution of the environment. Stimulation of use of waste of production of various branches of industry for construction. Organization of practical construction activities with the aim to ensure the maximum reduction of negative impact on the environment and the minimum use of power resources within the whole period of useful life of the construction.

Energy saving and efficient energy consumption, stimulation of producers and consumers to use effectively local, renewable and waste energy resources are the main objectives of the energy policy that are determined in the Law of Energy and National Energy Strategy. It was the first program in national economy after the restoration of Independence of Lithuania. Considering the current situation and development forecast of the national economy and its different branches, in 1996 the National Energy Efficiency Program was revised and approved by Government of Republic of Lithuania. According to the estimations the introduction of prioritized energy resources and energy saving measures would save about 25% of currently consumed energy resources in the country. Besides, the local and renewable energy resources could replace about 12-14% of current consumed primary energy resources.

2 Best practice policies and measures yielding ancillary socio-economic benefits

The consumption of local, renewable and waste energy resources allows saving the import resources as there is no need to purchase them longer. Also it provides the additional working place and improves the ecological conditions of the environment. The usable annual consumption of local, renewable and waste energy resources depends on a number of interrelate factors as well as on assumptions used in calculation presented in program are tentative quantities, which reflect the recent knowledge and provisions. Currently the consumption of local and renewable energy resources makes up 8 TWh per year. The utilized waste energy amounts to 0.93 TWh per year. The major part, i.e. 7 TWh per years, falls on the fire-wood that covers up to 8.5% of the national fuel balance. The possible energy production based on fire-wood makes up to 10 TWh per year. Not only the fire-wood, but also the wood waste of lumbering, forest's thinning and wood processing enterprises as well as the biomass of fast growing trees and bushes cultivated in plantations can be used for fuel. A number of joint stock companies, institutions and scientific institutes explore and implement the use of the fire-wood: JSC "Kazlu Rudos metalas", engineering company "Ardynas", the Lithuanian Energy Institute, etc. The utilization of the existing peat bogs and newly selected ones without a damage to the nature can allow consuming about 0.55 mio tons. of peat for fuel. The potential of peat fuel available to use is 1.4 TWh per year. In 1997 the operation of straw fired boilers was started in the country. The annual yield of straw is about 4.5 mio tons. About 10% of annual yield can be used as a fuel and this will result in 1.5 TWh. Currently there are about 15 straw fired boilers, capacity of which is equal to or greater than 0.5 MW. The total capacity of these boilers exceeds 10 MW. One of the most extensively used renewable energy resources is hydro energy. Technical, or realistically, hydro energy resources in country are assessed to be at 2.7TWh per year. At present more than 50 small HPPs have been already built or are being built. The total capacity of all them exceeds 8 MW and they produce about 0.04 TWh of electricity per year. The geothermal energy potential available to utilize is 0.8 TWh per year. The demonstration plant for the utilization of the geothermal energy was built in Klaipeda city. Energy consumption and saving possibilities in household and other non industrial buildings. Distribution of heat supply systems of residential buildings in Lithuania according to the living area of heated buildings in urban and rural territories is presented, considering that lately only inessential structural changes took place in this field.

The table below shows the Distribution of heat supply systems of residential buildings according to the living area of heated buildings in urban and rural territories

Table 1: Distribution of heat supply systems of residential buildings

	Urban		Rural	
	mill. m²	%	mill. m²	%
Central heating systems				
District heat supply	34	73	0.3	1
Heat supply from local boiler house	7	15	17	59
Local heating systems	6	12	12	40
Total	47	100	29	100

In 1998 the total consumption of final energy was 53.7 TWh, and 24.4 TWh whereof was consumed by residential and other non-industry buildings. During the period of 1993-2000 the average annual decrease of energy consumption for heat was 3.7%. Electricity consumption increased about 2%. The total annual average energy decrease in this sector was 3.3%. Buildings are technical systems, whose energy consumption efficiency is expressed by comparative factors, i.e. heat consumption of buildings of different height in kWh/m. The present situation of heat consumption has been forming during the construction process lasting about a century. Marginal heat losses determined by national regulation require to build the new buildings that have the heat demand for heating 63% less than the present buildings. These reference factors to improve the energy efficiency are recommended till 2005 the heat demand for heating to decrease by 25%, for hot water preparation – by 25%, till 2010 the heat demand for heating to decrease by 35% of the consumption in 2000.

These factors are possible to reach if the financing and subsidy system for the building renovation is functioning with assistance of World Bank and other donors coordinated by national authorities. At present with help donors' contributions 18 buildings were renovated and their monitoring was performed. The obtained results indicate that the implementation of 1 to 5 saving measures in the different residential buildings would save 8-57% heat (21.3% in average). The energy saving measures of the administrative and other public buildings consist of: 1) two technical groups, 2) energy management. The first technical group deals with heat supply systems, the second – related to the rehabilitation of different partitions (insulations of roof, external walls in separate cases, renovation of windows, replacement of windows) and other designed solutions. The implementation of renovation works of the first group in the administrative buildings could save about 0.07 TWh of heat and 0.03 TWh of fuel. The second renovation stage could save about 300 – 350 GWh of heat.

Table 2: Estimation of the total energy saving potential in households and main branches of economy (TWh)

Branch of economy or area of energy consumption	Consumed in 2000	Saving potential
Household:		
residential buildings	29.4	3.5
buildings of the service	3.4	1.3
sector	9.7	2.3
Industry	13.7	1.8
Transport	1.3	0.6
Agriculture		
Local, renewable energy resources	7.6*	17.9**

* energy production
** total potential of energy production

3 Climate change mitigation and the use of the flexible mechanisms

One of the main goals of environmental protection in Lithuania is the reduction of greenhouse gas emissions. Lithuania has ratified the United Nations Framework Climate Change Convention and Kyoto Protocol, which is intended to perform regulation of GHG emissions. Laws of Lithuania should be harmonized with corresponding laws of the European Union because of the future membership of Lithuania in this organization. Laws on the subject of environmental protection, energy efficiency improvement and consumption of renewable energy sources should be harmonized, too. Some national programs and strategies of development of particular branches of economy have already been established in order to meet such requirements.

Large part of EU requirements on reduction of environmental pollution in the sectors of energy and industry concerning assessment of air quality have already been implemented in Lithuania .Commitments of Lithuania, as well as of other European countries, according the Kyoto Protocol in 2008-2012 are to reduce GHG emissions by 8% based on 1990 level. Such requirements are set in Kyoto Protocol of United Nations Framework Convention on Climate Change (1997). In addition, Lithuania is obliged to assure, that till the year 2010 the emission of the following pollutants will fall short the following limits: emission of SO_2: $142 \cdot 10^3$ t/a, emission of NO_x: $110 \cdot 10^3$ t/a and emission of non-methane volatile organic compounds (VOC): $92 \cdot 10^3$t/a.

A decrease of fossil fuel consumption through utilization of renewable energy sources is intended in the National Energetic Strategy of Lithuania. The main renewable energy sources are wood, waste wood and peat.

Consumption of biomass as a fuel is increasing continuously in Lithuania as well as in other Baltic countries. Large amount of wood fuel is consumed both in heating of private buildings and boiler houses of large and small industrial enterprises. Such increase is caused by development of wood processing industry and increase in the price of solid and liquid fuel (heavy fuel oil, light fuel oil, coal). Some boiler houses are converted for consumption of wood fuel, waste wood and straw. Hards are used as a fuel in all flax processing plants of Lithuania. Burning of biomass influences decrease of environmental pollution (emission of SO_2 is very low). Biomass is the cheapest energy source in Lithuania at present. This is another reason for popularity of this kind of energy resource in industrial companies of Lithuania (the cost price of production decreases). Expenses for energy make a large part in the cost price of production for some key industries in Lithuania. It is very important for companies to reduce the cost price of production and this target could be realized by lowering the expenditures for the energy. Taxes on environmental pollution are applied for companies, which are sources of heavy environmental pollution. This is especially relevant for those companies, which consume heavy fuel oil, because consumption of heavy fuel oil with large content of sulfur is causing considerable emissions of SO_2. Taxes on environmental pollution could be lowered by consumption of biomass.

Consumption of wood in thermal boilers began during the energy crises of Lithuania in the early 90s. At the same time program of energy efficiency improvement was initiated by the Swedish National Energetic Administration. 10 projects have been implemented during this program. Most of them are related with conversion of boilers with regard to consumption of wood fuel.

According to the data of fuel balance of Lithuania, biomass fuel has similar share in the sectors “Industry” and “Commercial and public services” in 2001. The final energy from wood fuel achieves 1926 TJ in industry and 1674 TJ in commercial and public services.

More than 110 projects for utilization of wood, straw, peat and biogas for the generation of energy have been implemented in Lithuania till 2000. The largest part of energy is generated from wood (firewood, cutting residues, waste of wood processing factories). Consumption of wood fuel has started in 10 factories and boiler houses of central thermal power supply under the financial support of the Government of Sweden and technical support of Swedish companies. Under the support of PHARE program, Governments of Sweden, Denmark and other countries, the total capacity of wood fuel burning boilers in Lithuania reached more than 250 MW. The total capacity of straw burning boilers in Lithuania reaches more than 10 MW.

A lot of companies performed conversion of their boiler houses for consumption of wood and waste wood fuel in Lithuania using funds of their own or loans. There is no precise statistical data related with the total number of operating boiler houses of wood fuel input in Lithuania. Such data can be obtained by questioning companies of production and selling of equipment for wood fuel burning. During 2001-2003 JSC “Šilmeta” alone produced and installed more than 30 boilers of 0,3 – 3 MW capacity with the total capacity reaching approximately 40 MW. These numbers show the increase of demand of equipment for wood fuel burning and operation of wood fuel. The total capacity of biomass burning boilers in Lithuania reaches approximately 400 MW.

The pilot phase involved 7 Joint Implementation projects in 2000 – 2002. The projects below are all projects that have been investigated for financing with the allocation from the Swedish Baltic Billion Fund. The allocation is valid up to the end of year 2002. Description of few projects.

Didžiasalis

Didžiasalis is a small town with around 1 700 inhabitants . The project comprises a new production plant for the district heating system and a renovation of the distribution network from the new plant. Previously heat was supplied from a brick factory, which was closed down some years ago. This plant was worn out and too big for the present demand. Partly this project was financed in the form of a loan on favorable conditions from STEM .The financing from STEM was mainly used for procurement and installation of the equipment in the new boiler house consisting of a 3 MW bio-fuel boiler and 2 oil boilers for reserve and peak load, automatic fuel storage, flue gas cleaning etc. Around 2 600 tons of HFO has been replaced by bio-fuels. The payback time is calculated to 5,7 years. The emission reductions for the period 2008-2012 are estimated to around 25 400 tons of CO_2.

Utena

Utena is a town in the north-eastern part of Lithuania and have approximately 40 000 inhabitants. The district heating company Utena Heat Company (UST) has prepared a project for switching from gas/HFO to bio-fuel. The planned project comprises a base load boiler using bio-fuel with a capacity of 8 MW. The project will also include two new gas boilers of 14 MW each to replace two existing HFO fired boilers of 35 MW each. NEFCO has approved to finance around 50 % of the investment costs through a loan. STEM will furthermore provide technical assistance during the whole project preparation and implementation phase. It is expected that the bio-fuel boiler will provide for the base load with an annual production of 60 000 MWh. Total annual heat demand is calculated to 100 000 MWh. Losses in the networks are estimated to decrease from today's 25 % down to around 10 %. It is also calculated that heat demand will increase in the years to come. The emission reductions for the period 2008-2012 are estimated to around 59 500 tons of CO_2.

Kačerginė

Kačerginė Sanatorium for Children is situated just outside the city of Kaunas. The sanatorium is hosting around 100 children living there for different period to be treated for their diseases. The sanatorium was built in the beginning of 1960's. The buildings are poorly insulated and were originally constructed for summer use only. The heating system is in poor condition with leakages and heat losses. The boilers were originally designed for coal firing but have been provided with oil-burners of simple design. The total building area is 3 200 m^2, the average energy use has been calculated from noted oil consumption and amounts to 365 - 630 kWh/m^2. Total potential for energy reduction is estimated to 40 %.

The planned project comprises a new pre-fabricated boiler for wood chips of around 0.6 MW capacity. The new equipment, a complete installation including all necessary auxiliary components as heat exchangers and circulation pumps, is mounted in a container housing. Large-scale solar panels will be mounted on ground fixtures near-by the boiler house. The solar installation, including a storage tank will be dimensioned to cover the summer load for hot tap water consumption. New pre-insulated pipes will replace the existing distribution network cost. The project will be 100 % grant financed as demonstration project for the combination of wood fuel boiler and solar panels.

Lithuanian-Swedish wood fuel development project

The main aim of the project is to ascertain that increased use of wood fuel in Lithuania is based on sustainable forest development and to form a basis for the establishment a domestic bio-fuel market using residues from forest cuttings etc.

The project started in May 2000 and the first phase comprised an inventory of the forestry sector in Lithuania based on available data. The first phase also included the selection of a demonstration area. The report from the first phase was presented in January 2001 in English and in Lithuanian. The project is implemented together with Lithuanian forest and energy authorities and the Department of Forestry in the Ministry of Environment is the co-coordinator on the Lithuanian side. On the Swedish side the project is coordinated by the National Board of Forestry and its Forestry Administration in the region Värmland-Örebro. STEM stands for the main financing of the project through the special allocation from the Swedish Baltic Billion Fund. The second phase started in 2001 and has as its main task to implement a demonstration project in connection to one or more fuel conversion projects.

The selected demonstration area is the Rokiskis Region. The second phase started with a study tour in the southern part of Sweden in May 2001. A number of representatives of ministries, authorities, forestry administrations as well as a representative of the Association of Lithuanian Municipalities participated in the study tour. The work is divided into three Activity Groups: A. Silviculture, Technologies and Logistics, B. Business Development and C. National Institutional work. Practical demonstration work and calculations has been made in the Rokiskis Region and in May 2002 a mobile chipper will be delivered to the project for further practical demonstration activities.

Within the framework of the Phase II a minor research project is also going on, implemented by the Lithuanian Forest Research Institute in Kaunas. The main objectives of the research project are estimation of silvicultural measures and technologies allowing for take out of a higher amount of forest fuel, evaluation of the financial and work costs for extraction using different technologies of forest cuttings and transportation to the boilers as well as utilization of ashes from the boiler houses.

Šiauliai (Kairiai) landfill

The landfill body in Kairiai covers approx. an area of 16 ha with an upper surface of 8 ha. The proposed project includes a gas extraction system with a distribution pipeline to the Zokniai town-district where the gas will be burned in a boiler and the heat distributed to the district heating network. The boiler house in Zokniai will be a new boiler house for this town-district with a total capacity of 6 MW out of which around 2.5 MW is estimated as demand for summertime. Most of the summer load is expected to be based on landfill gas. In the boiler house one of the boilers could be designed only for use of gas from the landfill. The gas is expected to be extracted during 15 years in the amount of around 35 million m^3, equivalent to 156 GWh.

The proposed project comprises a gas extraction system for 20 vertical gas wells on the landfill, a gas distribution system and a gas utilization system. The 40-50 % of the financing is estimated to be in the form of a loan from NEFCO, 30-40 % in the form of a conditional grant from STEM and the remaining part financed locally. In addition STEM would provide technical assistance in the form of a grant during the whole project preparation and implementation period as well as for follow-up activities. The project is estimated to be very cost efficient and with a payback time of 3-4 years.

The emission reductions in the form of reduced leakage from the land fill are calculated to correspond to around 17 000 tons/year of CO_2, if also reduced use of natural gas is included, calculated to 2 500 tons/year of CO_2, the total emission reductions will be 19 500 tons/year of CO_2 and around 97 000 tons of CO_2 during the period 2008-2012.

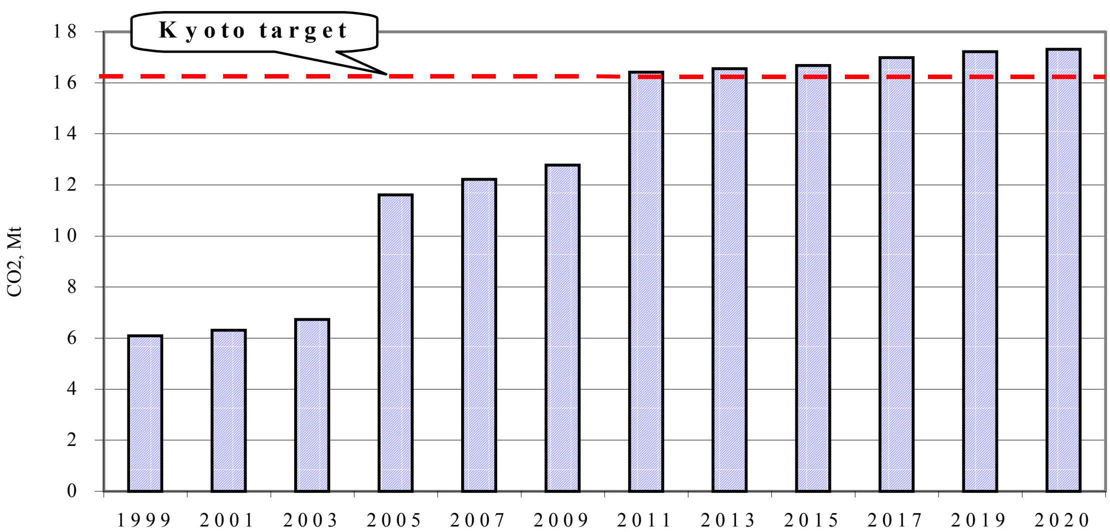
The Kairiai landfill is included in the EU-ISPA program and has partly another solution for the capture of the methane, either a torch for burning the gas or to use it for electricity production. Investigations are going on to clarify the situation and if there are possibilities to combine the two proposals.

4 Making the Kyoto mechanisms work: Challenges ahead

Commitments of Lithuania according the Kyoto Protocol in 2008-2012 are to reduce GHG emissions by 8% with regard to 1990 level. So, the limit for emission of CO_2 from stationary sources of energy generation would make $28 \cdot 10^6$ tons. Keeping to this limit depends on the future of Ignalina Nuclear Power Plant, development of industry, energy efficiency improvement and utilization of renewable energy sources. Ignalina NPP Unit-1 is intended to be decommissioned in 2005 and Unit-2 in 2010. Emission of CO_2 will increase after decommissioning of Ignalina NPP because the demand of electric energy will be covered by existing thermal power plants, i.e. by burning fossil fuel.

The largest emission of GHG in Lithuania falls to the sector of energetic, i.e. the sector of production of thermal and electric energy. A forecast of emission of CO_2 for this sector was performed by experts of Lithuanian Energy Institute.

Figure 1: Forecast of emission CO_2 in electric and thermal power generation sector



Emission of CO_2 from this sector will increase sharply in 2005 and 2011 after decommissioning of Ignalina NPP Unit-1 in 2004 and Unit-2 in 2010 correspondingly. After decommissioning of Ignalina Unit-2 in 2010 emission of CO_2 will achieve 16,3 Mt, 16,5 Mt in 2012 and 17,3 Mt in 2020. It can be stated according to such forecasts, that Kyoto target can not be implemented without additional measures for reduction of atmospheric pollution in the sector of electric and thermal energy generation. The main measures are as follows:

- to install modern technologies in energy production - progressive systems for consumption of organic fuel (cogeneration small and big scale CHP;
- to use fuel with less emissions of SO_2 or CO_2 – natural gas instead of heavy fuel oil;
- to renovate buildings and modernize their energy facilities.
- to use local, renewable and waste energy resources;
- to increase energy efficiency in the industrial processes;
- to perform information, education and consultation activities.

The main problems for Lithuania will occur due to implementation of Directive 1999/32/EC of European Union because usage of heavy fuel oil with large content of sulfur (more than 1 %) will not be allowed since 1 January 2003.

This directive was adopted as a law of Lithuania according to the order of Ministry of the Environment and Ministry of Communication of Republic of Lithuania “About confirmation of fuel quality indexes, related with environment protection”, issued on 31 August 2001. Under this order, consumption of heavy oil fuel containing more than 1 % of sulfur will be forbidden in territory of Republic of Lithuania since 1 January 2004. It will make great influence on consumption of fuel oil, because only two ways will be left – consumption of fuel oil with low content of sulfur or installation of equipment for cleaning of smoke. Price of energy, generated by using this type of fuel will rise in any way. Alternative way would be to switch on consumption of natural gas. This way requires large investments into development of system of gas supply.

Table 3: Consumption and forecast of indigenous and renewable energy resources, ktoe

TYPE OF RESOURCES	2000	2010
Wood and wood waste	619.8	795
Peat	11.2	31
Straw	2.5	12
Biogas	1.7	12
Wind energy	-	13
Solar energy	0.001	0.2
Geothermal energy	-	23
Bio-fuel	-	64
Municipal waste	-	17
Hydro energy	29.2	40
Total,	659.9	1007
% in primary energy balance	9.0	12.0

Due to this fact energy production by the means of renewable sources would be especially important in the whole Lithuania. One of the goal of the National Energetic Strategy of Lithuania (November 2002) is to achieve that renewable energy sources would share not less than 12 % in balance of primary energy by 2010.

All energy resources will have to be consumed depending on their possible impact on the environment and human health. All efforts should be made in order to remove all barriers to develop environmentally sound energy supply systems that encourage the sustainable development. In order to meet international requirements it is necessary:

- to reduce the emission of GHG by 8% till 2008-2012 comparing with 1990;
- to reduce the emissions of sulfur dioxide to the level, which is safe to the environment and most sensitive ecosystems;
- to pursue that the part of energy produced using the local and renewable energy resources would increase in the overall energy balance;
- in newly constructed and rehabilitated small energy objects of local importance the renewable energy resources should be encouraged and targeted to grow products for the production of energy resources;
- to create and develop the industry of bio-fuel by the preparation the national bio-fuel production and consumption program. To improve legal and normative base to stimulate the consumption of alternative and renewable energy resources;
- to encourage municipalities preparing the energy sector reconstruction and structural-regional development plans to utilize local energy resources on the largest possible scale;
- to introduce the economic mechanism to regulate the emissions of GHG in the context of the sustainable development of the national economy.

Reference / Documents / Links

Counties of Lithuania. Economic and social development. LR Statistikos departamentas, Vilnius. 2001

Lietuvos ūkio plėtros prognozė 2002-2005 metams. LR Finansų ministerija.

National Energy Strategy.www3.lrs.lt/cgi-in/prepc2?Condition1=197078&Condition2=

Jarmokas R. Nacionalinei energijos vartojimo efektyvumo didinimo programai – 10 metų // Statyba ir architektūra. 2002. Nr. 4 – 5. P.3-7.

Long-term Strategy of Economy Development in Lithuania. Strategy of Development of Energetics till year 2015. Project. December 2001

Energy in Lithuania 2001. Lithuanian Energy Institute, 2002.

Pasiūlymai dėl tam tikrų teršalų emisijos į orą mažinimo didelėse deginimo įmonėse, įgyvendinant ES Tarybos direktyvų 88/609/EEC , 2001/80/EC reikalavimus bei dėl sieros sunkiame kure sumažinimo iki 1 procento, įgyvendinant ES Tarybos direktyvos 1999/32/EC reikalavimus. Ataskaita, LEI.. LR Ūkio ministerija, Vilnius, 2002.

Elaboration of an exemplary energy-conception concerning the intensified supply of renewable energies in the region of apskritis Utena. Report. GERTEC- Kaunas university of technology, 2002.

Lithuania power system: www.lpc.lt

Statistical Department of Republic of Lithuania: www.lsd.lt

Lithuanian Ministry of Environmental: www.am.lt/

Lithuanian ministry of Economy: www.ekm.lt

Country Report: Republic of Macedonia

Energy Efficiency and Climate Change Mitigation

Prof. Dr. Konstantin Dimitrov
University of Sts. Cyril and Methodius, Faculty of Mechanical Engineering, Skopje

Tech. Ass. Ognen Dimitrov, dipl. mech. eng.
MACEF Macedonian Centre on Energy Efficiency

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

The Republic of Macedonia is a developing country of approximately 25713 km^2 and 2.1 million inhabitants. Its energy supply is based 50% on domestic fossil fuel and hydropower, and 50% on the import of liquid fuel and coal for industry and electricity. A significant part of the electricity generating capacity is thermal.

The Republic of Macedonia has been an independent country since 1991. It is also a country whose economy is in transition. Against this background, efforts dedicated towards implementing the provisions of the Energy Charter Treaty (ECT) and of the Protocol on Energy Efficiency and Related Environmental Aspects (PEREEA) have to be noted. The country ratified the ECT and PEEREA in September 1998.

The country is not rich in natural resources, with the exception of lignite and hydro. Fuel diversification and a reduced dependence on external resources are strong reasons for promoting energy savings. Increasing the penetration of natural gas and improving the interconnection with neighboring countries are high priorities.

The reorganization of the energy sector is seen as a priority. This refers especially to the electricity and gas sectors. In the gas sector the priority is to increase gas availability. The electricity sector suffers from severe problems of both inefficiency and consumer nonpayment. This situation causes great difficulties to operate under market conditions and to integrate the system into the European energy networks. The transformation of the public electricity enterprise into a joint stock company is underway.

The first Energy Efficiency Program in the country dates back to 1988 and was valid until 2000. The realization of the Program was formerly conducted through public announcements for co-financing of concrete projects in the field of saving, substitution and rational energy use. On the basis of established criteria, from the applied projects, a priority list of projects was prepared, i.e. projects that offer most favorable energy and economic effects, for which the Government gave its consent.

Within this Program, more than 100 projects have been realized by June 2000, which have led to a reduction in the total energy consumption of 8% annually. In the framework of these 100 projects, there are projects for use of geothermal energy, incorporation of solar collectors, using the heat of the recovered condensate, briquettes from wood waste for energy consumption, heating of urban areas, using natural gas etc.

In 1994, in absence of funds from the Republic's budget and with the aim of continuing the realization of this Program, credit funds amounting to 9 million DM from the European Bank for Reconstruction and Development were provided. The terms of this credit are 10 years repayment, including 2 years grace period and interest LIBOR+1.

In 1999 the government approved the long-term Program for Energy Efficiency, which will be valid until 2020. The main pillars of the Program are:

- Establishment of an Energy Efficiency Strategy and an Energy Efficiency Fund;
- Information and education on Energy Efficiency;
- Stimulation measures;
- Amendments to legislation;
- Fulfillment of international obligations.

The first activity to be achieved from the Program was the preparation of an Energy Efficiency Strategy (up to 2020). This is now under preparation and it is receiving technical and financial assistance from USAID. It will be completed by the end of 2003.

A major focus of attention for Energy Efficiency improvement is the household sector, where there is a very high potential for improvement: 18% of the total electricity used in households is for heating.

There are important barriers to Energy Efficiency, which have started to be addressed. These barriers are of a different nature:

- Financial: difficulties in providing financial support. An Energy Efficiency Fund will be created, but currently there are no adequate financial conditions for this. This is partially overcome by the use of money from other programs. There is very little private investment in energy efficiency and there are no ESCOs in operation;
- Legislative: legislation concerning Energy Efficiency is incomplete, although work is ongoing. Wider international co-operation is necessary in order to adapt the legislation of energy efficiency and environment of the country to EU legislation;
- Organizational: this remains a serious problem, as the Ministry of Economy has only 6 people working on Energy, including Energy Efficiency.

There have been programs to raise awareness, such as training for energy managers of enterprises and consultants for the industrial sector as well as courses and seminars directed to specific audiences in the service sector. There have also been financial programs for district heating upgrading, extension and construction of new networks, as well as for geothermal and solar energy and to improve energy efficiency in the industrial sector.

There is a Standardization Department in the **M**inistry of **E**nvironment and **P**hysical **P**lanning (MEPP) to harmonize national standards to EU standards in the field of Environment.

Macedonia participates in most of the major international forums (such as the climate change negotiations or PEEREA) on energy efficiency and environment and is receiving assistance from a number of international institutions, as well as bilateral aid from a number of countries, such as Japan, Austria and the Netherlands.

In the State there is a great potential for saving, substitution and rational use of energy in households. The energy types used in the households are the following: electricity, heat, heating wood and coal. From the total electricity consumption in the Republic 40% is used in households, and 18% of it is used for heating.

Hence, the following activities for more efficient energy use in households would be directed towards:

- extending existing heating systems and construction of new ones, especially in the bigger urban areas,
- creation of conditions for faster and more massive connection of the households to the gas system,
- extending the geothermal systems in the region where the geo-thermal water is used for connection of the households and enhancing the use of solar energy, which so far has only been used in very few households and hotels.

2 Best practice policies and measures yielding ancillary socio-economic benefits

The only renewable energy sources that are used to any extent in the Republic of Macedonia are geothermal and wood. According to the Macedonian State Energy Balance (SEB), wood provides an average of 2 660 gigawatt-hours of energy annually. This is estimated by the SEB to be about 8.9 per cent of total primary energy used in the State. Residential heating is almost the only use for this energy.

There are five major applications that use geothermal resources, all are for heat generation. Consumption is small, about 210 gigawatt-hours of energy annually - 90% of this is for heating agricultural greenhouses.

There are various resource springs of geothermal energy in the country, the best known being in Kochani, Vinica, Strumica and Gevgelija.

Republic of Macedonia has over a 30-year tradition in geothermal energy utilization. The oil crisis of the 1970s and 1980s provided a fresh impetus for assessment and exploration of potential systems in fractured aquifers, and for development of applications of low-enthalpy thermal water. There are 15 projects for heating greenhouses, drying agricultural products, space heating, swimming pools heating, sanitary warm water preparation, industrial uses, etc.

The development of alternative domestic energy sources had received considerable attention in recent years, including numerous efforts to assess and to develop geothermal energy for greenhouses and space heating. This activity is moderate, because of political conditions in the State, after secession from former SFR Yugoslavia.

Kocani geothermal project. In the region of Kocani where 18 ha of glasshouses have been heated geothermal since 1982, as well as a rice-drying plant. Non-corrosive water permitted a simple technical design. A successful new borehole, which increased the flow rate to 450 l/s, opened the way for introducing geothermal energy in industry (paper industry and factory for vehicle parts production) and the heating of dwellings. A few potential industrial consumers are in the process of adaptation or are planning for a direct connection to the system.

The significant difference in the contents of suspended solids and dissolved iron between unused and used water causes the following problems:

- the re-injected water continuously contaminates the aquifer;
- the pumped water contaminates the river into which it is dumped;
- corrosion of the piping system.

In order to neutralize the aggressive effects of used thermal water, a treatment plant is designed.

Bansko geothermal project. The initial agriculture geothermal energy utilization has commenced in Bansko. A 2.2 ha out-of-date glasshouse is supplied with heating fluid from the thermal spring. The low corrosivity water is used directly in the steel-pipe heating installation. The Car Samoil hotel, built near the spring, is now using thermal water for central heating, sanitary and balneological purposes. The part of the installations for Hotel Car Samuil are properly connected to the source and working more-or-less according to the designed conditions. The greenhouse installations are connected wrongly and disturb the proper use of the total system. Other hotels partially are connected, or have not yet finalized the access to the system connection. Heating installations of plastic-houses are of temporary nature and use only the effluent water.

Gevgelia geothermal project. This project comprises of two parts: the first an agricultural project supplied with geothermal energy from the springs from locality Smokvica with 15 MW installed capacity, and the second is an balneological project supplying the hotel complex with energy for central heating, sanitary and balneological purposes from another locality at Negorcy, 10 km far from the Smokvica. Initial irregularities with the inappropriate direct connection of 22.5 ha of glasshouses to the aggressive geothermal water are still not removed completely. The connection line is badly corroded, causing problems in exploitation. Steel heating installations are nearly completely corroded and out of use. New installations of PP (polypropylene) corrugated pipes are under successful exploitation.

Vinica geothermal project. The geothermal energy of approximately 14 160 kWh annually is used for heating of 6 ha glasshouses. The project is not finished. The installation of aerial steel pipes, is not in use continuously and a great part of the connection line and connecting installations is corroded. Heating installations are not adjusted properly for geothermal energy use.

The share of geothermal in the total energy consumption is 0.5% and it is of significant importance at a local level in those regions where it exists.

Further investigations and development continue with re-injection of used thermal water, modernization and rehabilitation of old fashion greenhouses and increasing of number of dwellings heated by geothermal energy.

At the moment, because of political circumstances around Macedonia, the economic situation is influencing very much the development of the geothermal systems, especially discouraging the new industrial consumers. However, the integrated geothermal systems already passed numerous obstructions, and it is to believe that this one shall be passed, too. The acceptable price of geothermal energy and its environmental advantages give us the right to believe in prosperous future of wider direct application of geothermal energy.

The introduction of natural gas into the Republic of Macedonia has been planned since the 70s. There is a gas pipeline connected to the transit pipeline that runs from Russia through Ukraine, Moldova, Romania, Bulgaria and on towards Greece and Turkey.

The main gas pipeline from Bulgaria has a 500 mm diameter and is 100 km long. It extends to Skopje with 5 branch lines to adjacent small cities. The total capacity of the gas pipeline is 800 million m^3 /year, with the possibility of it increasing to 1 200 till 1 300 m^3 /year.

There is a 30 km long pipeline distribution system supplying industrial consumers, i.e. 13 enterprises in Skopje and 4 in other cities. Given the current economic situation, the gas pipeline capacity is used very little, mainly for industrial consumers.

3 Climate change mitigation and the use of the flexible mechanisms

The leading role in the implementation of the Convention on climate change falls within the competence of the MEPP, in cooperation with other ministries.

To address the problem of climate change more effectively, a Climate Change Project Unit, within the MEPP is established. The Macedonian Government has also appointed the National Climate Change Committee entitled to supervise and co-ordinate the implementation of the projects and climate change related issues.

The Ministry of Economy (i.e. the Energy Sector which is a part of its structure) is the Institution responsible for the implementation of Energy Policy, while the MEPP is the institution in charge of implementing the Environmental Policy. It is in the domain of its work to also cover the energy/environmental aspect. The Ministry of Economy (i.e. the Energy Sector) is the Institution responsible for the preparation of the legislation in energy, energy efficiency and energy price policies, in consultation with the MEPP when the environment protection and promotion aspects are concerned.

There is no specific Energy Efficiency Law. The Energy Law (Official Gazette No 47/97 and its Amendments O.G. No 40/99 and 98/2000) is the main law covering Energy Efficiency.

The institutions that are part of the MEPP (the Agency of Environment and the State Inspectorate of Environment) participate in the process of environmental policy implementation and monitoring without neglecting the energy policy aspects. The Institution that is directly included in project financing in the energy efficiency sphere is, currently, the Fund of Environment and Nature Protection and Promotion. At present there is a discussion related to finding the best location for a future Energy Efficiency Fund (which will be established when certain financial conditions are created), either as a newly established Fund within the competence of the Ministry of Economy, or as part of the already existing Fund of Environment.

The contracting parties are obliged to build a policy for economic, efficient and environmentally friendly energy use. The MEPP adheres to these trends and objectives in all areas. The guidance for gaining energy efficiency is directed towards interventions in five categories: strategic, organizational, economic, regulatory and technological. The strategic aim of the MEPP stresses, among others, the management integrity, i.e. promotion of mutual responsibility in the implementation of the concept of energy efficiency and energy sustainable use.

Recommendations regarding the technological aspect are an application of this mutual approach. They anticipate changes, i.e. improvements in the already existing processes for different reasons that will indirectly result in energy efficiency. It should be stressed that in the Working Program of the MEPP, adopted by the Government, there are activities related to the largest polluters in the Republic. Proposals - applications were prepared on this issue, with a common purpose: promotion and realization of the concept of cleaner production also improving energy efficiency. Governmental Decision identified 8 legal entities as priority entities looking for investment in technology transfer. Financing will be secured by concession loans and by giving a state guarantee to the realization of the loans. For some of these entities the EU is financing projects in the field of environmental improvement. For the others, the government is taking measures for the replacement of the debt towards the Paris Club of creditors in environmental investment.

Furthermore, concerning economic actions, the recommendations are for integrating environmental costs into energy prices, because the more the price expresses the costs of energy production integrating environmental costs, the higher is the potential for energy savings (Eco-tax). The concept of an Eco-tax is contained in the Law on Environment and Nature Protection and Promotion and its practical application is expected. There are no environmental taxes or levies in the Republic of Macedonia.

In the regulatory domain, the recommendation is to stimulate energy efficiency and environmental protection measures in all means of transport by applying obligatory standards. Here the Strategy for phasing out leaded petrol can be mentioned, which is also planned in the Ministry's Working Program, and is part of the Sectoral Operational Program.

Increasing awareness of the final users for energy saving and its rational use, as well as use of alternative and renewable sources of energy, through campaigns, marketing and education, is certainly one of the more successful ways for promoting energy efficiency and energy sustainable use. The Environmental Information Center and the Public Relations Office within the MEPP (which were established in 1998) are the implementing institutions in this domain.

Environmental policy is included as part of the promotion of the energy efficiency concept, through active project financing relating energy efficiency and energy savings, as well as through an active inclusion in the campaigns for raising public awareness in this sphere.

In the basic Law on Environment and Nature Protection and Promotion, and in its changes, there are provisions concerning the reduction of any negative impacts on the environment from the energy sector. According to this Law, the MEPP shall issue decisions on integrated pollution prevention and control, which estimate the environmental-technological projects positively and is a condition for starting the activity. One of the aspects covered is the energy/ environmental aspect. The analysis of this aspect estimates the probable levels for environment pollution by emission of polluting substances when using certain types of energies. This level of emission is compared with the maximum allowed level and measures for energy savings are proposed, (ex. alternative sources of energy), as well as measures for environment protection energy/environmental aspect.

The GHG abatement measures were projected in such a way that they follow the present status of the Macedonian economy and its possibilities for development.

4 Making the Kyoto mechanisms work

The Republic of Macedonia is a party to the Framework United Nations Convention on Climate Change as a non-Annex I party, and therefore has no obligation for emissions reduction. The Convention was ratified in 1997, and entered into force in April 1998. According to the Convention, during the next three years since the day it entered into force, Macedonia was obligate to submit its first National Communication on Climate Change and it is realized.

The Republic of Macedonia has not ratified:

- 1985 Protocol on the Reduction of Sulfur Emissions or their Trans boundary Fluxes by at least 30 %, Helsinki, July, 1985.
- 1988 Protocol concerning the Control of Emission of Nitrogen Oxides or their Trans boundary Fluxes, Sofia, October 1988.
- 1998 Protocol concerning the Further reduction of Sulfur Emission (Oslo, June, 1994) .

For the purpose of addressing the problem of climate change more effectively, the Government established a National Climate Change Committee (NCCC), consisting of representatives from relevant Ministries, academic, private sector and NGOs. NCCC is responsible for overseeing the national policy and the process of implementation of the UNFCCC at a national level, developing negotiating positions and strategies for the Government of Macedonia for meetings of the CoP of the UNFCCC, etc.

For daily management and coordination of the implementation of the project for preparation of the First National Communication, the Project office was established within the MEPP. Preparation of the National Communication is the first step in the actual implementation of the UNFCCC in the country. The intention is this office to become an integral part of the Ministry. Further capacity building activities with regard to climate change issues are of the highest priority, including activities for strengthening institutional capacities to prepare analyses related to thematic areas of the communication, as well as activities for strengthening the capacity of the country to contribute on the international negotiations related to climate change, and to analyze the opportunities and obligations that the new initiatives and commitments are posing at national level.

The National Communication of Macedonia is the first national report on the country's conditions regarding climate change issues, prepared following the guidelines adopted by CoP for preparation of national communications by Parties not included in Annex I to the Convention. Preparation of the National Communication is seen as an initial step in the actual implementation of the UNFCCC in the country. It allowed development of expertise in each sector involved in the preparation of the National Communication, enhanced institutional and technical capacities in these fields and increased the public awareness concerning the UNFCCC and climate change related issues. This report contains the analyses, results and recommendations of technical expertise undertaken by expert institutions in the country that implemented complex activities in the thematic areas, fully utilizing the resources and results of relevant prior or ongoing national and international related activities. The three main thematic areas in the National communication are following:

1. the inventory of GHG emissions by sources and removals by sinks, following the guidelines from IPCC, for the base year 1994 and periodical series for 1990-1998 for the three main greenhouse gases - CO_2, N_2O and CH_4;

2. the assessment of potential impacts of climate change on the most vulnerable sectors of the country - agriculture, forestry, water resources, natural ecosystems and human health, and adaptation measures for each sector, considering the specific geographical and climatological characteristics of the country;
3. the GHG abatement analysis and potential measures to abate the projected increase in GHG emissions, for both energy and non-energy sectors.

During project implementation, several workshops were organized on the thematic areas of the National Communication. The workshops were divided in two phases: in the first phase methodologies, tools, experiences and approaches of the countries in the region for analysis in particular thematic areas were presented. In the second phase, results from analysis and related response measures were presented and discussed. The workshops contributed to strengthening technical capacity, enhancing knowledge and exchange of experience about climate change issues among academic sector, civil servants in relevant state institutions, private sector and NGOs in the country. National experts participated in the regional workshops, organized by the National Communications Support Program, which contributed to experience accumulation and establishing links for information exchange among experts on the particular thematic areas.

In the scope of several Institutions is now making the record on greenhouse gasses. SO_2 emissions are monitored and calculated according to European regulations, but the final record of Polluters has not been finished yet, so about 80% of the polluters are not taken into account. Ratification of the Protocols regarding the Convention on long-range Transboundary Air Pollution are part of the Working Program of the Ministry as a short term goal but, due to staff shortages (due to the International Monetary Fund restrictions) the procedure will take longer than expected.

Atmospheric observations and research are carried out by the Hydro-Meteorological Service (HMS) of Macedonia within the Ministry of agriculture, forestry and water management. Climate-meteorological observations are carried out by 270 stations as follows: 16 main, 6 meteorological hail suppression stations, 21 regular (two of them are for urban climatology), 26 phenological, 1 aerological and 200 precipitation stations. In order to improve the existing databases and to carry out the research of mezzo-scale and micro-scale climate systems, the number of measure points for hydro-meteorological parameters need to be increased. Modernization of the hydro-meteorological network for information exchange archives and publication is needed, as well as establishment and renewal of observations that are not yet in function. It is necessary to carry out permanent activities for systematic observation and monitoring of GHG emissions and their reductions. For this purpose a capacity building is projected within the MEPP, through opening a permanent office within the Ministry in order to coordinate and initiate activities at national level.

An important share of training and education in the area of climate change has been contributed by NGOs in the form of lectures, advisory services, and campaigns. NGOs also play an important role in popularizing the use of renewable sources of energy, the efficient use of energy, environment-friendly traffic, the use of bicycles instead of cars in urban areas.

Barriers. In the course of the realization of the activities in the field of energy efficiency the main obstacles that exist are of a financial, legislative and organizational nature, i.e. difficulties in providing financial support for these activities, incomplete regulation, and inadequate organization of the energy sector.

Legislative barriers derive from the non-existence of an Energy Efficiency Law and a Strategy for Energy Efficiency in the forthcoming period. This is so far overcome through partial treatment of Energy Efficiency within the Energy Law and the Program for Rational Use of Energy until 2020.

Financial barriers derive from the lack of an Energy Efficiency Fund. This is solved partially and incidentally by providing funds from various other sources (such as grants, donations, favorable credits, budget resources and other).

Providing funds are the starting points, upon which, the realization of the rest of the activities in the energy efficiency field depend.

The institutional problem is a serious one. The Ministry of Economy has only five employees responsible for Energy (and not only for Energy Efficiency).

With the aim of adapting to EU legislation on energy efficiency and environment and achieving the expected effects, it is necessary to have co-operation and exchange of experiences among the countries of the region. Wider co-operation is necessary for the implementation of energy efficiency activities, as well as for providing financial support to these activities.

Unfortunately, the awareness about climate change issues in Macedonia has not been raised at a sufficient level until now.

The process for the preparation of the First National Communication on Climate Change has positively contributed to awareness rising among all relevant stakeholders. Within the preparation of the National Communication, a public awareness campaign was carried out.

In all educational degrees, through various educational matters, the environmental issues are partially introduced. However, it does not correspond to the real needs. Preparation of special programs for environmental education is recommended to start as soon as possible. Publishing books and other printed materials with topics related to the environment, as well as climate change, should be a good contribution to the education of students, engineers, and the public in general.

References / Documents / Links

Law on Environment and Nature Protection and Improvement, "The Official Gazette of RM" No: 51/00, revised version, as a framework law in this area

Law on Air Protection against Pollution, "The Official Gazette of SRM" No. 20/74, 6/81, 10/90 and 62/93

Law on Energy Sector, "The Official Gazette of SRM" No. 47/97, revised in 2000

Law on Waste, "The Official Gazette of SRM" No. 37/98

Law on Public Hygiene and on Communal Solid and Technological Waste Gathering and Transportation, "The Official Gazette of SRM" No. 37/98

National Environmental Action Plan, Ministry of Environment and Physical Planning, 1997, under revision

Physical Plan of the Republic of Macedonia, Spatial Planning Management, 1998

National Human Development Reports, supported by UNDP, Skopje, 2001

National Development Strategy for Macedonia, Development and Modernization, Macedonian Academy of Sciences and Arts (MASA), 1997

Energy Sector Development Strategy for Macedonia, ELECTROTEK, MASA, Ministry of Economy of the Republic of Macedonia, supported by USAID, 2000

Energy efficiency strategy of Macedonia up to 2020, under preparation, Nexant - USA, Team of local consultants, supported by USAID

Energy efficiency Protocol and related environmental aspects, Regular review of the EU Energy Charter for Macedonia, 2001

Energy policy in the EU Countries concerning environmental protection and energy efficiency: Possibilities for implementation in Macedonia, Synergy project, supported by EU

Assessment of Macedonia's Geothermal Resources, supported by World Bank, 2001

Introduction of natural gas in energy consumption in the households, study

Small Scale Co-generation Systems in Macedonia, supported by PHARE, studies, 2000

"Development of mini-hydropower plant", project supported by GEF

Rehabilitation of Small Hydropower Plants in Macedonia, study supported by Ecolinks, 2001

Renewal energy sources in Macedonia, studies

New standards for the quality of liquid fuels

Country Report: Moldova

Ruslan Surugiu
Alliance to Save Energy

Lucia Lavric
Consultant

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

1.1 RES policy developments

Most policy developments regarding the use of RES in Moldova took place in 2000.

- The Energy Strategy of the Republic of Moldova until 2010 adopted in 2000 is a comprehensive document, which included a range of objectives and development perspectives for Moldova's Energy sector. These goals include
  - Encouragement of energy efficiency and energy conservation,
  - Assurance of the state's energy security and
  - Protection of the environment,

  and their achievement involves a higher utilization of domestic energy sources, which are all renewable.

According to the Energy Strategy, energy consumption will quadruple until the year 2010 and the use of RES will suffer a six-fold increase, which will make the share of RES in total energy consumption grow from the current 4.94% to 12.5%. This would involve about 70% of biomass, 14%--hydro, 10% solar energy and 5% of wind energy.

Note: The assumptions on which the Energy Strategy is based may be inaccurate: the expectation is that GDP would grow by much less than the energy consumption, i.e. the strategy assumes that the energy intensity of Moldova would double. This is not realistic in the current conditions of the energy market. Depending on other factors, this may affect the projected ratio of RES in Moldova's energy consumption structure.

- The Resolution of the Government No. 1092 of 2000 concerning the Utilization of Renewable Energy Sources includes a comprehensive list of intentions corresponding to the Energy Strategy, but these do not include specific state programs for the promotion of RES, no funds from the state budget have been allocated for this purpose.
- The Law on Energy Conservation from 2000 stipulates the creation of a scientific, practical, technical, economic and informational infrastructure that would promote along with the rational use of energy resources the introduction in the economy of more renewable energy source.
- The Action Plan until the year 2010 stipulates the creation of an educational centre for the promotion of energy efficiency and RES in 2003 and the elaboration of the Law on the Utilization of Renewable Energy Sources in 2005.

An important concern regarding the envisaged legislation pieces addressed at promoting RES is raised by the fact that the Government is not planning to change the general energy and electricity laws, but is rather planning to deal with this problem separately. Another worrying factor is the vagueness of the plans about the way RES intentions will be financed.

1.2 Financing structures

- The Law on Energy Conservation from 2000 indicates the creation of a National Fund for Energy Conservation. The state budget is the only financial source for the moment, which is not sufficient for a proper operation of the Fund. Furthermore, it is not determined specifically what share of finance is to be used for energy conservation and what for RES.
- The Resolution of the Government No. 1092 of 2000 concerning the Utilization of Renewable Energy Sources stipulates that the envisaged projects will be financed from development funds and the funds created with the purpose of supporting energy conservation activities, the profits from the difference in the costs of renewable energy and fossil fuels, and from donations from international organizations." These financial plans are unsatisfactory because of their vagueness and also because they imply that the Government is expecting a net profit from the introduction of RES, which in fact usually requires significant subsidies in the initial stages.

There are no provisions for the renewable energy to be purchased at a guaranteed price, as is the case in many EU member states. However, this would not be realistic in Moldova's current economic situation. Therefore, the major part of the financing for the further introduction of RES is likely to originate from foreign donors and investors. Currently two such projects are operating on Moldova's territory, both of which are biogas installations[1]:

- at the poultry firm in Vadul-lui-Voda with the help of the Dutch PSO project and
- in a rural farm in Cotova, Soroca judet financed by the Dutch NGO "NOVIB."

In addition, with the help of a grant from the Government of Denmark, another biogas installation is envisaged at the sewerage station of Chisinau.

1.3 Biomass project description

In August 2002, a biogas installation was commissioned at the poultry farm from Vadul-lui-Voda. The system will use the energy of the poultry waste for the fermentation of biogas; the capacity of the fermentor is 700 m.[3] The biogas is used for a CHP with the electricity generation capacity of 87 kW and 116 kW heating capacity. The heat is currently only used for some washing processes in the poultry farm itself because there is no network for the distribution of hot water even within the farm. The cost of the installation is around € 350,000, and the total cost of the project is € 500,000.[2]

1.4 Unexploited potential

Especially with regards to the Kyoto Protocol mechanisms, there are human resources assets in the country that are not being fully utilized. For example, the Technical University of Moldova has performed in the 80s experiments on biomass potential in the sugar, spirits, and wine industries as well as in agriculture—more specifically for pig and poultry farms. The academic staff had arranged relations with the Agricultural Departments, installation construction workshops and with biology experts. Although many of the organizational connections would not be relevant in today's context, the experience of the academic staff may prove useful.

2 Best practice policies and measures yielding ancillary socio-economic benefits

The policies described in Section 1 above will be implemented in the years to come, hence it is only possible to comment on the limited past experience of the three implemented projects and on the predictions about the effects of the measures foreseen in the existing strategies.

The biogas projects in Vadul-lui-Voda and Soroca did not create additional jobs, however in Vadul-lui-Voda, the employee currently operating the biogas installation has participated in the construction works of the project and received on the job training. These skills and knowledge could be used for the implementation of similar projects in Moldova, which would reduce the costs for foreign consultancy services.

According to the Chief engineer of the poultry factory, Ion Nistreanu, the main ancillary benefit of the project is that of reducing the waste stream from the farm. Previously, the waste was transported to accumulation lakes, which were overfilled and toxic substances were flowing into the ground water.

Since the enforcement of environmental protection legislation is very weak, current economic activities are accompanied by various negative externalities, the costs of which are not monetarized. What in other circumstances would be included in the cost-benefit analysis of an enterprise (for example the true cost of waste disposal) and would add to the economic profitability of RES installations would rather be included in the social equation. Hence, the social benefits of introducing RES would be those of reducing local pollution such as that arising from organic waste, the burning of fossil fuels, etc.

In addition, many of the small-scale renewables generation can be located in rural areas where 54% of the population lives. The unemployment rate in these areas is very high, and job creation would contribute to the development of the local economy. According to a study by the SEETEC project, the implementation of the Energy Strategy to 2010 would lead to the creation of 5,000 new jobs, the majority of which would be in rural areas.

1 xtracted from unpublished Draft Framework Program of the National Strategy for promotion and implementation of renewable sources of energy in Republic of Moldova.

2 nformation from personal interviews Dumitru Ungureanu, Biomass specialist at the Technical University, Moldova and from Ion Nistreanu, chief engineer of the Vadul-lui-Voda poultry farm

3 Climate change mitigation and the use of flexible mechanisms: State of the art

3.1 Climate change mitigation policies

The Ministry of the Environment and Territorial Development is the authority designated to deal with the implementation of the UNFCCC and the Kyoto Protocol.

Currently in Moldova there are no direct climate change mitigation policies and no AIJ projects have been implemented.

Other policies that may lead to relevant secondary results are those aimed at energy efficiency improvements, the introduction of renewable energy sources, and environmental protection, such as:

- The National Program for ecological security approved by the Decision of the Government no. 447 of April 14, 2003
- The national strategic Action Program for Environment Protection, 1995
- National strategy for a Sustainable Development - "Moldova 21", elaborated in the year 2000 within the UNO Program Capacity 21
- The Energy Strategy of the Republic of Moldova until 2010, Government Resolution No. 360, of 11.04.2000
- The Law on Energy Conservation No. 1136-XIV of 13.07.2000
- The Resolution of the Government No. 1092 of 30.10.2000 concerning the Utilization of Renewable Energy Sources.

Strengths

- In the laws above, it is envisaged that an educational demonstration center for the promotion of energy efficiency and renewable energy will be created. Such a center would increase the public awareness about these important issues for the energy sector and would contribute to a more successful implementation of the various measures that are to be taken.
- The strategy does not stipulate a drastic change in the RES share or in energy efficiency—this would not be realistic under the current circumstances, hence an advantage of the existing framework is its feasibility.

Weaknesses

- The enforcement of environmental legislation is very limited;
- The financial or institutional support from the state for the introduction of renewable energy sources is almost inexistent;
- Neither the legislation on energy efficiency improvements nor that on the utilization of renewable energy sources stipulates changing other laws or procedures, the current form of which creates an impediment for the implementation of the RES and energy efficiency laws. For example, the current property structure and technical structure of the buildings creates problems for the implementation of energy efficiency measures on the building level as well as there is no incentive for apartment owners to implement energy efficiency measures on the apartment level (for example the use of heat). The efforts of the government are discrete rather than holistic, which will delay or prevent the implementation of these important laws;
- Some of the documents listed above do not have a sound scientific or economic grounding. This may lead to difficulties in the process of implementation.

3.2 Capacity development

The main relevant capacity development efforts are those under the UNFCCC, the UN-sponsored "Climate Change" project. This project generated a number of awareness building activities and the following important publications:

- UN Convention on Climate Change. *Technological needs and development priorities.* Chisinau: 2002.
- Todos P., Sobor I., Ungureanu D., Chiciuc A., Plesca M. *Renewable Energy: Feasibility study*. Chisinau: 2002.
- UN Convention on Climate Change. *The first National Communication of Republic of Moldova*. Chisinau: 2000.

Other projects that have secondary capacity building effects in activities related to Kyoto Protocol activities are those of

- The Danish Environmental Protection Agency, Ramboll
- Cleaner Production and Energy Efficiency Centre, Norway Project
- UNDP project "Mesmerizing Moldova"
- USAID Energy Sector Restructuring Project
- Alliance to Save Energy, Moldova
- The World Bank Energy Project

These projects have generated skills, knowledge and relevant past experience, which will prove useful for the implementation of CDM projects.

4 Making the Kyoto mechanisms work: Challenges ahead

4.1 Institutional infrastructure and the emerging policy

The flexible mechanism relevant for the Republic of Moldova is the CDM. Although CDM-related policies and structures are still being developed, the government appears to have a welcoming attitude towards this mechanism.

Moldova meets two of the host country requirements for hosting CDM projects:

- it became a party to the KP in February 2003 and
- it has a Designated National Authority for CDM within the Ministry of Ecology, Department of Hydro-Meteorology.

There are two officially assigned groups working on CDM-related issues:

- a strategy working group, which develops draft policies pertaining to climate change and to Moldova's participation in the Kyoto Protocol
- a provisional CDM project processing Committee

The Executive Director of the National Focal Point, Mr. Valeriu Cazac, who is also the head of the Hydro Meteorological department of the Ministry of Ecology, heads both entities.

The strategy working-group has developed a draft for a Government Decree stipulating the processing procedures for CDM projects, Moldova's priority areas, and the members of the Committee, which will deal with CDM project applications. The draft stipulates that the CDM Project Assessment Committee will comprise representatives of the Ministry of Ecology, Ministry of Economy, a few members of Parliament and staff from the Institute of Energy. The committee will rely on experts to assess technical issues pertaining to the project, while the committee itself will decide on the appropriateness of the proposed project in Moldova's context.

The criteria applied to CDM project proposals will be based to a great extent on the UNFCCC recommendations and regulations. Although these regulations require that the host country authorities determine criteria sustainable development standards for CDM projects, none have been put forth by the Designated National Authority. In addition, no specific CDM procedures for the assessment of environmental impacts been developed in addition to the 1996 law "On the Ecological Expert Evaluation and the Assessment of Impacts on the Environment" No. 851-XIII.

Despite the fact that the CDM-relevant policies are still under preparation, the National Focal Point is disposed to process all project applications and two projects - one in the forestry sector and a wind energy project - have been approved already.

Of concern is the fact that there is not payment procedure to the Designated National Authority for processing project applications, and the Committee members are likely to be distracted from many other duties in order to process CDM project applications.

It has been mentioned that there is limited awareness among policy makers and the general public regarding the CDM process and that more training is required, which is a potential focus for capacity building.

One of the strengths of the current arrangement is that the policy is flexible and it will be possible to adjust project assessment procedures as soon as more knowledge and experience is gained.

One potential weakness of the emerging policy is that the procedures are likely to be intransparent. Also, although the strategy under preparation does not preclude any project types from being considered as CDM activities, energy sector projects are a priority. It is not excluded that the CDM committee will attempts to force GHG credits buyers to focus on the sectors, where investments are direly needed, but the risks are very high; this is the case in the energy sector.

Potential conflicts may be caused by the fact that the policy is being prepared at a moment when there is still little understanding about flexible mechanisms under the Kyoto Protocol among policy makers. It appears that stakeholders such as potential project partners are not involved in the process of the policy making. No direct capacity building efforts have been made to date, however, the Prototype Carbon Fund of the World Bank is planning a CDM seminar for policy makers in the next couple of months.

4.2 General investment climate

The general investment climate depends on institutional factors such as the quality of regulations and the rule of law, as well as on economic indicators such as the GDP, which represents the purchasing capacity of the population, and the openness of the economy to foreign investors.

- The quality of regulations and the rule of law are rated as average in Moldova: EBRD indicated that in 2002 the quality of business regulations was at 3.7 out of 4.33 and the rule of law was ranked with 3.3, also average for the Eastern European region[3].

- The purchasing capacity of the Moldovan population is very low. According to the EBRD, in 2002, 84.6% of the Moldovan Population was beyond the poverty line, the GDP was among the lowest in transition economies—$444/capita. This would matter to investors in the power sector, for example, as low purchasing power of the population would have a negative influence on expected sales of electricity.
- The investment climate in the energy sector of Moldova is rated as very poor—due to state interventions in tariff setting, and to the slowness of the privatization process. According to the EBRD indicators, Moldova's infrastructure reform rates 2 out of 4, which is at the lowest end of the spectrum in the context of transition economies.

4.3 Low cost GHG abatement options

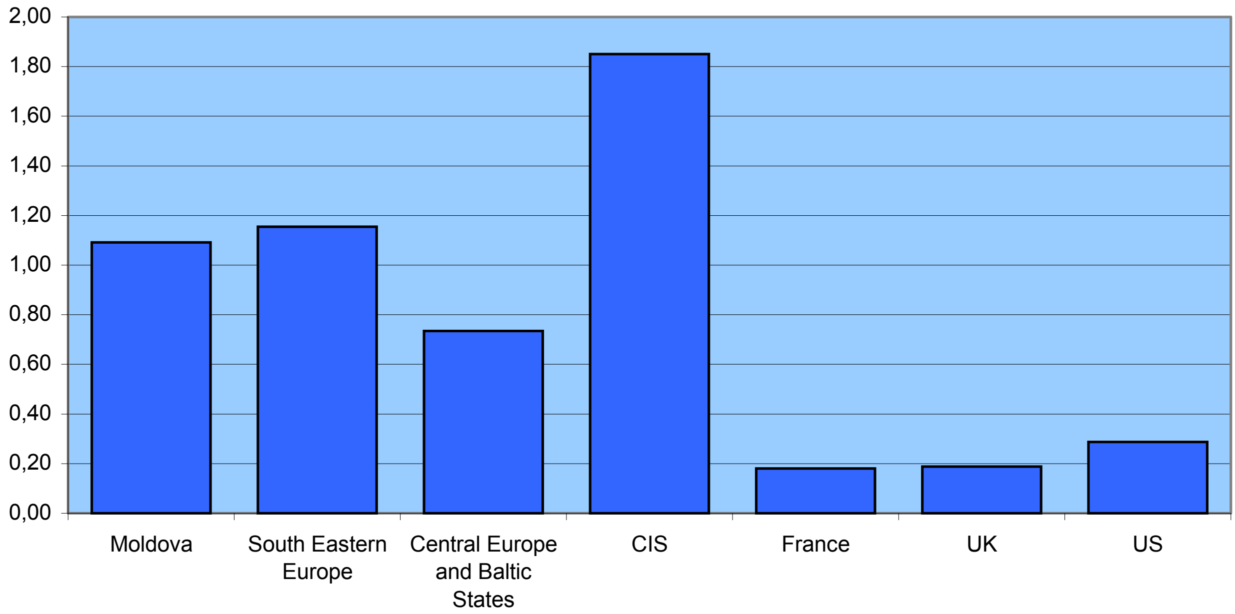
As is the case in many countries, the main source of GHG emissions in Moldova is the energy sector. According to Moldova's First National Communication to the UNFCCC, the energy sector generated in 1998 71.04% of the GHG emissions. Hence, this sector is also the main field for emission reduction.

Energy intensity (E/Y) indicates an economy's potential to improve energy efficiency. The higher the E/Y indicator, the lower the costs of energy efficiency improvements. Moldova's E/Y is lower than the CIS average, similar to that of South East European countries, and higher than the average for Central European Countries, Baltic states, France, UK or the US (see figure 1). In addition, recent data of Moldova's Ministry of Energy suggest that energy intensity indicators grew by 1.9% in the last 5 years. According to the same source, energy losses for the year 2000 were significant: 33.59% of the electricity, 12.53% of heating energy, 9.64% of gasses and 3% of diesel.[4] Reducing these losses can provide convenient project structures for supply-side CDM.

Moldova's size and infrastructure would allow two categories of project sizes:

- small-scale projects, which could be bundled in order to reduce transaction costs;
- medium scale projects of about 500,000 TCO_2 eq.

Figure 1: Energy intensity indicators



Tons of oil equivalent/US$ 1,000
Source: IEA, 2000 [3](data for 1999).

[1] Except when mentioned, all indicators taken from: EBRD. (2002). Transition Report 2002. European Bank for Reconstruction and Development, London.

[2] Ilie Timofte (2003). Regarding Some Priority Directions in the Development of Energy Infrastructure of the Republic of Moldova in the Medium and Long Term. Ministry of Energy, Chisinau.

[3] IEA. (2000). *Energy Statistics of Non-OECD Countries*. International Energy Agency, Paris

Country Report: Poland

Prof. Dr. Adam Guła
AGH, University of Science and Technology, Faculty of Fuels and Energy, Cracow
and the Polish Foundation for Energy Efficiency

Artur Wyrwa
AGH, University of Science and Technology, Faculty of Fuels and Energy, Cracow
and the Krakow Institute for Sustainable Energy

Introduction

The legal framework for the promotion of renewable energies has been established by the Energy Act of April 10th, 1997 [1]. The Act was adopted by the Polish Parliament in August1997 and entered into force in January 1998. It is the main legal document in the field of energy in Poland.

The Act defines the principles of developing a national energy policy, for the supply and use of energy, and for the operation of energy enterprises. It also defines the agencies, which have jurisdiction over the issues of fuel and energy economy. The purpose of the Act is to create conditions to provide energy security, rational use of energy, and the development of competition. It also defines the conditions of conducting economic activities in the energy sector, imposes certain obligations on economic entities, and guarantees certain rights for them. Since 1998 the Energy Act has been updated several times. The most recent and major amendment was done in July 2002, and the changes entered into force in January 2003.

In August 2001 Polish Parliament adopted The Second Environmental Policy. Its main objective is to provide for environmental safety of the Polish society in 21st century, and to create the basis for elaboration and implementation of the national sustainable development strategy [2]. The integration with the European Union is regarded as a significant factor to achieving major objectives of this new national policy, which envisages three phases of achieving the assumed goals. The first phase with short-term objectives was to make Poland prepared to the EU membership in this field by 2002. The second phase, was the implementation of medium-term objectives to adjust and harmonize the Polish system with the EU standards during the transition periods (2003-2010). The third, long-term objectives will be specified in the framework of the „Strategy for Poland's Sustainable Development by 2025", which is presently under preparation by the Polish government prepared following the Parliamentary Resolution of March 2nd, 1999.

In respect to the protection of air against pollution the new Policy puts special emphasis on pollution control at source, through changes of energy carriers (with special focus on renewable energies), use of clean raw materials and technologies (in accordance with the Best Available Techniques and Methods principles) and minimization of energy and raw material use. It also assumes further development of standardization of emissions in industry, in energy sector, and transport, as well as further development and implementation of product standards, limiting air pollutant emission as a result of full product cycle. It also brings to the attention of the government the global and international aspects, such as: transboundary pollution, climate change, ozone layer depletion.

In November 2002 the Executive Program to the Second Environmental Policy was prepared by the Council of Ministers. The Program provides guidelines for reaching targets set forth by the Second Environmental Policy and specifies the respective tasks. The tasks are grouped into packages of investments and non- investments ones. The latter are e.g. actions in the field of law making, programming developing economic mechanisms, spatial planning, R&D programs, monitoring and control, international co-operation etc.

According to the Second Environmental Policy much attention is put to the necessity of elimination of risks to human health and life, counteraction of environmental degradation and participation of Poland in mitigation of the Global Climate Change

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

Climate Change mitigation potential in Poland is primarily related to energy generation and use. In practical terms it means increasing the share of renewable energy sources in Poland's energy balance and increasing energy efficiency of the national economy. Below we describe the recent developments in both areas starting with RES.

1.1 Developments concerning renewable energies

It should be fist noted that the recently amended Energy Act introduces new definition of renewable energies which complies with the EU Directive 2001/77/EC. It reads" renewable energy sources shall mean renewable non-fossil energy source s(wind, solar, geothermal, wave, tidal, hydro-power, biomass, landfill gas, sewage treatment plant gas and biogases)".

The amended Act also introduces obligation for energy utilities to purchase heat from RES unless it would exceed the demand of its customers, and sets minimum quotas on the share of green electricity in their purchase portfolio. The quotas are determined quantitatively by the ordinance of Minister of Economic Affairs. The first ordinance to the Energy Act concerning RE purchase obligation came into effect on December 15th 2000 [3]. The Ordinance set the green energy fraction at 2.4 in 2001 which would be gradually increased up to 7.5% in 2010. However, the Ordinance had several essential drawbacks: there were uncertainties about fulfilling recommended quotas and about penalties that were to be imposed on energy utilities failing to meet the targets. Most importantly, it made it possible to count the same green electricity several times by different utilities. Consequently, the ordinance was updated on May 30th, 2003 [4] with the fractional quotas remaining as aforementioned.

- The main objective of the change was to eliminate the possibility of multiple counting of the same green electricity which, unfortunately, began to be practiced under the first ordinance. However, the new regulation will become fully "tight" against such tricks only with introduction in the Energy Act itself of an obligation to provide documents certifying the origin of the green energy purchased by a utility. Still, the amended Ordinance seems to serve further development of the renewable energy sources much better than the previous one.
- The new Ordinance also specifies the mechanism of setting prices for energy derived from renewable sources. Energy utilities may refuse purchasing heat from RES only if it may lead to increase of the price of the heat above the inflation rate (previously the cut-off was set at 1.25 of the inflation rate).
- For co-generation, where - more and more often - biomass is co-fired with coal the rule has been adopted that only a fraction of energy due to combustion of biomass will be counted as green. Again documents certifying the origin of the green energy will help eliminating abuses of the law.

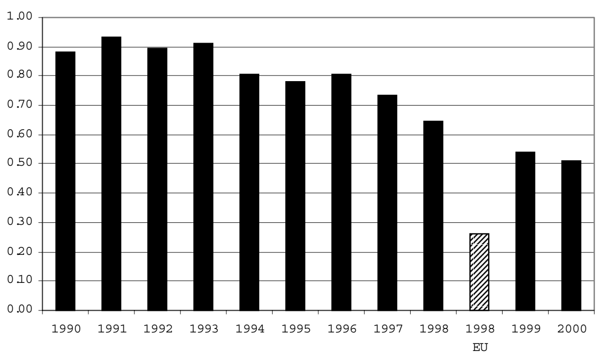
In August 2001 the Polish Parliament adopted the document entitled Development Strategy of Renewable Energy Sources. The Strategy sets the political background for development of RES in Poland. The main goal of the Strategy is to increase the RES share in Poland's primary energy balance from the present mere ca. 2.5% to 7.5% in 2010 and 14% in 2020, respectively [5]. The progress in implementation will evaluated every 3 years starting with the first assessment in 2003. According to the existing prognoses it may happen that Poland will not reach the 14% target by 2020. However, the document has also a political meaning to encourage further action for sustainable energy development and to emphasize importance of renewable energy sources.

In the past 18 months Poland witnessed a hot political debate about liquid bio-fuels for motor vehicles. The first proposal of the Bio-fuel Act was quite radical. It would place Poland as leader in mandatory content of bio-components in motor fuels. The proposal was successfully lobbied by the (then) coalition party PSL, representing mainly the Polish farmers. The main goal of the Act was to promote bio-fuels i.e. mixtures of petrol with ethanol or diesel with the methyl or ethyl esters. It faced a fierce opposition from the oil and car lobbies. Nevertheless, the Act was adopted with the SLD and PSL votes, despite of the opposition of the right wing (liberal) parties. In December 2002, the president of Poland Mr. Kwašniewski yielded to the pressure of the motorist lobby and vetoed the Act, which meant returning it to the Sejm (lower chamber)to introduce changes required by the opposition or reject the President's veto. The veto, however, was not rejected, which finally has lead to the split of the coalition in March 2003. The changed, softer, version was elaborated and finally adopted by Sejm [6] with a lower content for ethanol (min 3.5 and max. 5%) added to petrol. However, very recently, in August 2003, the Senate, the higher chamber, suggested deleting of the respective paragraph, so that the situation is rather confusing at present. One has to wait until the Parliament resumes its work after summer vacations. The new version also stipulates that separate filling columns will have to be available with non-bio and bio-fuel, with very clear information displayed about the content of bio-components. Strict control of the quality and composition of the fuels will be also implemented. It is also stated that that the bio-components added to fuel must come from Polish plantations, which will soon become in conflict with EU legislation.

1.2 Developments concerning energy efficiency

Before the political transition of late eighties the heavy industry and mining sector were significantly favored in Poland. It led to inefficient use of the natural and economic resources and to a constantly growing demand for energy. With the collapse of those industries in early nineties, the consumption of energy decreased more than Poland's GDP, which automatically led to a decrease of energy intensity of national economy between 1991-1998. Presently, in order to increase energy productivity, more determined and well coordinated actions are required. The figure below shows the trends in energy intensity indicator for Poland, together with the 1998 value for the average over the EU countries.

Figure 1: (primary) energy intensity of GDP in Poland [kgoe/000$]



Source: Current situation in energy sector, Ministry of Economy, http://www.mg.gov.pl.; European Union Energy & Transport in Figures 2001, European Commission in co-operation with Eurostat

One can observe a systematic downward trend with clear, albeit insufficient, reduction in energy intensity. Energy-intensity has been reduced in the period between 1990-1997 under the current environmental policy and economy restructuring almost by a factor of 2. However, it still remains approximately twice as high as the current level in the European countries. The basic assumptions of the national energy policy foresee further reduction of energy intensity, induced by the expected growth in energy prices, modernization and restructuring of industry and national economy as a whole. According to the medium and long term objectives of The Second Environmental Policy energy intensity should be reduced by 25% and 50% by the year 2010 and 2025 respectively against the 2000 level. As energy efficiency and environmental protection were recognized in Poland as key elements in energy policy, the government supported works on further development of mechanisms that can stimulate energy efficiency and environmental protection. The most important mechanisms, which have been analyzed [7] as possible elements of a national energy efficiency strategy are financial and fiscal incentives to retire old, inefficient energy equipment, subsidies to investments in RE technologies, obligation of the national and local government administrations to use energy efficient equipment and high insulation standards in public buildings, creation of a network of Energy Efficiency Advisory Centers including schemes for financing them, economic incentives (e.g. tax relief) for companies regularly performing energy audits, tax relief for companies developing production of energy efficient equipment, increased support for R&D projects related to energy efficiency improvements, elaboration of energy audit standards in industry, pilot and demonstration projects, and distributing information about the possibility of financing energy saving investments from EU funds.

Finally it should be noticed that Poland as opposed to some countries in transition has no dedicated Energy Efficiency Act and no plans to introduce one are made. However as seen in figure 1 energy efficiency is constantly and remarkably improved, even now, when the changes cannot be attributed any more to the collapse of the heavy industries. This means that the prices of energy which increased sometimes by an order of magnitude have been the prevailing factor.

1.3 Small CHPs

Polish energy sector bases mostly on the large scale, professional plants. Approximately hundred of the thermal plants use CHP technology and deliver heat to industrial or municipal customers. Most of them are coal-fired. Additionally, there are five brown coal-fired plants which accounted for ca. 36% of electricity produced in 1998 [8].

Up to now there has been a substantial political debate in Poland on the privatization of generation capacity and liberalization of the energy market. In 2001 there were still more than 220 thousands people employed in the mining and quarrying [9]. Overcoming all social problems surrounding mine closures presents a big challenge to the Polish government. Recently one can observe an emerging sector of very small-scale producers of heat from biomass and electricity from small hydro and wind.. The power producers are, guaranteed access to the grid electricity by means of the Third Party Access (TPA) principle, and network operators are required to buy the electricity or heat offered [10]. However, due to the overcapacity in the Polish power sector, transforming the existing district heating stations into small CHP units is at present not a very attractive option. Most researchers believe that the most cost effective (both financially and from point of view of CO_2 reduction) is to use biomass for heat production only.

2 Best practice policies and measures yielding ancillary socio-economic benefits

Over the past few years one can observe in Poland an explosion of interest in using biomass for energy purposes. Since 2001 this problem was extensively covered, many conferences, meetings and seminars have been organized, addressing this issue at national or regional. If the goals of the aforementioned Development Strategy of Renewable Energy Sector (7.5% of primary energy from Renewable Energy Sources (RES) in 2010 and 14% in 2020) are to be successfully implemented, biomass will play the dominant role in the RES balance [10]. According to one of the scenarios, the share of biomass as the primary renewable energy source will constitute almost 85% as far as heating and electricity production alone are concerned. No doubt, biomass constitutes far the biggest RES potential in Poland. Apart from fulfilling Poland's Kyoto commitment, and the EU accession targets, as well as decreasing the local air pollution, the growth of the biomass-for-energy sector is a very desired development for social and economic reasons. With insufficient demand for domestic nutrition crops and decreasing exports, the alternative provided by energy plantations is very attractive and welcome. At the same time, it may help to ease the problem of excessively large fraction of people employed in farming. It would create jobs in the rural areas and provide the very needed income for farmers. One should also mention that about 2 million hectares of agricultural land are not used at present and the per capita area of farmland is almost four times higher than in EU.

One can enumerate several areas where development of biomass-for-energy activity may fill the emerging niches of demand. Ambitious targets set for "green electricity" have already created practically unlimited demand for energy crops, primarily - as the present trends indicate - for wood chips of salix viminalis, which has already prompted a rapid development of energy plantations. Also increasing demand for biomass for heating - particularly district heating - is already creating a significant and constantly growing demand for biomass. This may originate from the agricultural residues, particularly straw, other energy plantations, such as topinambur, sida hermaphodita or miscantus giganteus, as well as for forest wood waste or post-production wood residues). Targets set for the fractional shares of liquid bio-fuels for motor vehicles have already led to enormous interest among farmers and investors in planting crops for ethanol production and rape for bio-diesel, as well as created a huge controversy concerning the state policy in this area. As far as meeting the primary targets (Kyoto, EU, national), the above list is by no means exhaustive. It only reflects the complexity of the problem of finding a solution, which would be optimal from the country-wide perspective. In addition to the environmental goals, the physical potentials, agricultural and biotechnology parameters, this solution should take into account also economic and social (notably job creation) aspects. One faces therefore a multidimensional optimization problem of a multidisciplinary character, on the RES supply side alone.

However, the RES supply side has to be confronted with demand side. If thermal improvements of buildings are taken as an example, it presents another huge potential for reduction of GHG emissions, job creation and increasing life standards of population by reducing heat bills and thermal comfort.

In this context a very positive policy of the ECOFUND foundation should be mentioned. The grant schemes of ECOFUND favor now projects integrating fossil-to-biomass fuel conversion of boilers with thermal improvements of the building envelopes and heating systems. Similar policies are implicitly applied by the National Environmental Fund (NFOS) and its regional branches. It is difficult to assess the extent of such practices as the regional funds are independent entities and have their own rules and priorities. In any case the substantial and growing support of both institutions to establishing energy plantations serves the environmental, social and economic purposes at the same time.

3 Climate change mitigation and the use of flexible mechanisms

Since the beginning of the transition period in 1989 the Climate Change issues have not been considered as of any significant importance by the majority of the political elites in Poland. Other issues such as unemployment, reforming the old fashioned industries and medical system, public safety issues and crime were overwhelming problems. Fortunately, this situation is gradually changing. In 2001 the Polish Executive Office for Climate Convention initiated the process of formulating the National Climate Policy. To provide an analytical background for the new legal act a study of the relevant technical, political and economical aspects has been commissioned to the consulting company EnerSys Ltd. As a result a vast (496 pages) document entitled „Elaboration of the Project of National Climate Policy and Scenarios of its Implementation in the Time Horizon 2020" [11] has been prepared, which consisted of four major parts:

- Prognosis of GHG Emissions by 2020
- Technical and Economical Characteristics of Possible GHG Emissions Reduction Activities
- Strategies for GHG Emissions Reduction by 2002
- Draft Proposal of the National Climate Policy

In summer 2002 the document has been reviewed by a panel of experts and submitted for further processing to the Ministry of Environment (MoE). Upon inter-ministerial consultations, two documents were presented for public consultation by the Dept. of Environmental Policy of the MoE in March 2003:

- [Draft Proposal of] National Climate Policy [Act]
- [Draft Proposal of] Strategies of GHG Emissions Reduction by 2020.

Their current versions (as of Aug. 22 2003) can be found on the MoE web page [12]. Bela brief description is presented of their main provisions.

3.1 National climate policy

The proposal draws from the existing legal acts, in particular from the Environmental Protection Act adopted by the Polish Parliament on April 27, 2001 [13], the aforementioned II-nd Environment Policy Act of August 23, 2001, and ordinances of the Council of Ministers: „Executive Program to the II-nd Policy" and „National Environmental Policy for 2003-2006 with perspective of 2007-2010" [14], of December 10 and 17-th, 2002, respectively. It also indirectly draws from the Waste Disposal Act of April 27 2001 or the acts dealing with packaging, deposits and product charges of May 11, 2001 [15].

The draft proposal states that, the main challenges Poland faces in fulfilling its commitments are:

- Overcoming the domination of coal as the primary fuel in Poland
- Resolving the problem of past investments in inefficient technologies
- Low rentability of enterprises which means lack of resources for investment in cleaner production or reduction of GHG emissions
- Low average income level of Poland's population which also means lack of resources for investments in more energy efficient appliances, lamps, heating systems or thermal improvements.

As far as the lack of capital in the enterprises is concerned, emphasis is put on the emission trading, which is seen as a short term priority. The resources Poland will acquire from its surplus GHG emissions reduction will be used to further support energy efficiency. improvements and counteract competition disadvantages due to incurring environmental improvement costs by the enterprises.

The latter point in the list above deserves a separate comment. Namely, the increase of the income level may not necessarily or automatically lead to a more efficient use of energy. Considering the current trends it may be likely channeled to an increased consumption of energy intensive goods and services. For example it may rather feed more car travel instead of using public transportation. This problem cannot be resolved without addressing the issue of life styles, which requires a major education and awareness raising effort. This unfortunately has not been adequately addressed so far in any of the countries in transition.

Therefore it should be noted that the Draft Proposal states, i.a,. that „the implementation of the National Climate Policy should increasingly rely on:

- Changing the patterns of production and consumption
- Decreasing energy-, material- and water intensity
- Adoption of BAT and Best Practice examples.

Among more concrete provisions the Draft Proposal specifies the short term priorities and policy instruments to achieve them. The short term goals and activities for the years 2003-2005 are designed mostly to integrate Poland with EU and secure „ active and advantageous for Poland participation in the Kyoto flexible mechanisms including legal actions to introduce emission trading". Also in this period integration of

Poland's Climate Policy should be initiated with the other national policies, first of all with those concerning infrastructure and subsequently with financial and tax policies. In long term (by 2020) it is assumed that reduction of GHG emissions will reach 30-40%. In defining the priorities special emphasis is put on the energy and transportation sectors.

Energy sector

- Identification and review of subsidies hampering the increase of energy efficiency with the aim the gradual abolishment of such subsidies [a rather soft formulation and no reference to external costs should be noticed].
- Support to renewable energy and fuels gas for electricity generation [the latter is no doubt controversial and can be, perhaps, attributed to the unfortunate take or pay contract with Russia].
- Introduction of motivation mechanisms (including local ones) for an increased use of renewables
- Continued support for co-generation with the goal of increasing by at least 50% its share in electricity production referred to the level of 2000 [no target date is given]
- Reduction of methane leakages in the distribution networks and production processes
- Active promotion of energy efficiency activities addressed to different groups of end users

Transport sector

- Reduction of GHG emissions from aviation
- Support to restructuring of transportation [systems] towards more efficient and environment-friendly forms (i.a. combined transportation systems) including improvements in management and logistics
- Reduction of GHG including N2O emissions from motor vehicles
- Promotion of production and use of alternative fuels aimed at constantly increasing their share and promotion of high mpg vehicles
- Support to activities aimed at reflecting full environmental costs in the prices of transportation services
- Decoupling of the GNP growth from the demand for transportation services.

Comparing the two last bullets with the respective contents for the energy sector above, one may have an impression that the energy and transport paragraphs have been written by different people. The priorities for the other sectors (industry, agriculture, housing, etc) are defined in a very general, in fact meaningless, manor.

However, it should be noted that the cross-sectoral priorities include introduction as fiscal measures (coherent with the EU rules), voluntary agreements and support to research related to Climate Change. The approach can be illustrated by the table below.

Table 1: Possible policy instruments for different sectors

Activity	Possible policy instruments
Power and heat generation	Emission limits, emission charges and penalties, carbon tax on fuels, subsidies and preferential loans (for RES and cogeneration), emission trading and other flexible mechanisms, green certificates for RE
Steel and iron industry, Cement industry, Industrial technologies	Voluntary agreements, Technical standards
Industrial use of electrical energy and heat (motive power, lighting, heating, cooling, steam)	Technical standards for electrical motors, Efficient lighting standards, Tax on electricity [consumption], Carbon tax, [Use of] compressed air
Fuel consumption in road transport	Technical standards Environmental tax on motor fuels Environmental tax on low mpg vehicles Tax preferences (abolishment of excise tax) on alternative fuels
Housing sector, heating, hot water, lighting, house appliances	Technical standards, Tax on electricity [consumption]. Carbon tax, Tax reductions for purchasing high-efficiency equipment, Labeling of appliances
Forestry (CO_2 absorption)	Joint Implementation projects, Subsidies to new forestation

3.2 Strategies of GHG emissions reduction by 2020

The document is a synthesis of several detailed analyses performed in 2002. Its structure and content largely correspond to the aforementioned work of EnerSys. The goal has been to identify scenarios which would lead to significant GHG emission reduction by 2020. Two quantitative targets were considered: 30% and 40% reduction as compared with the 1988 level (the base year for Poland). The analyses were restricted to carbon dioxide and methane only, which is a sufficient approximation, as they constitute ca. 93% of equivalent GHG emissions in Poland. Different emission reduction options are evaluated and unit reduction costs per ton CO_2 equivalent are calculated.

The results are presented in the figure below (figure 2 in the „Strategies..”). However, it should be noted that some of the low cost options may change into rather expensive ones with e.g. rising prices of heating oil or gas. No doubt such analyses have to be updated repeatedly.

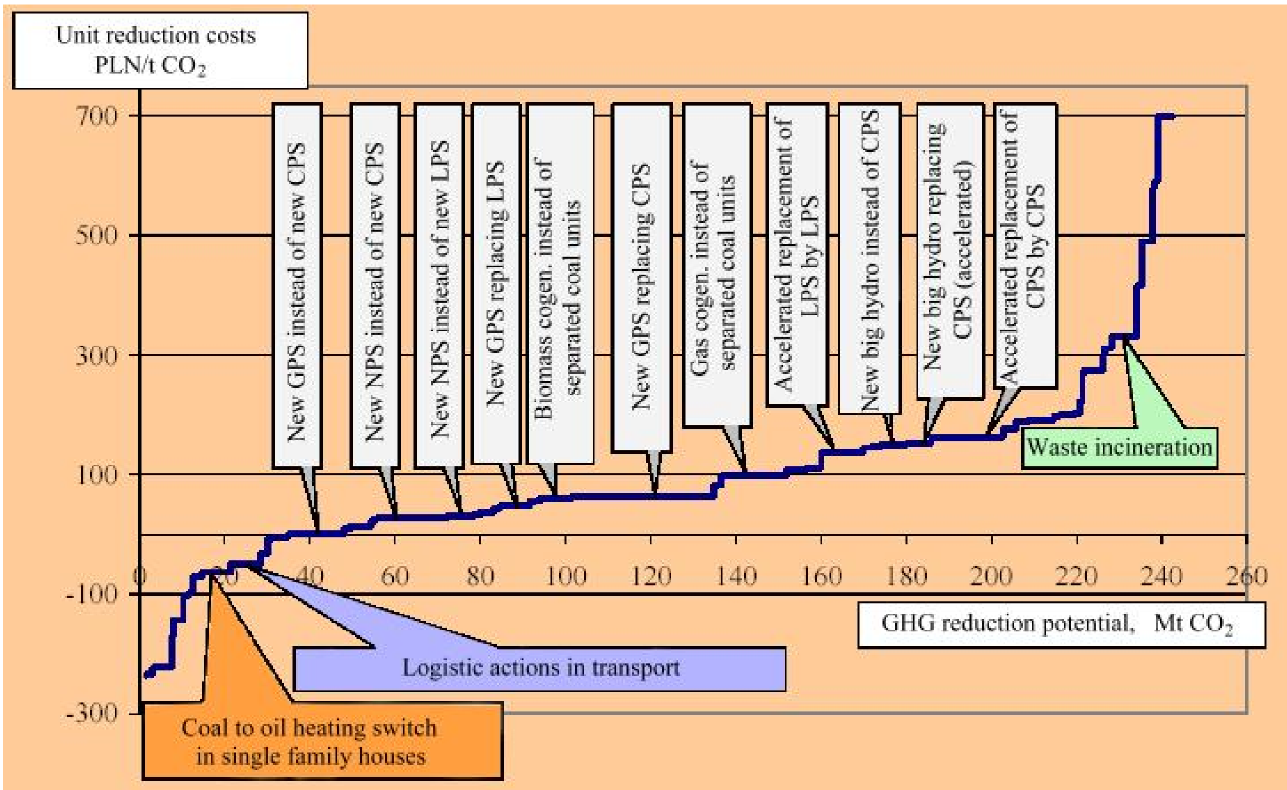
The document contains also a list of recommendations following from the analyses; in particular:

- Bearing in mind that in 2010 Poland will likely achieve a 30% reduction (i.e. 24% above the target) there is no need of undertaking new actions apart from those presently implemented.
- Since the analyses have shown that a 40% reduction is feasible by 2020 energy policies have to be designed adequately and preference to RES should be given.
- The conditio sine qua non for achieving the 40% reduction at economically justified costs is introduction oh market mechanisms which will result in reduction of coal extraction in Poland.

The following instruments and actions are suggested:

- Introduction of market mechanisms such as green certificates and emission trading
- Introduction by 2005 at the latest of a system of tradable emission quota
- Introduction of financial and fiscal instruments before 2010 is not recommended. Their possible introduction afterwards should be conditional upon emission reduction quotas in the second period, internal regulations of the enlarged EU and the situation on the international emission trade market

Figure 2: Specific GHG emission reduction costs vs the volume of reduction, for different possible measure



Source: Strategies of GHG Emissions Reduction by 2020 [16]
GPS= (thermal) Gas Power Station,
CPS= (thermal) Coal Power Station ,
LPS=(thermal) Lignite (brown Coal) Power Station,
NPS = Nuclear Power Station

- The development of RES bring also positive side effects. In Poland, considering the economic and social aspects, special emphasis should be put on the development of energy plantations, liquid and solid bio-fuel production. However the quantitative target set forth in the „Renewable Energy Strategy" (7.5 and 14% in 2010 and 2020, respectively) may turn out to be too expensive for Poland. Therefore lowering these targets should be considered E.g. bringing down the 2020 target from 14% to 12% will decreases the associated costs by ca. one billion USD (ca 50%) with only a 2% decrease in the reduction volume. (The RES vs GHG reduction effects are non-linear).
- Urgent and wide ranging introduction of a complete spectrum of auxiliary instruments is recommended, such as: information campaigns, education and R&D programs, demonstration projects, etc. In order to overcome the infrastructure, information and awareness barriers to achieve the GHG reduction by properly operating market mechanisms

4 Making the Kyoto mechanisms work: Challenges ahead

Poland signed the UNFCCC in 1992, ratified it in 1994, and became a full party to the Convention on October 26, 1994 [18]. Due to negotiations, 1988 was set as a baseline year for Polish GHG emissions [1] . Under the Kyoto Protocol, which Poland signed in July 1998 and ratified in December 2002, the country committed itself to a 6% reduction of the main six greenhouse gases by 2008-2012.

Polish AIJ program

The introduction of a pilot phase for Activities Implemented Jointly (AIJ) under the UNFCCC has led to the establishment of a "Secretariat for Joint Implementation (JI)" in the National Fund for Environmental Protection in 1994 [19]. In August 1999, the JI Secretariat became a part of the "Executive Office for Climate Convention" In the previous years the Secretariat developed guidelines and criteria for the implementation of projects and implemented a few projects. A coal-to-gas boiler conversion program, which includes a USD 1m grant from the government of Norway, is the largest project so far. By summer 1999 around 30 boiler conversions, as well as accompanying energy efficiency improvements i.e. insulation of buildings and installation of energy efficient equipment, have been agreed upon within the framework of this project. While the total project cost amounts to roughly USD 48m, the AIJ component is restricted to USD 1m from Norway. I In addition there are two Polish-Dutch AJI projects carried out. First one concerns reduction of atmospheric pollution through modernization of heat supply system in the town of Byczyna the second one sustainable heat and power for public networks in Szamotuly. These focus on fuel switching (coal to gas) and boiler modernization.

The main obstacle to implementation of AJI was the lack of a legal basis for the "carbon credits" trade by the projects. The Polish Ministry of Environment has represented a cautious approach to JI. This has created an impression that sale of emission credits to foreigners can be difficult.

Joint Implementation

The first JI project (providing for carbon credit sharing) was implemented in Jelenia Góra by the installation of a Dutch biomass fired boiler (firing wood chips and sawdust) for the municipal greenery enterprise. The second one is a Polish-Canadian 900 kW -hydropower project on the Bóbr River, at Leszno Górne in Lubuskie Voivodship in Western Poland.

upon the Polish-Dutch project of establishing the wind park. The third project concerns a 60 MW wind farm financed partly by Dutch government in exchange for Emission Reduction Units, ERUs, in the framework of the ERU-PT Program in north-western Poland. The wind farm was planned to consist of 30 wind turbines of 2 MW each Unfortunately, there are some uncertainties which show that the project may be jeopardized.

There were also efforts to create conditions for implementation of the Finnish-Polish Joint project at the heating company PEC in Elbląg to allow combined heat and electricity production.

Emission Trading

By creating an open market for ERUs, the Emission Trading scheme should lead to minimization of the total costs of CO_2 emissions reduction. The international co-operation mechanism within the confines of UNFCCC offers significant benefits for participating countries. Poland is likely to achieve cuts in its GHG emissions more substantial than it is required by

[1] Poland makes use of Article 4.6 of the Convention which allows 'a certain degree of flexibility' to countries with economies in transition in fulfilling their commitment (UN 1992). This can been justified by the fact that 1988 represented the last 'normal' year before the setting in of strong economic recession in the second half of 1989. 10

its Kyoto target. This potential of tradable emission units can release additional funds necessary for modernization and further development of Polish energy sector. If properly revolved within the energy sector, these funds may lead to further reductions by promoting more efficient and environment friendly technologies.

By a decision of the Minister of the Environment of 2000, the National Fund for Environmental Protection and Water Management was designated as the institution to conduct work to develop the basis for greenhouse gas emission trading. Poland intends to trade primarily with the Member States of the European Union, but its choice of partners will depend on the market rules.

It seems that Emission Trading is for Poland the most suitable mechanism of all flexible mechanisms. It has transparent rules that allows the parties to reach economic and social benefits at a relatively low risk. JI projects although decreasing the country GHG emissions but in a parallel are reducing country GHG emissions limits. From the short term perspective JI projects provide foreign capital and know-how, but from the longer perspective they might cause the higher costs of GHG reduction. Therefore, taking into account the present technological potential of Polish companies, the researchers suggest [11] that Poland should aim at becoming a donor rather than recipient country in a possibly near future. Polish participation in CDM project is attractive mainly in regard to the climate policy.

References / Documents / Links

[1] Council of Ministers, Energy Law, OJ 1997, No 54, item 348 with later amendments.

[2] Ministry of Economic Affairs, An Ordinance on Feed-in Obligation for Electricity from Unconventional Sources, Renewable Energy Sources and Cogeneration as well as Heat from Unconventional and Renewable Sources, OJ 2001 No 122, item 1336.

[3] Ministry of Economic Affairs, An Ordinance on Fees-in Obligation for Electricity and Heat from Renewable Energy Sources, as well as electricity from Cogeneration, OJ 2003 No 104, item 971.

[4] Development Strategy of Renewable Energy Sector, August 2001.

[5] The Second Environmental adopted by the Polish Parliament as of August 2001.

[6] Bio-fuel Act accepted by the higher chamber of polish Parliament in August 2003.

[7] B. Jankowski, W. Suwała, H. Gaj M. Kudełko, J. Kamiński, Global climate initiatives and countries in transition - Case study for Poland, Kraków 2002.

[8] Jochen Hauff, The Feasibility of Domestic CO_2 Emissions Trading in Poland, Riso National Laboratory, September 2000

[9] Industry Statistics Yearbook 2002.

[10] A. Guła, M. Filipowicz, A. Wyrwa, A. Figórski, E. Guła, A Plan to Establish a Biomass-for-Energy Education and Demonstration Centre at AGH University of Science and Technology in Krakow, Starbienino 2003.

[11] H. Gaj et al, Opracowanie projektu państwowej polityki klimatycznej i wariantowej strategii jej realizacji w horyzoncie czasowym do roku 2020, eng. A study of a Proposal of the National Climate Policy and Variant Strategy of its Implementation in the Time Horison 2020, Energsys, internal document of NFEP, June 2002

[12] http://www.mos.gov.pl/1prace_legislacyjne/inne_dokumenty/index.shtml

[13] Environmental Protection Act OJ 2001 No 62 item 627, No 115 item 1229 and OJ 2002 No 74 item 676, No 113 item 984, No 153 item 1271 and No 233 item1957.

[14] Council of Ministers National Environmental Policy for 2003-2006 with perspective of 2007-2010, December 2002

[15] Waste Disposal Act of April 27 2001, Packaging and Packaging Deposits Act of May11 2001, Waste Management Obligation Act of May11 2001

[16] Ministry of Environment, Draft Proposal of National Climate Policy Act, March 2003

[17] Constitution of Poland, art. 5, art 74, April 1997

[18] United Nation Framework Convention on Climate Change, http://unfccc.int/

[19] The Polish UNFCCC Executive Bureau, http://www.climate.pl

Country Report: Romania

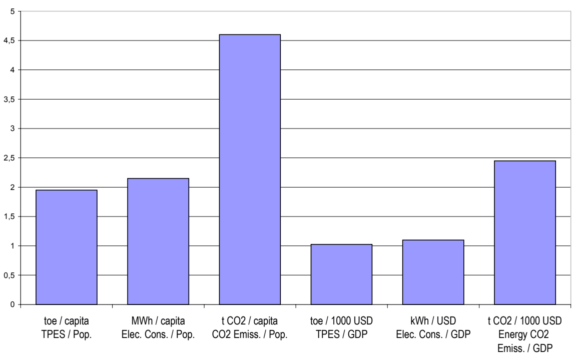
Cristian Tantareanu
ENERO • Center for Promotion of Clean and Efficient Energy in Romania

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

Romania has made progress in preparing for internal energy market, in particular as regards the level of market opening, pricing policy and restructuring of some utilities. Electricity prices were adjusted several times and now reflect production costs to an acceptable degree. Prices have been indexed with the US dollar.

Poor collection of energy bills and low energy prices still distort the energy efficiency policy. As far as energy efficiency and renewable energy is concerned, some progresses were made during the reporting period. Romania should continue to move from its current energy production-oriented policy, towards a policy based on energy saving.

The general indicators on energy and environment are presented in the figure.



Since 2001, the following legal acts regarding energy efficiency have been adopted:

- Government Decision-GD no. 27 establishing the necessary requirements referring to labeling and the energy efficiency for the market placing of household dishwashers (Official Journal-OJ. no. 68/30.01.2002);
- GD No. 1056/18.10.2001 with regard to energy labeling and energy efficiency of domestic lighting lamps, in view of placing them on the market, which transposes Directive 1998/11/EC. The provisions of GD No. 407/2003 enter into force in August 2002;
- GD No. 27/17.01.2002 with regard to energy labeling and energy efficiency of domestic dish-washers, in view of placing them on the market, which transposes Directive 1997/17/EC The provisions of GD No 27/2001 enter into force in October 2002;
- GD No. 270 establishing efficiency and energy labeling requirements for market placing of boilers functioning with liquid and gaseous fuel (OJ no. 238/09.04.2002), which transposes Directive 92/42/CEE
- GD No. 393 for the approval of the Norms enforcing the Law no. 199/2000 on energy efficient use (OJ no. 292/30.04.2002);
- GD No. 1549/18.12.2002 (OJ No. 20/15.01.2003) establishing the energy efficiency requirements for ballasts for fluorescent lighting in view of placing them on the market, which transposes Directive 2000/55/EC on energy efficiency requirements for ballasts for fluorescent lighting. The provisions of GD No. 1549/2002 enter into force in July 2004;
- GD No. 407/2.04.2003 (OJ No. 267/17.04.2003) with regard to energy labeling and energy efficiency of household air-conditioners, in view of placing them on the market, which transposes Directive 2002/31/EC with regard to energy labeling of household air-conditioners. The provisions of GD No. 407/2003 enter into force in April 2004;
- GD No. 1117/10.10.2002 (OJ No. 785/29.10.2002) with regard to energy labeling of household electric ovens in view of placing them on the market, which transposes Directive 2002/40/EC with regard to energy labeling of household electric ovens. The provisions of GD No. 1117/2002 enter into force in October 2003;

In order to reduce the energy consumption in buildings, Emergency Ordinance-EO No. 174/22.12.2002 (OJ No. 890/9.12.2002) has been elaborated, regarding the establishing of special measures for the thermal rehabilitation of certain multi-story buildings, approved by Law No. 211/16.05.2003 (OJ No. 351/22.05.2003), setting up measures for the thermal rehabilitation of certain multi-story buildings completed between 1950-1985 and their installations.

The technical co-ordination of the rehabilitation actions is carried out by the Ministry of Transport, Constructions and Tourism, while the funds necessary for covering the thermal rehabilitation costs, and the costs of the expertise and energetic audit of the buildings are provided as follows:

- loans and/or state-financed allocations, covering 85% of expenses (of which 30% are subsidies), and the owners/lodgers associations' maintenance fund, covering 15% of expenses, for dwellings owned by natural persons;
- state budget and local budgets for state owned/administered dwellings and spaces having other destinations than lodging;
- own funds of the economic agents, for the dwellings in their property/administration.

Furthermore, for the implementation of the energy efficiency requirements in buildings, the following legal documents have been elaborated: the Orders of the Minister of Public Works, Transports and Housing No. 1435/30.09.2002 (OJ No. 732/07.10.2002) for the approval of the technical regulation on "Methodology on energy audit of existing buildings, heating installations and installations for preparing hot water" and No. 550/09.04.2003 (OJ No. 278/21.04.2003) for the approval of the "Guidelines for attesting energy auditors for buildings and their installations".

In 2003 the Ministry of Economy and Commerce approached the renewables issue by promoting a "Strategy on renewables development" and the GD No. 443/10.04.2003 (OJ No. 288/24.04.2003) on the promotion of electricity produced from renewable energy sources, which transposes the Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market. The provisions of GD No. 443/2003 enter into force in April 2004.

However, this act does not provide any concrete support market mechanism for renewables, but builds the framework for further specific regulations. So, much remains to be done. Effective implementation of the EU directive requires energy companies that operate transparently, an energy market that functions smoothly, a sound regulatory framework and functional institutions. Problems to be signaled are: an unclear allocation of responsibilities among various government bodies, poor co-ordination of strategies at a macro level and weak feedback from major stakeholders because of a constant failure to secure active involvement of the civil society, the business community and other stakeholders in policy making.

The GD 443 document establishes also the following targets:

- renewables electricity production as a quota of the gross power consumption: 30% in 2010.
- renewables contribution as a quota of the gross energy consumption: 12% in 2010.

The target for electricity production includes the contribution of large hydro, which anyhow reaches today some 29 % of the gross power consumption. It means that the development of "real" renewables for electricity will be very modest.

The national specialized body in the field of energy efficiency is the Romanian Agency for Energy Conservation (ARCE), created in 1991, and placed under the subordination of the Ministry of Economy and Commerce.

ARCE was created to co-ordinate and implement the government's energy efficiency and conservation policies and specific sectoral programs, but only recently, on 1 January 2002, ARCE strengthened his administrative capacity, as a legal person with functional, financial and organizational autonomy, according to the provisions of GD No. 941/29.08.2002 (OJ No. 673/11.11.2002) regarding the organization and functioning of ARCE. The framework for the self-financing of certain activities of ARCE has been ensured too.

The Agency has been re-organized in view of implementing the provisions of the Draft Strategy on energy efficiency, reinforcing the structures responsible with market surveillance activities, the authorization of energetic auditors and persons who are entitled to perform energy break-downs, and the implementation of projects promoting energy efficiency and the use of renewable energy sources.

In 2003, ARCE carries out projects with a value of approximately 3 MEURO in the field of energy efficiency.

For the promotion of energy efficiency, the Romanian Fund for Energy Efficiency (FREE), a self-financing, independent institution, has been set up by EO No. 124/8.10.2001 (OJ No. 644/15.10.2001), approved with modifications by Law No. 287/15.05.2002 (OJ No. 344/23.05.2002).

Within an Agreement of non-reimbursable financial assistance between Romania and the International Bank for Reconstruction and Development, 10 millions USD were granted to the Fund.

The services offered by FREE consist of:

1. Financing services for the coverage of up to 80% of the investment costs of the approved energy efficiency projects. They will take the form of:

- Loans on term offered directly to the final user;
- Loans to Energy Service Companies (ESCOs), according to the nature of the project;
- Loans in which FREE forms a partnership with a consortium of products and services supply, offering a full package, which includes technology, equipment and financing.

2. Technical assistance for training and project development.
   - re-orientating investors in the private sector towards this low-risk market, recuperating the capital of the initial donors;
   - structuring itself in such manner as to be attractive to the co-financers, a basic mechanism for increasing investment capacity in time;
   - absorbing local resources (local financial institutions) as much as possible in order to reduce costs, such as the ones regarding credit analysis.

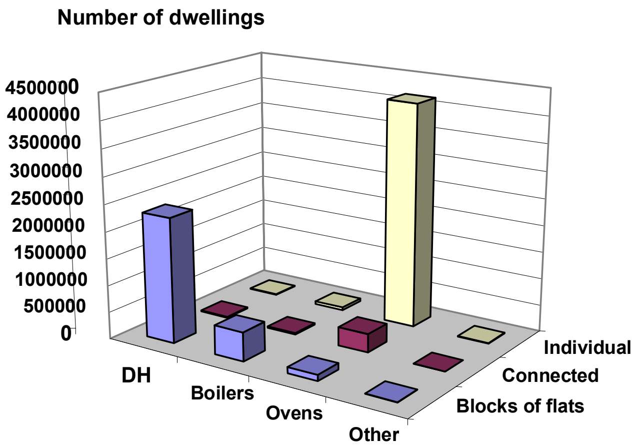
At present, the portfolio of potentially eligible projects is being established within FREE, while the actual financing is programmed to begin in the second semester 2003.

In December 2002, GD No. 1488/18.12.2002 (OJ No. 956/-27.12.2002) setting up the Inter-Ministerial Working Group for the co-ordination of the elaboration and implementation of the national strategy in the energy efficiency field and of the related action plan, was adopted. In the first quarter of 2003, the Inter-Ministerial Group, coordinated by the Minister of Industry and Resources, drafted the National Strategy in the energy efficiency field, in response to the European Union's recommendations included in the Regular Report for 2002.

The EU accession process is the main driving force and plays a crucial role in reforming the energy markets and re-shaping energy and environmental policies. The negotiation of the relevant Chapters had a positive impact in more clearly defining the potential for energy savings and a policy framework for renewable energy sources.

Chapter	Status
1 • *Free movement of goods*	opened
5 • *Company law*	provisionally closed
6 • *Competition policy*	opened
10 • *Taxation*	opened
11 • *Economic and monetary union*	provisionally closed
14 • *Energy*	opened
11 • *Economic*	opened
16 • *Small and Medium-sized Enterprises*	provisionally closed
22 • *Environment*	opened
28 • *Financial control*	opened

2 Best practice policies and measures yielding ancillary socio-economic benefits



The centralized public systems for heat supply are functioning in some 200 cities and towns; in almost all of these cities, the heat distribution is carried out by companies subordinated to the local public administration. The DH systems assure the heat and hot water demand for approximately 30% of Romania's total building stocks (see figure), a figure that rises to 58% in urban areas. The heat production in Romanian centralized heating systems in 2001 was 33,260,000 Gcal, of which 26,275,000 Gcal (79%) for the residential sector (31% for Bucharest only). The national scale extent of different heating solutions by the 8,100,000 dwellings in year 2001 was as follows:

- District heating 31%
- Individual central heating 8%
- Individual traditional stove on solid fossil fuel 57%
- Individual stove on natural gas 4%

Almost all existing DH systems are obsolete, register high losses, and are no more able to cover the demand. Transmission and distribution losses in DH systems are 30-35%.

Consequently, the most topical, large-scale, social problem related to energy is securing the heat supplied by small DH systems, at affordable costs for population. Serious social problems are present in poor areas, where the population asked to be disconnected from the existing inefficient DH systems, fuelled by fossil fuels.

Households pay a national unified tariff, established by governmental Decision, the difference being paid from the national and local budgets to the DH companies. Today the reference price is 20 USD/Gcal (from July 2003). Local authorities can however establish a different local price if they are unable to cover their part of the subsidy. Problems for suppliers often arise from considerable delays in the payment of the local subsidies. In 2002, subsidies amounted to approx. 150 millions Euro. Added the population direct debts, it results that about 70% of the nationally accumulated debts for heating are directly or indirectly related to the population incapacity of paying the heating bills, a real and impressive social dimension of the heating problem.

The heating problem is worsened by the poor thermal insulation of the buildings. The average annual energy consumption in buildings is 350 kWh/m^2/year, 50% more than the EU average.

Efforts are done to improve the situation and legislative incentives are intended to boost the economic feasibility of investment projects in building energy efficiency:

- Custom tax exception and accelerated repayment (50% in the first year of operation) for new imported technologic equipment in investment that exceeds 1 million USD, plus VAT tax delay up to equipment start up. A fiscal deduction of 20% of investment value operates in the year when the investment is declared (Laws 332/2001, 345/2002, 414/2002).
- Beginning with 2004 there is a 30% local budget support for the apartment blocks that are connected to district heating systems and invest in building thermal insulation refurbishment. Financing sources must be identified in the local budgets for 2004.
- Governmental guarantee for financing loans of several selected projects and the operation of CHP plants that supply district heating systems. The governmental guarantee is presently the most operable and attractive incentive.
- Electricity generated in CHP plants that supply heat to DH systems is mandatory purchased by the electricity grid.

Under these circumstances, the carbon credits are a valuable additional source of funds in Romania, in order to manage the social heating problem, following joint implementation agreements with the Netherlands, Norway and Switzerland. As example, for the city of Targoviste district heating rehabilitation and new CHP Project of 36 million USD, as much as 14 million USD come from the government of Netherlands in a CO_2 emission trade contract.

The most relevant type of project, as a best practice, is the replacement of expensive liquid fuel with biomass, wood waste in particular, for small DH systems. These projects have a triple impact - on energy efficiency, on environmental protection by using wood waste and on social protection by reducing cost of heating.

The Romanian wood processing industry uses about 11 mil m3/year, and large quantities of waste from wood industry are reported: up to 3 millions tons. From these, hundreds of thousand tons of sawdust, deposited legally or illegally, are endangering the environment. It may seem strange that a country like Romania with huge biomass resources are not utilizing these resources, while import of expensive natural gas and oil has been ongoing for years.

The “break-through” was performed in 1999, when a demonstration project, replacing two light oil-fired boilers by biomass boilers in the city of Campeni was co-financed by PHARE; a similar project for sawdust utilization followed in the same year, financed by the Danish Environmental Protection Agency-DEPA in the Neamt county.

Now, a whole program, called SAWDUST 2000, is in progress. The SAWDUST 2000 project, carried out by ARCE in co-operation with DEPA and the project developer, the Grue&Hornstrup consultancy, aims to disseminate this experience in several cities. The considered locations are sited in the Northern part of Romania, with focus on the forest areas where saw dust and wood waste is available within a short distance from the boiler plants.

The total investment budget for implementation is 13,129,869 Euro, out of which approx. 80% already has been secured by funding from the town hall budgets, grant from the Romanian Special Fund for Energy System Development under ARCE and a combined grant from the EU Phare 2001 Program and the regional development activities. Sawdust 2000 is also the first project in Romania developed from the Danish side targeting the JI projects mechanisms.

At the beginning, 12 sites have been surveyed of which 5 sites have been selected for future implementation: Vlahita, Vatra Dornei, Huedin, Gheorghieni, Intorsura Buzaului. In Vlahita the existing boiler system utilized natural gas while oil was used in the other four towns. In all the towns, the existing boilers producing hot water for space heating and domestic hot water will be replaced by new automatically controlled biomass boiler systems, including flue gas cleaning systems. Implementation of new track pre-insulated pipes is also included.

The cornerstone in the project is to introduce boiler technology making it possible to utilize wet biomasses as fuel. In this respect wet biomasses like sawdust, wood chips, bark etc. with water content up to 55% are considered. Project boundaries are from a GHG emission reduction point of view achieved by:

1. Substituting natural gas and liquid oil by a renewable energy resource in form of wood waste more specific sawdust residues from local sawmills.
2. Reduction of the methane emission from anaerobic digestion of wood residues caused by illegal dumping of sawdust and other wood waste fraction from wood processing industry in the areas where the towns involved are located.

Table 1: Fossil fuels substituted - the figures are presenting the actual fuel consumption over the years mentioned

Town	Fuel	Unit	Annual Fuel Consumption				
			1997	1998	1999	2000	2001
Vlahita	Natural gas	Nm3	953.835	975.582	1.003.420	892.830	599.210
Gheorgheni	Liquid oil	tons/year	1.181	1.298	858	601	855
Huedin	Liquid oil	tons/year	315	450	320	300	300
Intorsura Buzaului	Liquid oil	tons/year	965	940	772	611	489
Vatra Donei	Liquid oil	tons/year	1.589	1.666	1.112	914	-

Implementation of the SAWDUST 2000 - Project will benefit a major part of the inhabitants in the five towns involved, where the services provided by public utilities were at an unbelievable low level, also reducing substantially the willingness to pay. A vicious circle has been created, which under the actual economical conditions only can be changed through a grant-supported project like Sawdust 2000.

Results of the Sawdust 2000 Project, in all 5 towns, are presented in the table below

Number of heated apartments	No,flats	3 018
Number of individual buildings connected to network	No	64
Total number of persons living in apartments and individual buildings	No.person	10 160

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

The Ministry of Agriculture, Forests, Waters and Environment has distinct responsibilities for monitoring the evolution of environmental factors and enforcing preventive, protective and remedial measures with special reference to air, soil and water pollution resulting from the entire chain of activities in the energy sector.

Policies and measures in Romania in the energy field are being progressively linked to environmental concerns, specifically to climate change mitigation through GHG abatement. Most strategy papers and sectoral blueprints developed over the past 11 years emphasized the need to live up to Romania's commitments under various multilateral treaties and conventions and to achieve conformity with EU legislation and directives as part of the accession process to full EU membership. The principles of sustainable development were also listed as a fundamental rationale for medium and long-term policy options

It should be noted that Romania has been commendably eager to sign the principal international agreements on environment protection and climate change mitigation, including the Kyoto Protocol (Law 3/2001), the first country in continental Europe to do so. The follow-up measures, however, have been hesitant and slow to come. Some progress has been made in terms of capacity building, in particular with regard to Joint Implementation. Inter-ministerial commissions have been set up to co-ordinate the specific interests and the work actually being done by various stakeholders.

Notwithstanding the imperfections of the legal and institutional instruments now in place, there is an increasing awareness at the level of decision-makers and stakeholders alike about the need to pay more attention to environment matters. Environment-minded NGOs and the academic community have played a significant part in this process by promoting initiatives of their own, lobbying and disseminating relevant information. Private businesses are also beginning to seize the commercial opportunities and to specialize as consultancies and project structuring organizations dealing with energy efficiency and tradable emissions reductions.

Mere compliance with international obligations for GHG emissions reduction is not, however, the main argument for strong climate change policies in Romania. In any GDP growth scenario (high, moderate or low) Romania is going to be able to meet its GHG emissions reduction targets under the Kyoto Protocol by 2008-2012 and beyond.

The National Commission on Climate Change, as inter-ministerial organism coordinated by MWEP, was established through Government Decision (H.G.) no.1275/1996.

The following agreements and projects on Climate Change issue are to be reported up to date;

- The first Memorandum of Understanding on cooperation under article 6 of the Kyoto Protocol, Join Implementation projects between Romania and the Netherlands signed on the 23rd of November 1999 at the Hague (2Mton CO_2e/year for the period 2008-2012).
- The second Memorandum of Understanding on cooperation under article 6 of the Kyoto Protocol, Joint Implementation projects between Romania and the Netherlands signed in November 2000 at the Hague (5 mio tons CO_2e/year for he Period 2008-2012)
- 2001-the first ERU-PT organized in the Nederlands: Municipal Co-generation Targoviste; Surduc-Nehoiasu Hydro Power Plant
- 2002-proposed projects for the ERU-PT: Rehabilitation of unit no.3 of 330 MW from CTE Rovinari; Rehabilitation of unit no.4 of 150 MW from CTE Paroseni; Modernization of 3 hydro units in Portile de Fier I Hydrostation; Upgrading Alesd II Cement Plant; Refurbishment kiln lines 1 and 3 at Campulung Cement Plant; Efficiency improvement of Boilers no.5 and 6 at CET Sud Bucuresti; Efficiency increase of cogeneration delivery from CET Govora; Efficiency increase for heating process at RAFO Onesti Refinery.
- Memorandum of Understanding regarding AIJ/JI Cooperation between the Government of Romania and he government of Switzerland and the Project Agreement - "Swiss Thermal Energy Project (Buzau, Pascani)" signed on the 8th of January 1999 at Bucharest (ratified through Law no.201/2001).
- Memorandum of Understanding on Cooperation between the Government of Romania and the Government of the Kingdom of Norway on Joint Implementation (JI) and the Project Agreement - "Development of municipal utilities - Modernization of heating system in Fagaras, Brasov County" signed in December 2001 at Oslo.
- Proposal for Host Country Agreement between Romania and EBRD as a trustee of PCF (World Bank Mission in Romania 18-22 February 2002).
- Two PCF project proposals exist at the moment for Romania: Cluj Napoca Energy Islands Projects; Afforestation of Degraded Agricultural Land Project - 7000 ha under the article 3.3 of the Kyoto Protocol (LULUCF - ARD).

In order to support the implementation of the National Action Plan for the Environment, the environmental fund has been established as a special extra budgetary fund managed in compliance with law no. 73/2000 amended by Emergency Ordinance no.93/2001. The fund will be financed from environmental taxes and charges, the sale of shares, payments, donations, interest, financial assistance from international financial institutions and others. According to Government Ordinance 93/2001, taxes will be applied to emissions of greenhouse gases (including CO_2), SOx, NO_x, particles and persistent organic pollutants (POPs). The Fund will provide reimbursable and non-reimbursable loans, co-financing, grants and interest subventions. The Fund's budget in its first year of operation is approximately Euro 100 million. Energy efficiency projects are not the central focus of the Fund, taking into consideration the establishment of the Romanian Energy Efficiency Fund FREE, which is dedicated to energy efficiency projects.

4 Making the Kyoto mechanisms work: Challenges ahead

Despite the clear commitment towards the use of Flexible Mechanisms, the fact remains that an agreed comprehensive and detailed medium and long-term strategy on environment related energy policy has not yet become fully operational. The successive versions of policy papers differ substantially in conceptual terms, and they suffer from a lack of integrative effort with the political, macroeconomic, social and regional policy targets. Political changes and fluctuations of managerial staff have also affected the consistency of forecasting and forward planning exercises.

Beside the existing incentives (as on-going restructuring and privatization of the energy sector aiming at involvement of private investors; regulated grid access; well-documented wind, solar, biomass & geothermal resources), the following key barriers, gaps and needs related to JI projects may be identified.

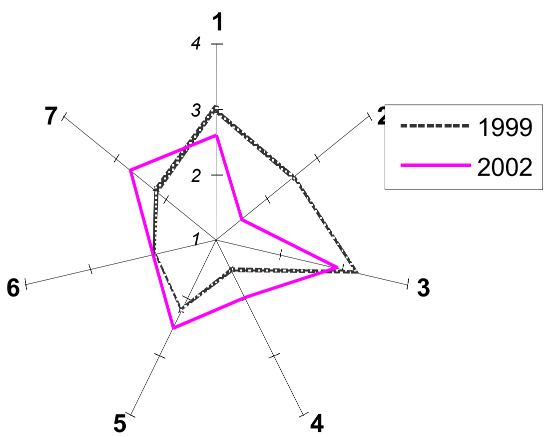
- Lack of knowledge and experience in preparing bankable feasibility studies;
- lack of fiscal and financial incentives for EE and RES investments (subsidies, taxes exemption);

- limited visibility of these projects in banking sector from Romania and abroad.

Here it may be added: shortage of investment capital; under-development of energy saving service and equipment industry; uneconomic pricing policy & uncertainty over ownership. Restructuring and privatization of the energy sectors assign private investments a fundamental role in future development plans. On the other hand, private investors have limited access to adequate long-term financing from local banks and funds.

The qualitative assessment of the investment climate may be reflected by the following graph. Ratings reflect enterprise perceptions. A larger surface area indicates a more problematic business environment. EBRD ranks Romania 11th as business environment, in comparison to other 12 transitions countries.

Qualitative assessment of the investment climate



1- access to financing
2- quality of infrastructure
3- taxes
4- regulations
5- quality of judiciary
6- crime
7- corruption

Scale from :
1- no obstacle to business operation to
4 –major obstacles

Source: EBRD (2002)

A priority might be to strengthen the ARCE as the focal point to promote and support the development and financing of EE and RES projects in Romania and create adequate legal framework with supporting financing schemes.

Slow progress in energy sector reform and flawed tariff policies

Although direct subsidies from the central budget have already been abolished, the existing methodologies for calculating energy prices by traditional producers do not fully account (or do not account at all) for certain expenses from the past or those related to the future decommissioning of energy capacities. Typical examples are the fossil fuel generators which do not account for their toll on the environment, or the nuclear power sector which underestimates, or ignores, the public costs for decommissioning facilities and storing waste.

Another barrier is that the main actors on the energy market are in transition. As example, the privatization of the distribution utility ELECTRICA. In this period, long term PPA are difficult to conclude with ELECTRICA.

- Difficulties to secure long term financial agreement for heat and power supply to the power grid/DH system
- Renewable energy sources still face high entry barriers in global energy market.

There are many reasons for this, but the most important barrier in many cases appears to be the perceived poor economics of renewables compared to fossil fuels. This is often due to traditional pricing structures, which do not internalize social and environmental costs and other externalities of energy provision and use. There are also financial and institutional barriers related to the small size of most renewable installations. Also Romania has a relatively powerful energy sector inherited from the period of centrally planned economies. Because of the drop in productivity since the changes, free capacity is still present, despite the closure of certain inefficient and polluting power plants. More than that, the national strategy sees the nuclear power as a priority, promoting the quota of nuclear electricity from 10% today, towards 20-25%.

There is a relatively limited supply of advanced technologies on the domestic market because the equipment is quite expensive by regional standard. There is also a limited know-how and technology in the field of energy efficiency and renewable energy sources. Leading world manufacturers of such equipment must work out a specific, regional marketing strategy to penetrate these markets. This would include convenient leasing schemes and reduced prices for products.

Despite the above barriers, the potential for JI projects is high. Point Carbon and Vertis Environmental Finance ranked recently Romania first JI host, within 13 Central and East European countries. The ranking is based on assessment of investment climate, climate policies and institutions, project experience, project pipeline.

As conclusions, Romania has a good JI potential and are in the process of building the necessary institutional capacity. For JI projects prospects, this could be enough to offset concerns about difficult investment climate.

References / Documents / Links

Renewable Energy and Energy Efficiency Partnership-REEEP- Background paper Central and Eastern Europe, Szentendre, Hungary, July 3-4,2003

2002 Regular Report on Romania's Progress towards Accession, EC COM(2002) 700 final, October 2002

Report on the progress in preparing the accession to the European Union, September 2002-June 2003, Government of Romania, June 2003

The investment climate for climate investment: Joint Implementation in transition countries, EBRD, working paper no.77, January 2003

In-depth Review of Energy Efficiency Policies and Programs of Romania, Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects –PEEREA Secretariat, 2002.

The Combined Heat&Power Generation for District Heating Purpose, In-Country Report Romania, SAVE project, April 2003.

Carbon Market Europe review, May 23, 2003.

SAWDUST 2000, Project Design, Grue&Hornstrup Consulting Engineers, 2002

http://www.reeep.org

http://www.infoeuropa.ro/infoeuropa/start.jsp

http://www.ebrd.com/pubs/econ/workingp/main.htm

http://www.encharter.org/

http://www.save2001.asa.ro/

http://www.pointcarbon.com/

Country Report: Russia

Dr. Igor Bashmakov
Center for Energy Efficiency, CENEf, Moscow

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

1.1 Energy efficiency and GHG mitigating activities at the federal level

According to IEA, in 2000 Russia was among ten least energy efficient countries in the world. Since 1990 energy intensity, depending on evaluation methodology, grew by 20-30%. “Russia presents both challenges and opportunities for anyone concerned with addressing global climate change. Russia ratified the United Nations Framework Convention on Climate Change (FCCC) in 1994, and it has emerged with potential opportunities for carbon mitigation that are as promising to environmentalists, as its vast fossil fuel reserves are to oil and gas executives. At the same time, however, Russia faces several formidable barriers to capturing this new carbon market (Chandler 1999)[1]”. This was written 4 years ago, but is still valid, especially when a shift back to coal becomes a priority for Russia’s energy strategy (Russian Energy Survey, 2002)[2].

Russia put into place a formal legal and regulatory framework to promote energy efficiency. Federal Law on Energy Conservation was signed in April 1996. Its language was too general to be efficient. This long-awaited law failed to bring any fruit. It failed to provide mechanisms to promote investments in energy efficiency. So in 2003 the Ministry of Economic Development and Trade started drafting a new law.

The mentality to find solutions to energy problems at the supply side is deeply rooted, and the attitude of the present Russian government towards energy efficiency is limited to just verbal support. Recently (in 2001) adopted Federal program “Energy Efficient Economy” provides a perfect illustration to this. It is a Federal program with available financing of only 0.4% of the total program costs. While it was titled “Energy Efficient Economy”, the share of energy efficiency in the program costs equals to 3.6% (see table 1), and is ten times less than the budget allocated for the gas industry, and 80% less than the budget for nuclear safety support. For the residential and communal sector, this program suggests to allocate 2 USc per person per year. What can be achieved with such miserable financing, even if everyone contributes his own $2? Calculations based on data presented in this program show, that the effectiveness of the program investments in energy efficiency is 10-15 times higher, than in energy supply. In 2002, federal funds were allocated only to one renewable development project, geothermal power plant in Kamchatka.

Energy efficiency policy at the federal level has been very weak. It lacks real leadership, and is not supported by financial and administrative resources. In 2003, only around 10 man-years of federal bureaucrats’ time were spent on energy efficiency matters. This figure was 50 back in 1998. In the Ministry of Economic Development and Trade, there is no person responsible for energy efficiency improvement policy. There are just a couple of such people in Gosstroy, and a few people in the Ministry of Energy and the Ministry of Science and Industry. Therefore, there are no people to implement even the weak decisions made. So “policy” means just a “verbal policy”. It cannot succeed.

Russia’s economic growth should depend both on its vast natural resources and on the efficient use of these resources. In contrast to investments in the development of energy resource base, no effort was made to update the evaluation of energy efficiency potential since 1993, which was only an extrapolation of the evaluation made for the USSR for 1990.

Unwise pricing policy was the only real federal policy to inspire efficiency. Prices were escalated with no account of old billing schemes, budgeting processes, limited purchasing power, or unavailability of technical means to regulate consumption and to be responsive to price signals. Therefore, reduced markets for CHPs, huge accumulated energy debts, and re-distribution of wealth in favor of energy supply companies, which led to limited ability of consumers to finance energy efficiency improvements, are among results of such pricing policy.

[1] W. Chandler. Editor. Climate Change Policy and Programs in Russia: An Institutional Assessment. August. 1999. AISU. PNNL.

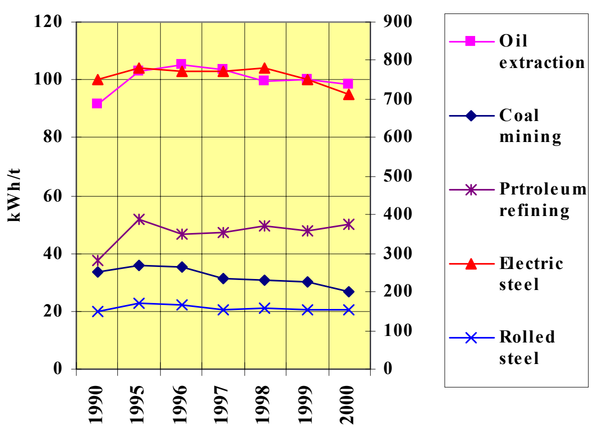
[2] See Russian Energy Survey 2002. OECD/IEA. 2002.

Table 1: Fragments from the budget of the Federal program "Energy efficient economy"

Program components	Program expenditures Billion rubles	Share %	Federal budget Billion rubles	Share of federal budget in overall costs %	Share in federal budget costs %	Per capita per year rubles
Total program	2958.00	100.0%	12.30	0.42%	100.0%	
Gas industry	1122.40	37.9%	2.35	0.21%	19.1%	4.03
Nuclear safety	181.65	6.1%	1.14	0.63%	9.3%	1.95
Energy efficiency	106.00	3.6%	1.69	1.59%	13.7%	2.89
Industry	34.68	1.2%	0.26	0.75%	2.1%	0.44
Agriculture	4.10	0.1%	0.12	2.95%	1.0%	0.21
Residential	25.09	0.8%	0.42	1.67%	3.4%	0.72
Transportation	9.00	0.3%	0.14	1.52%	1.1%	0.23
Public buildings	4.15	0.1%	0.49	11.71%	4.0%	0.83
Fuel and energy complex	29.01	1.0%	0.27	0.92%	2.2%	0.46

As experience of 1990-2003 shows, energy prices escalation alone is not sufficient to reduce specific electricity consumption even in industries which were in a much better economic shape compared to others (see fig. 1). There are still too many barriers to energy efficiency in Russia, which the government should address.

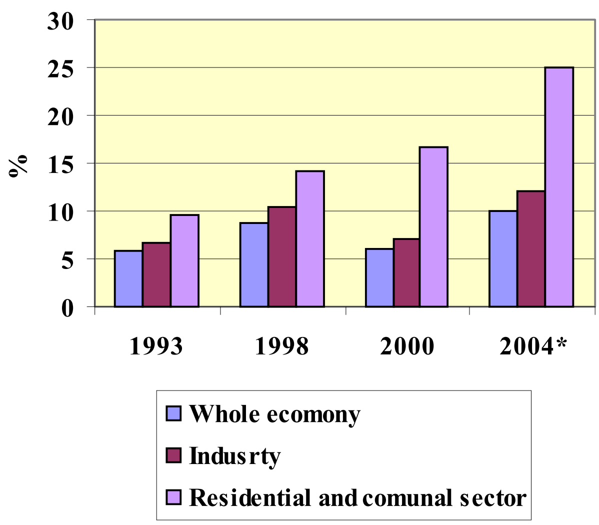
Figure 1: Specific electricity consumption for major industrial products



Energy costs are putting Russia's economy in irons (see figure 2). The higher they are, the more vague the hope for sustainable economic growth.

Industry and communal sector suffer the most from abrupt growth of energy prices. Even petroleum industry is concerned with the possible impacts of electricity price growth both on the production costs and demand for petroleum products, which is related to economic growth.

Figure 2: The share of electricity and heat costs in overall costs (estimate for doubling electricity and heat prices)*



While federal energy efficiency policy is weak, policies of many regions and enterprises are much more aggressive. The number of regional and municipal energy efficiency centers, which already exceeds 100, with over 2,000 people employed, is only one indicator. There are over 200 energy efficiency groups at industrial enterprises. The staff of energy efficiency centre of Magnitogorsk Steel Plant alone equals 70 people. There are many success stories of effective policies and programs implementation, but the replication rate is still low.

1.2 GHG mitigating policies and activities

Since December 1997, there has been an intense internal discussion in Russia, whether it should ratify the Kyoto Protocol. The Kyoto Protocol is on the agenda of many federal institutions. Coordination of all climate related activities is the responsibility of Interagency Committee on Climate Change. However, the real problem today is lack of coordination among all federal institutions involved: State Parliament, President Administration, State Hydro-Meteorological Committee, Ministry of Economic Development and Trade (this Ministry has the final word in determining economic reasons for Russia to participate in Kyoto mechanisms), Ministry of Energy, Ministry of International Affairs, Ministry of Natural Resources, Security Council, and many other agencies and institutions. Several government agencies, including the Ministry of Economic Development and Trade and the Ministry of Energy, are actively involved in international negotiations on the Kyoto Protocol and in the discussion of how it should be implemented domestically (Popov, Pluzhnikov, Gavrilov, 2002)[1].

Another problem is insufficient knowledge of issues under discussion. Only a few participants in such discussions ever got to read IPCC reports or special publications (Grabb, Vrollik, and Brack, 2001)[2]. So skeptics – some economists, politicians, and political analysts with little expertise in the field – spend a lot of time discussing whether climate change has been registered, and if there is any anthropogenic impact (Roginko and Mashenko, 2003)[3]. Another argument of Russian skeptics is that Kyoto will not address climate stabilization problem. This is true. But Kyoto Protocol is not intended to so. It is only a first step to understand, where we can go, how far we can move in the direction of mitigation, and at what costs. Not more than that.

Many Russian experts support ratification of the Kyoto Protocol, and Russian business community already expressed a wish to participate in flexible mechanisms and work to identify, what Russia needs to implement future flexible mechanisms (Bashmakov, 2002)[4]. Both leading federal agencies, Federal Hydro-Meteorological Committee and the Ministry of Economic Development and Trade, support ratification of the Kyoto Protocol. The major shortfall on the part of the federal government is lengthy discussions of ratification and low institutional readiness to launch implementation mechanisms. Nevertheless, the first steps were made in the right direction: the Federal Parliament drafted legislation on GHG emission control, JI and emission rights and trading (Kosarikov, 2002)[5]. Many large industrial companies expressed a clear interest in participating in the Kyoto mechanisms.

On the other hand, there is a fear that due to intensive economic growth Russia will fail to meet its obligations under the Kyoto Protocol, if a substantial part of AAU is sold abroad. Projections made by all expert groups (including the Ministry of Economic Development and Trade) show, that under any foreseeable scenario Russia's GHG emissions before the year 2010 will not exceed the 1990 level. Unused AAUs for the period 2008-2012 are estimated between 3 and 5 billion t CO_2. The Third National Communication of the Russian Federation also confirms this (The Third National Communication of the Russian Federation)[6].

---

1 A. Popov. O. Pluzhnikov and V. Gavrilov. Kyoto Protocol: perspectives, benefits and costs for Russia. In "Kyoto Protocol: Responsibility and business perspectives". WWF, Regency group and environmental projects consulting institute. 2002;

2 See for example M. Grabb, C. Vrollik and D. Brack. The Kyoto Protocol. A Guide and Assessment. (In Russian. Moscow. "Nauka". 2001.

3 See for example S.A. Roginko and P.V. Mashenko. Europe, Russia and the Kyoto Protocol. (In Russian) "Ogni". Moscow. 2003. The positive side of this publication is an explanation of some European mitigation policies.

4 See for example I. Bashmakov. How Much Does Mitigation of Anthropogenic Influence on Climate Change Cost? "Voprosi Economiki". V.1. 2003; I. Bashmakov. Climate Change. What Is Science Certain About? "Towards a Sustainable Russia". V. 20. 2002; What Has Russia Done to Reduce GHG Emissions? "Towards a Sustainable Russia". V. 21. 2002; Development of GHG Emission Trade Mechanisms. Bureau of Economic Analysis (In Russian). 2002; The Kyoto Protocol: Responsibility and Business Perspectives. WWF, Regency group and environmental projects consulting institute. 2002.

5 A. Kosarikov. Possible approach to legislation on GHG. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting institute. 2002; V. Grachev. On legislative problems to implement the Kyoto Protocol in Russia. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting institute. 2002.

6 The Third National Communication of the Russian Federation. Interagency Commission on Climate Change Problems. Moscow . 2002; Development of GHG Emission Trade Mechanisms. Bureau of Economic Analysis (In Russian). 2002; The Kyoto Protocol and Energy in Russia. The second version. Ministry of Fuel and Energy and Institute of Energy Strategy. Moscow, 1999.

2 Best practice policies and measures yielding ancillary socio-economic benefits

Ancillary socio-economic benefits concept may be viewed from two angles. First, there are many policies and activities, which, as a side effect, bring significant reduction of GHG emissions. All energy efficiency activities with paybacks acceptable to a decision-maker (decision-makers may have different IRR hurdle rates) bring reduction of GHG emissions as a co-benefit. Second, every specific climate change mitigation policy can bring ancillary costs and ancillary benefits.

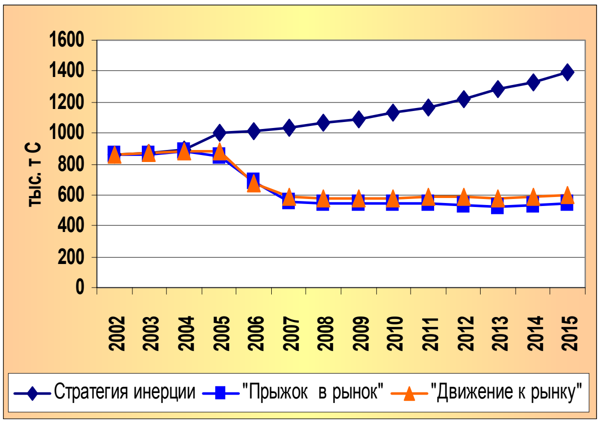
Activities aimed to reduce GHG emissions or enlarge sinks often have the following co-benefits: improvement of water balance and water quality, improvement of biodiversity, improvement of competitiveness and expansion of a market niche, or reduction of public energy expenditures and reallocation of them for other purposes through energy costs reduction, additional employment, GDP growth, improvement of energy security, etc. (Climate Change 2001. Mitigation. Contribution of WG III IPCC. Cambridge University Press. 2002)[1]. Of course, for some sectors, such as coal and heavy fuel oil production, there are costs associated with mitigation actions. So the discussion is to be conducted in terms of net ancillary benefits.

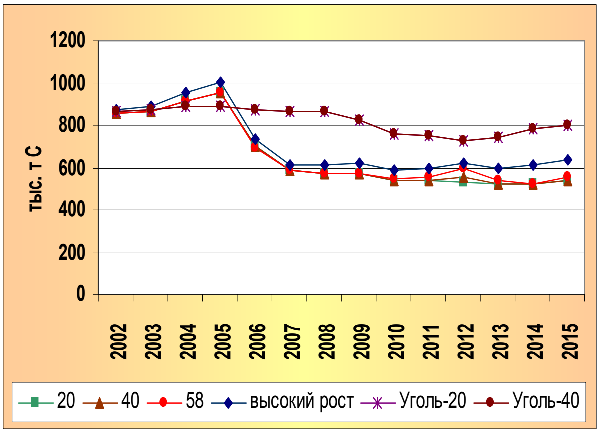
Russia should start from "no-regret" activities to implement energy efficiency measures with low paybacks and, as a side effect, get abundant GHG emissions mitigation fruit. The power sector reform program developed by CENEf for Sakhalin island in 2001 shows, that if effective reform scenarios based on power sector gasification are implemented, annual CO_2 emission from the power sector in 2015 is only 63% of the 2002 level (decline by 6 million t of C, see figure 3). But even in "coal" scenarios, due to efficiency improvements inspired by competition, CO_2 emission declines by about 4 million t of C). If we assume that only 50% of emission reduction is traded, with the 1 t CO_2 market price equal to $10, this will result in additional income from AAUs trade of $112 million.

"No regret" activities also bring multiple ancillary benefits. Below only a few examples are presented.

Human health. Russian experts made an assessment that GHG emissions reduction by every 3.5 thousand t of CO_2 (accompanied by the reduction of SOx and NO_x emissions) saves 1 life (Avaliani/Golub/Dudek/Safonov/Saparov: 2003)[2]

Figure 3: CO_2 emission from Sakhalin power sector in 2002-2015





Another example. Reliability of heating systems is a high priority for Magadan Oblast. Insufficient supply of fuel results in poor heat supply. When outdoor air temperature was extremely low (-30 to -40°C), indoor temperature fell down to the critical, even life-threatening, values (+10°C or lower). Such low indoor air temperature (below the dew point) promoted condensation on the cool surface of insulation materials.

This effect contributed to the deterioration of insulation. Children in orphanages suffer a lot from diseases caused by frequent super-cooling. Practically all orphans in "Dom Detstva" orphanage in Ola were allergic to super-cooling (coldness allergy) between February and May 1999, after the heating was brought to a stand-by mode (this mode is determined by lack of fuel and implies circulation of heat carrier heated up to 5-18°C). The situation was even more depressing in departments and rooms for bed-patients (children with serious con-

---

1 For more details on this discussion see Climate Change 2001. Mitigation. Contribution of WG III IPCC. Cambridge University Press. 2002.

2 S. Avaliani, A. Golub, D. Dudek, G. Safonov, and M. Saparov. Co-benefits of GHG emissions reduction in Russia. In "Life in the atmosphere of greenhouse gases". Institute of environmental projects consulting. Moscow. 2003.

genital mental and/or physical disabilities), for example in the boarding-house for mentally retarded children, Magadan, Armanskaya St., 24. To a certain extent, extremely low indoor air temperature contributes to high death rate among these children (during fall and winter of 1998/1999 10 children died of super-cooling). Within two weeks CENEf implemented emergency energy efficiency measures to mitigate low quality heat supply and provide standard comfort in this building.

Saving taxpayers' money. Building management department in Sverdlovsk Oblast managed to reduce its electricity consumption by 18%, and heat consumption by 45%. So taxpayers' money was used more wisely (Danilov, 2003)[1]. It is just one example of hundreds similar ones for the public sector. In 1999-2001, the Ministry of Education alone invested $18 million in the energy efficiency program (in 2001 prices). Annual effect is $8.3 million (in 2001 prices). Internal rate of return is 63%. Simple payback period is 2.2 years. With an account of the financial lever, public funds allocated for the program implementation pay back in 0.8 years. All educational institutions report to the Ministry and directing agencies on the funds utilization and attach copies of payment orders for energy efficiency equipment, as well as complete lists of equipment, specifying installation locations and potential savings.

Fighting poverty. The federal government has to start intensive energy efficiency improvement program at its own facilities. Annual energy bills of the government are over $3 billion, while reduction potential exceeds $1 billion. If this money is saved, 4 million teachers can get a salary rise of $30 per month, or about 20% (Shearer and Bashmakov, 2003)[2].

Improvements in competitiveness. In 2001, industrial plants of Sverdlovsk oblast reduced energy consumption by 6-30% through energy efficiency measures, which paid back in less than 1.5 years (Shearer and Bashmakov, 2003)[3]. So their energy costs fell down by 1-5%, and competitiveness and employment situation improved. These achievements result from capacity and institutional building in the industry supported by the local government, and includes: creation of energy efficiency teams at enterprises, training these specialists, energy audits, (audits were made at 25 of 40 large enterprises in Sverdlovsk oblast), introduction of enterprise standard for industrial energy efficiency activities, installation of energy meters and regulation systems, installation of energy efficient equipment, introduction of energy efficiency technologies, utilization of secondary energy resources, introduction of the system of personal benefits for achievements in improving energy efficiency, informational support to energy efficiency policies at enterprises (Tikhonov, 2003)[4].

Success of the housing and communal services reform. Covering high energy costs and maintenance and repairs of inefficient buildings are major barriers to the housing and communal services reform. The only possible way to further reform this sector is to launch mechanisms allowing for substantial cost reduction through energy efficiency improvements. The potential is huge. Just three examples: in 2000, a heat utility in Krasnoturinsk reduced its electricity consumption by 15% and heat losses by 23%. Heat became less expensive for residents. When hot and cold-water meters are installed, metered consumption declines by 40%, so households behave differently and are able to save money by controlling their water consumption. Introduction of new building codes in Moscow alone allowed for reduction of heat consumption for space heating by 15% since 1994.

3 Climate change mitigation and the use of flexible mechanisms: State of the art

Many Russian regions and municipalities are seeking to be involved in Kyoto mechanisms. Some of them have already conducted regional GHG emissions inventories (Bashmakov and Gritsevich, 2002).[5] Many non-government institutions were set up to address mitigation challenges and flexible mechanisms. RAO "EES Rossii" has established the Energy Carbon Fund, which started with making GHG emissions inventories at RAO facilities based on the IPCC methodology (Fedorov, 2002) [6]. There are also "National organization to support carbon sink projects", "Center for JI projects", to

1 N. Danilov. Present Energy Efficiency Improvement Policy in Sverdlovsk Oblast. "Vestnik FEC". №3. 2003.

2 Beth Shearer and Igor Bashmakov. Possibilities to realize federal energy efficiency improvement program in Russia. (Unpublished presentation. In Russian). 2003.

3 Ibid.

4 N. Tikhonov. Energy Conservation at Sverdlovsk Oblast Steel Plants. "Vestnik FEC". №3. 2003.

5 I. Bashmakov / I. Gritsevich. NGOs assist regions and business to approach Kyoto mechanisms: start of practical actions. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting. 2002.

6 Yu. Fedorov. The Kyoto Protocol: opportunities for Russian energy business. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting. 2002.

name just a few. The Energy Carbon Fund has already identified projects for joint implementation. So regulation is required regarding how emission quotas will be allocated, and how such projects can legally deliver AAUs at the international market.

Many of the findings of the study conducted in 1999 with CENEf participation are still valid today (Chandler, 1999)[1]:

- Jurisdictional concerns are a focus for Russian efforts to lay the groundwork for international emissions trading programs. Several agencies are working simultaneously on programs such as JI and monitoring. Jurisdictional issues appeared frequently in discussions about flexible mechanisms. Many agencies and private companies are waiting to see which government organization will develop and manage infrastructure for trading and JI;
- A great deal of agency time and effort has been devoted to flexible mechanisms, but Russia will be unable to participate in any international trading regime if it is not in compliance with the FCCC;
- Planning is a relatively inexpensive way for Russian climate change institutions to establish priorities and improve performance. A planning exercise would also provide guidance to the administration of the Russian government on where funding was most urgently needed;
- Performance standards and goals could be divided into three groups: meeting FCCC commitments, developing flexible mechanisms, and managing research and program implementation".

4 Making the Kyoto mechanisms work: Challenges ahead

In Johannesburg, Russian Prime Minister Kasyanov announced that Russia would make preparatory activities to ratify the Kyoto Protocol. If it happens, substantial activities are to be launched to promote practical mitigation actions. The need to develop legislation on GHG emission mitigation and trading is recognized, as well as a need for setting up effective institutions, which would develop and implement governmental policy on mitigation and trading.

But even when both legislation and institutions on the Kyoto Protocol implementation are in place, federal GHG mitigation activities will face lack of incentives and resources to develop and implement energy efficiency policies and institutions capable to explore waste energy efficiency potential. In Russia, about all parties to GHG emissions mitigation discussions agree that energy efficiency is the first priority for mitigation options. There is only some disagreement regarding if it should start from power plants efficiency improvements or at the consumer side.

But what is more important, is the demonstrated inability of the federal government to inspire and manage energy efficiency activities, and lack of leadership from the federal government. This should be changed.

So there are two challenges to be addressed:

- Gap between the need for strong institutional capacity to manage emission quotas allocation, projects monitoring, JI activities, emissions trading and present lack of such institutional capacity;
- Gap between the need for energy efficiency generated mitigation results and inability of the federal government to develop and implement energy efficiency.

Russia faces some serious challenges in complying with the FCCC and advancing policies and programs to mitigate climate change. Lack of clearly defined roles for various agencies may lead to the fact that Russia will develop "all of the bureaucracy with none of the resources." The project team developed seven findings and recommendations, which are divided into three categories.

[1] W. Chandler. Editor. Climate Change Policy and Programs in Russia: An Institutional Assessment. August. 1999. AISU. PNNL.

References / Documents / Links

AISU (1999) W. Chandler. Editor. Climate Change Policy and Programs in Russia: An Institutional Assessment. August. 1999. AISU. PNNL.

OECD/IEA. (2002). Russian Energy Survey 2002.

Avaliani S., A. Golub, D. Dudek, G. Safonov, and M. Saparov. (2003) Co-benefits of GHG emissions reduction in Russia. In "Life in the atmosphere of greenhouse gases". Institute of environmental projects consulting. Moscow.

Bashmakov I. (2003). How much does Mitigation of Anthropogenic Influence on Climate Change Cost? "Voprosi Economiki". V.1. 2003;

Bashmakov I. (2002 a). Climate Change. What Science Is Certain About? "Towards a Sustainable Russia". V. 20.

Bashmakov I. (2002 b). What Has Russia Done to Reduce GHG Emissions? "Towards a Sustainable Russia". V. 21. 2002;

Bureau of Economic Analysis. (2002). Development of GHG Emission Trade Mechanisms. (In Russian).

Bashmakov I. and Gritsevich I. (2002). NGOs assist regions and business to approach Kyoto mechanisms: start of practical actions. In "Kyoto Protocol: Responsibility and business perspectives". WWF, Regency group and Ecological projects consulting. 2002.

Danilov N. (2003). Present Energy Efficiency Improvement Policy in Sverdlovsk Oblast. "Vestnik FEC". №3.

Grabb M., Vrollik C. and Brack D. (2001) The Kyoto Protocol. A Guide and Assessment. (In Russian). Moscow. "Nauka".

Fedorov Yu. (2002). The Kyoto Protocol: opportunities for Russian energy business. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting. 2002.

Grachev V. (2002). On legislative problems to implement the Kyoto Protocol in Russia. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting Institute.

IPCC. (2001). Climate Change 2001. Mitigation. Contribution of WG III IPCC. Cambridge University Press. 2002.

Kosarikov A. (2002). Possible approach to legislation on GHG. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting Institute.

Ministry of Fuel and Energy and Institute of Energy Strategy (1999). The Kyoto Protocol and Energy in Russia. The second version. Moscow.

Popov A., Pluzhnikov O. and Gavrilov V. (2002). The Kyoto Protocol: perspectives, benefits and costs for Russia. In "The Kyoto Protocol: responsibility and business perspectives". WWF, Regency group and environmental projects consulting Institute.

Roginko S.A. and Mashenko P.V. (2003). Europe, Russia and the Kyoto Protocol. (In Russian). "Ogni". Moscow. 2003.

Shearer B. and Bashmakov I. Possibilities to realize federal energy efficiency program in Russia. (Unpublished presentation. In Russian). 2003.

Tikhonov N. (2003). Energy Conservation at Sverdlovsk Oblast Steel Plants. "Vestnik FEC". №3. 2003.

The Third National Communication of the Russian Federation. Interagency Commission on Climate Change Problems. (2002). Moscow.

WWF (2002). The Kyoto Protocol: Responsibility and Business Perspectives. WWF, Regency group and environmental projects consulting Institute.

Center for Energy Efficiency: www.cenef.ru

State Duma of the Russian Federation: www.duma.ru

Ministry of Economic Development and Trade: www.economy.gov.ru

Ministry of Energy : www.mte.gov.ru

Ministry of Foreign Affairs: www.mid.ru

Ministry of Science and Industry: www.mpnt.gov

State Hydro-Meteorological Committee: www.cityline.ru/politika/prav/roshydr.html.

Country Report: Slovakia

Vladimír Hecl
Energy Centre, Bratislava

1 Cogeneration in Slovakia

1.1 History of combined production of heat and power in the Slovak Republic

Combined production of heat and power in the steam cycle (conventional technology) was first developed in parallel with industrial expansion during the 1960s and 70s. Cogeneration technologies based on combustion engines evolved in the early 90s. Probably the first cogeneration unit was implemented in the locality of Dolný Hričov, near Žilina (year 1992). Two years later a cogeneration unit was installed at a swimming pool in Drienica (year 1994).

A significant project involving the exploitation of biogas was carried out at an agricultural/animal farm in Bátka.

Historically, combined heat and power production was predominately provided in conventional heat and power plants, mostly in industrial facilities. Along with the development of industry, a housing infrastructure was built, creating the conditions for centralized heat supply. Small scale CHP units began to be used in the early 90s. These projects were oriented to centralized heating of houses, hospitals, swimming pools, and to utilization of biogas created by methanegeneous processes.

1.2 Present situation

Because of the lack of specific and exact description of combined heat and power in Slovakia, cogeneration is divided into three groups in this Study:

- gas-engine small and medium cogeneration units (up to 5 MWe)
- heat power plants
- gas – steam cycles.

1.2.1 Small and medium cogeneration units (up to 5 MWe)

121 gas-engine cogeneration units are currently in operation in Slovakia. The total installed capacity is 16.3 MWe and approximately 24.5 MWt. Table 1 presents the number of units in operation and installed capacity of the sectors of implementation.

Table 1: Number and installed capacity of small and medium cogeneration units (up to 5 MWe)

Sector of implementation	Number of units	Installed power capacity (kWe)	Installed thermal capacity (kWt)
Hospitals	24	2 423	3634.5
Food industry	3	416	624.0
Sewage tanks	13	1 033	1549.5
Agriculture	4	436	654.0
Communal sector	21	6 904	10 356
Administration buildings	7	2 297	3445.5
Hotels	16	465	697.5
Swimming pools	8	294	441.0
Industry	17	1 872	2 808.0
Family houses and others	8	164	246.0
Total	121	16 304	24 456.0

Figure 1 illustrates the number of cogeneration units according to the sector of operation (in Nové Zámky, one new CHP unit with installed capacity of 5.4 MWe will be added in September 2002). Figure 2 shows installed power capacity of cogeneration units according to the sector of implementation. The biggest groups of units are in operation in hospitals and in the municipal sector, their shares are 19.8 % and 17.3% respectively. Following sectors of implementation are: industry, hotels and sewage tanks. Less than 10 units are installed in swimming pools, administration buildings, agriculture and the food industry. The shares were defined according to the number of units. In case we have to show the structure of installed capacity, the biggest share belongs to municipal sector - 42.35 % and hospitals are in second place – 14.9%.

Four types of fuel are used in cogeneration units in Slovakia: natural gas, propane – butane, geothermal gas and biogas. The biggest share belongs to natural gas - 82.6 %, the share of other fuels is: propane – butane 2.5%, geothermal gas 0.8% and finally, biogas 14.1%. The shares were defined according to the number of units in operation. Table 2 presents the number of cogeneration units according to fuel type.

Figure 1: Number of cogeneration units according to the sector of operation

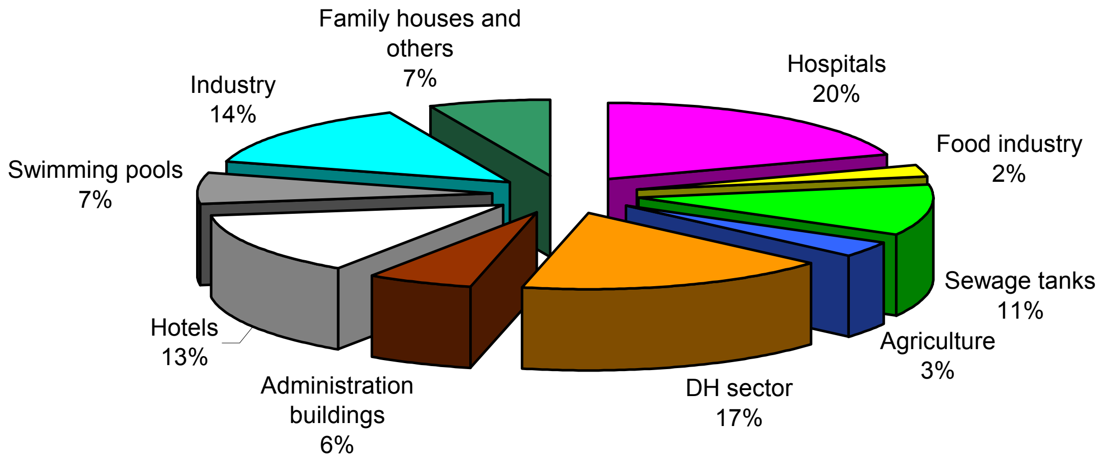


Figure 2: Share of installed power capacities of cogeneration units according to the sector of implementation (kWe)

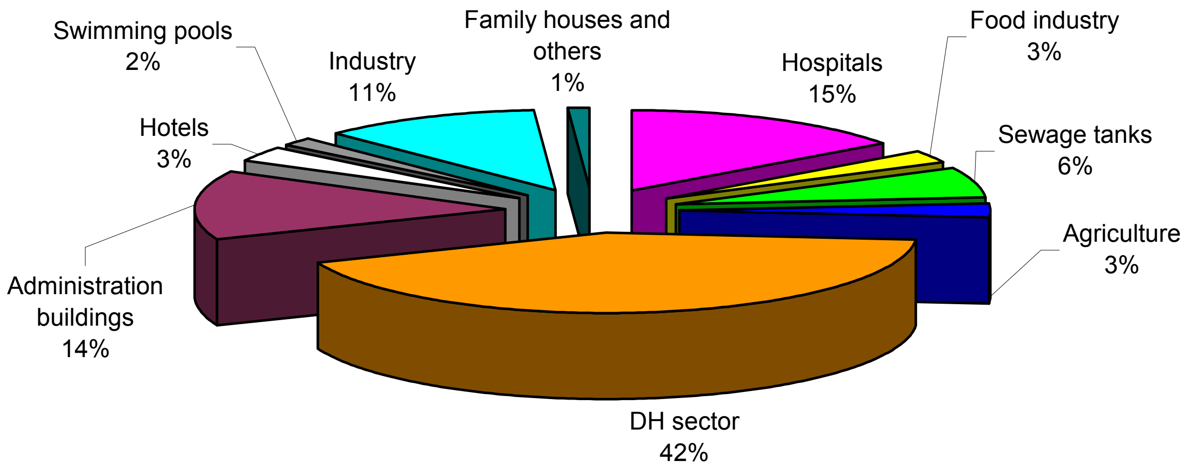


Table 2: Number of cogeneration units and installed capacity according to fuel type

Type of fuel	Number of units	Installed capacity (kWe)
Biogas	17	1 469
Geothermal gas	1	22
Propane – butane	3	53
Natural gas	100	14 760

1.2.2 Heat and power plants

Conventional heat and power plants in the industry sector

Currently heat and power plants exist in 38 industrial companies. The biggest share of installed thermal capacity is 19.7% in the metallurgical industry, followed by chemical (18.5%) and malt & paper industry (16.4%). Electricity production in heating power plants is very low in comparison with thermal production. The ratio of thermal to electrical production is 10.7:1. Table 3 presents the number and installed capacity of heat and power plants according to the sector of industry.

Table 3: Number and installed capacity of conventional heating power plants according to the industry sector

Sector of industry	Number of boilers	Installed thermal capacity (MWt)	Installed power capacity (MWe)
Petrochemical	13	1050.0	114.0
Chemical	36	1536.1	141.8
Rubber industry	10	279.1	9.8
Malt & paper	24	1359.6	127.3
Wood industry	8	156.8	5.9
Textile	37	755.8	38.3
Leather industry	11	254.5	13.1
Metallurgical industry	20	1633.9	227.9
Mechanical industry	25	625.8	42.4
Food industry	15	646.8	56.4
TOTAL	199	8 298.5	776.6

Figures 3 and 4 (see next page) present the number of cogeneration units in operation and their installed capacity according to the type of fuel.

Figure 3: Number of cogeneration units (to 5 MW) according to the type of fuel

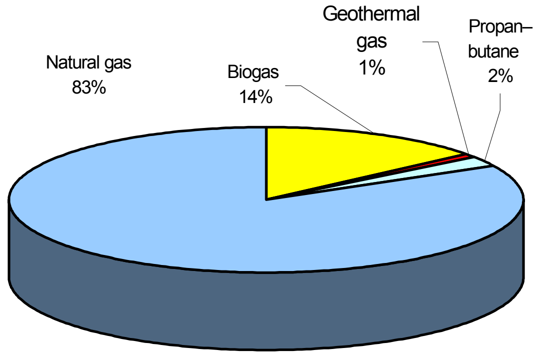


Figure 4: Installed capacity of cogeneration units (to 5 MW) according to the type of fuel (kWe)

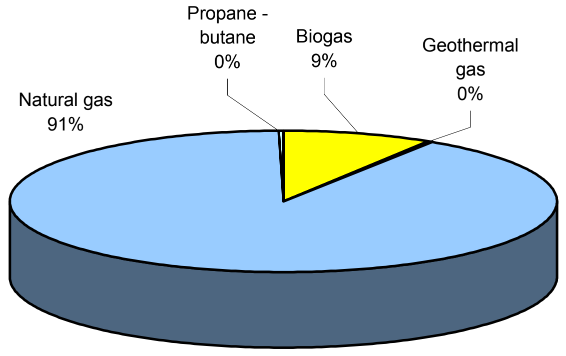


Figure 5: Number of conventional heat and power boilers according to industry sector

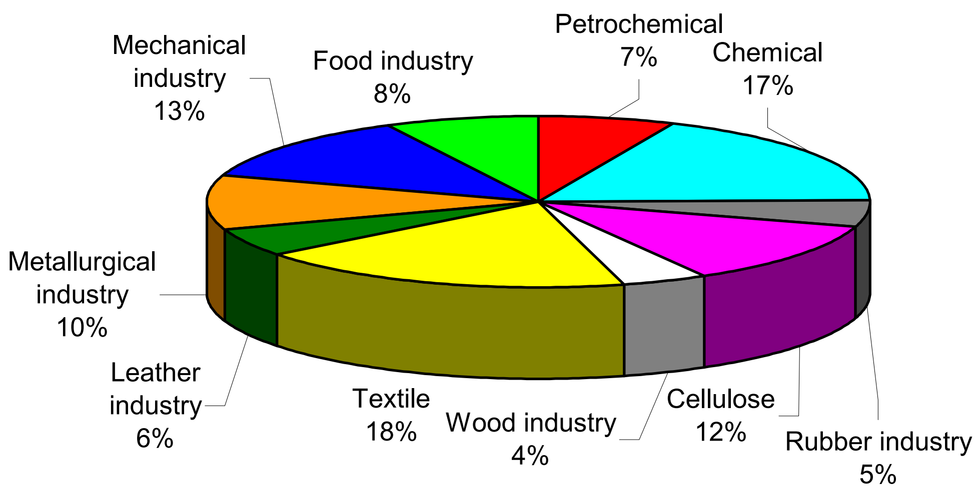
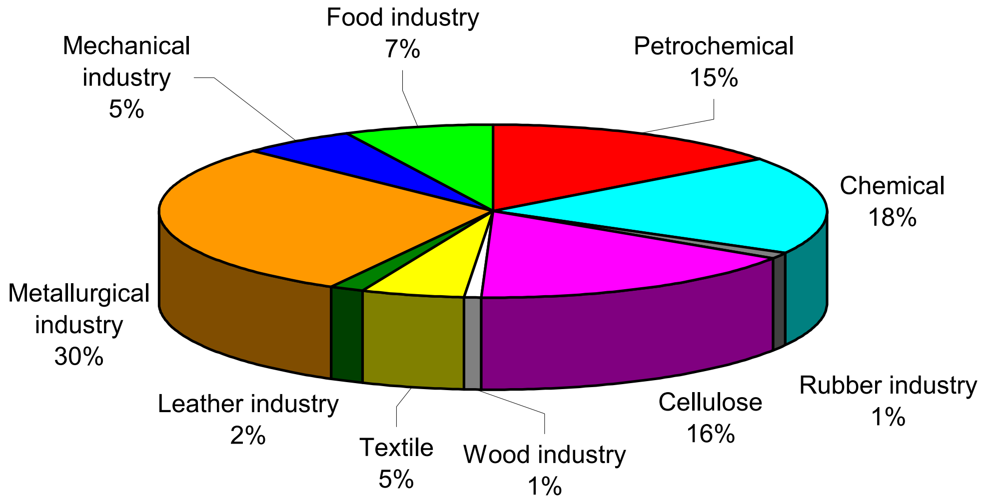


Figure 6: Installed power capacities of conventional heat and power boilers according to the industry sector (MWe)



Figures 5 and 6 present the number of conventional heat and power plants and their installed thermal capacity according to industry sector.

Municipal heat and power plants

There are 11 large-scale heat power plants currently in operation in Slovakia. Table 4 shows the structure and installed heat and power capacity. All heat power plants have a large installed capacity. They supply the power grid with electricity, and industry and municipal with heat. The heat power plant in Banská Bystrica was a conventional thermal plant before reconstruction. After a complete change of heat boilers and equipment, the company which owns this plant (1. Banskobystrická energetická spoločnosť) became the first communal producer of electricity in Slovakia. The other communal producers do not produce electricity. General reconstruction of the district heating system in Banská Bystrica is a typical example of conversion from thermal production to combined heat and power production.

Table 4: Installed thermal and power capacity municipal heat power plants

Locality	Installed power capacity (MWe)	Installed thermal capacity (MWt)
Bratislava I.	14.4	136
Bratislava II.	20	438
Bratislava – West	25.0	262
Trnava	12.0	169
Martin	47.5	572
Banská Bystrica	5.85	50
Zvolen	34.8	176.2
Žilina	49.0	456
Nováky A	64.0	160
Nováky B	220.0	320
Košice	121.0	875.8
TOTAL	613.55	3 615

1.2.3 Gas – steam cycles

Gas – steam cycles are generally divided into two groups:

a) Combustion turbine + boiler

Only one conventional gas – steam cycle is installed in Slovakia, in PPC Bratislava. The parameters of this system are:

- installed power capacity: 218 MWe (8oC)
- installed thermal capacity: 186 MWt

Gas steam cycle produces heat for the district heating system in Bratislava and covers basic consumption in DH system in Bratislava – West.

b) Combustion turbine + boiler + steam turbine

Prefixing of a combustion turbine in front of a heat boiler is a typical process of heat source reconstruction. This process provides increasing heat efficiency and is used in the Biotika Slovenská Ľupča company. The same reconstruction was done for the heat power plants in Žilina and Vojany II.

1.3 Share of installed power capacity from cogeneration of total installed power capacity

The total installed power capacity is 8 321 MWe in 2000. The estimation of the share of installed power capacity from cogeneration depends on the definition of cogeneration in the specific country.

Table 5: Installed capacity of cogeneration sources

Type of cogeneration source	Installed power capacity (MWe)
Small and medium gas – engine units	16.3
Heat and power plants	1 390.1
Of which: Industry sector	776.6
Municipality heat power plants	613.5
Gas steam cycles	218.0
Total	1 624.4

Table 6: Share of individual types of cogeneration units of total installed power capacity

Type of cogeneration source	Total installed power capacity (MWe)	Share of cogeneration on the electricity market (%)
Small and medium gas – engine units	16.3	0.2
Small and medium gas – engine units + heat and power plants	1 406.4	16.9
Small and medium units + heat and power plants + gas steam cycles	1 624.4	19.5

The share of individual types of cogeneration units of total installed power capacity is shown in table 6. If we consider only small and medium gas-engine cogeneration units, installed power capacity makes up only 0.2% of the total installed power capacity in Slovakia. By adding small and medium gas–engine units and heat and power plants, the share is 17% and in the case of all types of combined heat and power generation sources, the share is 19.6% of total installed power capacity. The share of power produced by cogeneration is interesting from two criteria:

- power produced by cogeneration is higher than the share of installed sources, and has higher utilization than installed sources

- power produced by cogeneration is higher than the average share of cogeneration in EU countries (9%)

Besides the share of production by cogeneration, the use factor of installed capacity is very important. Use Factor is defined as the share of annually electricity production to annually available capacity, which is 40.96% according to the data from the year 2000. The average for this factor is 43.2% in EU countries; Slovakia is at the same level as France and Ireland.

1.4 Industry sectors appropriate for implementation of CHP

One possibility for determining sectors where combined heat and power production could be a viable option is to examine the installed cogeneration units in Slovakia. In the category of small and medium gas-engine cogeneration units (up to 5 MWe), the first three places are the following:

by installed power capacity	
1. municipality sector	42.00%
2. hospitals	14.80%
3. administration buildings	14.08%
by number of installed units	
1. hospitals	24.20%
2. residential sector	21.17%
3. industry	17.14%

In the category of conventional heat and power plants in the industry sector, the first three places are following:

by installed power capacity	
1. metallurgical	30.00%
2. chemical	18.00%
3. malt & paper	16.00%
by number of installed unit	
1. textile	18.00%
2. chemical	17.00%
3. mechanical industry	13.00%

Industrial energy sector

Utilization of CHP units sector is high in industrial energy. The electricity produced is used for own consumption. Because industrial complexes are generally consumers of electric power in composite tariffs, use of cogeneration enabled a decrease of electricity taken from the net, as well as a decrease of settled and measured maximums. First of all in combination with other measures (control of maximums) the cogeneration units provide considerable savings in the field of energy consumption.

Heat utilization is the basic condition for effective cogeneration unit operation in industrial companies. In addition to the possibilities for using heat for heating and HDW preparation, heat is used for the heat demands of technology. Cogeneration units with higher installed capacity (from several 100 kW of capacity) can also produce steam. Of course, it is possible to produce cooling in combination with absorption cooler.

Communal and tertiary sector

In addition, conventional heat and power plants are installed in industries with high consumption of electricity and power (metallurgical industry, chemical, textile, mechanical industry) The communal and tertiary sector is the best for installation.

Communal boilers (Heating of buildings)

Heat and HDW supply in buildings is one of the most promising development fields for combined production in Slovakia. First of all, this is an opportunity for central heat supply systems. Concerning the annual heat production for HDW preparation, cogeneration units achieve high yearly utilization. Cogeneration units can be used in communal plants in several ways:

1. Cogeneration units are used for heat consumption with maximal yearly utilization (generally production of HDW) and where electricity is partly consumed in the boiler room; the rest is delivered to the power network.
2. Minimal variant of cogeneration units utilization, used in objects with low energy consumption (as communal boiler rooms), is to cover own boiler room consumption, and heat produced will be used in own central heat supply system.
3. Another possibility is electric power production at times of net peak load, for sale in the power network with utilization of heat produced in own central heat supply system.

Hospitals

Hospitals are also a sector where it is possible to use CHP as a heat and electricity source. First of all, thanks to yearly heat demand of HDW it is possible to reach high yearly operational utilization of cogeneration units. The electricity is used for own consumption.

Cogeneration units can work also in an independent operation (without connection to a distribution network), which enables this unit be used as a back-up electricity power supply. In this case, it is possible to use also double-fuel cogeneration units (in addition to natural gas also e.g. diesel oil) to implement the principle of an independent fuel base.

Hotels

In hotels, CHP units are designed for internal consumption of HDW and electricity. There is also the possibility to use the heat in air-conditioning, in conjunction with absorption cooler. Cogeneration units often enable a change of tariffs. A hotel with cogeneration is able to produce a large part of the electricity by itself; therefore it can change from two-component tariffs (payment separately for use and separately for operation to single-component tariffs (payment only for use).

The ability of cogeneration units to work as an alternative source of electric power is important in the case of hotels. Failures of electric power mainly in mountain areas make inconveniences for guests in the hotel and causes financial losses for the hotels.

Swimming pools

Swimming pools belong among the most advantageous operations for using combined production. Yearly and relatively stable heat demand for the heating of swimming water and HDW enable them to reach a high level of utility through cogeneration. A correctly designed cogeneration unit can work full power nearly non-stop in swimming pools. Thereby maximum operation efficiency can be achieved.

Produced electricity is used to cover internal consumption of the object, which is, depending upon the installed technology, relatively stable. Only small surpluses are delivered to the electric power net. Also in this case savings could be improved by exchange of two-component tariffs with a single-component.

Family houses

The use of cogeneration units in houses is in the initial phase in Slovakia. However, CHP units are used in houses; this is mainly in the case of a house built in an area where the energy distributor company can not guarantee the required power of the project. In this case cogeneration is a cheaper solution and could cover electric power demands of the house. For system reliability of heat consumption, it is also necessary to provide heat and the ideal solution is a heated basin.

Agriculture and Waste Water Treatment Plants (WWTP)

Biogas is the most interesting alternative for use as a fuel for cogeneration units. The quality of biogas is very important. Undesirable substances could cause failures in motors and decrease operational safety. Cogeneration units achieve high savings because of the quality of biogas.

The heat produced is used for heating of HDW, space heating and in technology for biogas production. Electric power is used directly in the operation, and surpluses are delivered into the electric power net.

1.5 Potential of CHP in the Slovak Republic

Two aspects of CHP have been estimated: the technical and economical potential. The technical potential assumes the implementation of all technically feasible CHP options. The economic potential considers the economic viability of CHP projects. It should be noted that these potentials strongly depend on estimates, and should be regarded as indicative only. Medium scale and small scale cogeneration is considered.

1.5.1 Technical potential

It is limited mainly by demand for heat and the availability of distribution systems. The total technical potential for new capacity in 2010 is estimated at 1 480 MWe; this corresponds to an increase of 150% of currently installed capacity.

Table 7: Estimated technical potential of CHP in the Slovak Republic in 2010

	Capacity range MWe	Power MWe	Heat MWt	Heat / Power ratio
Medium scale industry	5-50	180	250	1.4
Medium-scale-DH	5-50	200	280	1.4
Small-scale	to 5	1 100	1 870	1.7
Total		1 480	2 400	1.6

The major application of CHP within the three categories is the following. All options include the use of fossil fuels (coal, natural gas, oil) and renewable energy sources (wood, straw, and biogas):

Medium-scale CHP plants in industry include usually the replacement of old boilers by new CHP units, in many cases including a switch from coal to gas, rehabilitation/replacement of existing steam turbine and/or installation of new steam turbines in former boiler plants.

Medium-scale CHP plants in district heating include a large variety of CHP plants: CHP plants with backpressure steam turbines, combine-cycle CHP plants and gas engines.

Small-scale CHP plants include many new projects with gas engines in municipal district boiler plants, in sewage treatment plants, and in commercial services.

1.5.2 Economic potential

Due to major economic barriers for CHP implementation, it is more realistic to use the economic potential for setting implementation targets. It is influenced by a range of economic assumptions like pay-back period of investments and viability of technologies based on macro economy. The economic potential is 565 MWe in 2010 corresponding to approximately one third of the technical potential. See table 8 for a breakdown of this potential.

Table 8: Economical potential for small and medium-scale CHP in Slovakia till 2010

	Capacity range MWe	MWe	MWt	Economical / technical potential %
Medium-scale-Industry	5-50	120	180	67
Medium-scale-DH	5-50	125	200	63
Small-scale	to 5	320	500	29
Total		565	880	38

The conclusion can be drawn that in addition to the existing share of CHP, a large technical potential still remains in the Slovak Republic. The economic potential strongly depends on economic conditions, but with slightly more favorable conditions than at present the economic potential to the year 2010 still represents a large potential growth.

1.5.3 Market potential

Market potential was assessed based on micro economy taking into account the investor's view point on financial viability of investments, i.e. real pay-back period, real interest rate, inflation and technology risks.

Since the economy viability of CHP has a pay-back period close to accepted by market actors, there have been considered only additional limitation of technology penetration i.e. risks, financial capacity, low awareness on technology advantages. Market potential is presented in the table 9.

Table 9: Market potential for small and medium-scale CHP in Slovakia till 2010

	Capacity range MWe	MWe	MWt
Medium-scale-Industry	5-50	108	162
Medium-scale-DH	5-50	100	160
Small-scale	to 5	240	375
Total		448	697

1.6 Barriers and instruments of market development

Barriers for combined heat and power in Slovakia can be summarized as follows:

Lack of policy and institutional framework

A policy framework to promote CHP, with CHP targets and priorities, is to a large extent lacking. In energy policy CHP has a low priority. Furthermore, the present co-operation between the various stakeholders and the Government in the promotion of CHP is rather weak. A strong institutional framework for CHP is required as a solid common basis for improving energy efficiency in the Slovak Republic.

Regulatory framework

Legally, free access to the grid for independent producers exists. In practice inadequate payment for sales of surplus capacity to the grid and high tariffs for stand-by and top-up supplies offered by the distribution companies, who are natural monopolies and make use of this position, exclude the CHP alternative. These are the factors impeding the penetration of CHP even in a partly liberalized European energy market.

Pricing and tariffs

Major economic barriers in the generation and sale of electricity and heat arise from the distorted prices. Distortions originate in the policy of social acceptance of energy costs for households - industry pays a higher than cost-based price for electricity and gas, while households benefit from cross subsidies. The process of removing the subsidies has been started and should be terminated in a short time.

Lack of knowledge and awareness

Many potential users and possible investors are not aware of the advantages of CHP, in particular of small-scale CHP. The need for external qualified assistance is underestimated as well as the necessity of proper project development and its relevant costs, despite the fact that lack of experience can lead to large overhead costs for the development of small CHP projects, with risk of project failure. In the energy policy of the Slovak Republic, the support of CHP implementation has been declared as one of the short- and medium-term goals.

Technical conditions of distribution companies for connecting of cogeneration units to the electricity network

Standards of the distribution companies (ZSE, VSE, and SSE) are so strict that total competition needs higher investment than investment for cogeneration. Reduction of connection standards is possible only after long and complicated interviews with these companies. The reasons are: concerns over security and insufficient knowledge. This barrier is removable only in time, possible instruments are: seminars, workshops, demonstration projects, visits, etc…

Purchase price of electricity by cogeneration – non-favorable price of electricity purchase in peak tariff

In the Slovak heat market favorable pricing of electricity purchase in peak tariff does not exist. This situation is very important for the development of cogeneration in the heat market. For example, the purchase of electricity is strongly supported in peak time in the Czech Republic. Cogeneration units with high installed performance are in process only in peak times and the heat produced is accumulated and consumed as needed.

Instability of tax conditions

Tax conditions are not stable in Slovakia, especially the issue of tax holidays. This aspect was often changed in the period of two years and there are lot of changes in the process.

2 Legislation in cogeneration

2.1 Energy Act

The Energy Act provides the legal framework for the implementation of energy policy in the energy sectors. It regulates trading with energy carriers, and has to accommodate steps towards a liberalized energy market in the future.

The amendment of the Act on Energy was issued in 2001 by the Ministry of Economy of Slovak Republic, but not to the extent initially designed.

The necessity to define the role of energy utilities as regards promotion of renewable energy and energy efficiency, including priority access to the power grid and heat from CHP and renewable energy and/or the obligation of purchase of heat indicated in the Combined Heat and Power Action Plan, has still not been implemented.

The only indication of the above is in the following parts of the Act on Energy:

“The single buyer shall be obliged to purchase all electricity from energy sources, provided that such sources are environmentally justifiable and that technical and economic conditions make such purchase possible.”

“The heating supplier shall be obliged to purchase heating from renewable or waste heating sources or from facilities for combined production of heat and power, in order to meet the need to supply such heat to direct heat consumers as agreed in the underlying agreement, unless the above results in an increase in the price of heat to be paid by consumers, or in a reduction of the energy efficiency of other heating sources forming part of the system.”

2.2 Energy Efficiency Act

The Energy Efficiency Act should specify the rights and obligation of private and legal persons in the sphere of conversion and consumption of energy, leading to an increase in effective use of energy in the Slovak Republic and to environmental protection.

The final version of the Act was to be submitted to the Government and the Parliament for approval by the Ministry of Economy by the end of June 2000.

The Act has not yet been introduced, even though the proposal was already prepared. It can be assumed that the content of the proposed act could be to some extent integrated in other legal acts.

Decree of Slovak Government Nr. 1146/2002 (from 6. December 2002) cancelled Decree of Slovak Government Nr. 703/2001, part on Term of Energy Efficiency Act presentation. A new term had not been specified by mid May 2003.

2.3 Act on Regulation in Network Industries

Act No 276/2001 Coll. On Regulation in Network Industries and on amendments and additions to some acts came into effect on 1 August 2001.

In essence it relates to the scope of regulation, jurisdiction of the Office for Regulation in Network Industries, conditions for capacity of regulated activities (in interactivity with the Act on Energy containing licensing), price regulation in network industries, rights and responsibilities of regulated subjects and proceedings.

2.4 Policy Action Plan in cogeneration

2.4.1 Policy objectives and priorities

Objectives and targets

Combined heat and power generation contributes to the three major goals of the national energy policy of the Slovak Republic: overall competitiveness, security of supply and environmental protection. Also the accession to the EU is a motivation for the promotion of CHP because CHP plays an important role in the European Union’s energy efficiency and climate change policy. The EU’s indicative but ambitious target regarding the share of CHP is a doubling from 9% in 1995 to 18% of electricity production in 2010.

The Energy Policy White Paper should provide the general framework for the future role of combined heat and power production in the Slovak Republic. To promote CHP it is necessary to develop specific policies based on policy targets. The Action Plan will support this policy development process by recommending measures and actions promoting medium and small-scale CHP.

The Slovak Government should set specific official targets for CHP for the medium term (2010). In addition to building new capacity, also replacement of existing capacity is required in the period to 2010. As a consequence, CHP targets for 2010 have to deal with additional, as well as with the replacement of existing, capacity. Furthermore, these targets should be consistent with the energy efficiency and renewable energy policy (biomass CHP). The economic potential can be used as a reference for the setting of a target.

Priorities

Priorities should be set in CHP policy with regard to those CHP applications that are most promising and need support. Based on the analysis of the technical and economic potential of CHP and possible impact on the environment in the Slovak Republic, the following fields can be identified as most attractive for implementation of medium and small-scale CHP and should therefore be the focus of CHP policy:

- Replacing old medium-size CHP plants in industry and district heating. The old CHP plants in district heating and the industrial sector can be replaced by new options (fluidized bed CFB, combine-cycle gas units etc.). This replacement will not result in a structural change in heat and power production.
- Small municipal boilers can be replaced by more efficient small-scale options (e.g. natural gas-fired gas-engines). This replacement will result in a structural change in local power production.
- Installation of medium small-scale options in industry, and small and medium enterprises (SME). In the industrial sector major efficiency improvements can be achieved by application of natural gas-fired CHP options. This replacement will result in a structural change in local power production and demand.
- Biomass fired CHP options (wood, straw or biogas fired plants). Although this application is still far from being profitable, its application deserves special attention, because it both contributes to increasing energy efficiency, as well as increasing the share of renewable energy.

2.4.2 Policy framework for CHP – short overview of document

The lack of a clear energy efficiency and CHP policy is a main barrier to the promotion of combined heat and power in the Slovak Republic. The need for a policy framework for CHP is supported by two external commitments of the Slovak Government: first, by signing the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects, the Slovak Republic has committed itself to drawing up a program to support energy conservation, including CHP. This includes relevant legislative and regulatory measures as well as subsequent enforcement. Second, one of the basic political objectives of the Slovak Republic is accession to the European Union. Increasing the share of CHP is an important objective of the European Commission, addressed in the Community Strategy to promote CHP (1997).

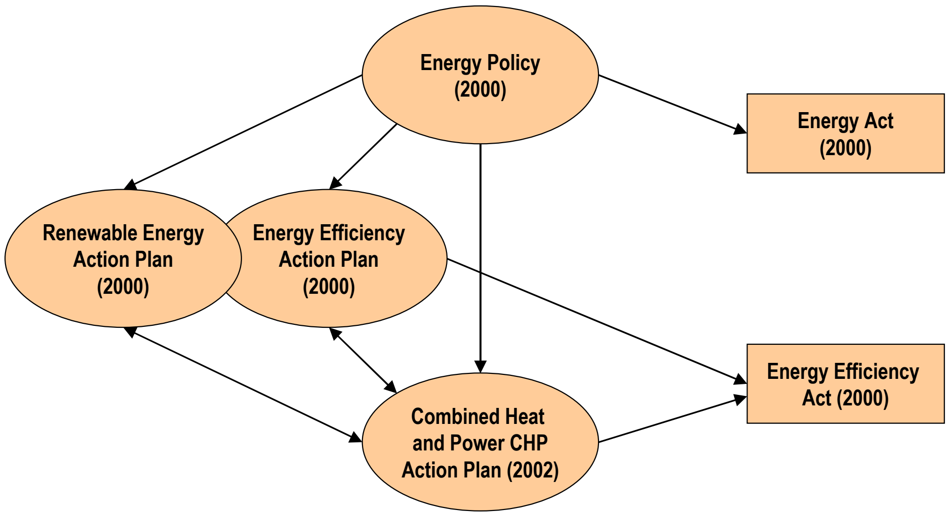
In the Energy Policy of the Slovak Republic, the support of CHP implementation has been declared as one of the short- and medium-term goals. Nevertheless no concrete action plan has been elaborated. Without having developed an enabling environment for CHP, the government intends to introduce the obligation of CHP installation in some specified cases in the Energy Efficiency Act.

Given the specific characteristics of CHP technologies, applications and markets, a separate Action Plan is required that would define the policy of the Slovak Government. The CHP Action Plan should formulate the government's objectives and targets, as well as a set of policy measures to achieve these targets, including the role of other stakeholders in the economy and the assessment of possible costs and benefits of the implementation of the plan. The document will commit the government to its targets and will be a necessary basis for the involvement of the other stakeholders (incl. finance), which must also support the policy. Full account should be taken of relevant European Union regulation and the commitment to the Energy Charter Protocol.

CHP policy is strongly interlinked with energy policy and energy efficiency policy and, in the case of biomass fuelled CHP, also with a renewable energy policy. The Action Plan should therefore be integrated into the overall energy policy framework of the Slovak Government, and be harmonized with the energy efficiency policy and renewable energy policy. It is recommended that an Energy Efficiency Action Plan and a Renewable Action is also developed and adopted by the Slovak Government.

After developing a new CHP policy, it is very important to monitor and evaluate the achieved results. Regular policy updates are required to adapt to changing external conditions and changing priorities. This is done on the basis of the actual development of CHP, which will indicate the success of the policy. Therefore a prerequisite for policy monitoring is an improvement of the quality and availability of statistical data, because currently the statistics on CHP utilization are poor. This is particularly the case with small-size CHP plants, which are not covered by the current statistical system.

Figure 7: Relationship between the recommended policy documents and acts



2.4.3 Recommended actions – new policy framework

Short-term

- The Ministry of Economy will propose targets for the development of CHP in SR.
- The Ministry of Economy, in co-operation with the Ministry of Finance of the Slovak Republic and the Ministry of Environment, will prepare an Action Plan for the Promotion of CHP
- The Ministry of Economy will ensure consistency between the CHP Action Plan, Energy Policy, the Energy Act, and the Energy Efficiency Action Plan with regard to the promotion of CHP.
- The CHP Action Plan will be completed by the Ministry of Economy and approved by the government.

Medium-term

- The Ministry of Economy in co-operation with expert institutes and institutions will develop specific targets for specific sectors on the basis of the general targets/objectives for CHP development.

Long-term

- The results of short-term measures will be monitored and analyzed and corresponding adjustments will be made in the energy policy/concept of the Slovak Republic.

2.4.4 Recommended actions – monitoring and evaluation

Short-term

- The Ministry of Economy in close collaboration with the Slovak Statistical Office will implement a new system of statistical data collection from all license holders on power and heat production to ensure maximal coverage of the CHP production.
- The Ministry of Economy will separately evaluate the key measures in CHP policy. The impacts and costs of the policy measures and possible improvements will be assessed.
- The Ministry of Economy will elaborate a program evaluation action plan with more attention to monitoring in the field and to feedback from participants.
- Continuously
- The Ministry of Economy will monitor the development of CHP on a yearly basis to be able to assess the progress of CHP policy, and will report on the progress. The annual costs are estimated at SKK 1.5 million per year.
- The CHP Action Plan of the Slovak government will be updated every three to four years.

2.5 Regulatory framework and pricing

Energy and environmental regulation have a strong impact of CHP. In this section, relevant regulatory issues are discussed. Recommendations are given for improvements of existing legislation and the introduction of new regulations.

Access to the grid, priority dispatching and purchase obligation

In the Slovak Republic, the regulatory tasks of the state have been defined in the Energy Act (Act No. 70/1998 Coll.) This Act specifies conditions for licensing of businesses in the energy industries. Its § 18 stipulates that distribution companies are obliged to purchase all electricity from power sources, which have environmental benefits. The Act thus includes the obligation of power distribution license holders to purchase electricity from combined heat and power production where technically feasible.

Most CHP schemes are built to meet industrial or community heat demands, so dispatching and heat purchase obligation is not a problem. Heat demand determines power generation apart from some heat storage used to maximize power generation potential during peak periods. Heat distribution companies are obliged to purchase heat from CHP schemes. The obligation to purchase heat may need to be regulated after price stabilization (in 2003) in order to protect wholesalers and end users from inequitable contractual requirements.

The dispatching and purchase of electricity from a CHP plant should be regulated while respecting the EC directives to ensure priority dispatching for the most efficient systems (in terms of marginal production costs), incorporating all plants supplying the electricity network. In the summer period, this may put CHP plants at a disadvantage against other power generation systems, but that will depend on the type of plant with which the CHP is being compared.

Price and tariff regulation

The price of electricity to be purchased has to be negotiated in accordance with existing pricing regulations. Slovak power companies base feed-in prices on their tariff structures. The producer and purchaser agree the final price within the given tariff.

The heat price is artificially high because of redistribution of production costs between power and heat. This has resulted in the past in the need for a subsidy to the heat price. The subsidies have recently been removed. The maximum price has been set up by the state, while the heat price is regulated by district authorities and the Ministry of Finance. The latter has to approve price increases on the basis of justifiable costs in specific cases. The separation of heat price into fixed and variable elements in a two-component tariff is being discussed at the moment. A single component tariff would be retained as an option for the end user. ESCOs may wish to set minimum and maximum levels of heat purchase in order to guarantee their revenue, but wholesalers and users need to be protected from the setting of inappropriate levels of use. This protection could take the form of specified use ranges, recognizing the normal quarterly variation in space heating requirements in conjunction with predictable annual variations, or with process demands where sales to industry are being considered.

Licensing of CHP producers

Electricity supply licenses are essential for the promotion of CHP. In Chapter 3, article 6 of the Electricity Directive, the EC states that „it must be possible for auto producers and independent producers to obtain authorization, on the basis of objective, transparent and non-discriminatory criteria. The Energy Act in the Slovak Republic requires that anyone wishing to do business involving the sale of energy to others must have a license. This is granted by the Ministry of Economy for a period of at least 20 years. The Energy Act will regulate the granting of a license, dictate the rights and duties of the license holder and control the purchase of electricity.

Environmental regulation

There is a positive environmental impact from most CHP schemes, but not from all. New CHP schemes that only partly replace the output from existing CHP or heat-only systems using solid fuel may not produce a reduction of emissions. As the plant loading decreases and fluctuations in output increases (due to the base load effect of the CHP), the environmental capacity of the solid fuel plant could be positively affected. A regulation is recommended to require the review and evaluation of the wider environmental implications of each CHP scheme when a solid fuel fired plant is being retained. In general two levels of environmental regulation are applicable on CHP plants:

- Building regulation-Environment Impact Assessment based on Act No. 127/94, which clearly stipulates the way the impact of the new technology on the environment should be assessed before building/operation permission is issued.
- Operational regulation-mainly Decree No. 92/1996 of the Ministry of Environment, which sets the emission limits and other conditions for operation of stationary sources of pollution and protection of the environment. This Decree provides a list of air pollution substances, specifies the categories of stationary sources of pollution and technical conditions of their operation, the requirement on monitoring of air pollutants emissions, and finally requirement of quality of fuels.

Country Report: Slovenia

Prof. Dr. Mihael Gabrijel Tomšič
"Jožef Stefan" Institute, Energy Efficiency Centre

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

During the past decade, Slovenia experienced a less severe variant of the transition to a market economy than some other countries in transition. After a short downturn, the economy of the country recovered. Unfortunately, so did the emissions of greenhouse gases. By some indicators, the transition was not only gentle, but also incomplete.

One aspect of the limited scope of restructuring is evident from data in table 1 where primary energy intensity is compared to that of EU and other countries. By 1995 the economy was still on the downturn (the lowest point was, by GDP, in the year 1994). As expected, the energy intensity grew during this period. Production and energy consumption maintained former characteristic. Machinery has been operated at part load. Households had to do with lower real income but mostly retained their basic comfort and energy consumption. There were limited opportunities for new investments and refurbishment.

It was only with real growth of economy in the second half of the 90's, with an emerging new structure and new production capacities that improvements were felt.

In the milestone year 2000 the primary energy intensity in Slovenia was still worse than at the beginning of the decade, but on a reasonable trend to improvement, at -2.9% p.a.

Table 1: Energy intensity of selected countries

	1991	1995	2000	Annual change. 1995 to 2000
	Primary energy intensity kgoe/1000 €95 [1]			
EU15	216,8	207,0	193,9	-1,3%
Accession countries[2]		936,8	708,8	-5,4%
Slovenia	304,6	424,4	365,7	-2,9%
US	387,7	369,1	333,6	-2,0%
Japan	115,3	123,1	120,8	-0,4%

1) Energy intensity of the economy - Gross inland consumption of energy divided by GDP (at constant prices, 1995=100) - kgoe (kilogram of oil equivalent) per 1000 Euro95Accession countries
2) 10 countries scheduled to join EU membership in 2004.

Source: Eurostat on www, version 2 of 13.6.03

In absolute terms, energy use in the household and service sectors increased by about 50% within the ten years. Slovenia is behind EU in total primary energy use per capita by 20%. Consumption of liquid fuels and electricity is at par with the EU average. CO_2 emissions are lower than EU average per capita by only 17%.

A warning signal of an incomplete transition and a possibly faulted energy policy arrived during the last two years. During 2001 and 2002 the primary energy consumption rose faster than the value of domestic product. Energy intensity trend reversed – instead of decreasing intensity, we had approximately +0.5% p.a. growth (estimated, official energy balance data are only available for the year 2001). Even higher was the growth of the intensity of electricity use. In the two year the intensity of electricity use increased by 5.4%, or 2.6% p.a., respectively, that is, electricity consumption is growing faster than GDP.

Kyoto activities: hesitant ratification

The Kyoto Protocol was ratified in Slovenia in June 2002, a few weeks after the joint ratification by EU member countries. The parliament has been hesitant due to a high and uncertain estimate of compliance costs.

GHG emissions have decreased after the base year (1986 for CO_2) by 12% to a minimum in 1992. By the year 1996 the emissions were back close to their historic maximum. In a business-as-usual scenario, in the Kyoto commitment period 2008-2012, the –8% target would be missed by +30%, or at least by 20% if forestry sinks are considered. Slovenia is the first of the economies in transition that will encounter a demanding emissions abatement program. This also means that there are meager opportunities for hosting JI projects (ref. [1], [2]).

On the other hand, there are good potentials for emissions reduction. For presentation of known options refer to [1] and [3].

Adoption of GHG emission mitigation and National Energy Programs

A GHG emission mitigation program [3] has been approved by the government in July 2003. It is closely related to the National Energy Program (NEP), also recently proposed by the government. The most plentiful and cost-efficient potentials for GHG emissions reduction seem to be on the energy supply side, in the coal and electricity sectors. The NEP is to be adopted by the parliament after a public debate period.

The key idea of the GHG reduction program is, that compliance with other obligations assumed by Slovenia with the Accession Agreement to the EU (effective May 1st 2004) will (almost) automatically result in the required GHG reductions. A preparatory study [5] has listed 40-odd acts of the *acquis*, including some proposed directives likely to be adopted soon that affect GHG emissions. Options for country-specific implementation of the *acquis* allow fine tuning of the mechanisms to the Kyoto obligation.

Creation of an internal European market for electricity and natural gas can have a major impact. The Slovenian Energy law of 1999 is based on the electricity directive of 1996 of the gas directive of 1998. Experience with this transposition is less than satisfactory. The domestic coal in Slovenia is quite costly, so that opening of the market should discourage its use. For internal political reasons, the present legal framework maintains cross-subsidies within the energy sector for both electricity producers and large industrial consumers. In the last few years, with alleged market opening, record growth of both coal burning and industrial electricity consumption have been recorded. The new electricity and natural gas market directives of 2003, supported by the Regulation 1228/2003/EC on cross-border electricity exchanges, offer a new chance for transposition that should be more supportive of the Kyoto obligations.

The *acquis* will have significant effects on manufacturing industries. Industrial enterprises have to comply with the IPPC (Integrated Pollution Prevention and Control) directive (96/61/EC). Mostly the same installations will be included in the EU emission trading scheme, and thus subject to double scrutiny. Accession driven mechanisms may indeed be almost sufficient for compliance with the Kyoto obligations.

CO_2 tax and emission trading

An instrument not so widespread in the EU is a CO_2 tax, in operation in Slovenia since 1997 [6]. The regulation has been modified several times. The most important change has been adopted in 1998. It included a threefold increase of the tax level, to 15€/t CO_2 (now the effective level has eroded by inflation to approximately 13.5 €/t CO_2).

The redesign of the levy in '98 [7] allowed some direct tax recovery mechanisms, in particular an allowance of 0.44 kg CO_2/kWh for any production of electricity by small-scale CHP. The allowance is 0.40 kg CO_2/kWh for producers delivering to the high voltage grid. This is equivalent to state-of-the-art gas fired CC-GT plants. Large-scale electricity producers are now practically exempt from the tax by a 92% grandfathered allowance. The same is true of most industrial fossil fuel users. For these the grandfathering is at 67% of a historic quantity, which is augmented by initial transitory clauses. Full tax is paid by households, commercial or service sector customers.

Even with full CO_2 tax, the price of fossil fuels in Slovenia is lower than the average in EU. [8] Useful message of the CO_2 tax is differentiation between fossil fuels according to their carbon content. CO_2 tax design offers some comparative advantage for co-firing of biomass and for CHP. Under present uncertainties this advantage does not seem sufficient.

The CO_2 tax has not been very effective in curbing CO_2 emissions. Nevertheless, the instrument brought attention to the problem. Administrative records of CO_2 emissions have been established. Both achievements will be essential for establishment of emission trading (ET).

A further revision of the CO_2 tax will have to accommodate emission trading. The major difference is the cash flow. ET will be mostly neutral for the national budget and the seller of allowances will automatically receive positive monetary compensation, whereas in CO_2 tax, money flows to the national budget. A small fraction (less than 20%) of the CO_2 tax collected is recycled to emission mitigation measures.

Most probably emission trading participants will be excluded from CO_2 tax obligations. Large industries will enjoy a doubly favorable position. The cost of traded allowances that they will be able to use is expected to be lower than the current CO_2 tax, and they will be able to cash on any emission reduction. Nevertheless, the CO_2 tax remains a useful economic instrument.

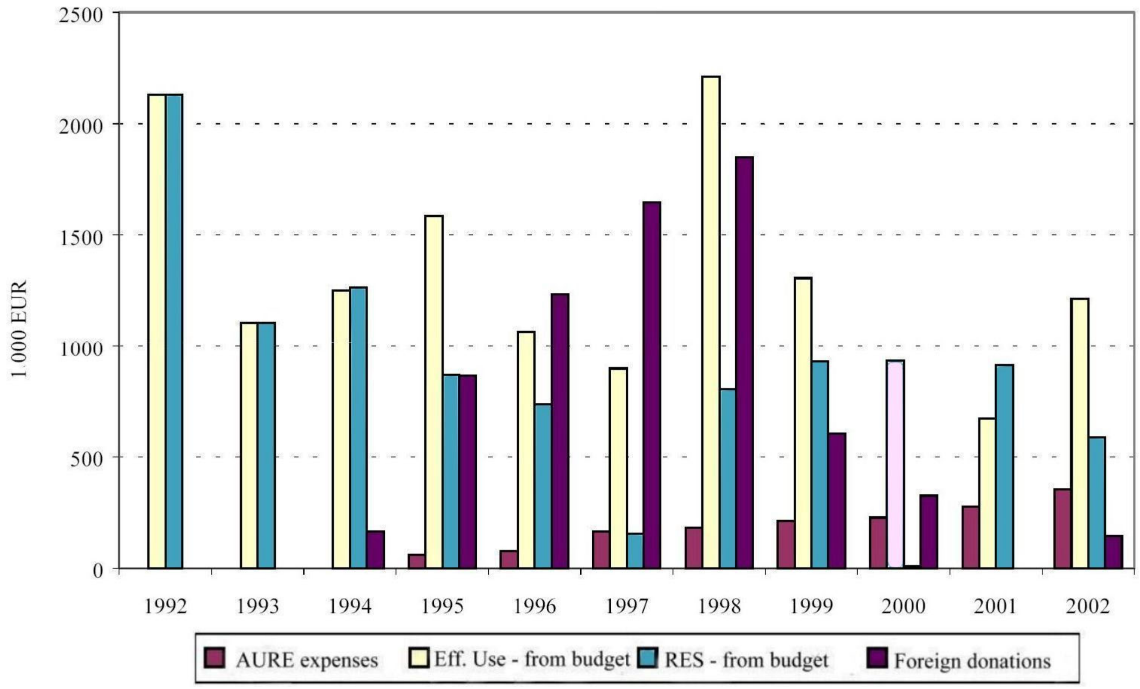
Subsidies from the national budget for energy efficiency and renewables

The main instrument of the energy policy for efficient use of energy are promotion and demonstration programs and subsidies financed from the national budget. The budget allocation is dispensed by Agency for efficient use of energy (AURE, [12]), since 2002 responsible also for RES. Figure 1 presents allocations during the years 1992-2002. Population of Slovenia is little less than 2 million. So the outlays in 1992 were equivalent to 2.1 €/person for energy efficiency and renewable sources (for EE only: 1.05 €/person). These were the highest outlays until 2003. In the years 2000-2002, the effective outlays were more than halved – down to the range of 0.25 to 0,5 €/person.

RES support from the national budget was quite unstable, with some very "dry" years (1997 and 2000), in which this type of support almost vanished. The AURE operating expenses of are steadily increasing, reaching up to 25% of all budgetary expenses.

Foreign donations, mainly form EU, represent a significant share in the five-year period 1995-1999 (up to 50% of the total outlays, in 1997).

Figure 1: Expenses for stimulation of efficient use of energy, renewable energy sources from the national budget and from foreign donations.



Source: AURE; [4].

In 2003 the AURE budget is boosted by a GEF biomass project. Additional allocation came also from the national budget, as counterpart financing. The total budget of the Agency is 7.5 million € (3.8 €/person), of which 60% will be used for promotion of biomass.

Feed-in tariffs for RES and CHP electricity

A guaranteed feed-in price for the production of electricity from CHP and renewable energy sources has been in operation since 1992. Up to the year 2002 a price equivalent to household tariff for energy (without the fixed components, effectively 75% of the total household price) was used for all small power plants up to 10 MW.

When regulations under the new Energy Law of 1999 were promulgated, the option of a feed-in tariff was preferred to any system of "green certificates" that could also be accommodated under the law. In the law CHP and RES power plants are collectively referred to as "qualified producers of electricity". A feed-in price decision, comprising rules and a table has not met full approval of the interested public, due to unequal, possibly unjustified differences in feed-in tariffs for various types of qualified production [9]. The feed-in tariff level was set mostly according to perceived needs of the investors. A more justified approach is based on the realistic value of electricity (time and place of delivery), augmented by transfers (add-ons) for strategic and environmental benefits of qualified production.

Present arrangements generated considerable interest for construction of large wind turbine farms by foreign (Spanish) suppliers and an incumbent utility company, certainly led by expected profits. Environmentalists would prefer a "quality RES" rule applied first, as some of the targeted sites have specific natural values.

Biomass for heating and electricity

Slovenia is one of the most wooded countries in Europe. Woods are advancing as marginal farmland and pastures become unattractive for exploitation. Now woods cover 55% of the territory. Nevertheless, use of wood or other biomass for energy is decreasing. With seemingly abundant oil, even village house-owners are installing oil-fired central heating systems. Gas distribution companies are also on the move. Natural gas has exhausted the expansion potential in industry, but its penetration to the heating market is still low (approx. 17%).

Under such conditions, a proper energy policy, with realistic and sufficient incentives for biomass and disincentives for fossil fuels, can make a difference.

2 Best practice policies and measures yielding ancillary socio-economic benefits

Considerable experience with energy efficiency (EE) programs has accumulated during the years. Though fluctuating in intensity, the state-sponsored activities achieved continuity in the Agency for efficient energy use, established in 1995 [12].

Energy auditing and consulting

The program of energy auditing and consulting is a backbone of other EE activities. Industrial EE consulting has been sponsored even in the '80s. Counseling and auditing for small businesses and households started in 1996, with the ENSVET program. Now the territory of Slovenia is covered with a sufficiently dense network of energy consulting offices (33 offices). Any interested person has access to an office within approximately 25 km, mostly less. The offices are located in regional centers and run in cooperation with communities (counties or municipalities). Some subsidies for EE measures are available only after consultation with a certified energy counselor. Additional activities include a telephone hot-line, articles in local newspapers, contact broadcasts. Energy efficiency promotion material is broadly available at the offices or through the OPET network members [13].

Energy consulting for households is free of charge. For industry and commerce, a 50% contribution towards the costs of an energy audit and feasibility studies is expected. Same applies to the development of local (community) energy concepts.

Socio-economic benefits of the consulting exceeds the directly observable parameters: number of consultations or directly linked measures adopted. Energy efficiency offices and consultants contribute to a continuous presence of EE actions in the society.

Promotion of first-step improvements: windows draught-proofing, loft insulation, adjustment of burners

Promotion of first-step improvement programs included free or subsidized material for performing the improvements. These actions have achieved their purpose: promotion of measures that are very cost-effective. In 2003 these basic actions are not offered any more, as the goal has been achieved.

Windows / glazing replacement

Windows / glazing replacement is a program still active in 2003. The subsidy offered is 29 Euro/m^2 of windows replaced, up to a total of 290 Euro/ household. This is approximately 9.5% of the total investment needed. Participation is attractive, but not massive. 1000 households receive the subsidy annually, or one out of approximately 650 households. Two effects are observable from this program:

- a high standard of window quality is promoted to the customers, and
- windows producers have dropped sub-standard production.

The majority of customers included in the action demand products with better-than-required (standard) quality (minimal standard: k=1.5 W/m^{2}K; mostly demanded: k=1.1 W/m^{2}K). The improvement of the production standards is attributed also to the effects of the broader market. Most producers are active exporters to other competitive markets.

Biomass promotion program, national + GEF Biomass Project

Currently, biomass promotion is the main direction of AURE activities. This is due mostly to a sizeable project sponsored by GEF. For the year 2003 the GEF Biomass Project budget is gauged at €4.3 million (2.15 €/inhabitant). Technical assistance component is €1.8 million. The main share of the GEF budget (€2.5 million) is an equity contribution.

GEF project will sponsor 3-5 biomass district heating projects. The financial structure for these projects is expected to be: 25% investor funds, 25% government grant, 25% GEF equity (property share), and 25% soft loan of Eco-Fund of Slovenia. Thus, it is expected that financially viable projects with 30 to 35% effective subsidy will be developed.

Biomass DH success factors

Key features contributing to most successful projects are:

- inclusion of all front-end costs in project financing (including standard connection with metering at the district heating customer's premises), so increasing attractiveness of the project to customers and increasing the share of facilitated financing, and,
- rapid construction and connection of most customers, if at all possible within the first year of operation.

An exemplary project is the Preddvor district heating system. It started operation in November 2002, less than 6 months after construction started. 60% of the customers were connected in this first step.

Environmental issues of RES

Even the project mentioned above, well managed in business and technical aspects, encountered some opposition form a group of village residents. House-owners from near the boiler house feared excessive pollution. Initial operation, with a usual share of start-up difficulties, provided some substance to the complaints. The problems were enhanced by reports form other biomass-burning sites, where obsolete equipment is used, and allegedly even contaminated wood: colored, chemically treated or even wood-chip composites, have been occasionally incinerated.

Recent history in Slovenia offers and example of disillusionment with small hydro developments. After a boom in the early 90's, small hydro development came almost to a halt, technically by new regulations on water concessions, but essentially due to bad publicity of some miss-managed projects. Presently, wind-farm projects are encountering severe opposition from environmental groups, as they are planned in sensitive and rare natural habitat environments. Any renewable energy development is susceptible to bad publicity. Environmental issues have to be taken very seriously and a responsive relation with local and general public maintained.

Small scale biomass

Small scale biomass for heating is promoted by subsidies for wood fired boilers. These subsidies are awarded after the installation of a boiler with specified performance. The maximum subsidy is 40 % of investment and an absolute limit is set as in table 2.

Table 2: Maximal subsidy for small biomass boilers

Type of boiler	Maximal subsidy* (€)
Wood logs (heat storage obligatory)	1,300
Wood pellets	1,750
Wood chips	2,200

* in any case not higher than 40% of investment)

Not all available funds for these subsidies have been exhausted by mid-year, contrary to what might be expected. Interest for wood-log boilers, the cheapest, was better than for pellet or wood-chip boilers (35:3:11 installations).The present intensity of the wood-boiler market is far behind the physical potential, which is cumulatively several tens of thousands installations, so the annual installation rate should be at least in the hundreds, if not thousands.

Wood is suffering strong competition from fuel oil and natural gas. Even though the price of fuel oil has occasionally during the last three years been above 0.5 €/liter, now it is back to around 0.35 €/liter. The government is "controlling inflation" by setting the excise tax below its discretion limit even without long-term pronouncements, such as might have been: "oil products are expensive and should be kept so for strategic reasons".

Solar heaters and heat pumps

In 2002 and 2003 subsidies were offered for solar collector systems and heat pumps. The interest was higher than the allocated funds, so that 20% of requests had to be postponed and may be eligible next year.

For solar collectors the rate of subsidy was 110 €/m^2, up to a maximum of € 650 per household. Installation rate is less than 0.5 m^2/1000 inhabitants (total for two years app. 1.800 m^2), so that the market is really small.

Heat pumps for hot water preparation enjoy better popularity, most probably because they offer additional comfort of cooling a cellar or other space. A subsidy of up to € 400 per system has been offered. This established a minute market for hot-water heat pumps. The number of systems subsidized grew from approximately 250 in 2002 to almost 400 in 2003, even though in 2003 some (approx. 20%) of requests have not been honored. (The call was open, so any eligible request was honored. When the funds have been exhausted, further requests were returned unopened.)

Conclusions

Almost the whole set of classical energy efficiency and RES promotion instruments has been tested in Slovenia by the government agency (AURE [12]). Notable omission is demand side management by energy supply companies, where only a preparatory project has been performed. The network of energy consulting offices is a good practice example, as it provides continuous presence of the issue in the society.

Subsidies for the basic efficiency improvements have served the purpose of drawing attention to these options (draught-proofing, loft insulation) to the public, and to producers of building furniture (efficient windows). These measures are now standard for any well-kept household. A targeted approach for low-income families is planned.

Other subsidy programs are facilitating appearance on the market of more sophisticated and possibly less cost-effective measures, such as facade and other building element improvements, and use of renewable energy. Except for hot-water heat pumps, which seem to have an additional comfort driver (cool cellar), the subsidy program will hardly be sufficient for a market breakthrough. Either more favorable economic conditions (higher energy prices) or increased perceived value, such as prestige, will be needed.

An efficiency contracting and biomass district heating projects are in good progress and may become, after completion and hopefully replication, examples of good practice.

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

Climate change issues have touched reality with introduction of the CO_2 tax in 1997 ([6] - [8]). More effective, large-scale activities are to result form the Operational GHG Program and the National Energy Program of 2003.

A Climate Change Committee has been established by the government in 1999. It serves as a meeting point between NGO and the responsible Ministry of environment, spatial planning and energy (MOPE, "the ministry", [11]). Two most active NGOs in the area are: Slovenian Energy Forum [14] and Umanotera [15]. The government is not actively promoting JI & CDM project activities, yet a Working group for project-based flexible mechanisms (JI & CDM) has been established by the ministry in 2003. Slovenia, herself in need for emission allowances, will probably not host many projects, if at all. Preference is also given to mitigation measures at home.

Emission trading should be established within the EU scheme. Important activities are to be performed during the rest of 2003 and in 2004, so that trading can start in 2005, as proposed by the draft directive on emission trading. MOPE is investigating the necessary legislative changes. The national scheme will probably be worked out in 2004, with national allowance allocation plan and other difficult details.

4 Making the Kyoto mechanisms work: Challenges ahead

Emission trading seems most promising Kyoto mechanism in which Slovenia will in any case participate. Neither the state nor the business community has yet found notable interest in the project-based mechanisms (JI and CDM). It is expected that at least energy supply companies will investigate these opportunities when they reach serious emission limits.

The emission trading, an obligation for EU member-states in the EU, is the first priority of the government. Capacity building in this area is needed especially at the level of participating industries. The idea of trading emissions (as well as exporting abatement projects) has itself not been sufficiently promoted (or debated). Capacity building in this area should involve broad exposure to considerations leading to the flexible mechanisms. This may include topical discussion of market-based competitive approaches in general: their benefits, shortcomings and market regulation essentials.

Of the three sub-sectors covered by the seminar, buildings, biomass, small-scale CHP, biomass and small-scale CHP are proposed as target sub-sectors for capacity building. This report hardly touched on CHP, as the developments in this sub-sector lack the best-practice character. The CHP sub-sector though is of eminent importance both for Kyoto process, and for energy policy development.

References / Documents / Links

[1] Slovenia's First National Communication under The UN Framework Convention on Climate Change (published by Ministry of the Environment, Spatial Planning and Energy, July 2002), at: http://www.sigov.si/mop/en/index.htm (Publications, Other)

[2] Kranjc A.: Implementation of the Kyoto Protocol, DREE Regional Seminar Budapest 3&4 October 2002, (www search: Kranjc Implementation Kyoto)

[3] Operativni program za zmanjševanje emisij toplogrednih plinov (Operational program for reduction of emissions of greenhouse gasses, in Slovene), adopted by the Government of Slovenia, July 31, 2003. for version availability consult the author at miha.tomsic@ijs.si

[4] Draft National Energy Program of Slovenia, adopted for public discussion and later presentation to the Parliamnet by the Government of Slovenia, July 31, 2003, available (in Slovene) from MOPE site, July 2003 version: (http://www.gov.si/mop/dokumenti/nep_28_julij.pdf)

[5] Strokovne podlage za pripravo operativnega programa za zmanjševanje emisij toplogrednih plinov (Background for Preparation of an Opertional Program for GHG Emissions Reductions, in Slovene), Jozef Stefan Institute for MOPE, Final Report March 2003.

[6] Schlegelmilch K. (ed.) Green Budget Reform in Europe, Springer, 1999. Markovič – Hribernik, T. and Schlegelmilch, K.: “Green Budget Reform in Slovenia, Case Study”, pp. 291–445

[7] Tomšič, M. G., A. Urbančič: Design of a CO_2 Tax in Slovenia, 1998, 1st Austrian-Czech-German Conference on Energy Market Liberalization in the Central and Eastern Europe, Prague, 6-8 September, 1999

[8] D. Zagožen et al.: Nova CO_2 taksa (The new CO_2 tax, in Slovene), EGES, Ljubljana, #5, 2002, pp. 2-3

[9] Tomšič, M. G.: How to justify and define a feed-in tariff? A debate and decisions in Slovenia, 2002, Proc. ENER Forum (ed.: P. E. Grohnheit): Successfully Promoting Renewable Energy Sources in Europe, Budapest, 6-7 June 2002

[10] Selan B.: Status of Financing Support for EE and RE Projects in Slovenia, Proc. Meeting of the EnR Working Group on Central and Eastern Europe, 16 January 2003, DENA, Berlin, contact boris.selan@gov.si

Links

[11] MOPE, Ministry of environment, spatial planning and energy (Ministrstvo za okolje, prostor in enregijo), http://www.sigov.si/mop/ (site in Slovene and English)

[12] AURE, Agency for efficient use of energy (Agencija za učinkovito rabo energije), http://www.gov.si/aure/ (site presently in Slovenian only)

[13] OPET Slovenia Consortium: Jozef Stefan Institute, Energy Efficiency Centre, IJS-EEC (consortium leader; industry & services) http://www-rcp.ijs.si/~opet/ ; Faculty for Mechanical Engineering, Ljubljana (RES) www.fs.uni-lj.si/opet/ ; ZRMK – Buildings Institute (buildings) http://www.zrmk-tig.si/OPET/ ;

[14] SE-F, Slovenian Energy Forum, society for energy economics and environment, http://www.ljudmila.org/sef/index-en.html (in English, paritally translated), http://www.ljudmila.org/sef/index.html (in Slovene)

[15] Umanotera, Slovenian Fundation for Sustainable Development, Fundacija za trajnostni razvoj, http://www.umanotera.org (in Slovene, English site under preparation)

Country Report: Ukraine

Dr. Georgiy Geletukha
Scientific Engineering Centre "Biomass", Ukraine

1 Recent developments regarding sectoral energy efficiency and climate change mitigation policies

Some Laws of Ukraine on renewable energy sources (RES) and co-generation have been recently developed/accepted in Ukraine [1-3].

Law of Ukraine "On combined heat and power production (co-generation) and utilization of dump energy potential" (registration N 2583 from 08.05.2003) has been accepted "in the first reading/ or as a base" by Verkhovna Rada on 23.05.2003. This Law regulates relations between State, producers of power, which use co-generation technologies, dump energy potential of technological processes, and energy supply companies. This Law acts for qualified CHP plants, which started exploitation after 01.01.2003. It is proposed stimulation of construction and utilization of such CHP plants. National Commission on Regulation of Power Sector of Ukraine has to use profit norm of 22% for calculation and approval of sale tariffs for RES power. This figure is calculated from the condition that payback period for investments in such CHP plants will be less than 4.5 years. It is maximal payback period, which is still interesting for investors in Ukrainian conditions.

Law of Ukraine N 555-IV "On alternative sources of energy" has been accepted by Verkhovna Rada (Ukrainian Parliament) on 20 February 2003. It is framework Law, which defines legislative, economical, ecological and organizational basis for utilization of alternative sources of energy and promotion for their use in fuel-energy complex. According this Law term "alternative sources of energy" is equalized to "renewable energy sources". This Law does not propose any financial stimuli and support mechanisms for producers and consumers of renewable energy sources. All financial stimuli and support mechanisms which where predicted in the first versions of the Law were excluded after some vetoes of the President of Ukraine in 2001 and 2002. First variant of this Law was registered in the Verkhovna Rada on 16.10.2000. That means that its acceptance took about 2.5 years with full excluding of financial stimuli and support mechanisms. In any case this Law has progressive significance such as indicated increase of renewable energy production and utilization as a main principle of State policy in this sphere.

Draft Law of Ukraine "On corrective action to the Law of Ukraine "On power energy" has been developed and approved by the Cabinet of Ministers and has been submitted to the Verkhovna Rada (registration N 3504 from 16.05.2003). This draft Law was developed according the schedule of works on adaptation of Ukrainian legislation to legislation of EU. The subject of legislative regulation is improvement of relations on the power market, guaranty of power quality, in the sphere of construction of new generating capacities and free access to the power grids, stimulation of power production from renewable energy sources. Minister of Fuel and Power will present draft Law in Verkhovna Rada. According this draft Law power supply companies must guarantee access to the power grids to small hydropower stations, and power stations producing power from renewable energy sources. New chapter IV "Stimulation of power production from renewable energy" is included in the draft Law. This stimulation includes: Purchase on the whole sale market of Ukraine power produced from RES;

- Guarantee access to the power grids for producers of power from RES;
- Installation of special tariff for the transportation of power from RES in the grids;
- Providing to RES power generating companies by subsidies, grants, tax, credit and other concessions.

The *"Energy Strategy of Ukraine till 2030"* is under development by a group of Ukrainian energy experts on the decree of President of Ukraine. According to draft version targeted utilization of RES is 6.6 mtoe (4.7% of Primary Energy Consumption (PEC)) in 2010 and 24.6 mtoe (17.5% of PEC) in 2030 (table 1). Corresponding figures for biomass are 1.9 mtoe (1.35% of PEC) and 6.5 mtoe (4.6% of PEC).

Table 1: Utilization of RES in Ukraine according to "Energy Strategy of Ukraine till 2030" (draft)

Indices	Technical potential of RES		Heat and power production from RES in 2001-2030							
			2001		2010		2020		2030	
	mtoe	%	mtoe	%	mtoe	%	mtoe	%	mtoe	%
Wind energy	10.5	23.8	0.008	0.2	0.4	6.3	3.0	18.9	6.2	25.4
Solar power	1.4	3.2			0.006	0.1	0.2	1.0	0.5	2.1
Hydro small	2.1	4.8	0.1	3.1	0.1	1.6	0.3	2.1	0.5	1.9
Hydro large	4.9	11.1	3.1	78.7	3.4	51.2	3.9	24.6	4.6	18.7
Solar heat	2.8	6.4	0.001	0.04	0.1	1.2	0.5	3.1	1.4	5.6
Bio-energy	**14.0**	**31.7**	**0.7**	**17.8**	**1.9**	**28.5**	**4.4**	**27.9**	**6.5**	**26.3**
Geothermal energy	8.4	19.0	0.003	0.07	0.7	11.1	3.5	22.4	4.9	20.0
Total	44.1	100.0	3.9	100	6.6	100.0	15.8	100.0	24.6	100.0
Share of own fossil fuels, %	78.0		7.0		12.0		28.0		48.0	
Share of total consumption of primary energy	32.0		2.8		4.7		11.3		17.5	

2 Best practice policies and measures yielding ancillary socio-economic benefits

Beginning from 1994 more than 500 wind turbines with total installed capacity above 50 MWe have been installed in Ukraine. For comparison this figure was 11.4 MWe in 1999, 24.15 MWe in – 2000, about 30 MWe in 2001. Serial production of wind turbines has been established mainly on the base on former military plants including rocket plant Uzhmash in Dnipropetrovsk. The main part of them are licensed units USW56-100 of 107,5 kW installed capacity. Ukraine is a leader in the Former Soviet Union countries and Eastern European countries on the total installed capacity of wind turbines.

The country has adopted a Complex Wind Power Development Program [4], which was developed according to the President's of Ukraine Decree 159 of March 2, 1996 «On development of wind farms» and approved by the Cabinet of Ministers' resolution 137 of February 2, 1997. In early 2000 were developed «Alterations and Amendments to the Complex Wind Power Development Program» [5]. The document specifies the main regulations of the Complex Program [4] with consideration of 4 years experience of wind energy development in Ukraine.

The Complex Program, according to the President's Decree 159, is to be funded at the expense of 0.75% tariff extra charge on sale of electricity. In 1997-1998 this funding ought to have totaled about 220 million Hrivnya. However due to the great non-payment problem, including that for the electricity consumed, in reality the Program only got 17.3% of the indicated amount. Therefore the Program development was delayed. The payment situation slightly improved in 2000, resulting in the Program receiving about 40% of the due funding. This has had a positive effect on acceleration of wind farms construction.

Three new wind turbines of 600 kWe/ unit of Belgian firm "Turbowinds" have been started exploitation on 3 June 2003. Wind turbines of such capacity are considered as a future of Ukrainian wind energy sector. There licensed production is planed in Ukraine.

3 Climate change mitigation and the use of the flexible mechanisms: State of the art

In June 1992, 161 countries signed the United Nations Framework Convention on Climate Change (UNFCCC), of which Ukraine is an active participant, being listed in Annex I of the Convention. After ratifying the Convention in October 1996, Ukraine became an official Party to UNFCCC in August 1997. In 1997 a binding GHG emission commitment was agreed upon at the Kyoto Conference of the Parties to this Convention. The Protocol commits developed countries and countries in transition to a market economy to reduce their emission on average by 5.2% below 1990 levels during the commitment period from 2008 to 2012. Ukraine's commitment is not to exceed its 1990 emissions during that period.

Additionally, the Kyoto Protocol provides the foundation of an international emission credits market. Because greenhouse gas abatement costs differ among countries, through an international trade of emission rights, it is possible to take advantage of economic gains while pursuing the goal of improving the environment. This would allow countries and firms around the world to reduce emissions in the most cost effective manner. The Kyoto Protocol includes three so-called *Flexible Mechanisms*, instruments that allow governments in industrialized countries to achieve parts of their emission reduction commitments under the Kyoto Protocol through projects abroad rather than through action or policy changes at home. Below is a brief explanation of the above mentioned mechanisms:

- *Joint Implementation (JI):* JI is a project-based mechanism to be used among Annex I countries that consists of an investment in reducing GHG emissions. Besides traditional benefits from the project, the return on this investment is represented by emission credits. The emission reduction effect is calculated by comparing the achieved level of emissions with an emissions baseline and is measured in “Emission Reduction Units” (ERUs).
- *Clean Development Mechanism (CDM):* CDM is a mechanism meant to assist developing countries in achieving sustainable development in line with the objectives of the Convention, and to assist Annex I countries in complying with their quantified emission limitations and reduction commitments. CDM projects are very similar to JI projects, with the difference that investments are made in non-Annex I countries. The emissions reduction obtained with the implementation of CDM projects are called “Certified Emission Reductions” (CERs). Note: the CDM is less relevant to Ukraine.
- *International Emission Trading (IET):* While the Kyoto Protocol’s Annex B lists the emission limits (called "Assigned Amounts") for all Annex I countries of the UNFCCC, to be achieved during the commitment period of 2008-2012, Article 17 of the same Protocol allows the possibility of ET among these countries. Thus, an Annex I country can buy part of its emission reductions from another Annex I country (incl. Ukraine), although the text of the Kyoto Protocol cautiously provides that such trading shall be supplemental to domestic actions to reduce emissions. The unit traded under the IET is the Assigned Amount Unit (AAU).

National Strategy of Ukraine for Joint Implementation and Emissions Trading

National Strategy of Ukraine for JI and ET was developed in Ukraine in frame of the project supported by the Swiss Government, the Government of Ukraine, and the World Bank [6]

Within the National Strategy Study (NSS), two scenarios forecasting economic growth and associated GHG emissions have been produced. The study clearly shows that Ukraine will have excess GHG permits under any plausible scenario at least until 2020. In terms of tons of carbon, this means that Ukraine’s aggregated energy related CO_2 emissions during the commitment period of the Kyoto Protocol will be between 2’037 and 2’265 $MtCO_2$. Ukraine would be allowed to emit 3’360 $MtCO_2$ during that period (based on 1990 level of energy-related CO_2 emissions) and has a total assigned amount of 4’300 $MtCO_2$ equivalent. This means that the country will have excess emission rights of more than 1’000 $MtCO_2$. These excess emission rights can be sold on the international market.

Besides, the costs of CO_2 mitigation are estimated. The marginal abatement cost curve (MAC) is based on various data sources, including project costs of real projects. The MAC shows that Ukraine has great potential for GHG emission abatement. Considering the period 2002-2012, 1’500 Mt CO_2 can be reduced at costs equal or smaller than 8 $/t$CO_2$., 1000 Mt CO_2 are in fact no-cost options. A significant portion of this potential (approximately 1/3 of the total potential) is directly related to energy savings.

However, it has to be realized that emission reductions achieved before 2008 have no market value, because Ukraine can only sell allowances from its Kyoto assigned amount of the period 2008-12. Thus Ukraine’s potential to produce (marketable) emission credits via emission reduction projects is in the magnitude of 750 Mt CO_2.

For GHG price estimates NSS suggests a price of 4-5 $/t$CO_2$ as a likely scenario, whereby the full range of the expected price is 1-5.5 $/t$CO_2$. Furthermore the study summarizes GHG prices observed in current market transactions. These market prices are in the range of 1-12 $/t$CO_2$. However, the model also shows that prices will drop significantly in case Russia and Ukraine sell a large part of their excess AAUs on the market. This has to be kept in mind when calculating potential revenues for Ukraine from selling excess AAUs.

The NSS has set out necessary institutional structures within Ukraine, which are to be seen as a prerequisite for participating in the GHG market. The study describes that for JI two possible tracks have been established in the Marrakech Accords: A fast track (Track 1) and a slow track (Track 2). In the case a country wants to participate in the fast track (which is associated with lower transactions costs) a number of prerequisites need to be fulfilled: it needs to have an accepted national emissions inventory and allowance registry in place and report correctly to the UNFCCC.

Besides, the study summarizes Ukrainian legislation relevant to climate change issues. It is concluded that the legislative basis for regulating procedures concerning IET and JI (such as JI approval rules and Laws regulating AAU and ERU ownership) are not yet in place in Ukraine.

GHG mitigation potential and costs

By 1999, the Ukraine GDP had been reduced to 40% of 1990 levels. GHG emissions in 1999 also were about 60% lower than in the year 1990. Since 2000, the economy shows positive growth. Within the NSS, two scenarios forecasting economic growth and associated GHG emissions have been produced. The first scenario (Scenario A) predicts that 1990 levels of GDP will be reached in the year 2009, while the second and less optimistic scenario (Scenario B) sees GDP still at about 60% of 1990 levels during the first commitment period of the Kyoto Protocol.

Figure 1: GDP, energy consumption and CO_2 emission in Ukraine: scenario A

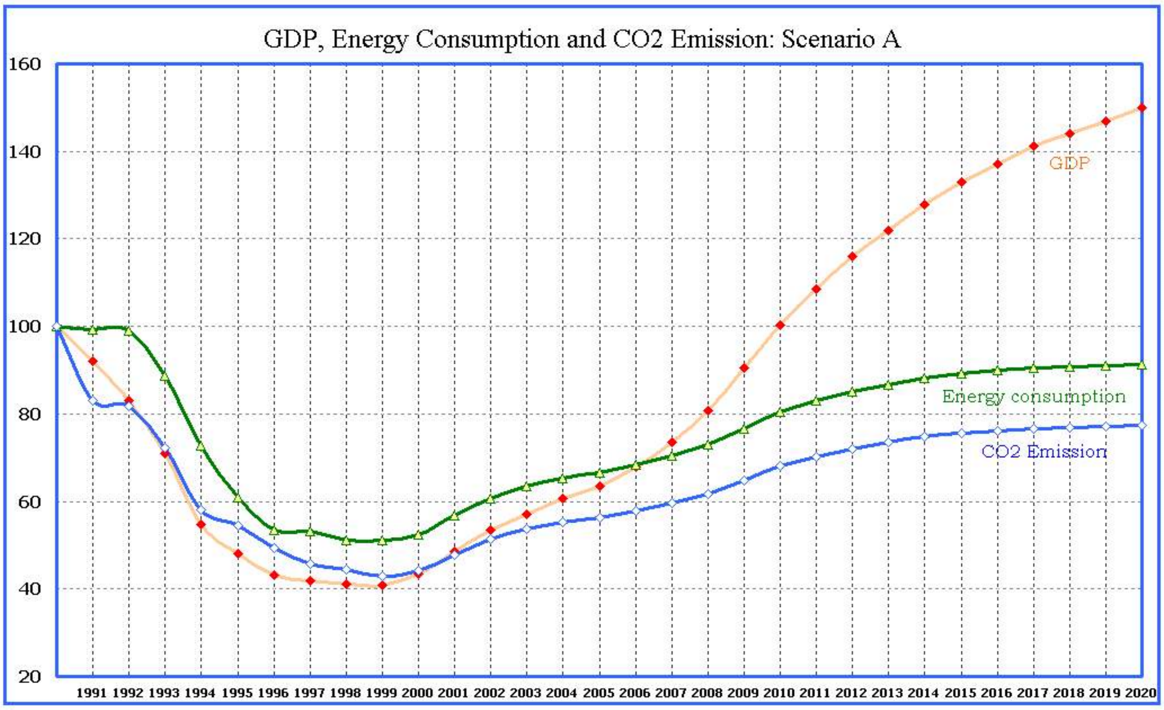


Figure 2: GDP, energy consumption and CO_2 emission in Ukraine: scenario B

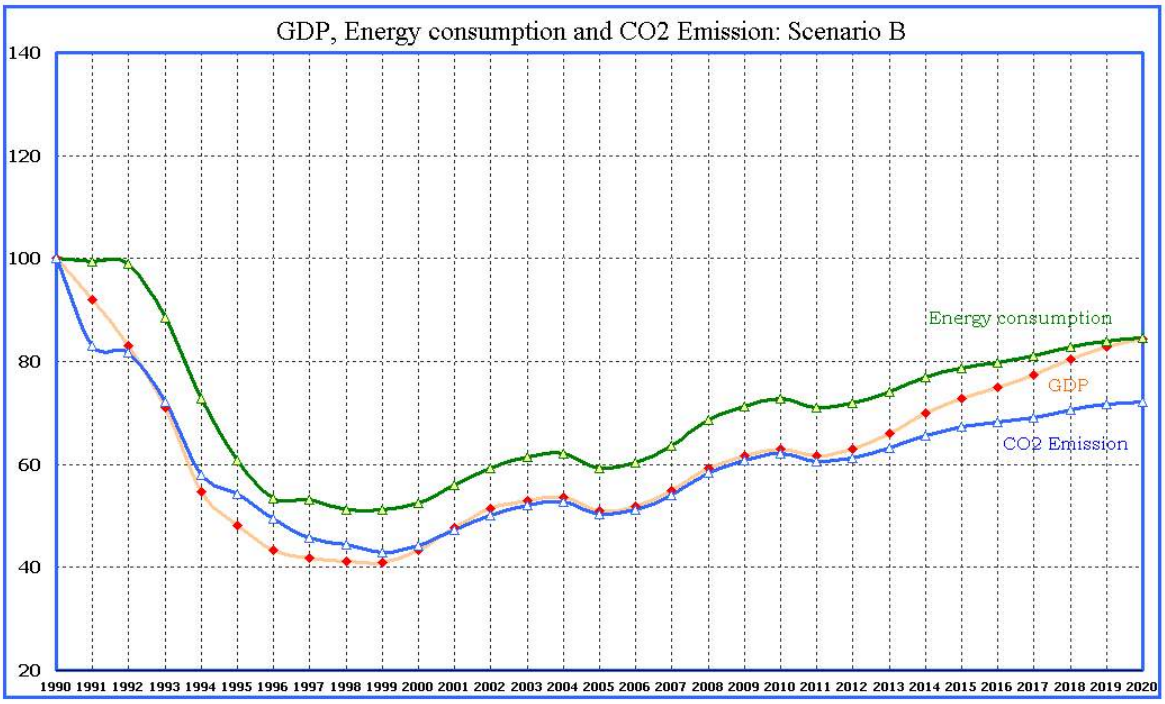
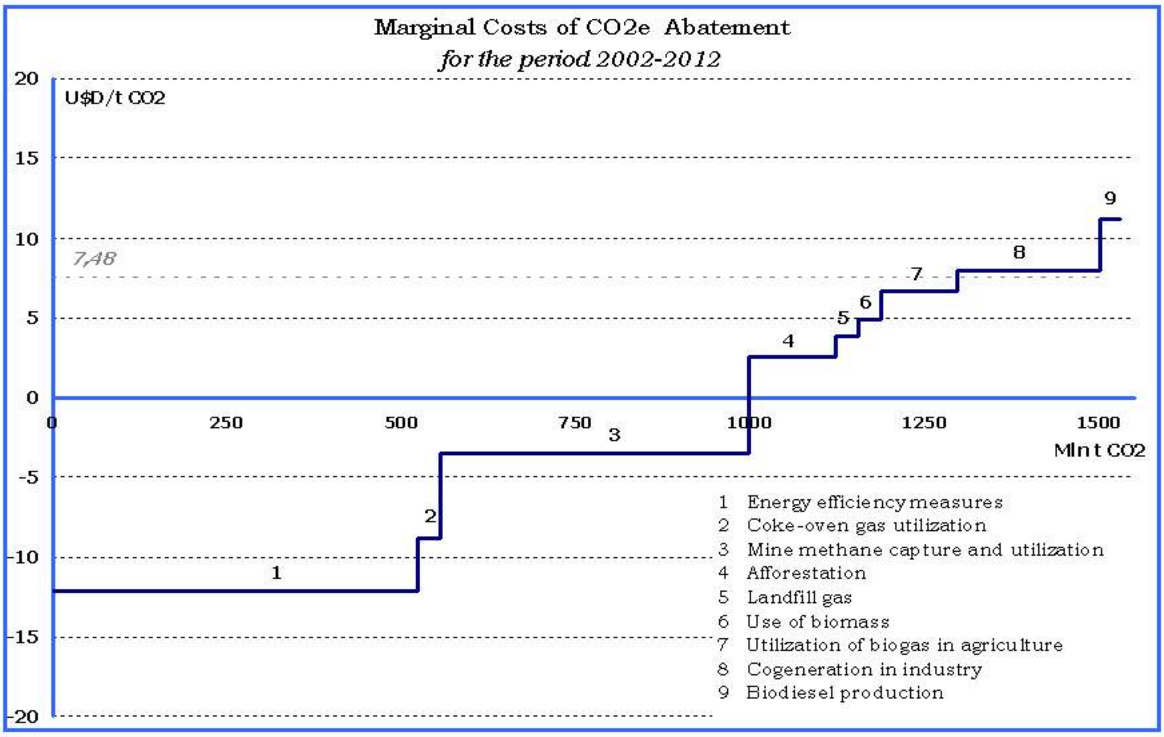


Figure 3: Marginal costs of CO_2 abatement



With respect to expected GHG emissions, the two scenarios differ significantly less. While in the fast economic growth scenario GHG emissions are predicted to reach about 68% of the 1990 level by 2010, the low-economic-growth scenario shows GHG emissions at 62% of the 1990 level in the year 2010. The reason for the small difference in terms of GHG estimates is that the pessimistic scenario is associated with low energy efficiency and high GHG intensity, while with fast economic growth, energy efficiency is improved significantly.

In terms of tons of carbon, this means that Ukraine's aggregated energy related CO_2 emissions during the commitment period of the Kyoto Protocol will be between 2'037 $MtCO_2$ (Scenario A) and 2'265 $MtCO_2$. Ukraine would be allowed to emit 3'360 $MtCO_2$ during that period (based on 1990 level of energy-related CO_2 emissions) and has a total assigned amount of 4'300 $MtCO_2$ equivalent (for a summary of these figures see table 2 next page).

This means that the country will have excess emission rights of more than 1'000 $MtCO_2$. These excess emission rights can be sold on the international market.

The graphs above show the GDP and CO_2 emission predictions for the base scenarios A1 and B1 (without specific energy saving instruments being in place).The marginal abatement cost curve (MAC) produced in the study (figure 3) is based on various data sources, including project costs.[1]

The MAC shows that Ukraine has great potential for GHG emission abatement. Considering the period 2002-2012, 1'500 Mt CO_2 can be reduced at costs equal or smaller than 10\$/tCO_2., 1000 Mt CO_2 are in fact no-cost options (whereby one needs to be careful with such estimates, as some risks and other barriers may not have been accounted for in all of the underlying studies. A significant portion of this potential (approximately 1/3 of the total potential) is directly related to energy savings.

However, it has to be realized that emission reductions achieved before 2008 have no market value, because Ukraine can only sell allowances from its Kyoto assigned amount of the period 2008-12. Thus Ukraine's potential to produce (marketable) emission credits via emission reduction projects is in the magnitude of 750 Mt CO_2. Table 4 summarizes Ukraine's projected Emissions and Reduction Potential.

During the past years a number of climate change activities have been taking place Ukraine:

1 Note on the forestry projects: calculating the abatement costs, future GHG abatement has not been discounted, which results in costs which are lower than they would be if GHG flows had been discounted.

Table 2: Ukraine's projected GHG emissions and reduction potential.

	1990 Mt CO_2e	1999 Mt CO_2e	2008-12 average Mt CO_2e	2008-12 cumulative Mt CO_2e
CO_2 energy related 1)	672	289	453	2'265
Other GHG emissions 2)	242	96	151	755
CO_2 removals 3)	-52	-52	-52	-261
Total GHG emissions and removals	862	333	552	2'760
Kyoto assigned amount (rounded 5)			860	4'300
Surplus AAU - all gases (rounded) 6)			300	1'500
Surplus AAU - only energy related CO_2 (rounded) 7)			220	1'100
Additional reduction potential (<8$/t$CO_2e$) 4)			150	750

Data Sources
1) 1990: 2nd National Communication (1999) p. 31; 1999 and 2008-12: Own calculations, according to Scenario A, Chapter 2
2) 1990: 2nd National Communication, 1999 and 2008-12: Assumed proportional to energy-related CO_2, at about 25% of total GHG emissions
3) 1990: 1st National Communication (1998) p. 6; 1999 and 2008-12: Assumed to remain constant at 1990 level
4) According to chapter 2, marginal abatement cost curve
5) Corresponding to 100% of 1990 GHG emissions
6) Calculated as Assigned Amount minus total GHG emissions. This value represents an approximation, because it is based on simplifying assumptions regarding GHG emissions other than CO_2, and regarding CO_2 removals by sinks
7) Calculated as energy-related CO_2 emissions in 1990 minus project emissions in 2008-12

First National Communication and First National Inventory of Greenhouse Gas Emissions: In 1998, the Government of Ukraine, in order to meet its commitments under the Convention, prepared and submitted to the Secretariat of the UNFCCC its First National Communication and First National Inventory. To date, only one national greenhouse gas emission inventory has been forwarded to the Secretariat of the Convention. The inventory refers to the year 1990, which is taken as the base year for Ukraine. The inventory provides data on fuel combustion in all sectors of the economy (industry, agriculture, public services), as well as data on the structure of greenhouse gas emissions.

National Policy and Strategies: During the last years, the Ukrainian Government has developed several important documents, which determine the strategy for the economic development, both in general terms and in specific aspects. Among them are:

- Program for the Restructuring of the Ukrainian Economy (1995)
- National Energy Program (1997)
- Comprehensive State Energy Conservation Program of Ukraine (1997)
- Program of State Support of the Development of Alternative and Renewable Sources of Energy and Small Hydro and Thermal Energy (1997)
- National Programs of Development of Sectors of the Economy (1993-1997)
- Short-term Programs of Development of the National Economy (annually)
- "Ukrainian Coal" (the Program of Development of Coal Industry in Ukraine as one of the priority branches of the fuel-energy complex)

The main official document, which can be used for predictions of greenhouse gas emissions in Ukraine, is the Comprehensive State Energy Conservation Program of Ukraine of February 5, 1997. The Program was prepared with the participation of the Ukrainian Ministry of Economy, the State Committee for Energy Saving and the National Academy of Sciences. In 2000, the Program was revised with due account to changes and results reported in 1998–1999. Furthermore a number of bilateral programs have been established:

- Various programs financed by the United States of America.
- The Canadian-Ukraine Environmental Cooperation Program
- The Dutch JI Program
- Cooperation on reduction of greenhouse gas emissions is in progress also with Finland, Sweden, Japan and other countries.

Cooperation with multilateral agencies and international financial institutions includes a program on the Removing of Barriers to Climate Change Mitigation in Ukraine through Increased Efficiency of Municipal Heating Systems (United Nations Development Program (UNDP) - 2002-2004), and a program on energy management at the municipal level (European Bank for Reconstruction and Development – EBRD- and Technical Assistance to the Commonwealth of Independent States TACIS- program).

Summary of past activities in Ukraine

There are certainly some positive signs for Climate Change in Ukraine. A process of the Kyoto ratification is in good progress. Ukraine proves an invention to follow the principles of the sustainable development formulated in Marrakech. As a result Cabinet of Ministers of Ukraine issued new decree #634 on April 26, 2003 named “On approval of the national complex program of the implementation of the decisions taken at World Summit on Sustainable Development for the period of 2004-2015” [7]. This program includes strong support of energy saving, renewable energy sources and climate change issues. An item 3-6 includes an obligation for Ukraine to meet demand of the UNFCCC (UN Framework Convention on Climate Change) and prepare conditions for Kyoto Protocol ratification within 2003. A responsible governmental body for this item is Ministry of Environment and Natural Recourses of Ukraine (MENR).

MENR developed draft plan of measures to be taken by relevant Ministries in preparation for the ratification review process. These include macroeconomic forecasts, industry development plans, recommendations on creating a structure to administer climate change programs, preparation of a Nation Climate Change Action Plan, National Communication and national GHG emissions inventories and other measures to ensure Ukraine’s compliance with the UNFCC requirements

At the end of 2002 – beginning of 2003 MERN took the active position on the ratification of Kyoto protocol in Ukraine [8]. Big job on the analysis of advantages and risks of Kyoto protocol ratification was organized and carried out in the short term with the participation of national experts on climate change. The special department was established in MERN with the task of organization and coordination of activities connected with climate change. At the moment on the instructions of Premier-Minister of Ukraine V. Yanukovich, MERN and all interested authorities have already agreed ratification package of documents, that gives confidence in successful finishing of Kyoto protocol ratification.

At the moment this package is officially submitted by MERN to the Cabinet of Ministers for approval. It is expected in the autumn 2003.Just after that this package must be submitted to Verkhovna Rada for ratification of Kyoto Protocol.

Memorandum of Understanding between the Government of Denmark and the Government of Ukraine

As one of the positive result first bilateral Memorandum of Understanding may be mentioned (it was signed in May 2003) [9]. According this memorandum the main Objectives of the Memorandum are based on the Article 4 of UN Convention on Climate Change (hereinafter “Convention”) and Articles 6 and 17 of the Kyoto Protocol (hereinafter "Protocol") and aiming at preparation and implementation of joint measures, in particular, by means of JI-projects. The JI-projects shall be carried out in accordance with the international criteria established under the Convention and the Protocol.

If the Danish and the Ukrainian Signatories agree, reductions before 2008 from JI projects can be transformed into Assigned Amount Units for the period 2008-2012 and traded with Denmark on the basis of Article 17 of the Kyoto Protocol. Decisions on transfers will be taken on a case-by-case basis.

The responsible authorities for implementing the provisions of this Memorandum are for the Ukrainian Signatory the Ukrainian Ministry of Environment and Natural Resources and for the Danish Signatory the Danish Ministry of Environment, Danish Environmental Protection Agency.

Signatories delegate the power of taking initiatives and the signing of all agreements on JI projects as well as the procurement of ERUs originating from such JI projects to the mentioned authorities. The mentioned authorities have the responsibilities to ensure the management of all issues mentioned in this Memorandum of Understanding.

The Danish Signatory will contribute to the development and implementation of emission reduction projects by the procurement of ERUs originating from those projects or by acceptance and registration of ERUs procured by private companies from the Ukrainian Signatories being the ultimate owners of such units. The Danish Signatory shall approve the JI-projects in accordance with Article 6.1 in the Kyoto Protocol by the issuing a letter of approval.

The Ukrainian Signatories will facilitate the development and implementation of projects by supporting private or public companies interested in carrying out emission reduction projects with information, consultation and by formal approval of projects as JI projects(in accordance with Article 6.1.a of the

Protocol) which meet all national requirements for such projects. The Ukrainian signatories will ensure transfer of proceeds from the sale of ERUs to finance those specific emission reduction projects from which the ERUs originate.

The Ukrainian Signatory will transfer the agreed and prepaid amount of ERUs, within the agreed period for each project in the procurement contract, as long as JI-project generating the ERUs keep generating emission reduction, which can be verified by an independent entity.

The approval must contain binding affirmation of the Ukrainian Signatory that it will transfer the agreed and procured part of the resulting ERUs to Denmark in accordance with Article 6 of the Kyoto Protocol. The letter of approval will also confirm that the transfer will be free of any extra charges beyond the agreed payment for ERUs. Payment schemes for JI projects will be agreed on a case-by-case basis.

According the information of MENR alike Memorandum of Understanding is under the preparation with the Netherlands at the moment.

4 Making the Kyoto mechanisms work: Challenges ahead

Domestic institutional, regulatory and legal prerequisites [according 6]

There are clear international requirements for taking part in IET and JI. The study describes that for JI two possible tracks have been established in the Marrakech Accords: a fast track (Track 1) and a slow track (Track 2). In the case a country wants to participate in the fast track (which is associated with lower transactions costs) a number of prerequisites need to be fulfilled: it needs to have an accepted national emissions inventory and allowance registry in place and report correctly to the UNFCCC.

The institutional structure dealing with JI and IET still needs to be put in place. There are a number of existing institutions that should play a decisive role in this context, first and foremost the Ministry of the Environment and Natural Resources of Ukraine and its Department of Hydrometeorology, although the latter currently is entrusted primarily with observation and climate change vulnerability activities. Furthermore, the Inter-Ministerial Commission on Climate Change (IMCCC) has a major role to play in coordinating climate change activities within Ukraine and formulating Ukraine's climate change strategy.

Also the following ministries are seen to play some role in Ukraine's climate change policy: Ministry of Fuel and Energy, State Committee on Energy Conservation, Ministry of the Economy of Ukraine, State Committee on Statistics of Ukraine, Ministry of Finance of Ukraine , Ministry of Foreign Affairs of Ukraine, State Committee of Forestry, Ministry of Transport.

Apart from the government sector, private companies are expected to take part in the GHG market, most notably consulting firms, banks, insurance firms and energy and environmental audit companies.

Secondly, the legislative basis for regulating procedures concerning IET and JI (such as JI approval rules and Laws regulating AAU and ERU ownership) are not yet in place in Ukraine. Despite the numerous existing institutions potentially dealing with climate change issues, it would be advisable for Ukraine to establish a central JI/IET office. Key functions of the office would be the following:

- Establishing the national legislative and regulatory framework for JI and IET, including arranging potential tax and import duty exemptions.
- Developing project approval criteria and procedures; developing and marketing national project pipeline.
- Providing information on the legal and procedural issues regarding project implementation, including terms and conditions of the transactions, environmental assessment requirements, and local consultation procedures, and any fees required.
- Verifying the conformity of economic, technical, social and environmental indicators of proposed JI projects with selection criteria and submitting them to the MENR for approval.
- Preparing bilateral Memoranda of Understanding or Letters of Intent between Ukrainian government and investor as well as final Carbon Purchase Agreements.
- Providing other services to minimize administrative and transaction costs of the investor, for example in organizing local consultation process.
- Establishing and administering a web-site and providing public access to JI projects and activity data bases.
- Building domestic public awareness on JI through mass-media, workshops and other sources of information.
- Issuing ERUs certificates upon appropriate international verification process.
- Administer National Registry.

Particular assistance of the JI/IET office may be required after the project is validated as an eligible JI project, at which point investor and host enterprises, with the intermediary service of JI/IET office, sign a Carbon Purchasing Agreement that defines the details of the implementation of the project.

The JI/IET office should be established as soon as possible and enable Ukraine to take part in JI Track 2 without delay. However, in the long-term (after eligibility for ET and Track 1 JI is obtained), the JI/IET office administrative structure will require a more complex and more effective structure consisting, at least, of three sections dealing with *JI projects, Tradable Allowances, and Information and Registration*.

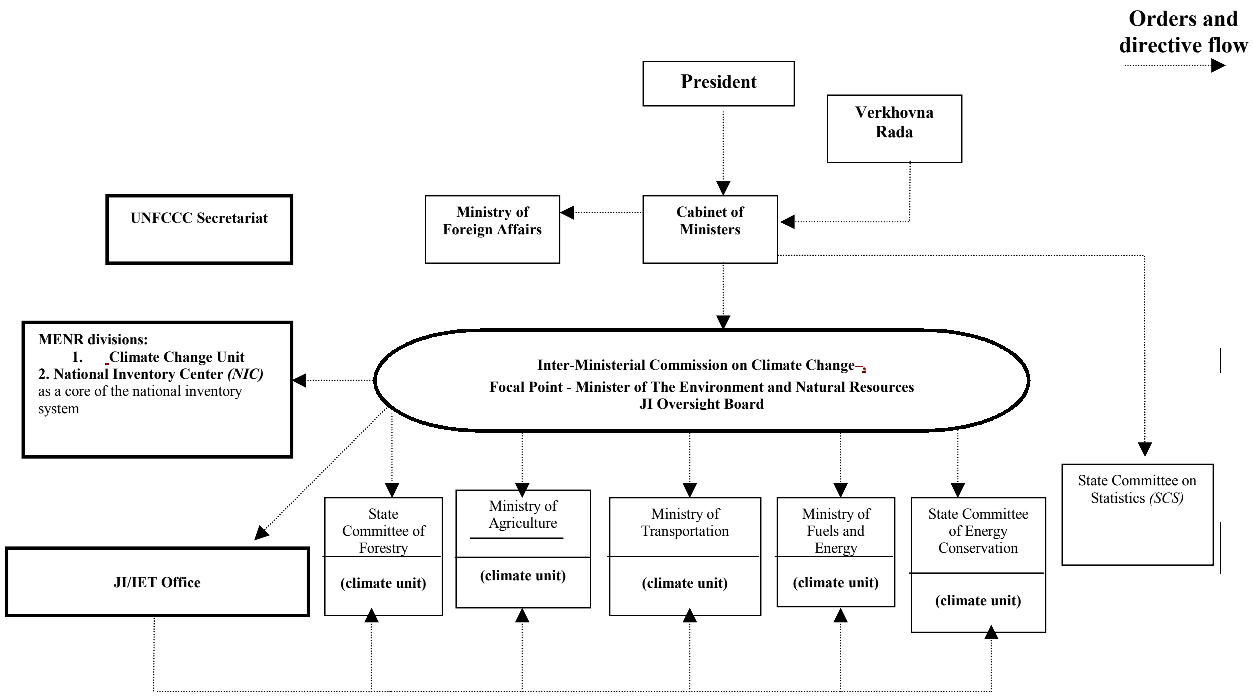
Building on the capacities developed by the JI/IET office in administering Track 2 JI, it will likely have to assume additional functions, such as:

- Developing guidance on the national requirements for project information, such as additionality assessment, project baseline analysis, and monitoring plan.
- Developing national procedures for project validation, monitoring and verification, including possible establishment of an independent monitoring and verification system.
- Conduct market research on IET; providing market and macroeconomic analysis for correct estimation of ET potential and appropriate price indicators.
- To carry out further JI and ET supervisory activities in line with the international requirements, particularly as regards certification, verification and reporting to UNFCCC Secretariat.

Finally, there is an urgent need to develop a sustainable and permanent national GHG inventory system and a national GHG register, as these are requirements of the UNFCCC for countries to participate in Track 1 JI and IET.

National GHG inventories were developed in Ukraine twice. The First National GHG Inventory for the 1990 base year was prepared under the U.S. Country Study Program. Annual inventories for the period of 1991-1998 were developed in 1999 and funded by the MENR. The results were submitted to the UNFCCC Secretariat in 2000. However, the Ukrainian national GHG inventory needs to be further developed to comply with the UNFCCC standards. Currently, the GHG inventory lacks data on the new gases: HFCs, PFCs, and SF6 , it uses IPCC default emission factors instead of local ones, and it is not reported in the Common Reporting Format (CRF). In order to be able to comply with the eligibility requirements for IET and Track 2 JI, Ukraine needs to improve its inventories to an international standard and establish a sustainable permanent system that would support national GHG inventory development and management on a regular basis. Figure 4 describes a possible administrative structure and JI/IET office form of Ukraine's institutional infrastructure for JI/IET (to be taken as an example).

Figure 4: Institutional structure (as proposed be NSS)



Options for Ukraine

Ukraine has the potential to become a major seller of GHG emission rights under the Kyoto Protocol. According to the study's estimates, the country will have surplus emission rights of about 1.5 billion tons of CO_2-equivalent in the first commitment period 2008-12 (including non-CO_2 GHG and forestry sinks). In addition the country offers potential for further emission reductions of approximately 750 $MtCO_2$ in the period 2008-12 which can be exploited profitably at the projected market price of 8 $/ t CO_2.

The sale of these emission rights on the international GHG market could generate substantial revenues for Ukraine, which could help to renew the country's obsolete energy infrastructure. In addition, a further reduction of GHG emissions would create substantial co-benefits for the country in the form of reduced dependence on imported fuels, and reduced health costs associated with air pollution.

In order to realize these revenues and benefits, NSS recommends that Ukraine should take the following strategy:

1. For the sale of surplus emission rights for the period 2008-12 (surplus AAU or "Hot Air"):
   - Start negotiations with potential buyers regarding sale of surplus AAU immediately.
   - Sell about 1/3 of the surplus AAU (only those related to energy CO_2, corresponding to 350 $MtCO_2$) at the projected average market price of 8 $/$tCO_2$. This could generate revenues of about $2.8 billion during the first commitment period 2008-12. Ideally, a part of these revenues can already be received before 2008, through up-front payments. But note: 8 $/$tCO_2$ is a somewhat optimistic price scenario, these prices might also be lower.
   - The revenues from these AAU sales should be spent on further emissions-reducing measures, i.e. on further de-carbonization of the national economy. Besides delivering large benefits for Ukraine in the form of renewed energy infrastructure and local environmental benefits, this recycling will be a prerequisite for attracting buyers, because it adds environmental credibility to the sale of surplus AAU.
   - Reserve the remaining surplus AAUs for sale at a later stage, or for Ukraine's own use in the second commitment period, 2013-17. These reserve AAUs should not be sold until Ukraine's emission target for the period 2013-17 has been defined, and until long-term development of carbon prices has become more certain.
2. For the generation and sale of further emission reductions:
   - Take all measures required to enable efficient sale of emission reductions under the Kyoto Protocols Article 6 JI mechanism. The demand for and supply of such emission reductions will be primarily driven by the companies involved in these projects. Ukraine Government should play an enabling role for JI, by creating clear national rules and an efficient approval process.
   - Consider introduction of further domestic policies for stimulating GHG emission reductions in Ukraine. These include, in particular: Introduction of a Governmental program to (co-)finance the renewal of the energy infrastructure, and policies promoting a shift from existing taxes on income / labor to taxes on energy consumption and carbon emissions. With the help of these policies, Ukraine could generate further emissions reductions which the Government could sell on the international GHG market under Article 17 ET. In the longer term, Ukraine may also consider introduction of a domestic GHG trading scheme involving large emitters such as e.g. power generators, metals, mining and cement companies. Such a scheme will very likely be introduced in the European Union from 2005. Participation in this European Trading Scheme would allow Ukrainian companies to sell emission rights at substantially reduced transaction costs, compared to Article 6 JI.

The proposed generation and sale of emission rights could bring to the country an impressive financial inflow from abroad. Overall, we estimate the possible revenues for Ukraine at 1.7 billion $ per year, or 8.5 billion $ for the total period 2008-12, whereby it needs to be noted that the figure will be lower at lower carbon prices. It may be possible to obtain a part of these revenues already before 2008, through forward purchase contracts with partial up-front payment by the buyers.

3. With respect to the choice of mechanism used by Ukraine (JI Track 1 or 2 or IET) the study makes the following recommendations:
   - JI: Ukraine should allow JI investors to choose between Track-1 and Track-2 JI. For this reason, Ukraine should become eligible for both Tracks by taking necessary institutional measures. This will require little time and resources in the case of Track-2, and moderate resources for Track-1. As a result, Ukraine should try to make Track-2 JI available for international buyers

as soon as possible, ideally from 2004, and Track-1 JI from approximately 2006.

- IET, Government level: With regard to the sale of surplus AAU, Ukraine should start preparations and negotiations immediately, in order to start actually selling AAUs approximately in 2006.
- IET, Company level: A domestic GHG trading scheme for large emitters is likely to become an attractive option for Ukraine in the longer term, if the corresponding European scheme materializes as expected. Ukraine should keep an eye on this option. Preparations could start as early as 2006, with a view to actually starting the scheme after 2012. A domestic GHG trading would essentially replace project-based trading under JI.

Plan of Action

Ukraine stands to gain substantial benefits in foreign investment, technology transfer and capacity building from participation in the Kyoto Protocol mechanisms. Therefore timely ratification of the Kyoto Protocol and creation of the necessary national capacity to participate in its mechanisms is the most important recommendation offered to the Government of Ukraine. Urging the Government to act, the NSS describes the steps to be taken by the Government of Ukraine to start building the necessary prerequisites for their implementation.

In particular it examines how the Marrakech Accords translate into specific needs with regards to establishment of national institutions, i.e. JI and IET focal point, the national inventory system and the national registry. Since no national climate change institution would be able to operate without proper legal underpinnings, it is recommended that a legislative and policy-making process be launched that would promulgate the establishment and functioning of the national climate change institutions.

Building institutional capacity will entail certain budgetary implications, such a direct expenditures required for the establishment of Kyoto Protocol institutions in the country, as well as the resources required for establishing relevant policies and ensuring appropriate compliance with the international rules. While some steps would require significant investment of time and resources on the part of the government, such as up-dating the Laws, preparing the *annual inventories* and establishing the *registry*, some are not so costly (e.g. allocating clear institutional responsibilities and developing administrative procedures). Moreover, the budgetary constraints substantially will differ depending on whether Track 1 or Track 2 eligibility is in question.

At the same it is important to build the local consultancy base in order to avoid the siphoning parts of JI investment to foreign consulting companies and agencies. Ukrainian private sector needs to be made broadly aware of the fact that they could develop JI projects, or gain accreditation as independent operational entities for JI internationally and domestically. More importantly, establishing Track 1 JI in Ukraine will bring the additional benefit of spawning a new set of service industries in the country, just as the global market for JI gave rise to international carbon consultancies. To maximize economic gains from the JI, it is important to develop local expertise in these new areas of economic activities, as at present the number of internationally qualified local JI experts is very low.

When examining potential Ukrainian strategy for engaging into IET and JI, NSS primarily looks into the issue of how to approach international market most effectively. It recommends to jump start with implementing pilot GHG reduction projects, either through Activities Implemented Jointly or through Track 2 JI, stressing that the implementation of first JI projects under Track 2 JI should coincide with the development of sound Track 1 institutions and the launching of the process to fulfill all Track 1 eligibility criteria, so that investors eventually are able to chose between Track 1 and Track 2. In order to encourage investor interest, Ukrainian government should provide all potential investors with clear and up-to-date information about their procedures, project eligibility criteria, decision-making authority, monitoring and reporting requirements. Transparency and consistency will be essential to ensure the political stability needed for effective JI investment.

In order to encourage buyer interest and improve marketability to Ukrainian surplus allowances, a revolving facility is recommended to streamline AAU revenues into real GHG reduction projects. At the same time transparent national registry for recording and tracking forward sales, as well as transparent GHG inventory are noted as critical prerequisites for determining the success of ET for Ukraine. In the longer-term, the national climate policy would benefit from such financial mechanism, as it would help Ukraine to overcome existing financial barriers to restructuring its carbon-intensive economy.

It is NSS recommendation that Ukraine proceeds with establishing the capacity to fulfill Track 1 eligibility requirements as soon as possible. Firstly, the sooner the eligibility information is submitted, the more the country will be able to benefit from the international review processes that will help Ukraine improve, in particular, its inventory systems. Secondly, it will cushion any potential delays in providing clarification, if such are requested to JI Supervisory Committee. Thirdly, any delay in setting up national systems and institutions means some delay in participating in the mechanisms, since they are the eligibility requirements to participate. Suggested timeframe for building the national infrastructure for participation in the Kyoto Protocol is presented below.

An important action stipulating JI investments in Ukraine will be the implementation of first JI projects. Continuously improved JI-related capacity in the country will further enhance the attractiveness of Ukraine as a JI host country. Below a suggested time table for project implementation and capacity building is sketched.

Table 3: Suggested time schedule for building the national infrastructure for participation in the Kyoto Protocol.

	2003	2004	2005	2006	2007
Designation of a JI/IET focal point					
Development of national JI/ IET strategy					
Elaboration of project selection criteria and procedures					
Track 2 available			→		
National inventory system development					
National registry developed and tested					
Preparation of the annual inventories					
Track 1 available					→
Assigned Amount established and recorded					
Preparation for IET and negotiation with purchasers					
Eligibility determination					

Table 4: Suggested time schedule for JI demonstration projects and capacity building.

	2003	2004	2005	2006	2007
Presentation of potential JI projects to interested investors such as the World Bank's PCF					
Contract negotiation on first projects, project approval by Ukraine's government					
Implementation of first JI projects					
Implementation of further JI projects					
Capacity building on project design, base line determination, financial project assessment					
Capacity building on project monitoring as well as verification and certification (under JI track 1). Contract negotiation training for IET					

References / Documents / Links

[1] Law of Ukraine "On combined heat and power production (co-generation) and utilization of dump energy potential" (registration N 2583 from 08.05.2003, accepted "in the first reading/ or as a base" by Verkhovna Rada on 23.05.2003).

[2] Law of Ukraine N 555-IV "On alternative sources of energy" (accepted by Verkhovna Rada on 20 February 2003).

[3] Draft Law of Ukraine "On corrective action to the Law of Ukraine "On power energy" (registration N 3504 from 16.05.2003).

[4] Complex wind power development program, Kyiv, 1996.

[5] Alterations and Amendments to the Complex Wind Power Development Program, Kyiv, 2000.

[6] National Strategy of Ukraine for Joint Implementation and Emissions Trading. Executive Summary. Kiev 2003. Final report on the project supported by the Swiss Government, the Government of Ukraine, and the World Bank. Supervised by: Wolfram Kägi (Coordinator of Swiss study team); Oleg Riabokon, Vadim Diukanov (Coordinators of Ukrainian study team); Hans-Peter Egler, Janine Kuriger (Donor Country Responsibility); Peter Kalas, Helmut Schreiber, Victor Loksha (World Bank).

[7] Decree of Cabinet of Ministers of Ukraine #634 on April 26, 2003 "On approval of the national complex program of the implementation of the decisions taken at World Summit on Sustainable Development for the period of 2004-2015".

[8] Press release of Ministry of Environment and Natural Recourses of Ukraine issued on March 28, 2003.

[9] Memorandum of Understanding between the Government of Denmark and the Government of Ukraine on co-operation in the implementation of the UN Framework Convention on Climate Change and its Kyoto Protocol, particularly in reducing emissions of greenhouse gases in accordance with Article 6 and Article 17 of the Kyoto Protocol.

Links

http://www.menr.gov.ua - Official site of the Ministry of Environment and Natural Resources of Ukraine.

www.climate.org.ua - Climate Change Initiative.

www.ji.org.ua - Joint Implementation Program Database.

http://oracle2.rada.gov.ua/pls/zweb/webproc2 - search system of Ukrainian legislation.

Country Report: Uzbekistan

Dr. Liliya V. Zavyalova
Technology Transfer Agency

Gulnara Sh. Rashidova
Technology Transfer Agency

Introduction

Energy crises of 1973, being accepted some international conventions including the UN Framework Convention on Climate Change have promoted the extension of studies connected with using renewable energy. Climatic and natural conditions of Uzbekistan give excellent capabilities for using renewable energy sources (RES). According to the estimations the gross RE potential makes about 51 billion tons in oil equivalent (toe), technical potential is 179.4 m toe (table 1).

Table 1: Potential of Renewable Energy, m t.o.e.

	Energy					
	Total	Solar	Hydro	Wind	Thermal	Biomass
Gross potential	50986.9	50973.0	9.2	2.2	0.2	2.3
Technical potential	179.4	176.8	1.9	0.4	no data	0.3
Use	0.6		0.6			

Uzbekistan having the great resources of renewable energy is behind the most of developed countries in using it. The national scientific centers have had a rich experience in the field of clean energy investigation. To date, however, practical introduction of the results of their research and development activities does not satisfy the real requirements of Uzbekistan. It is to be noted that only 0.6 million t.o.e. (0.3 %) of a technical potential is being used today. The situation can be explained both the financial problems of a transition period in the national economy and a weak development of institutional and legislation base in the field of renewable energy.

1 Small hydropower development case study

1.1 Background

The attitude to small hydropower sharply changed while development of the energy sector in Uzbekistan. First 4 MW HPS (Bozsu) were built in 1926. In early 1960, their quantity raised to 253 with installed capacity of 35 MW. Mainly, it was small and mini-HPS working separately for an individual consumer. Besides 26 stations with installed capacity of 504.3 MW were operating in the system of the Ministry of Energy.

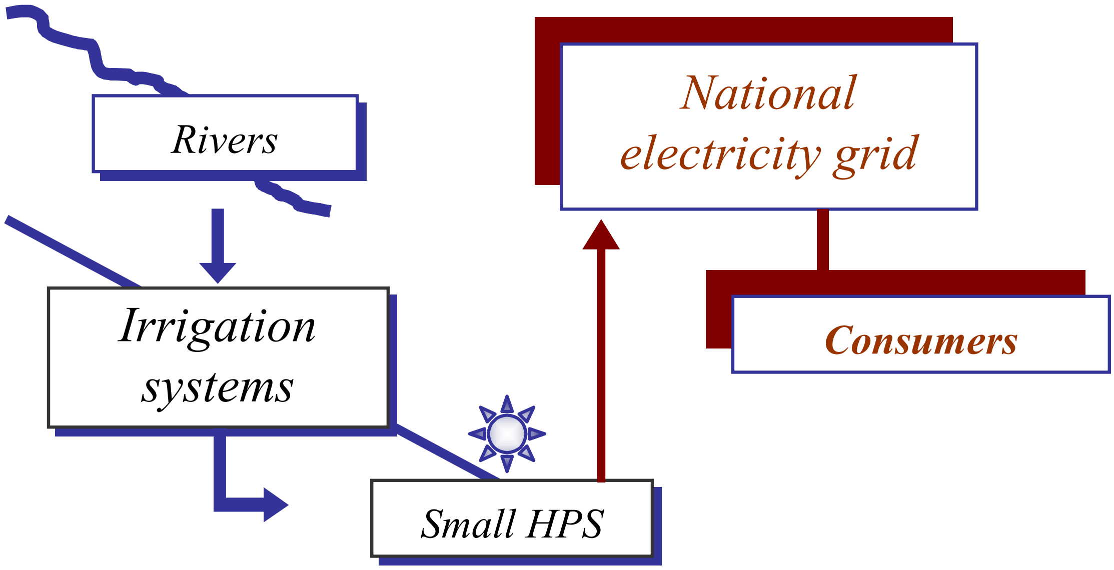
By present time, the majority of small HPSs has been desolate and disappeared without traces. However, some old HPSs are safe to some extent and could be restored that can be economically effective.

Water and power in Uzbekistan are inter-dependant (figure 1). In many regions the irrigation can be only done with using of the electric pump stations, thus causing a great demand for electricity in summer time. 30 % of generating electricity in the country is used by agriculture sector. Bridging of demand for electricity and water gives additional incentive for developing small hydropower on irrigation structures.

Box

In Uzbekistan, all small channels and irrigation systems belong to the Ministry of Agriculture and Water Management (MAWM). Effectiveness of small HPS construction is justified by availability constructed erections (dams, water intakes, stepped structures, water-discharged tracts) by now. It allows reducing specific investment costs per 1 kWh installed capacity in 4-6 times in comparison with option to construct these SHPS at a new place. Pay-back period of capital investment at these stations is comparable with thermal power ones.

Figure 1: A scheme of the electricity generation by small HPS



Now, 9290 mobile diesel pumping stations with a cumulative capacity of 918 MW, which annually burn about 560 thousand tons of diesel fuel, are operated in Uzbekistan. Pursuant to calculations of "Uzwatervodproekt", the potential of 140 HPSs included in the state program is sufficient for electric supply to all pumping stations and water transportation system of MAWM. Both the future small HPSs, and irrigation system are in a charge of the same Ministry, and that will give a chance to avoid institutional barriers.

1.2 State policy

Development of small hydropower is one of the priority lines of the state investment policy. In 1995, State Program of Small Hydropower Development was adopted by the Government (the resolution No 476 of the Cabinet of the Ministers). The program determined a priority of building small HPS - with short payback term up to 10 years (14 HPSs), perspective HPS with payback term more than 10 years (127 HPSs). The program implementation has been brought under control by Deputy Prime Minister responsible for agriculture sector. Besides, routine supervision is implemented by the Ministry of Finance and the Ministry of Economy.

On February 23, 2001 a resolution on "Deepening Reforms in the Energy Sector" was issued which could indicate a more favorable investment climate. The resolution called for turning various state-owned energy functions into corporations and partially privatizing them. The Government announced that major power plants and distribution units would be turned into joint-stock companies with some shares offered to foreign investors. However, 52 % of equities should belong to SJCC "Uzbekenergo" (former the Ministry of Energy). Acceptance of the resolution was the first important step for appearing private energy producers and suppliers in Uzbekistan.

In 2002, the Uzbek government decided to set State Program on Energy Efficiency till 2010 where one of the sections was dedicated to small hydropower development. The program would be revised within ADB project "Assessment of Energy Efficiency in Uzbekistan" launched in 2003.

1.3 Financing structures

The costs of the state program development were covered for account of a state budget. Two major sources for funding SHP buildings were defined by the resolution of 1995 – own financing and co-financing including companies and organizations, private capital, and foreign investors. Within formation of an annual state investment program the Ministry of Macroeconomics and Statistics, the Ministry of Finance were to make provisions to allocate funds for building the SHP stations, in priority order. For incentive of this activity, erected HPSs were exempted from taxes and realized profit was headed for reinvestment of new SHPs.

However, the money have came from the Uzbek government for building SHPSs is not evidently enough for developing small hydropower in Uzbekistan. The foreign investors have been theoretically interested in building small hydropower stations. The main obstacles are both high risks connected with unfavorable investment climate and lack of independent power producers in Uzbekistan.

1.4 Implementation

It was considered the possibilities of using hydropower potential on the existent irrigation reservoirs (43 HPS) and the canals (98 HPS). 30 small and middle hydropower stations, from which, 14 ones being entered into Program as top-priority, were selected taking into account the best technical and economical performances, favorable building conditions and demand for electricity. These small HPSs were to be built till 2000.

In reality, the program implementation has been faced with difficulties. Only seven of these stations are currently under construction and the design development works are done for the other selected HPSs. The main reason is lack of the money. Funding the construction was carried out at the MAWM own charge covered 25-30 % of required costs. The resolution has indicated that all receipts from selling electricity generated by HPSs of MAWM should be used for building of new HPSs. However, required financing has not been provided from irregular payments of SJSC "Uzbekenergo".

The situation is currently improving and the MAWM makes considerable efforts for attracting supplementary finance including foreign funds. ADB project "Power supply of the rural areas in Uzbekistan" launched in 2003 aims at helping small hydropower development.

1.5 Results

The program implementation was expected to result in: (i) generating additional electricity, (ii) improving electricity supply in the rural areas and (iii) reducing fuel consumption burnt by thermal power stations. Besides, stable electricity supply in the rural areas would induce a creation of small private enterprises (e.g., processing of agricultural products) and additional working places.

1.6 Problems

Main barriers have to be seen in the legal and the financial realm.

1. **Financial**. In Uzbekistan the great majority of the resources allotted by the government to energy sector were spent on development of traditional energy. Local and foreign banks are not interested in financing SHP projects from a long payback period and small cost-effective. Private firms stand the same position.
2. **Institutional**. The low prices on electricity are also an important obstacle in promoting small hydropower. The average price to be paid by residential customer is 14 sums (1.43 US cent in July, 2003). Legislation for independent producers needs to be detailed. The problem of energy selling is eminently important for investors putting up money in SHP projects. It stands to reason that positive decision of these and a number of other problems (such as, taxation, custom fees) will facilitate the investment flows in SHP projects.
3. **Technical.** In Uzbekistan, water-power equipment for hydropower stations has been exported from Russia and Ukraine. One of the alternatives for overcoming this barrier is to produce water-power equipment on a base of existed capacities of domestic enterprises.

1.7 Interfaces with Kyoto mechanisms

Small hydropower projects are practically attractive as a pilot CDM project. With investments of 1 to 5 millions US$ they entail manageable costs while being highly replicable. At the same time SHP can be a testing group for independent power producers and private sector participation, which are not established so far. At this case, the risks connected with entering into new market should be reduced and the rules of behavior would be polished. Besides, worked out FS, the procedures, modalities, rules can be easy used for the other SHPs implementations.

In 1998, twelve pre-feasibility studies (PFS) were prepared by IGEU within the World Bank project "Small hydropower - a pipeline of projects for CDM investments in Uzbekistan". PFS for 3 small HPSs was done in the project "Uzbekistan: capacity building in the CDM" funded by Swiss government. Unfortunately, there is no practical output of these PFS as yet.

2 Clean energy for the rural communities in Karakalpakstan

2.1 Background

The climatic and geographic conditions of Uzbekistan (approximately 260 sunny days per year) allow to use solar energy for transformation into electricity and heat. The duration of solar radiation in different regions makes from 2413 to 3095 hours per year. The autonomous republic of Karakalpakstan located near the Aral Sea has the most potential of solar energy – 19548 m t.o.e.

Karakalpakstan is one of the poorest agricultural regions in Uzbekistan announced a zone of ecological disaster. About

75 % of the population inhabits in the rural areas, a majority of them (from 50 to 70 % according to expert assessments) belongs to the poor part. At that, the people living in shepherd farms and remote villages, as a rule, have no access to electricity and pure drinking water. It is unlikely to expect that this problem could be resolved in the nearest future. The calculations have shown that the costs for laying power lines in remote rural areas are approximately by 20-30 times higher than installation of PV stations. E.g., it should be spent 44 million soums or US$ 140,000 for laying 10 km of high-voltage power lines in the remote areas in Samarkand region.

2.2 The project description

Pilot project "Clean energy for the rural communities in Karakalpakstan" financed by the UNDP was launched in 2003. The purpose of the project is to improve energy supply in the rural areas of Karakalpakstan which have no access to stationary power lines. The specific objectives are to: (i) demonstrate the possibilities of PV systems for energy supply in the rural areas; (ii) increase a share of RE in the structure of energy carriers; (iii) prove type PV systems produced in the plant "Foton"; (iv) improve living standards of the rural population in Karakalpakstan; (v) facilitate environmental enhancement.

Twenty five PV stations have been installed in the remote villages of Karakalpakstan; 15 of them (PV home system – 100 W) were used for providing home lighting, TV and radio sets work, and 10 PV stations (200 W) applied for water pumping. For two years, the tests of these PV systems in desert and semi-desert areas of Samarkand region implemented by the Technology Transfer Agency (TTA) have shown their technical high quality. An assembly of the PV stations from the components purchased in Germany and Russia has been carried out on "Foton" in co-operation with the TTA. The cost of a PV station is US$ 1800 (100 W), and US$ 2300 (200 W). Besides, training course for local personal has been arranged within the project.

2.3 The project results

The final results of the project will be estimated at the end of 2003. Nevertheless, from social and economical point of view, the project is undoubtedly a success. Installation of PV home systems has increased the level of comfort for the local people. The remote villages selected for the project are located in a semi-desert zone vulnerable for anthropogenic influence. Usage of clean energy allows to avoid the emissions of pollutants and GHG in the atmosphere and reduce water and soil contamination. Besides, the experience obtained within the project implementation could be used both in designing and implementing the same projects and for initiating serial industrial production of PV systems on "Foton".

2.4 Main benefits of the project

In terms of global benefit an input of the project is too small. But any long way begins from the first step and this pilot project is the best way for outreaching the advantages of using clean energy for solving the social needs in the rural areas. Success of the project should invite attention to solar energy development both high officials and local authorities. E.g. social part of municipal budget could be reduced if the inhabitants are provided by PV home systems instead of lying power lines. Besides, there are some social programs aimed at improving living standards in the rural areas. Implementation of them has annually called for plenty of money. These expenses could be also cut due to using PV systems, for example, for drinking water pumping.

Social benefits. The poorest families were selected for PV home systems installed in their homes. These people have never access to electricity and there are no any plans concerning stationary power lines building in these areas. After the project implementation they will be able to watch TV and listen to the radio. Besides, they can use electric lighting instead of old oil lamps. Electricity in a home situated in remote parts of the country is a significant event in its consequence both for owners and their neighbors. This is a good demand promotion of PV systems in these places. The local people will find the possibilities including drawing credits for purchasing PV systems. Apparently, a state system of soft credits should be developed by the Uzbek government taking into account a low paying capacity of the local population.

Women and children are most vulnerable part of local communities. Karakalpakstan ranks one of the first places in Uzbekistan for child mortality caused by extremely low living standards. It is clear that any steps aimed at improving the conditions will alter the situation for the better. E.g. meat and bread are the main food for the local inhabitants. Using PV systems for water pumping, local people will be able to grow some fruits and vegetables.

Unemployment rate is rather high in the rural areas of Karakalpakstan. This problem together with pure living conditions generates migration of the local population especially the young to other regions of Uzbekistan. This process could be reduced by increasing a level of comfort for the inhabitants and creating additional workplaces. Wide application of PV systems for production purpose (e.g. water pumping, sheep-shearing) could facilitate development of sheep farming especially most valuable karakul sheep.

Environmental benefits. Communities living in desert and semi-desert areas should be very reasonable in their activity. Half-baked actions may do harm and lead to unpredictable consequences. For instance, cutting of desert trees has been facilitating the process of desertification in Karakalpakstan. But, the local people have not other energy sources besides growing around vegetation and manure. So, installation of PV systems can allay the problem of desertification in these places.

Water pumping from well is carried out by petrol pump. It was calculated that a petrol pump used for water supply (flock from 600 sheep) consumes 2.3 tons petrol per year. Using ten 10 PV systems for water pumping we can annually spare 23 tons petrol. Besides, in this case, water pumping occurs without environmental pollution.

Technical benefits. It should be noted that a technical level of existing PV systems made in Uzbekistan does not yet conform to the best international standards. The PV systems used in the project have been set up from the imported components. As the experience has shown these PV systems successful worked in semi-desert areas of Samarkand region. The positive results received within the project implementation will additionally demonstrate possibilities of the proposed way for designing and assembling PV systems. In future, the experimental yielding of the PV could be expanded to the full-scale production.

3 Climate change mitigation and the use of the flexible mechanisms

3.1 Background

Uzbekistan has approved the UN Framework Convention on Climate Change (UNFCCC) in 1993 and ratified the Kyoto Protocol in 2000. Being Non-Annex 1 country Uzbekistan has no quantitative commitments under the Kyoto Protocol. According to Initial National Communication of the Republic of Uzbekistan under the UNFCCC (2001), in 1999 total GHG emissions reached 160.5 million tons of CO_2-equivalent and constitute 0.7 % of the global GHG emissions. The share of the processes related with mining, transportation and burning of fossil fuel makes over 73 % (117.8 million tons of CO_2-equivalent, 1999). It is to be noted that for nine-year period (1990-1999) the percentage of these emissions has increased to over 11 % (110 million tons of CO_2 equivalent, 1990 г), that is related with rising consumption of natural gas by the population (from 7.5 % up to 20.2 %).

3.2 Current status of climate regime in Uzbekistan

Detailed evaluation of GHG abatement potentials was made during implementation of the projects: the World Bank/Government of Switzerland “Study of Uzbekistan Strategy for GHG Emission Reduction” (UzNSS) in 1998; Government of Switzerland “Uzbekistan: Capacity Building on Clean Development Mechanism” (UzCDM) in 2000; and GEF/UNDP “Initial National Communication of Uzbekistan under the UNFCCC, Phase 2” in 2001. Despite discrepancies in the assessments resulted by difference in applied approaches, there is only main conclusion of all reports – *Uzbekistan has remarkable potential for GHG abatement.* Depending on the scenarios, implementation of the proposed actions can abate CO_2 emissions from 16.4 million tons to 33.5 million tons by 2010. Specific cost per 1 ton of CO_2 abatement varies from 0.8 to 21 US$/t.

Based on these assessments National Strategy on GHG Emissions Reduction was developed and adopted by the Uzbek government in 2000. Fulfilled the estimations of GHG abatement potential demonstrate that the greatest reduction can be obtained by implementing energy saving measures in the energy sector, including applying renewable energy sources. It was suggested that a bulk part of required funds would be covered for the account of foreign investments including the Clean Development Mechanism.

In 2002 Uzbek Government decided to develop a program for energy efficiency till 2010. Particular measures on introduction of resource saving technologies, economic mechanisms stimulating rational use of energy sources should be proposed following the analysis of key sectors of economy. In reality, the program could be called “a program on GHG emission reduction” since all the measures aimed at GHG emissions reduction.

Implementation of the energy saving programs requires considerable investments in energy sector. For in-stance, in 2001 the Uzbek government adopted the resolution on “Deepening Reforms in the Energy sector”. The cost of the 10-year program was estimated at US$ 1.4 billion, at that, a half of the money expected from foreign investments. In this situation it will be advisable to use the possibilities of international environmental-financial mechanisms for attracting investments in the energy sector. However, the slow-moving structural and financial reforms are the main obstacles to successful cooperation on energy and climate issues.

3.3 Current institutional infrastructure in the field of climate change mitigation policy

Main Administration of Hydrometeorology (Glavhydromet) has been a leader agency in climate change issues in Uzbekistan. According to the resolution of the Cabinet of the Ministers (2000) Glavhydromet is responsible for the issues connected with climate change. A relevant Secretariat has been established at Glavhydromet as a permanent body vested with the further implementation of national commitments under the Convention. All along, Glavgidromet' team has been engaging in negotiation process under the UNFCCC and its representatives were elected to the subsidiary bodies of the UNFCCC. Glavhydromet has been successful in outreaching the UNFCCC ideas in Uzbekistan. But, it is believed that the Kyoto Protocol should be adopted in the nearest future. In this case, the parties will direct their efforts to comply their commitments with low costs using the Kyoto mechanisms. The economy including the energy sector does not belong to the domain of Glavgidromet' activity. Besides, this agency takes a back seat in forming of a state investment program. It might be that these circumstances will brake a fast penetration of CDM projects in Uzbekistan.

The problem of a national CDM coordinator and a national CDM center is to resolve in the nearest future. The creation of CDM center should facilitate CDM process in the country. Firstly, it should be developed and approved national regulation and legislation for implementing CDM projects. The center should play a role of a broker since both searching of an investor is the important point for local partners and a reliable partner is a half of success for investor. It is necessary to sigh Memorandum of Understanding with different international financial mechanisms (such as the Prototype Carbon Fund, CDM/JI programs in developed countries and etc). This step gives the real opportunities of getting the CDM investments.

3.4 Capacity building in the field of climate change

A team of national experts working in the field of climate change was formed within implementation of the climate projects: GEF/UNDP "Initial National Communication of the Republic of Uzbekistan under the UNFCCC, phases 1 and 2 in 1998 and 2001; World Bank/Government of Switzerland "Study of Uzbekistan Strategy for GHG Emission Reduction" (UzNSS) in 1998; Government of Switzerland "Uzbekistan: Capacity Building on Clean Development Mechanism" (UzCDM) in 2000; ADB "Promotion of Renewable Energy, Energy Efficiency and GHG Emission Abatements" (PREGA).

In 2002 Caspian Basin GHG Emissions Reduction Training Program (CTP) was launched by Canadian International Development Agency (CEDA). The CTP has provided practical training in the setting of specific CDM projects. The program includes the actual preparation and implementation of small CDM projects and development of the substantive CDM projects for submission of IFI financing.

National experts had taken an active part in developing CDM project note. Some pre-feasibility studies were prepared within the project implementations (UzNSS, UzCDM, PREGA). A portfolio of implied CDM projects had been formed in phase 2 of Initial National Communication. At present, the database (Glavhydromet) contains 40 project notes in various sector of national economy, which can reduce the total GHG emissions by approximately 10 %. These preparatory actions will facilitate the dialogue with potential foreign investors.

3.5 Ongoing CDM project

The Uzbek government negotiated a soft loan from the European Bank Reconstruction and Development (EBRD) for implementing a project "Improvement of District Heating System in Andijan city". The EBRD had proposed to the Prototype Carbon Fund (PCF) to purchase the emissions reduction obtained within the project implementation. Baseline Study and Monitoring and Verification Protocol were carried out by Swiss consulting firm "Ernst Basler and Partners". The project design document was submitted to the PCF in February, 2000. But, it is not clear how this project will be registered in the Secretariat of the UNFCCC. The project owner is Andijan municipality and the PDD should be signed by national CDM focal point who is not nominated by the Uzbek government yet. Apparently, this is currently a bottleneck for coming CDM projects in Uzbekistan.

4 Making the Kyoto mechanisms work: Challenges ahead

Implementation of renewable energy and energy efficiency projects within the CDM is eminently attractive in the context of getting investments. But carbon emission trading with its rather exotic goods (air) is absolutely a new domain of market therefore a number of rules, procedures, modalities being obligate for participants of the CDM projects has been developed.

4.1 Institutional capacity

According to the UNFCCC procedures, the Uzbek Government should nominate a national CDM focal point, create a CDM national body, and register them in the Secretariat of the UNFCCC. Without these steps a party will not be able to register a CDM project and emission reduction units would not be certified. Investor should clear recognize with who he is to negotiate concerning CDM project and as far as national coordinator has wide reference in this problem.

The countries with set up CDM infrastructure will take more advantages in emerging carbon market. Above all, it is more appropriate to set national rules, procedures, modalities for approving, implementing, monitoring and appraising CDM project. It is very important to protect the rights of investors concerning emission reduction transfer. Otherwise, an investor put in jeopardy of losing expected profits from a CDM project implementation. Additional plus is to set CDM database and Web side where information about CDM projects implemented in this country will be placed. In this connection, it would be very fruitful practice of inviting interested persons including NGOs and local community to discuss proposed CDM projects.

4.2 Human capacity

The capacity building phase has provided with experience in dealing with climate projects. The main lessons learnt are the importance of close cooperation on both national and local level, and the necessity of engaging local experts in the whole project cycle and of providing information in the local language.

One of the earnest barriers for promoting CDM projects is lack of local skilled specialists being familiarized with methodologies for preparing project idea note and project development document. Elaborated claim has the most chance to win at carbon project market where supply exceeds demand. In effect, an additional component is supplemented to a conventional investment project. But this component requires carrying out the specific studies (baseline, monitoring and verification protocol). In spite of existing methodologies on development of baselines, M&VP, in reality, local experts have a slight idea about this literature. As a rule, they use only translations in which are not always reflected the point of the matter.

4.3 Investment capacity

CDM investors are likely to be private companies assessing projects on the basis of normal criteria such as feasibility, profitability and risk. In addition, CDM involves additional risk concerning the emission reductions and certification of these reductions. Establishing a transparent legal basis, the division of responsibilities between the host and investor, and possibly insurance would make project-based investments in Uzbekistan more attractive to foreign investments.

There are several independent evaluations of gas abatement potentials were carried on in Uzbekistan and projects portfolio of such abatement is prepared. Most of proposed projects are taken from measures list included in industrial sectors program for energy efficiency. But such kind of project is difficult to prove for additionality principle.

However, in order to be competitive in the new market of clean development mechanism projects it is important to match interests of potential investors with priorities of country's economic development. Taking into account high risks, no one will invest in realization of wide-scale expensive CDM projects on the early stage of market formation. The most probable models are either mixed financing (e.g. case of project in Andijan – privileged soft loan from EBRD and purchase of reduced PCF emission) or full financing of small pilot CDM projects.

Priority directions which are beneficial both to Uzbekistan and to investors can be introduction of clean technologies (solar energy, small hydro-power, biogas) as well as measures towards energy resources saving (introducing gas and water meters for domestic consumers, decentralization of heating system etc.). In addition to GHG abatement above projects have tremendous social and environmental effect and that is an important condition for financing via international finance institutions (EBRD, UNDP, ADB, World Bank).