ENVIRONMENTAL RESEARCH OF THE
FEDERAL MINISTRY OF THE ENVIRONMENT,
NATURE CONSERVATION AND NUCLEAR SAFETY

Research Report 298 97 718
UBA-FB 000260/2

Texte
70
01
ISSN
0722-186X

Energy and Environment in the Czech Republic

by

Jiri Zeman,
Marie Havlickova,
Jana Szomolanyiova,
Stanislav Travnicek

GERTEC GmbH - Ingenieurgesellschaft, Essen

On behalf of the Federal Environmental Agency

Publications by the Federal Environmental Agency in the TEXTE series are available subject to advance payment of **€ 10,00** by bank transfer, crossed cheque or paying-in form to

Account number 4327 65 - 104 at the
Postbank Berlin (Sorting Code 10010010)
Fa. Werbung und Vertrieb
Ahornstraße 1-2
10787 Berlin

At the same time please direct your written order to the Firma Werbung und Vertrieb naming the ***volume number*** *from the TEXTE series, and the* ***name*** *and* ***address*** *of the orderer.*

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 2.5
Dr. Peter Pichl

Berlin, January 2002

Jiri Zeman,
Marie Havlickova,
Jana Szomolanyiova,
Stanislav Travnicek

Energy and Environment in the Czech Republic

SEVEn, o.p.s., The Energy Efficiency Center

Study for the Federal Environmental Agency

Umwelt
Bundes
Amt
für Mensch und Umwelt

Project Series of the Federal Environmental Agency "Energy and Environment Policy in the Czech Republic"

Editor: Umweltbundesamt, FG I 2.5: Wolf-Dieter Glatzel, Peter Pichl

Project Management: GERTEC GmbH Engineering Association, Essen

Volume 1: Hans Günter Brauch
Osterweiterung der Europäischen Union - Energie- und Umweltpolitik der Tschechischen Republik

Volume 2: Jiři Zeman, Marie Havličkova, Jana Szomolanyiova, Stanislav Travniček
Energy and Environment in the Czech Republic

Volume 3: Hans Günter Brauch
Liberalisation of the Energy Market for Electricity and Gas in the European Union:
A Survey and Possible Implications for the Czech Republic

Volume 4: ITUT e.V.
Beiträge zum Workshop I
"Energie und Umwelt in Tschechien"
Prag, 22./23.03.2000

Volume 5: ITUT e.V.
Beiträge zum Workshop II
"Energie und Umwelt in Tschechien"
Liberec, 30.05.2000

Volume 6: GERTEC GmbH
Leitfaden zur Dokumentation des Umweltbundesamtes
"Energie- und Umweltpolitik der Tschechischen Republik"

Energy and Environment in the Czech Republic

Volume 2

Die Deutsche Bibliothek - CIP Einheitstitelaufnahme
Ein Titeldatensatz für diese Publikation ist bei der Deutschen Bibliothek erhältlich.

ISBN 3-

First Edition 2001

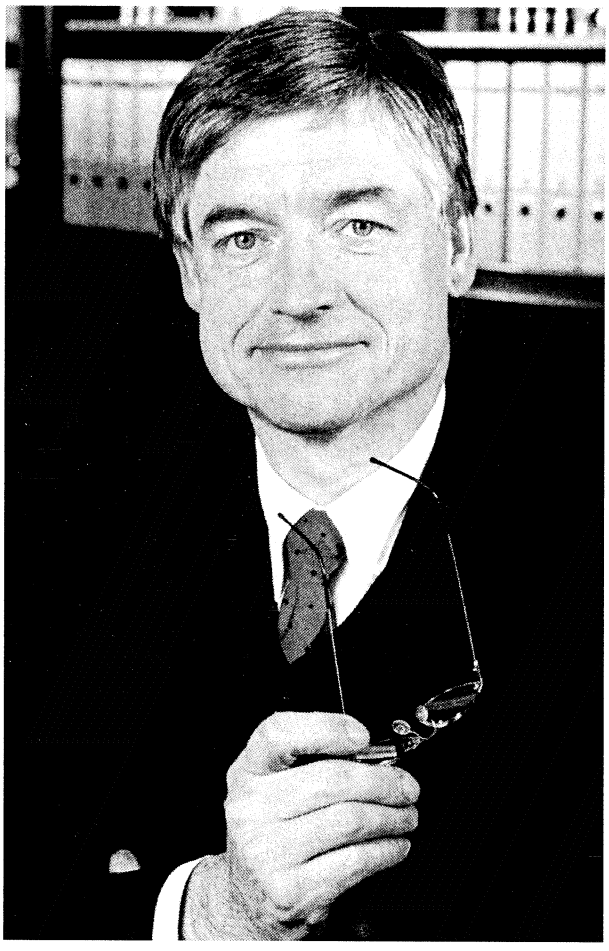
Editor:
Umweltbundesamt, Postfach 330022,
14191 Berlin, Tel. (030) 8903-0, FAX: (030) 8903-2285

Responsibility: Wolf-Dieter Glatzel und Peter Pichl

Language Editing, Layout, Typesetting: Hans Günter Brauch, AFES-PRESS

Title Design: Thomas Bast, AFES-PRESS

Preface



Ende März 1998 begannen die Verhandlungen der Europäischen Union mit den Staaten in Ost- und Südeuropa, die als erste der EU beitreten sollten: die Tschechische Republik, Estland, Ungarn, Polen und Slowenien sowie Zypern.

Wegen der großen Bedeutung der Klimaschutzpolitik für die Europäische Union wurden Auswirkungen des Beitritts der neuen Mitgliedsstaaten der EU in diesem Bereich zu einer wichtigen Frage nicht nur für die Beitrittskandidaten, sondern auch für die EU- Länder selbst. Die Europäische Union geht in den Beitrittsverhandlungen davon aus, dass sich Partnerschaften auf unterschiedlichen Gebieten und unterschiedlichem Niveau herausbilden, um den Beitrittsprozess möglichst reibungslos vorzubereiten. Deutschland hat sich dieser Frage gern angenommen und zu diesem Zweck das Forschungsprojekt "Energie und Umwelt in Tschechien" zur Untersuchung wichtiger Einzelfragen von Energie und Umwelt durchgeführt, um der tschechischen, der deutschen und der europäischen Umweltpolitik eine Handreichung für die Lösung klimapolitischer Beitrittsprobleme zu geben.

Im Projekt wurde die Problematik der Osterweiterung der Europäischen Union und ihre Konsequenzen für die Tschechische Republik untersucht (Band I), der Zustand von Energie und Umwelt in der Tschechischen Republik ausgewertet (Band II) und die Liberalisierung des Energiemarktes für Gas und Strom in der Europäischen Union als eine wichtige Bedingung für den Beitritt der Tschechischen Republik analysiert (Band III). Die hier publizierten Ergebnisse wurden in zwei Workshops in der Tschechischen Republik diskutiert. Ihre Resultate werden in zwei eigenständigen Broschüren veröffentlicht (Band IV und V). Ein Leitfaden als Zusammenfassung aller Dokumentationen und mit Vorschlägen zu weiterführenden Maßnahmen auf dem Gebiet von Energie und Umwelt in der Tschechischen Republik (Band VI) wird die Publikation zu diesem Gesamtvorhaben abschließen.

Das Projekt "Energie und Umwelt in Tschechien" wurde federführend von der GERTEC GmbH Ingenieurgesellschaft, der Tschechischen Energieeffizienzagentur SEVEn, dem Verein zur Förderung des internationalen Transfers von Umwelttechnolo-

gien, ITUT e.V. und AFES-Press bearbeitet. Diesen Unternehmen und Einrichtungen und allen anderen beteiligten Partnern, die die enge deutsch-tschechische Kooperation im Projekt beispielhaft praktiziert haben, gilt unser besonderer Dank.

Mit diesen umfangreichen Arbeiten wurde nicht nur zur Lösung klimapolitischer Probleme beigetragen. In unserem Verständnis war dieses Forschungsprojekt auch ein Beitrag zur Vertrauensbildung zwischen zwei zukünftigen Partnerländern in der Europäischen Union. Darüber hinaus wurde – und das ist für Deutschland nicht unwichtig – ein ganz konkreter Beitrag zu einer sachlichen Kooperation bei der Lösung von Umweltproblemen, die die beide Nachbarländer direkt betreffen, geleistet.

In Zukunft wird es darauf ankommen, das Weiterwirken dieses Forschungsprojektes durch eine konkrete, projektbezogene Zusammenarbeit zwischen deutschen und tschechischen Unternehmen zu verstärken, um den gemeinsamen Nutzen für Umwelt und Klima, aber auch für Deutschland und die Tschechische Republik zu verstärken.

Berlin, im April 2001

Prof. Dr. Andreas Troge

President of the German Federal
Environmental Agency

Contents

List of Tables

List of Figures

List of Abbreviations

AFES-PRESS	Peace Research and European Security Studies
AIJ/JI	Activities Implemented Jointly/Joint Implementation Projects
ALTENER II	Second support programme of the European Commission for the commercialisation of renewable energy sources
ALTENER	Support programme of the European Commission for the commercialisation of renewable energy sources
AV	Czech Academy of Sciences
BIPM	International Institute for Weights and Measures
BREF/BAT	Best Reference Documents/Best Available Technique
CBC	[EU PARE programme for] Cross Border Cooperation
CEA	Czech Energy Agency
CEEC	Central and East European Countries
CENTREL	Central European electricity network
CEPS	Czech electricity transmission company
CEZ	Ceske Energeticke Zavody = Czech national electricity company
CHP	Combined heat and power plant
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CMEA	Council of Mutual and Economic Assistance
CMZRB	Ceskomoravska zarucni a rozvojova banka
CO_2	Carbon dioxide emissions
COM	Document of the European Commission
COP	Conference of state parties
CPP	Czech Gas Company
CR	Czech Republic
CSN	Czech Standard
CSNI	Ceský normalizacni institut = Czech Standard Institute
CSOB	Ceska obchodni banka
CVUT	Czech Technical University
CZK	Czech crown
DG XVII	Directorate General of the European Commission for energy policy
DHS	District Heating System
DHV AIB	Dutch research company
DHV CR	DHV CR s.r.o. (Ltd.) - Czech Republic: Czech research company
DHW	District Heating Water
EAGG	European Agriculture Guidance and Guarantee Fund
EBRD	European Bank for Reconstruction and Development
EC	European Communities
ECN	Energy Research Foundation - Netherlands
ECU	European Currency Unit
EEC	European Economic Community
EIB	European Investment Bank

EIB	European Investment Bank
EIC	Euro-Info Centres
EKI	Advisory and Consultancy Centre of Czech Energy Agency
EKIS	Advisory and Consultancy Centre of Czech Energy Agency
EMAS	Environment Management Audit System (??)
EPC	Energy Performance Contracting
ERDF	European Regional Development Fund
ESCO	Energy Service Companies
ESF	[PHARE] Energy Saving Fund
EU	European Union
EUR	Euro = common currency of the European Union
FCCC	Framework Convention on Climate Change
FVZP	Federal Committee for the Environment
GDP	Gross Domestic Product
GEF	Global Environment Facility
GERTEC	German engineering company with headquarters in Essen
GHG or ghg	greenhouse gas emissions
GMOs	genetically modified organisms
GJ	Giga Joule
GW	Giga watt
GWh	Giga watt hour
IEA	International Energy Agency
IFC	International Finance Corporation
IFIs	international financial institutions
INTERREG II	Second EU programme for interregional cooperation
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control (EU Directive on)
ISPA	Instrument for Structural Policies for Pre-Accession of the CEEC
jsc	Joint stock company
JI	joint implementation
JOULE-THERMIE	Support programme of the European Commission for non-nuclear energy and rational energy use
KC	Czech crown
KSUE	Krushohorske sdruzeni pro uspory energie (Krusne hory association for energy savings)
kV	kilovolt
kW	kilowatt
kWh	kilowatt hour
LSIF	was replaced by →SAPARD
MJ	Mega Joule
Mp	Megapascal
Mpa	Megapascal
MtOE	Million tons of oil equivalents
MUFIS	Municipal Financial Company, jsc.

MVV	German utility
MW	Megawatt
neg TPA	Negotiated Third Party Access
NO_x	Nitrogen oxide
NPC/MC – ESC	National Programme and Monitoring Committee for economic and social structural policies
NPF	National Property Fund
NTL	low pressure gas pipeline
NUTS II	La Nomenclature des Unités Territoriales Statistiques - Territorial Statistical Units
OECD	Organisation for Economic Cooperation and Development
PECA	Protocol on European Conformity Assessment
PHARE	EU programme
PHARE	Support programme of the European Commission for Central and East European Countries
PIC	Business Innovation Centres
PIFS	Pre-investment Feasibility Studies: a British programme
PJ	Peta Joule
PMU	Regional Development Centre
PPP	Purchasing power parities
PRIBOR 3M	Prague Inter-banking Offer Rate for 3 months
PSO	Dutch Programme for Collaboration
PV	Photovoltaics
R&D	Research and development
RAEN	RAEN s.r.o. (Ltd.) - Czech research company
RDA	Regional Development Agency
REAS	Regionální distribuční společnost České Republice (Regional Distribution Company in the Czech Company
reg. TPA	Regulated Third Party Access
REPO	key interest rate of the Czech central bank
RES	renewable energy sources
REZZO	Registr emisí a zdrojů znečišt'ování ovzduší = Register of Emissions and Air Polluters
RIPC	Regional Consulting and Information Centres
RMMC	Regional Steering and Monitoring Committee
RPF	Regional Entrepreneurial Fund
RRF	Regional Development Fund
RSCO	firm dealing with energy services
RWE	Rheinisch-Westfälische Elektrizitätswerke = German electrical utility
SAPARD	Special Accession Programme for Agriculture and Development
SAVE	Support programme of the European Commission for energy efficiency
SAVE II	Second support programme of the European Commission for energy efficiency

SCE	Severoceska energetika, a.s.)= regional electric distribution company in North Bohemia
SCP, a.s.	Severoceska plynarenska, a. s., is the dominant natural gas supplier in Northern Bohemia
SEO	Foundation for Economic Research in the Netherlands
SEVEn	The Energy Efficiency Center – not-for-profit organisation in Prague
SFZP	Státní fond životního prostředí - State Environmental Fund
SME	Severomoravska energetika a.s.
SMEs	Small and Medium Enterprises
SMES	State Programme for Support of Small and Medium-sized Companies
SMP	Severomoravska plynarenska, a.s.
SO_2	sulphur dioxide
SRCI CS	SRC International CS s.r.o(Ltd.) - Czech research company
STE	Central Bohemian Distribution Enterprise
STEGAL	natural gas pipeline from the Czech Republic westward
STL	medium pressure gas pipeline
SYNERGY	Support programme of the European Commission for energy policy in non member states
TBT	technical trade barriers
TEMPUS	EU programme
THERMIE	Support programme of the European Commission for energy technologies for Europe
TIPS	Training for Investment Personnel Scheme: a British programme
toe	Tons of oil equivalents
TPA	Third Party Access
TPES	Total Primary Energy Supply
Transgas	Integrated gas transmission and supply company in the Czech Republic
TSO	Transmission system operator
TW	Terrawatt
TWh	Terrawatt hour
UBA	Umweltbundesamt = Federal Environment Agency
UCPTE	Union for Co-operation of Producers and Transporters of Electricity (Association of utilitites for the co-ordination of the Central and Southern European energy networks
UNDP	UN Development Programme
UNEP	UN Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UNO	United Nation Organisation
US $	United States Dollar
USAID	United States Agency for International Development
VAT	Value added tax
VHV	Very high voltage
VTL	High pressure gas pipeline
VUPEK:	Czech energy research company
VVTL	Very high pressure gas pipeline

Introduction

This report has been prepared as part of a bilateral German-Czech project on "Energy and Environment in the Czech Republic" that has been financed by the German Federal Ministry of Environment, Nature protection and Nuclear Safety. The project is focused on strengthening the cooperation between Germany and the Czech Republic in the field of energy and environment as well as on assisting the Czech Republic in its EU accession process.

The project was launched by the German Federal Environmental Agency (UBA) and is managed by Gertec GmbH, an engineering company in Essen. Additional subcontractors and cooperating organisations included both German and Czech partners: ITUT, e.V., Leipzig, AFES-PRESS, Mosbach, the Czech Energy Agency - CEA Prague, SEVEn, the Energy Efficiency Center, o.p.s., Prague, the German-Czech Chamber of Commerce in Prague, the Euroregion Nisa, Liberec, and KSUE, o.p.s., Litvinov.

The goal of this report is to provide brief but focused information for the German and Czech business community, for investors and decision makers both on the current situation and the development in 1990s in the area of energy and environment in the Czech Republic. This report consists of an *Executive Summary*, a detailed survey in part I with a detailed description of the energy sector and environment and in part II three regional studies focusing on North Bohemia, North Moravia, and Prague. These are supplemented by six appendices.

As part of this project two additional studies were prepared by AFES-PRESS that focus - from a social science perspective - on the accession process of the Czech Republic:

- Enlargement of the European Union – Energy and Environment Policy of the Czech Republic (Volume 1)
- Liberalisation of the Energy Market for Electricity and Gas in the European Union: a Survey and Implications for the Czech Republic (Volume 3)

More information on the whole project, the conducted studies and project partners can be found on internet www.uba-eecr.de or directly by contacting the project leader, the German Federal Environmental Agency, Umweltbundesamt, Dr.-Ing. Wolf-Dieter Glatzel, email: wolf-dieter.glatzel @uba.de, or Dr. Peter Pichl, email: peter.pichl@uba.de.

Prague, May 2000 Jiři Zeman (Project leader)

Energy and Environment in the Czech Republic

Jiri Zeman, Marie Havlickova, Jana Szomolanyiova, Stanislav Travnicek

Executive Summary

Basic Information

During the 1990s, the Czech Republic has experienced radical political changes and intensive economic transformation activities. Protection against air pollution and thus corresponding the energy sector were among the top priorities where dramatic changes occurred during the last decade.

The Czech environmental legislation adopted strict emission limits comparable with those valid in the EU. Subsidies for cheap energy have been removed step by step, and investments were made in practically each power and heating plant to upgrade its environmental performance and to meet the legal requirements and emission limits. During the 1990s, these "environmental investments" that were required to comply with the new strict environmental standards, reached an average of about 2-2.5% of the GDP. Thus, the Czech Republic ranked among those countries with the highest relative environmental investments per GDP unit. During the last decade, SO_2 and particulates emissions decreased to about one tenth of their initial levels. But the energy intensity per unit of GDP of the Czech economy is still rather high, that is about twice the EU average measured in purchasing power parity.

All Czech priorities in the energy and environmental sectors are subject to the main political goal to join the European Union by the year 2003 and to fully harmonise the national legislation with EU requirements. According to the energy position paper of the Czech Republic of July 1999, in the field of air quality, the country will be capable to meet all the relevant commitments resulting from the environmental *"acquis communautaire"* by the year 2003 when the Czech Republic hopes to become a EU member. In the environmental field, the requested transition period for the implementation of the EU Directive on integrated pollution prevention and control (IPCC) for existing facilities is the only one that is directly related to the energy sector. The other six requested transition periods deal with waste management, water quality and conservation of natural habitats.

The priority in the energy industry is to introduce competition into the electricity and gas markets. In the energy sector, the Czech Republic has asked for three transition periods to fully implement the EU directives on the internal market for electricity and natural gas, and a directive on minimum emergency stocks of crude oil. Therefore, the potential for future cooperation corresponds closely with the priorities identified above and the transitional periods the Czech Republic requested during the negotiation process.

Political and Economic Context in the Czech Republic

Since the global political turn in 1989, the Czech Republic transformed itself into a pluralistic democracy and a market economy. Until 2000, more than 80% of the enterprises were privatised. However, some key structural reforms must still be completed: e.g. bank privatisation,

capital market regulation, the creation of an efficient legal system, including stricter bankruptcy laws, the removal of energy price deformations and the liberalisation of rents.

Accession to the EU

The Czech Republic is an associate country of the EU that applied for membership in 1996. The Czech government opted for 2003 as the target date for its EU accession, however, it is uncertain whether it will fulfil all necessary requirements by then. EU membership requires the full adoption and implementation of the *Acquis communautaire*, i.e. of all present laws (EU regulations, directives, decisions) and obligations resulting from the EU system, its institutional framework and from international agreements to which the EU is a member. As all applicant countries, the Czech Republic submitted its position papers[1] on all 31 dossiers of the accessions negotiations with the EU in which it stated how and when it will transpose individual requirements of the *Acquis*, and if it will require a transition period for their implementation. Since March 1998, it has been engaged in accession negotiations with the European Commission. Since autumn 1998, in regular reports to the Council the Commission has reviewed the progress of each Central and Eastern European candidate towards EU accession in light of the Copenhagen criteria, especially to which extent to it has transposed the *Acquis*.[2]

Energy Sector and Environment

Legislative and institutional harmonisation with the EU is also significantly extensive in the energy sector and in environment protection. Priorities are the preparation for the internal energy market, especially with respect to the electricity and gas directives, and energy efficiency improvements. The Czech Republic still has an energy intensity per GDP unit that is several times higher compared with EU countries. Even after conversion in purchasing power parities (PPP) it is more than twice as energy intensive. This reflects a considerable energy saving potential.

The Czech position paper on environment of July 1999 stated with respect to air quality that the Czech Republic will be capable of meeting all the relevant commitments resulting from the environmental *acquis communautaire* by 2003 or whenever EU accession will occur. The requested five year transition period for the implementation of the integrated pollution prevention and control (IPPC Directive)[3] for existing facilities is the only one in the field of environmental protection with a direct reference to the energy sector. The other six requested transition periods deal with waste management, water quality and conservation of natural habitats.

During the 1990s much money was invested in the reduction of pollution resulting from energy industry. In spring 2000, the compulsory emission limits for existing sources are nearly as strict as those required by EU legislation. With the approval of the Proposed Directive COM(98) 415 additional and stricter emission limits will be required for EU countries.

---

[1] See <http://www.euroskop.cz/cr_vyjedn_pozdoc.html>.

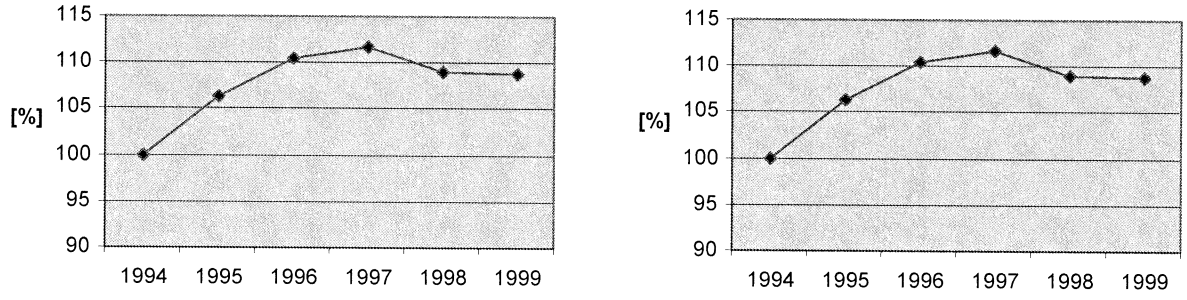
[2] See <http://europa.eu.int/comm/enlargement/czech/intro/index.htm>.

[3] Directive 96/61/EC on integrated pollution prevention and control. For the implementation of the provisions of this IPPC Directive for existing facilities, the Czech Republic requested a transition period of 5 years after 2007, that is up to 2012.

Economic Development

After a period of high growth in 1995 and 1996 (6% and 4%, respectively) the Czech Republic went into recession. The bottom was reached at the beginning of 1999 and since then signs of slow recovery have been observed. In the second half of 1999, the GDP grew by 1% and for 2000 growth of 2% is expected.[4]

Figure S.1: Development of GDP and Inflation Rate in the Czech Republic



Source: : Komercni banka: "Czech Economy in 2000", in: *Economic Trends*, No.23 (Prague: Komercni banka, March 2000): 1.

After 1994, inflation was around 10%, however, in 1999 it rapidly dropped to 2% (figure S.1). This has also significantly decreased future inflation expectations in the business community. For foreign investors the relatively stable exchange rate of the Czech crown is also advantageous. It lost only 6% of its value against the German mark (DM) during the previous seven years. Another advantage are lower labour costs in comparison with those in EU countries. As the Czech Central Bank has radically cut its key interest rate (2 week REPO from 15% in mid-1998 to 5.25% in April 2000) interest rates have significantly decreased and at the end of the year 1999 the PRIBOR 3M interbanking offer rate was approximately 6% and the average interest on credits about 8%.[5]

Development and Current Stage of the Energy Situation

Energy Intensity

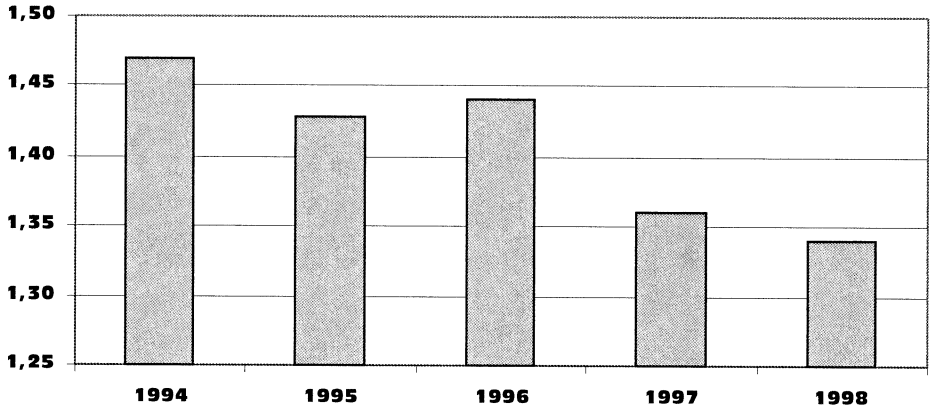
During the past decade, the development of the energy situation in the Czech Republic was influenced by the political changes in 1989. Although energy consumption has declined in the 1990s, the GDP dropped even more significantly and thus energy intensity declined only very slowly (figure S.2). Specific domestic consumption of primary energy resources related to GDP relating to Purchasing Power Parity is in comparison with EU countries approximately double (figure S.3).

---

[4] Komercni banka: "Czech Economy in 2000", in: *Economic Trends*, No.23 (Prague: Komercni banka, March 2000).

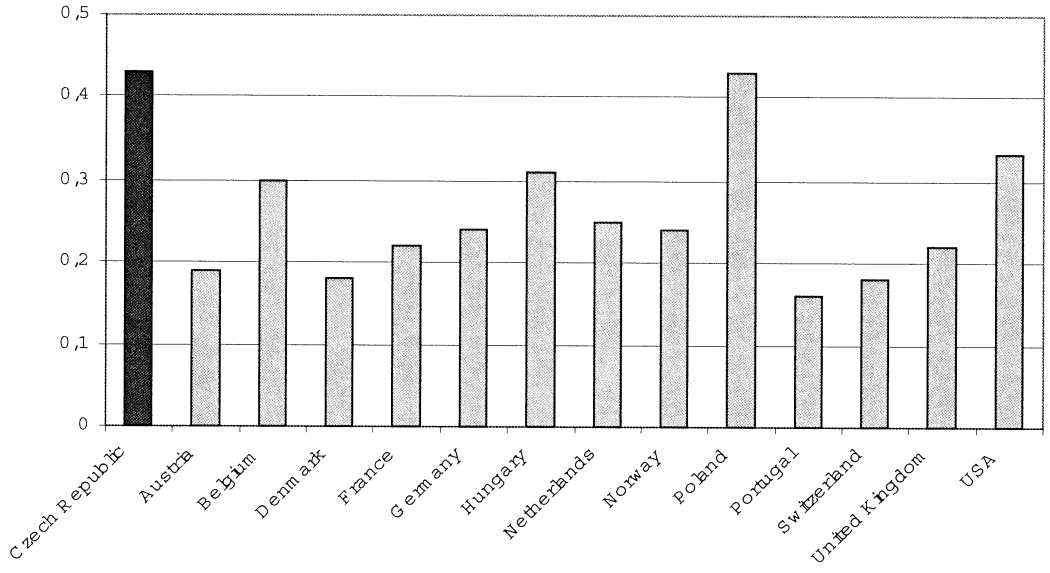
[5] REPO refers to the key interest rate of the Czech central bank; PRIBOR 3M refers to the Prague interbanking offer rate for 3 months.

Figure S.2: Development of Energy Intensity in the Czech Republic Related to GDP, 1994-1998 (in TPES/GDP in constant prices of 1994, MJ/CZK)



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in numbers*, (Prague: KONEKO Marketing Co. Ltd., October 1999): 4.

Figure S.3: International Comparison of Energy Intensity in 1997 (TPES/GDP (PPP), toe/1000, US $ PPP)



Source: International Energy Agency: *Key World Energy Statistics from the IEA*, 1999 Edition (Paris: International Energy Agency, 1999): 48-57.

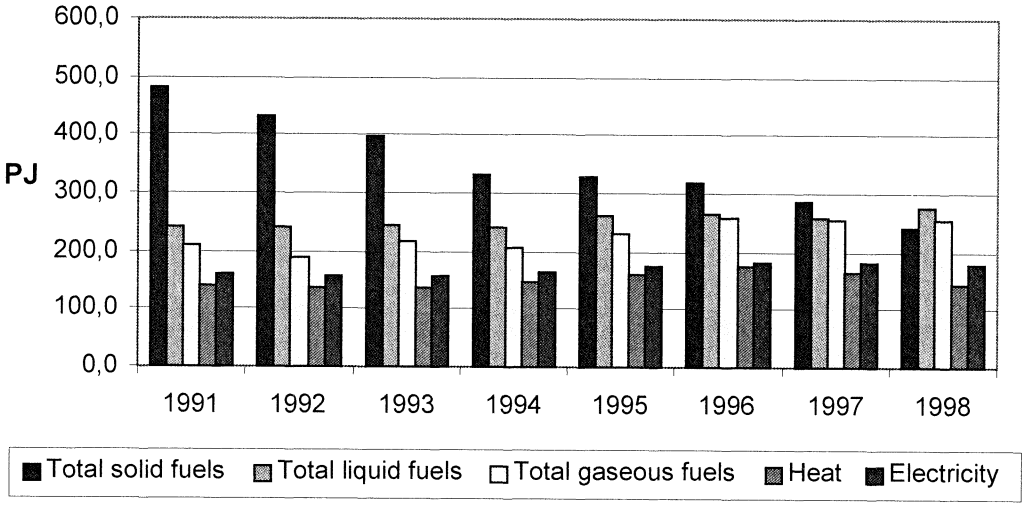
There are several reasons for the high-energy intensity of the Czech Republic:

- high proportion of energy intensive production with low added value,
- high proportion of domestic low quality fuel (lignite) that are used with relatively low energy efficiency in comparison with other types of fuel (e.g. natural gas), and
- lacking motivation and possibility to behave in an economic and energy efficient mode due to subsidised low energy prices in early 1990s, lack of responsibility for maintenance, shortage in investments, unclear ownership, and incomplete economic transformation.

Total Primary Energy Supply and Consumption

Since 1989, energy demand in the Czech Republic declined (figure S.4). However, this slowdown differed among sectors. The largest decline occurred in coal consumption, especially with brown coal or lignite due to its replacement in heat generation. Natural gas plays an increasing role in the Czech energy economy both in private and public or municipal heat power plants especially in cogeneration. This shift from coal to gas was primarily driven by legislation and also by significant national financial support programmes.

Figure S.4: Total Final Energy Consumption 1991-1998



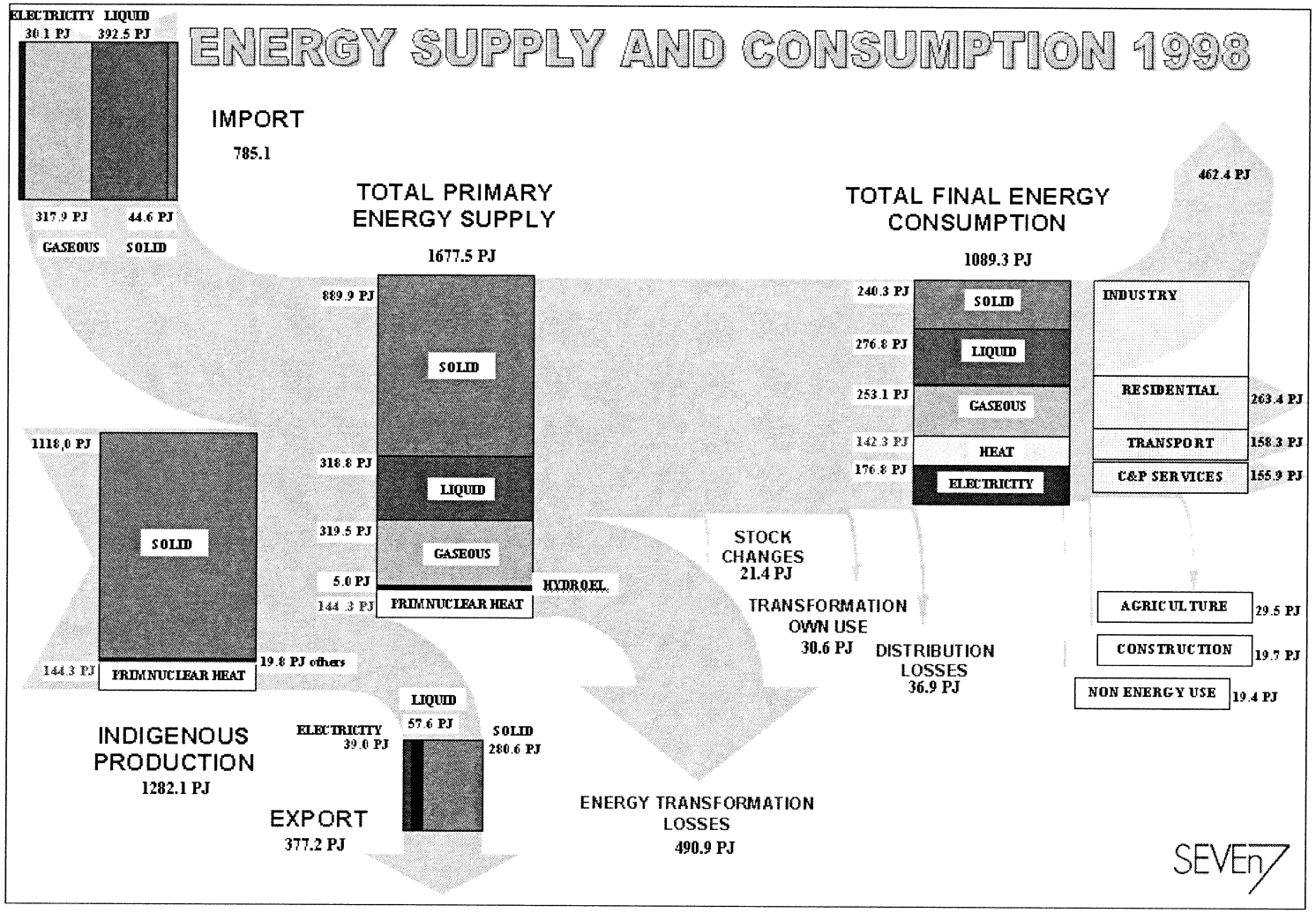
Source: *Source:* KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 21.

Figure S.5 offers an overview on the energy supply and consumption, on changes in stocks, and on imports and exports for the Czech Republic in 1998.

Energy consumption in sectors

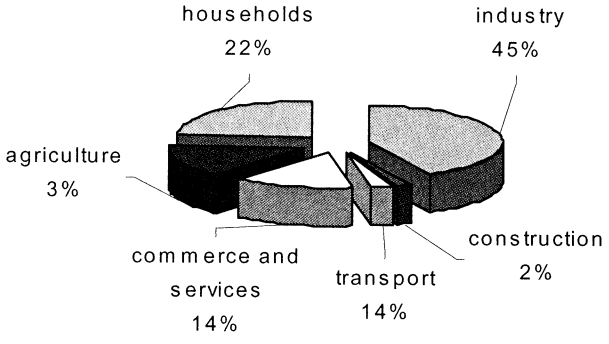
The sectors of the national economy are divided into industry, building, agriculture, transport, commerce and public services, and the residential sector (figure S.6). Between 1991-1998, in the industry sector energy consumption declined, primarily due to the restructuring process, while in the construction sector, in agriculture and consumption of households only a minor decline in consumption occurred. Substantial changes in the structure of fuel and energy consumption were caused by a drop in consumption of brown coal for heating, while the share of gas and electricity increased. Although total consumption in commerce and public services rose, the share of fossil and liquid fuels in final consumption declined in these sectors. During the1990s, the number of private cars and lorries rose rapidly, and thus, the consumption of liquid fuels in the transport sector increased (figure S.7).

Figure S.5: Energy Supply and Consumption in the Czech Republic in 1998



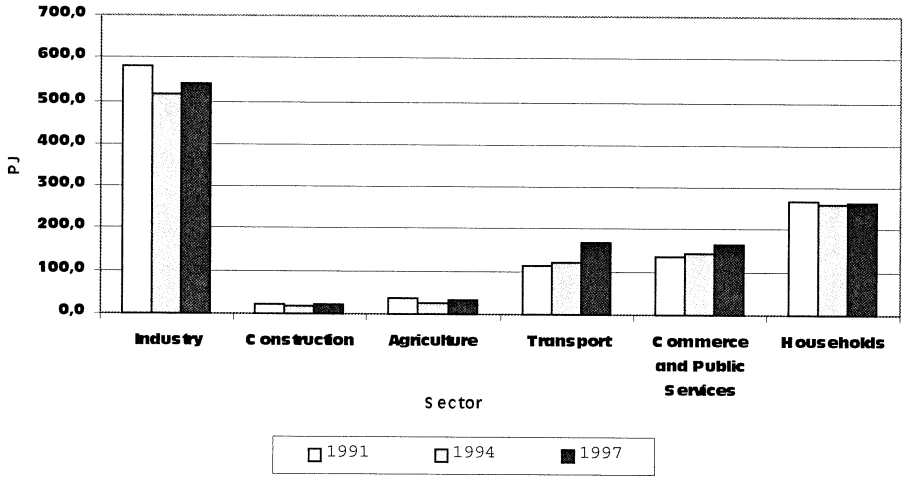
Source: Seven, 1999.

Figure S.6: Total Final Energy Consumption in Sectors in 1998



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 24-29.

Figure S.7: Total Final Energy Consumption in Sectors in 1991, 1994 and 1997



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 24-29.

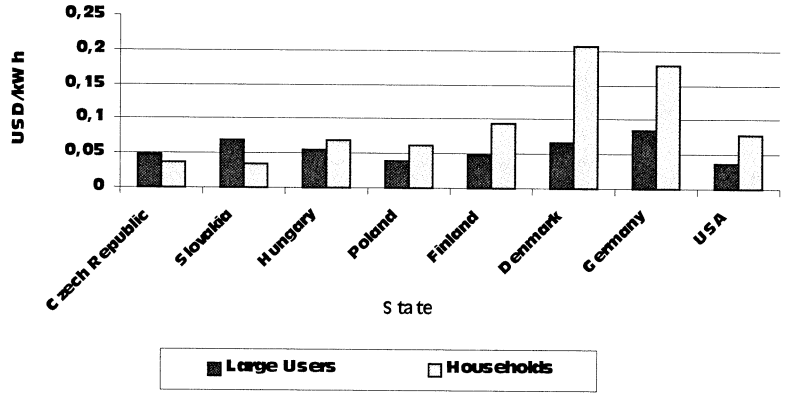
Energy prices

The prices of electricity and natural gas are set by a state authority based on calculated costs. For households they are cross-subsidised and thus significantly lower compared with those for large consumers. Other energy prices, such as those for coal, oil or motor fuels are made by the market and they are not subject to regulation. These cross-subsidies are being removed, gradually but slowly, and according to the draft *Energy Policy* document of July 1999 the government intends to complete this process by end of 2002 at the latest.

Electricity

Electricity prices for consumers are based on a tariff system. The fundamental criterion for the classification of consumers is the voltage level at which take-off occurs (figure S.8).

Figure S.8: International Comparisons of Electricity Prices in 1998

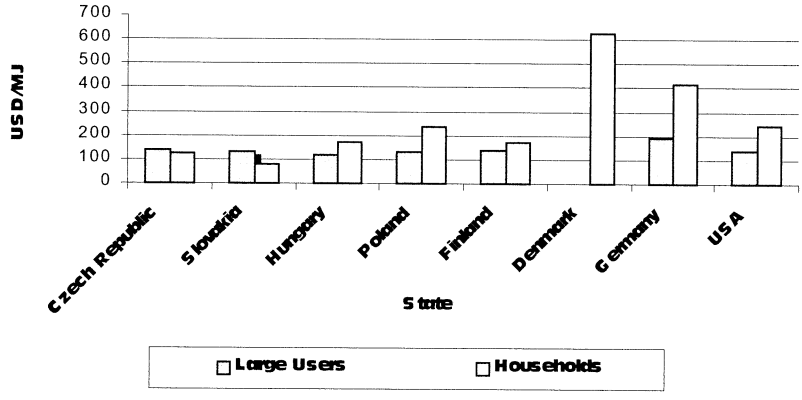


Source: International Energy Agency: *Energy Prices and Taxes* (Paris: OECD, 1998): 130, 137, 145, 164, 181, 255, 311.

Natural Gas

In spring 2000, as for electricity maximum double-component prices existed also for gas. There are two rates only for households that differ according to the amount used per year. It consists of the price for the permit and for the consumed gas per unit (figure S.9).

Figure S.9: International Comparisons of Natural Gas Prices in 1998



Source: International Energy Agency: *Energy Prices and Taxes* (Paris: OECD, 1998): 129, 137, 145, 163, 181, 255, 311.

Heat

The prices for heat are on the list of regulated prices for the producer and distributor. Current heat prices differ between regions. The average price is 220-350 CZK/GJ (7-10 US $/GJ).

Energy Policy and Legislation

In January 2000, the Czech government adopted a new *Energy Policy* document. Its three main cornerstones are in accordance with the objectives of EU energy policy and they include:

- environmental protection and adherence to the principles of sustainable development;

- assurance of energy supply security; and
- support for competitiveness of the energy economy.

This *Energy Policy* document suggests these solutions for the following main, but currently problematic areas of the energy sector:

- rectification of price and tariff structures and removal of price deformations;
- completion of the privatisation of the energy-sector;
- establishment of an independent regulatory body;
- adoption of rules for competitive electricity and gas markets;
- creation of an effective and transparent system for supporting energy savings, utilising renewable energy sources and for combined electricity and heat generation;
- support for sustainable extraction of domestic energy raw materials; and
- creation of conditions for the application of "clean coal technologies" and development of nuclear power engineering.

In the Czech Republic energy policy is approved only by the executive and not by the legislative branch of government. By law it is subject to an environmental impact assessment, the so-called *Strategic Environmental Assessment*. This assessment was made but the Ministry of the Environment expressed a negative opinion and claimed that this document does not comply with adopted environmental policies. But this statement is not binding for the cabinet, that approved the new *Energy Policy* despite of the negative opinion of the Environment Ministry.

Utmost priority of this new Czech *Energy Policy* is the adaptation of the national energy sector and of related legislation to the energy *acquis* of the European Union in time for EU accession by 2003. In the framework of pre-accession negotiations, the Czech Republic requested three transition periods with respect to the complete adoption of the *acquis communautaire* and the full harmonisation of Czech energy legislation with EU regulations, directives and decisions. For the energy sector the Czech Republic requested these three transition periods with respect to:

- Directives 68/414/EC and 72/425/EC on maintaining minimum stocks of crude oil and petroleum products (transition period until end of 2005);
- Directive 96/92/EC on the internal electricity market (transition period until 2005);
- Directive 98/30/EC on the internal natural gas market (transition period until 2008).

New Energy Legislation under Preparation

Closely linked to the priorities of the national energy policy, the government prepared a new draft *Energy Act* and a draft *Energy Economy Act* that have been discussed in the Czech Parliament since early 2000. It is assumed that both acts will enter into force by January 2001. The prepared *Energy Act* defines conditions for entrepreneurial activity in the electricity, gas and heating sectors and introduces competition in the electricity and gas industries in accordance with European Commission Directives No. 96/92/EC and 98/30/EC on the internal electricity and natural gas market. For the electricity industry the proposed act requires (Table S.1):

- Introduction of regulated Third Party Access (TPA) for producers and all final customers;
- between 2002 and 2007 gradual introduction of competition and opening up of the market in four stages and by early 2007 a competitive electricity market should be open to all customers without limitation;

- granting of licences and authorisations for building new sources and individual activities in the energy industry, including trading; and the
- possibility to choose, to conclude bilateral deals or to trade on the power exchange.

Table S.1: Assumed Time Schedule for Market Opening in the Electricity Industry

Period	Customers (one take-off point)	Producers	Assumptions
2001			new Energy Act
1/2002 -	> 40 GWh	>10 MW	
1/2003 -	> 9 GWh	100%	removal of cross subsidies
1/2005 -	> 0.1 GWh	100%	
1/2007 -	100%	100%	

Source: Czech Government: *Navrh zakona o pominkach podnikani a vykonu statni spravy v energetickych odvetvich a zmene nekterych zakonu (Energeticky zakon)* [Proposed Energy Act] (Prague, Ministry of Industry and Trade, Ministry of Environment, December, 1999): 16.

In the gas industry the draft act requires:

- Introduction of *regulated Third Party Access* (TPA) on the level of gas distribution networks and *negotiated TPA* on the level of the transit system;
- only partial competition and market opening in two stages until 2005 and 2008;
- granting of licenses and authorisations for the construction and individual activities in the gas industry, including trading (as in the case of the electricity industry).

Table S.2: Assumed Time Schedule for Market Opening in the Gas Industry

Period	Market opening
1/2005 -	>20%
10. 8. 2008 -	>33%

Source: Czech Government: *Navrh zakona o pominkach podnikani a vykonu statni spravy v energetickych odvetvich a zmene nekterych zakonu (Energeticky zakon)* [*Proposed Energy Act*] (Prague, Ministry of Industry and Trade, Ministry of Environment: December, 1999): 41.

During the discussion of the draft act in the Parliament, various amendments were tabled that may change the final wording of the act, including the degree and the terms of the market opening suggested in the government bill.

Price Liberalisation

One major objective of Czech energy policy since the early 1990s has been to remove energy price subsidies and price distortions, and to gradually move from centrally set prices to market prices, with the exception of regulated prices for monopoly activities. Most direct and indirect subsidies for energy prices have been removed during the past decade. In early 2000, the

greatest price distortions include cross-subsidies for electricity and natural gas prices between the households and industrial consumers (figures S.8, S.9), and lower VAT rate for heat of 5% instead of 22%. Programmes for the reduction of coal mining are subsidised by the state budget.

Although most price distortions have already been removed, the consequences of the past policy of cheap energy still exist. According to an analysis of price subsidies in the energy industry, between 1994 and 1998 the Czech Republic directly and indirectly supported fossil and nuclear energy with more than ten times the amount it spent on energy savings and renewable energy (table S.3).[6] Support for fossil energy includes, inter alia, assistance for the transition from coal to natural gas as part of the *National Programme for Healing the Atmosphere*.[7]

Table S.3: Average Direct and Indirect Annual Subsidies from 1994 to 1998

Fossil sources	20 billion CZK
Nuclear sources	4 billion CZK
Energy savings and renewable sources	1 billion CZK

Source: SEVEn: *Analýza dotací v°energetickém sektoru* [*Analysis of Subsidies in Energy Sector*] (Prague: SEVEn, 1999): 20-23

During the 1990s, several energy price subsidies were already dropped including the lower 5% VAT rate instead of the 22% rate (except for heat), direct subsidies of up to 7 billion CZK a year for the heat price of households. In spring 2000, cross-subsidies in the electricity and gas industries still existed. Besides the electricity prices for households, natural gas and, partially also heat, current energy prices depend on the market.

Privatisation

In early 2000, a strategy of completing the privatisation of state shares in electricity and gas companies was being prepared by the Ministry of Industry and Trade and the Ministry of Finance and was due by the end of April 2000.[8] In the heating sector denationalisation was already completed in the early 1990s. Basically, two competing proposals exist:

- to privatise the two distribution companies: *Transgas* and the *CEZ* power utility separately;
- to establish one *holding company* each for the electricity and gas industry, to interconnect distribution companies with CEZ or Transgas, and subsequently to privatise both holdings.

---

[6] SEVEn: *Analýza dotací v°energetickém sektoru* [Analysis of Subsidies in Energy Sector] (Prague: SEVEn, 1999).

[7] Ministry of the Environment of the Czech Republic: *National Strategy of Protecting the Earth's Climate System,* (Prague, Ministry of the Environment of the Czech Republic, 1999).

[8] These two alternatives are drawn up in partial sub-variants. In mid May 2000 it was not yet known which solution will eventually be chosen for implementation.

Energy Economy Act

In early 2000, the government prepared a new draft *Energy Economy Act*. In April 2000, this bill was being discussed in Parliament together with the new *Energy Act*. This draft act contains provisions on labelling of energy appliances and energy efficiency standards that adapt domestic legislation to EU standards. The bill also contains several controversial measures that provoked intensive discussions, including the obligation to elaborate energy audits for buildings and in industry if energy consumption exceeds a set limit. This draft act gives accredited energy auditors the power to decide on compulsory investments in heat and electricity cogeneration plants, for heat sources above 5 MW_t and electricity sources above 10 MW_{el}.

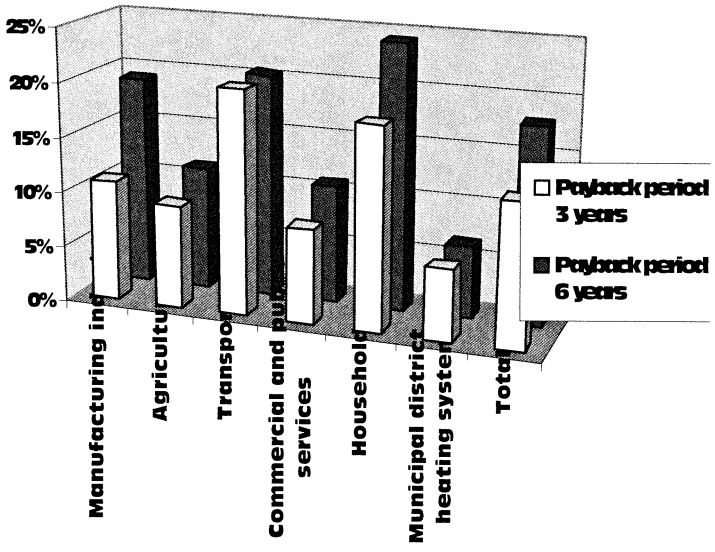
The draft *Energy Economy Act* also contains a proposal for the introduction of the so-called "green heller". According to this act, on each kWh one heller (i.e. 0.01 CZK) tax would be added (i.e. approximately 0.6% of the average electricity price of 1.60 CZK /kWh) that would be transferred to a special account. The State Environmental Fund would use this money to support the development of renewables and energy saving. Both acts may be significantly modified in the Parliament.

Energy Efficiency and Renewable Energy

Energy Efficiency Potential

The Czech Republic has a high energy intensity per GDP what implies a relatively large energy-saving potential. The *National Energy Efficiency Study* (1999) assessed the market potential with a payback period of 6 years as 18% of the total final consumption in selected sectors and the market potential with a restricted payback period over 3 years as 13% (figure S.10). Households (22%), transport (20%) and manufacturing industry (19%) would have the highest market potential if a payback period of 6 years would be used.

Figure S.10: Energy Efficiency Potentials for Energy Savings (% of Final Consumption)



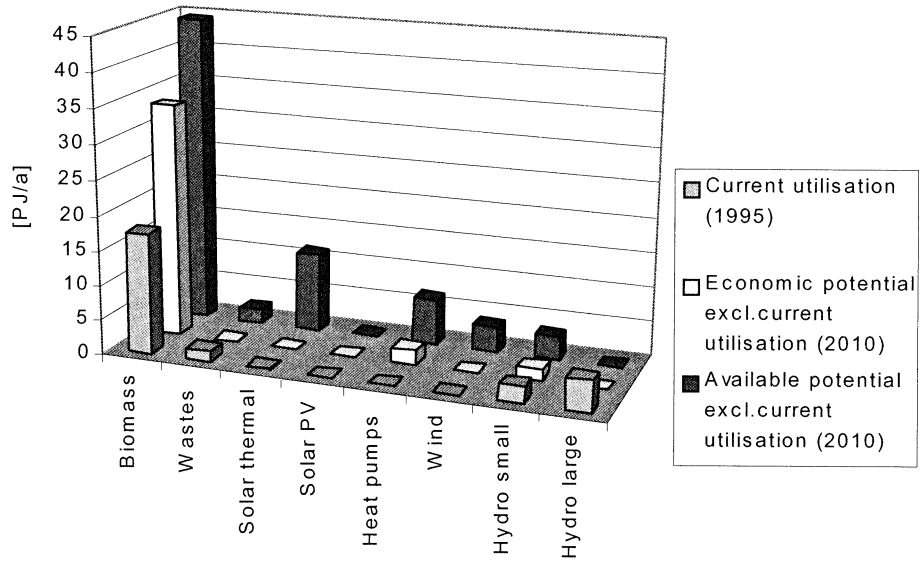
Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting, 1999: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 11-41.

Current Utilisation and Potential of Renewable Energy Sources

The current use of renewables in the Czech Republic is very low and amounts to about 1.5% of total primary energy sources. The *Czech Energy Policy* (2000) stated that renewables should reach 3-6 % of primary energy resources by 2010. As the natural conditions are not very favourable for renewables, its technical and economic potential is quite low based on the current state of technological development. At present, wider commercial opportunities exist only for biomass. For the Czech Republic it is much more effective to rely on energy conservation for reducing emissions than on renewables.[9]

The *National Energy Efficiency Study* (1999) assessed both current use, the available and the economic potential of renewables (figure S.11). The "available potential" of 70 PJ in 2010 (4% of TPES) refers to the highest possible use of renewables with currently available technologies under existing administrative, legislative, environmental and other constraints, excluding economic ones. The "economic potential" of 37 PJ in 2010 (2% of TPES) is the share of the "available potential" of renewables that can be exploited economically under current conditions.[10] The economic criterion relies on a limited payback period of 8 years (16 years for large hydro).[11] A significant economic potential was only identified for biomass (34 PJ).

Figure S.11: Current Utilisation and Potential of Renewable Energy Sources



Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting, 1999: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-34.

---

[9] SEVEn: *Strategie hospodařeni s energií* [Strategy for Energy Conservation] (Prague: SEVEn, 1999): 15.

[10] This includes economic, fiscal and legislative conditions, state energy policy, capital and operating costs, equipment availability, capital availability, interest rates, etc.

[11] The following assumptions were made: If the actual payback period of a given renewable technology is lower than 50% of the limiting payback period, the market penetration is equal to the full available potential. If the actual payback period is equal to the limiting payback period, the market penetration is equal to 50% of the available potential. If the actual payback period exceeds 200% of the limiting payback period, the market penetration is zero.

Economic Framework and Support for Energy Efficiency and Renewable Energy

Economic Framework

During the decade of economic transformation, the subsidies for the use of energy were significantly reduced, however prices for households are still largely cross-subsidised. Moreover some financial support by the state still continues for the use of national sources (e.g. support for mine closures). Negative environmental externalities are internalised only by extremely low environmental levies, some tax reliefs and slightly higher feed-in tariffs for renewable electricity (on a voluntary basis). The elimination of these price distortions would increase significantly the price of non-renewable energy for households, and therefore this would be the crucial step for supporting energy savings and renewables in the household sector. Limited financial support for energy efficiency and renewable energy projects is provided from several public sources.

Financial Support

In the Czech Republic a governmental programme supports energy efficiency and the use of renewables. Its scope is financially limited (20 mill. US $ per year). Its main activities are the financial programmes of the *Czech Energy Agency* (CEA) and the *State Environmental Fund* (SFZP). The main task of the CEA is to encourage activities leading to energy conservation (especially in buildings), including support for ESCO industrial development, as well as support for a greater use of renewables and secondary sources of energy. The average budget of the Agency is approximately 200-300 mill. CZK (5.6-8.4 mill. US $) per year. The SFZP provides financial support for pollution abatement measures. In the energy sector this mainly includes measures on the production side, especially for boilers and heating systems and use of renewables.[12]

In the agricultural sector, energy efficiency is included in the subsidy programmes of the Ministry of Agriculture for the production and use of renewables and energy savings on farms. The programmes include interest rate subsidies for commercial lending guarantees provided to lenders. Another form of grant support is for raising energy crops (1998-2002).[13]

Since 1992, the *Energy Savings Fund* that was founded in the framework of the Phare Programme has supported the interest rates for commercial loans for several energy efficiency projects. The Ministry of Regional Development implemented a programme for modernisation of existing buildings, but this only applies to a very small segment. There is also support for integrated public transport systems through central government subsidies that are given to cities and regions through budgetary grants and to transport companies through grants for equipment and vehicle maintenance.[14]

---

[12] SEVEn: *Umweltpolitische Instrumente und Handlungsmöglichkeiten im Rahmen der Annäherungsprozesse der EU-assoziierten Staaten im Bereich Umwelt und Energie*, Legal Gap Assessment, WP3 CR (Prague: SEVEn, 1999).

[13] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Annex A (Petten, Netherlands: ECN, 1999): 5-13.

[14] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Annex A (Petten, Netherlands: ECN, 1999): 5-13.

Tax Relief

To support energy savings and renewables, these forms of tax relief have been implemented:

- Lower VAT rates (5% instead of 22%) exist for environmentally sound products and goods related to energy savings.
- Income tax reliefs are granted for energy efficiency and recycling installations. Taxpayers can deduct 10% of the purchase price from their income tax base for installations such as thermal pumps, electric generator aggregates for CHP up to 2.5 MW_e and for other electric equipment.
- A real estate tax relief for five years for house owners who switch their heating system from solid fuels to natural gas, electricity or any renewable energy source.
- Combined transport is completely or partly exempt from road taxes for transport contractors who use this type of transport.
- Renewables (small water power plants, wind power plants, solar plants, biomass installations, geothermal plants, heat pump systems etc.) are subject to several tax reliefs. Legal persons operating these schemes do not pay income tax for 5 years of operation, or do not pay real estate tax. Biofuels (including biogas) as well as selected renewable energy technology components are subject to the lower VAT rate of 5%.
- Biofuels (including biogas) are exempt from excise tax on motor fuels.[15]

Feed-in Tariffs

In the Czech Republic, no law offers support systems for renewable electricity. However, feed-in tariffs for renewable electricity were increased by 15-20% (to 1.13-1.20 CZK/kWh, i.e. 0.03 US $/kWh) in a voluntary agreement among the Ministry of Industry and Trade, the Ministry of the Environment, regional power distributors and renewable energy associations.[16]

Joint Implementation

Marginal abatement costs of greenhouse gases in the Czech Republic are still relatively low compared to other OECD countries. This leaves a certain potential for *Activities Implemented Jointly/Joint Implementation Projects* (AIJ/JI).[17] The official requirements for AIJ/JI projects have been prepared by the Ministry of Environment. But they will be quite restrictive.

Energy Sector and the Environment

Environmental Impact of the Energy Sector

The energy sector has a negative environmental impact on the entire cycle from the extraction of primary raw materials to energy consumption. Production, transfer and consumption of energy affect all environmental segments, but the air is affected worst by emissions of pollutants, especially from fuel combustion. Despite the fact that during the last ten years solid fu-

---

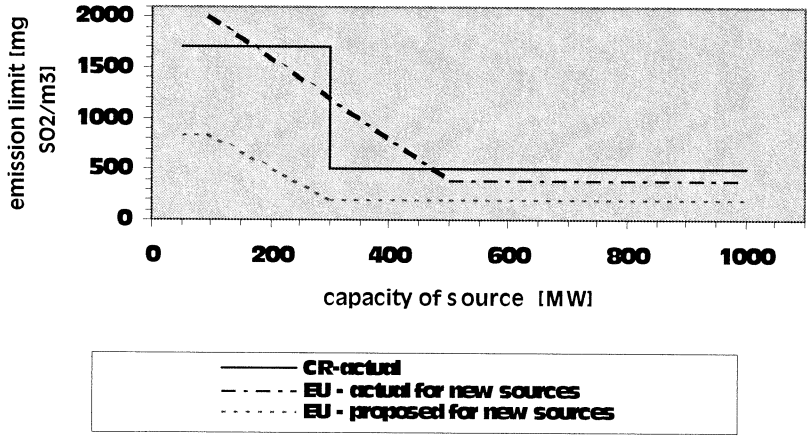
[15] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 59.

[16] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 54.

[17] A foreign investor invests in a joint implementation project that considerably lowers greenhouse gas (GHG) emissions and gets in turn emission credits from the country hosting the project. Emission credits can be used to fulfil the investor's country national GHG emissions limit stated in the Kyoto Protocol. Activities implemented jointly are projects conducted in the pilot phase and without any credit allocation.

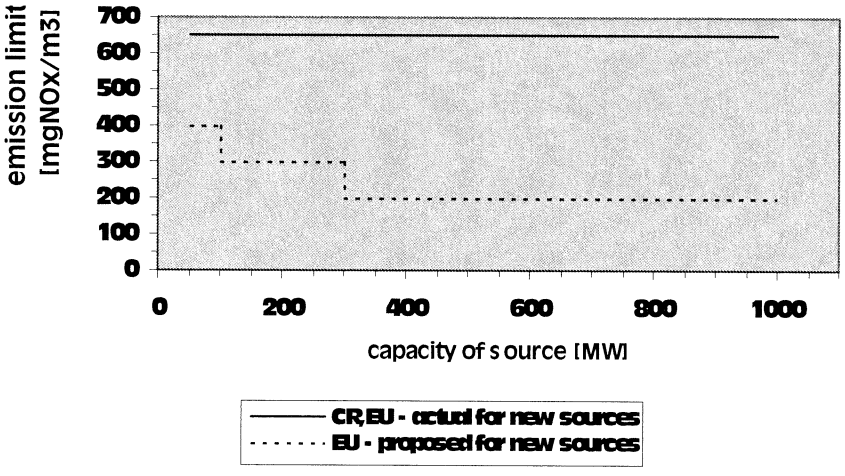
els, particularly brown coal with high sulphur content, have been to a significant extent replaced by more environmentally friendly fuels, the share of solid fuels remains high since they are an important domestic raw material. Before 1989, the level of environmental pollution was very high, in some regions of the Czech Republic it was even hazardous for the health of the population.

Figure S.12: Comparison of SO_2 Emission Limits for Fossil Fuels in Energy Industry



Source: SEVEn: *Specifikace a rozsah požadavků k plnění protokolů EHK OSN k Úmluvě o snižování přenosu znečišťujících látek přes hranice států* [Specification of the requirements to the fulfilment of the UN ECE Convention on the Long-range Air Pollution Transboundary Protocol] (Prague: SEVEn, 1999): 38.

Figure S.13: Comparison of NO_x Emission Limits for Fossil Fuels in Energy Industry

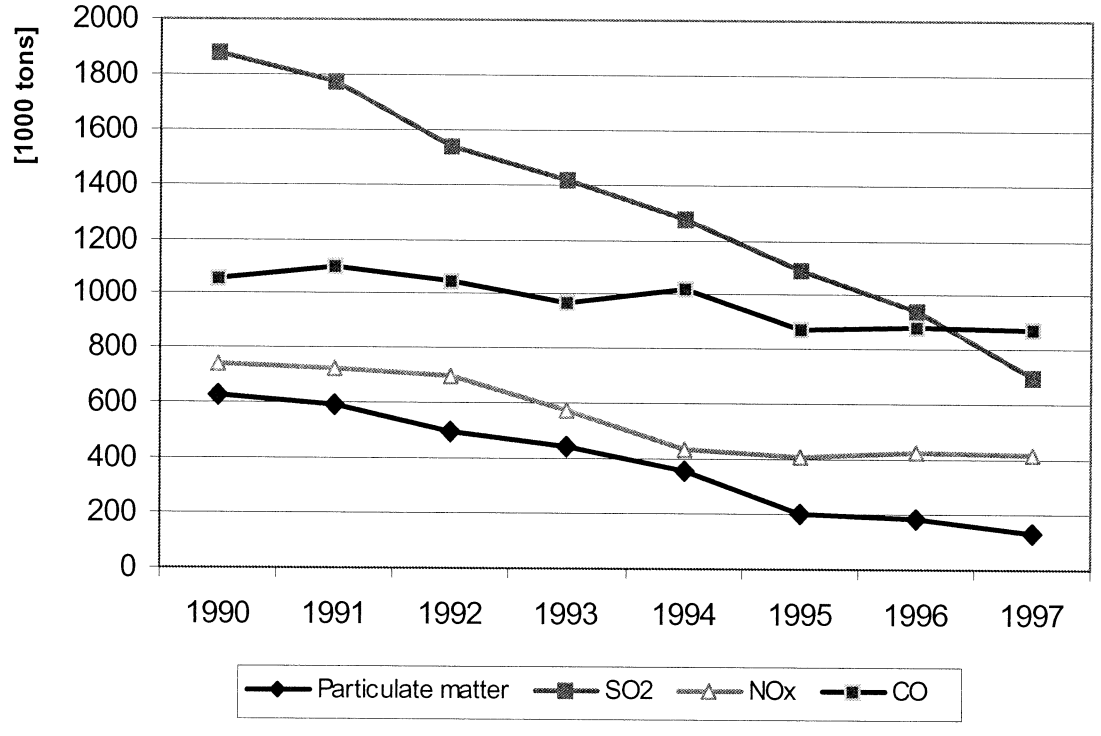


Source: SEVEn: *Specifikace a rozsah požadavků k plnění protokolů EHK OSN k Úmluvě o snižování přenosu znečišťujících látek přes hranice států* [Specification of the requirements to the fulfilment of the UN ECE Convention on the Long-range Air Pollution Transboundary Protocol] (Prague: SEVEn, 1999): 38.

The improvements essentially resulted from new legislation that came into force in 1991-1992, especially the *Clean Air Act*, the act on nature and landscape protection, the act on land resources, the act on wastes, the act on environmental impact assessment and the act on the Environment that defined the most crucial concepts in the environmental area. Other important laws were adopted between 1995 and 1998. Of great importance for energy production is Regulation No.117/1997 of the Ministry of the Environment that defined emission limits and other conditions for the operation of stationary sources of pollution and air pollution control. This regulation amends the *Clean Air Act* No. 309/1991, in the wording of later regulations. It requires plants stricter, generally obligatory emission limits for operators of combustors with installed heating capacity higher than 0.2 MW and listed operators of industrial plants. After a transition period, it entered into force on 1.1.1999.

The values for SO_2 and NO_x emission limits and the comparison of those with values valid in the EU are shown in figures S.12/S.13. It is evident that the structure of SO_2 emissions, valid for small-scale sources currently differ in the Czech Republic from EU countries. But emission limits for installed capacity of sources above 500 MW are practically the same. NO_x emission limits are identical. Figures S.11 and S.12 show proposed EU emission limits for new sources.

Figure S.14: Total Emissions of Major Pollutants in the Czech Republic (1990 – 1997)



Source: Ministry of the Environment of the Czech Republic: *The Czech Republic Report to the CRLTAP Secretariat, 1997* (Prague: Ministry of the Environment of the Czech Republic, 1997).

Legal measures have resulted in significant improvements in national air quality: in the period 1990 - 1997 sulphur dioxide emissions were reduced by almost 63%, airborne dust (dust aerosols) by almost 80%, and carbon dioxide emissions by 18%. The overall development of airborne dust (dust aerosol), SO_2, NO_x, and CO emissions is shown in figure 6.13. The picture shows the rapid reduction of SO_2 and dust aerosol emissions from 1990-1997. Concerning NO_x and CO emissions, a slight growth occurred after 1995. Although NO_x emissions from large stationary sources were reduced, their increase was caused particularly by the rapid growth of road transport.

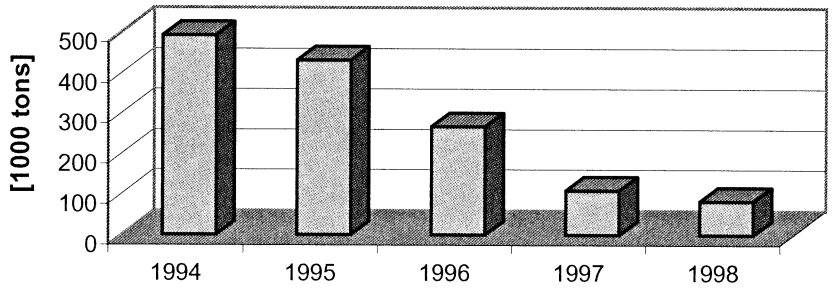
SO_2 Emissions from Combustion Processes

The reduction of SO_2 emissions from combustion processes was mainly affected by these two factors:

- substitution of coal with natural gas or other, more environment-friendly fuels;
- implementation of technical measures for major air pollution sources.

The replacement of coal by natural gas for heating considerably improved the environment in industrial and urban areas of large towns, but also in small towns and villages. Major air pollution sources were desulphurised and in some cases modernised. This primarily refers to large power plants whose total rated capacity in the Czech Republic is above 10,000 MW_{el}. The dominant domestic power utility is the CEZ joint-stock company, with a total rated capacity of 7,267 MW and approximately 74% of total electricity generation in the Czech Republic. Within the programme of modernisation and desulphurisation of coal sources, by 31 December 1998 CEZ had built desulphurisation units in 12 power plants with a total output of 5,930 MW and shut down 12 obsolete power units with a total output of 2,020 MW. Within the programme, 5 boilers for fluidised combustion with a total rated capacity of 532 MW were put into operation. The entire programme required capital expenditure of 46 billion CZK. Significant reduction of SO_2 emissions in all Czech power plants (including those outside CEZ) in 1994 - 1998 is shown in figure S.15).

Figure S.15: Sulphur Dioxide Emissions from Power Plants (1994 - 1998)

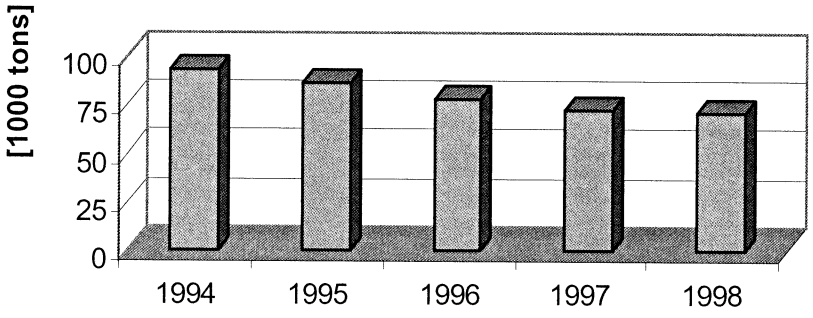


Source: KONEKO Marketing Ltd.: *Energy Economy, Czech Republic 1994–1998 in Numbers* (Prague: KONEKO Marketing Ltd., 1999): 8.

NO_x Emissions from Combustion Processes in Major Power Plants

As a result of the measures mentioned above, NO_x emissions were also reduced between 1994 and 1998, and in the last two years these emissions have stabilised (figure S.16).

Figure S.16: Nitrogen Oxides Emissions from Power Plants (1994 - 1998)



Source: KONEKO Marketing Ltd.: *Energy Economy, Czech Republic 1994–1998 in Numbers* (Prague: KONEKO Marketing Ltd., 1999): 8.

Policy of Air Pollution Control and Climate Protection, Related Legislation and International Obligations

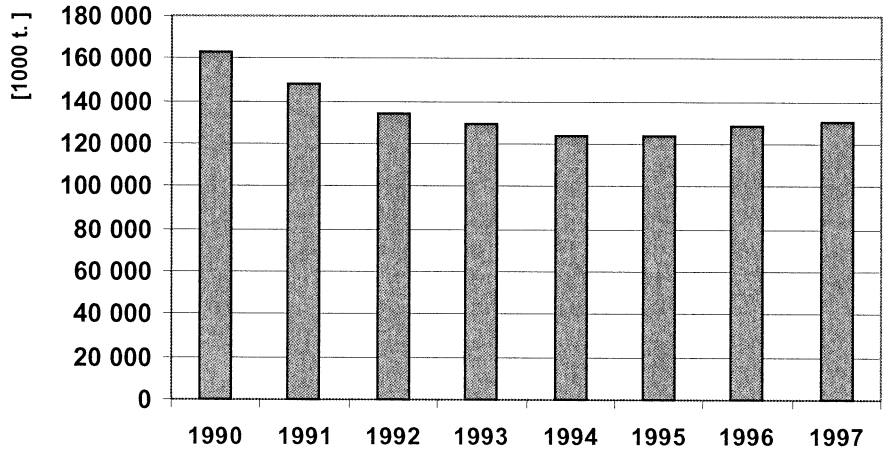
The Czech Republic signed the UN Framework Convention on Climate Change in 1993 and issued two National Communications in 1994 and 1997. In 1998, it signed the Kyoto Protocol to the UN Framework Convention that determines for industrialised countries quantitative reductions for six greenhouse gas emissions that would ensure a 5.2% reduction in global emissions in the first stage during the commitment period of 2008 – 2012 compared with the 1990 level. The protocol requires from the Czech Republic an 8% reduction in total greenhouse gas emissions until 2008-2012. The same reductions apply also to EU countries. To realise these goals in emission reduction, required by the Kyoto Protocol, it is necessary to use primarily methods and measures resulting from real national reductions. Furthermore, flexible mechanisms including joint international projects can be used. In the Czech Republic, the inventory of greenhouse gases for 1990 was carried out in accordance with the internationally recommended IPCC/OECD methodology and its results were verified by calculation. *A National Strategy of Protecting the Earth's Climate System* was also prepared.

The main source of greenhouse gas emissions is the energy sector, especially fuel combustion processes. In early 2000, the current gross consumption of primary energy sources per capita in the Czech Republic is still high. Due to the structure of the domestic primary sources (mainly lignite), the total greenhouse gas emissions per capita are also high with 14.4 tons of CO_2, while in advanced countries this level is presently below 13 tons of CO_2 per capita. Besides the energy industry, greenhouse gas emissions are also produced in other sectors (transport, agriculture, commerce and housing). Furthermore, methane is released from waste disposal sites and from transport, waste processing and incineration.

Between 1990 and 1994, the greenhouse gas emissions in the Czech Republic were reduced by approximately 24%. In 1995, they did not increase and in 1996 they grew again by 4.6 %, compared with the previous year. The growth slowed down somewhat in the following year

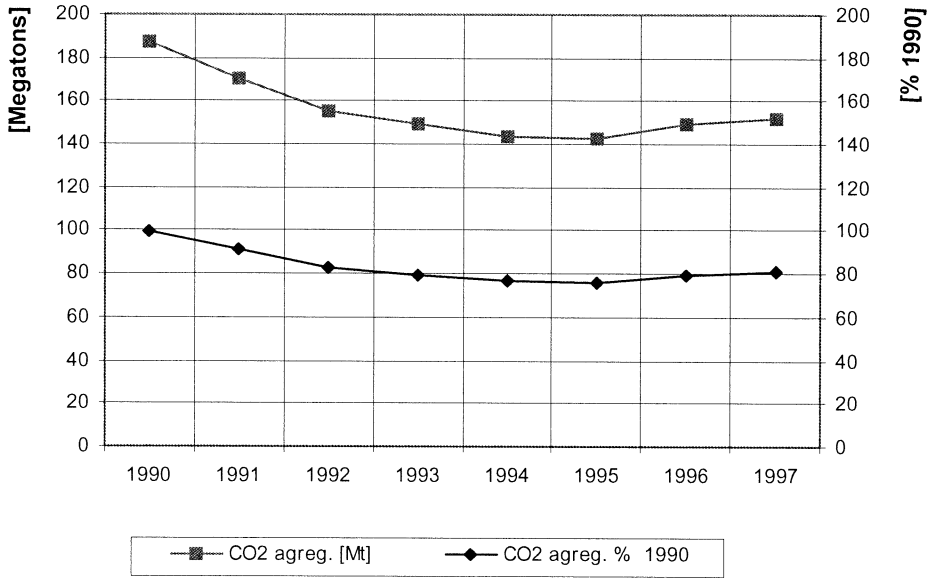
with an increase of 1.6 % (figure S.17). In 1990, total greenhouse gas emissions reached 187.5 million tons in CO_2 equivalents, whereas in 1997 the figure was 151.6 million tons.

Figure S.17: Total Emissions for CO_2 in the Czech Republic (1990 - 1997)



Source: Czech Institute of Hydrometeorology: *Inventory of Greenhouse Gases in the Czech Republic for 1990 –1997* (Prague: Czech Institute of Hydrometeorology, 1998): Part 3.

Figure S.18: Development of Greenhouse Gases (GHG) Emissions, 1990 – 1997



Source: Czech Institute of Hydrometeorology: *Inventory of Greenhouse Gases in the Czech Republic for 1990 –1997* (Prague: Czech Institute of Hydrometeorology 1998): Part 3.

The reduction in greenhouse gas emissions between 1990 and 1995 was a consequence of the overall economic slowdown from 1990 to 1993, of the partial restructuring of industry, a replacement of obsolete technologies by modern ones with higher energy efficiency and application of environmental legislation. Although the growth of greenhouse gas emissions after

1995 is not dramatically high, it led to the proposal for a gradual stabilisation and reduction measures in sectors of the national economy. The Czech government discusses approaches to protect the Earth's climatic system with the European Commission and EU countries. They are gradually being harmonised, as is the relevant legislation. This area of environmental protection was included in the national development objectives.

The current total share of the energy sector, i.e. of all national production, transfer and consumption of energy, in the total aggregate balance of greenhouse gas emissions is approximately 85%, with energy production accounting for roughly 39%, industrial power engineering for 30%, transport for 8% and the commercial and housing sector together about 8%. The fundamental task is to reduce energy demand and its consumption. It is also important to implement measures that motivate producers and consumers to save energy and use renewable sources. Total greenhouse gas emissions in CO_2 equivalents and in percentages compared with 1990 are shown in figure S.17/S.18.

Scenarios for Reduction of Greenhouse Gas Emissions

In 1997, two scenarios of emission development were specified on the basis of estimates of GDP's development. According to the so-called high scenario, between 1990 and 2010 greenhouse gas emissions should be reduced by 10 %. The so-called low scenario (according to lower GDP growth) assumes a 15% reduction of greenhouse gas emissions between 1990 and 2010.[18]

During the 1990s, the Czech Republic has made major progress in cleaning up the environment. The Clean Air Act and its strict emission limits that are comparable with EU standards came into effect for new and existing sources of pollution by end of 1998. Practically all power and heat plants in the Czech Republic, including boilers with a capacity above 0.2 MW, went through a major environmental upgrade, retrofit, reconstruction, or at least a fuel change so that they would meet the new emission limits. But despite of this major effort that was accompanied with high investments in environmental upgrades and the resulting significant decrease of emissions (for example SO_2 emissions declined during the 1990s by more than 80%) there remain many problems the Czech Republic must solve.

One of the main environmental priorities for the near future is the cleaning up of waste water what will require significant investments for waste water treatment plants. The Czech economy still remains very energy intensive in terms of energy spent for production of a unit of GDP, and thus energy efficiency is one of the priorities of Czech energy policy. There are several financial mechanisms and funds that use both local governmental funds and foreign grants to support energy efficiency and renewable energy projects in the Czech Republic (Czech Energy Agency, State Environmental Fund, PHARE Energy Saving Fund, MUFIS programme etc).

The Czech Republic prepares new energy laws and new legislation in the environmental field to harmonise its domestic legislation with EU regulations and directives. The new draft energy law includes a time-schedule for the implementation of competition into the electricity and gas sectors. A privatisation plan for energy utilities is being prepared and discussed by the Ministry of Finance and the Ministry of Industry and Trade. However, this process is accom-

---

[18] Ministry of the Environment of the Czech Republic: *National Strategy of Protecting the Earth's Climate System,* (Prague, Ministry of the Environment of the Czech Republic, 1999): 3.

panied also with many uncertainties and delays in governmental decisions what may discourage some investors.

There are numerous examples of successful German - Czech projects, joint ventures, and acquisitions, in both large-scale as well as middle- and small-scale projects. These joint projects include investments for the development of new 100 MW cogeneration plants in the country side, the privatisation and acquisition of existing energy utilities, entering the market and developing own projects in energy supply and energy contracting, as well as investments in energy efficiency projects. For example, two German investors Siemens and MVV utility have recently purchased two main local energy efficiency and energy service companies that offer third party financing and energy performance contracting projects in the Czech Republic.[19]

This report is focused at companies that are looking for opportunities to do business in the energy and environmental field in the Czech Republic. It wants to supply potential investors with relevant information that is necessary for their decision to enter the market and to develop new activities in this field. It also intends to provide information for decision makers at governmental and regional levels, as well as for all other interested parties. If this information will help investors to develop joint projects in the energy or environmental field, and to identify new opportunities for cooperation, the aim of the authors would be fulfilled.

---

[19] For further details see: Hans Günter Brauch: *Osterweiterung der Europäischen Union - Energie- und Umweltpolitik der Tschechischen Republik*, Series: Energy and Environment Policy in the Czech Republic, Vol. 1 (Berlin: Umweltbundesamt, 2000): 171-176; 242-259; Hans Günter Brauch: *Liberalisation of the Energy Market for Electricity and Gas in the European Union: A Survey and Possible Implications for the Czech Republic*, Vol. 3 (Berlin: Umweltbundesamt, 2000).

Part I: Main Report: Energy and Environment in the Czech Republic

Chapter 1: Summary Information on the Czech Republic

1.1 Basic Data

Population

The Czech Republic has 10.4 million inhabitants, 1.2 million are living in Prague. Six other towns have more than 100 000 inhabitants. The average population density is 131 inhabitants/km^2.

Area

The area of the republic is 78 864 square km (about 22% of the area of Germany). Approximately 50% is agricultural land (one third is arable). Forests represent roughly 33% of the surface and urbanised areas about 7%. The remaining 10% are covered by different surfaces, including water surfaces (ponds and water-storage reservoirs). Devastated areas from mining and non-recultivated areas cover about 7%.

Border and Administrative Structure

The Czech Republic shares border with four countries: on the west and north with Germany (810 km), on the north with Poland (762 km), on the south with Austria (466 km) and on the east with Slovakia 265 km). The current administrative structure constitutes of 75 districts. A law that divides the country into 12 administrative regions has recently been approved.

Climate

The average annual temperature in the warmest valleys of southern Moravia does not exceed 10°C. The coldest are mountain peaks where the average annual temperature drops below freezing. Average annual precipitation is 686 mm.

Currency

The Czech currency is the Koruna (Kc) or the Czech crown (CZK). In April 2000, the exchange rate was 37,8 CZK/US $ and 36,2 CZK/EURO.

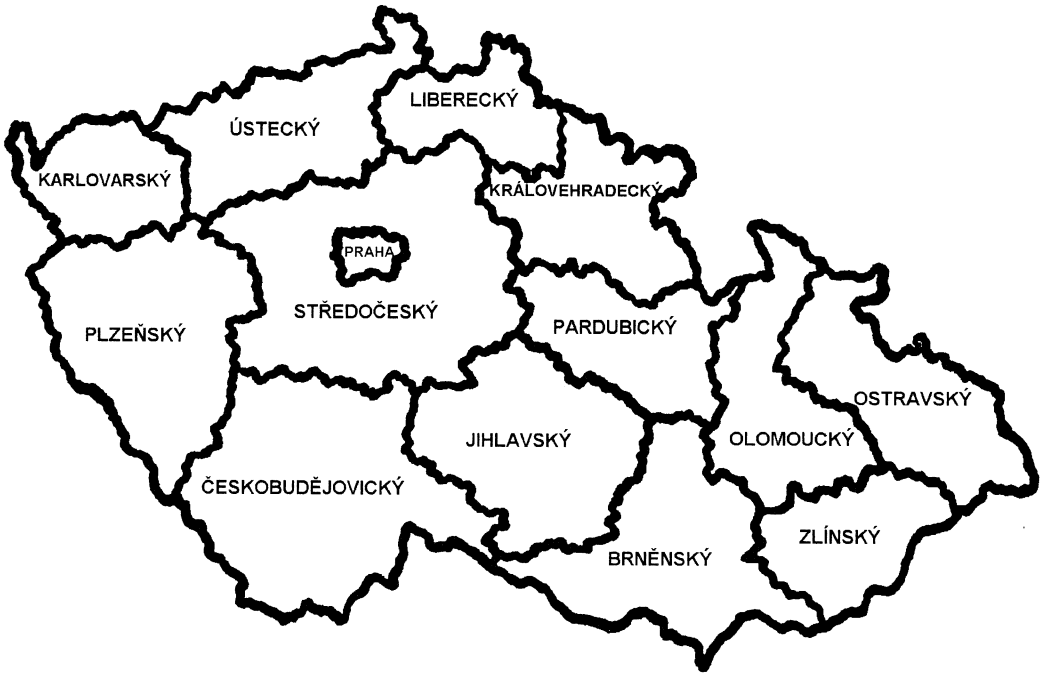
1.2 Business Environment in the Czech Republic

Since the global political turn in 1989, the Czech Republic transformed itself into a pluralistic democracy and a market economy. Until 2000, more than 80% of the enterprises were privatised. However, some key structural reforms must still be completed: e.g. bank privatisation, capital market regulation, the creation of an efficient legal system, including stricter bankruptcy laws, the removal of energy price deformations and the liberalisation of rents.

1.2.1 Accession to the EU

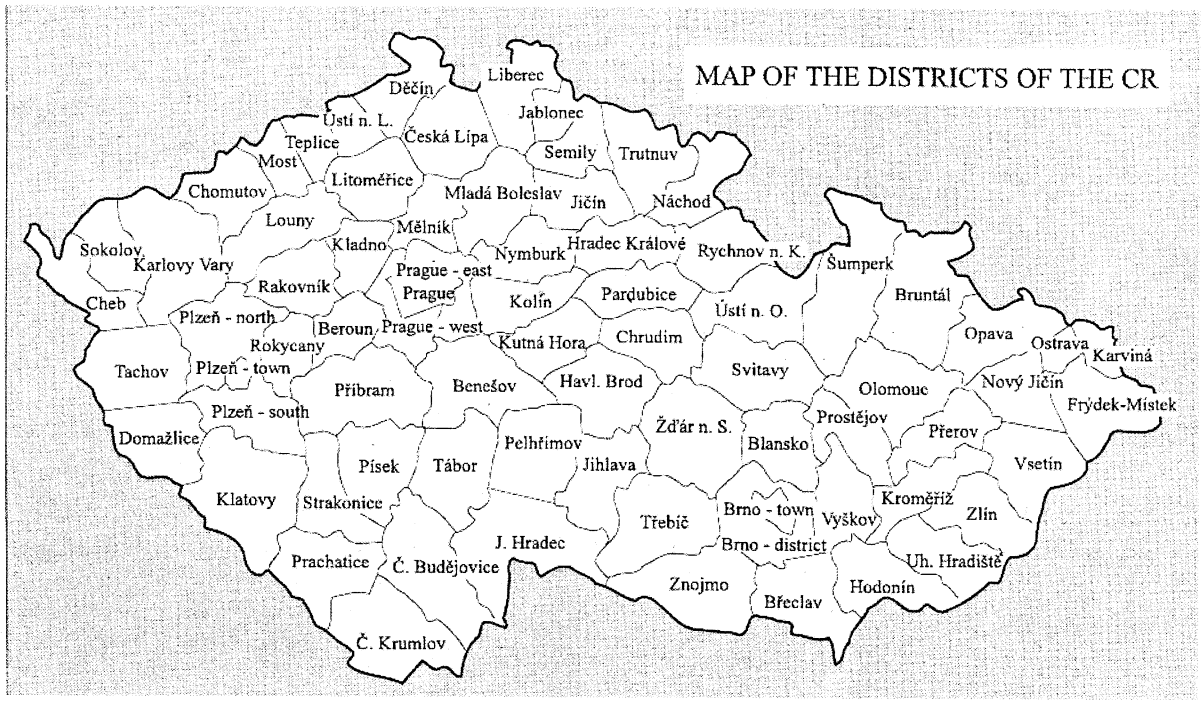
The Czech Republic is an associate country of the EU that applied for membership in 1996. The Czech government opted for 2003 as the target date for its EU accession, however, it is uncertain whether it will fulfil all necessary requirements by then.

Figure 1.1: New Administrative Structure of the Czech Republic (based on Act 347/07)



Source: Designed by H. König, SEVEn (Prague, SEVEn, 2000).

Figure 1.2: New Administrative Structure of the Czech Republic with Districts



Source: The Ministry of the Environment of the Czech Republic, Czech Statistical Office: *Statistical Environmental Yearbook of the Czech Republic* (Praha: The Czech Environment Institute, 1998): 493.

EU membership requires the full adoption and implementation of the *Acquis communautaire*, i.e. of all valid EU laws (regulations, directives, decisions) and obligations resulting from the EU system, its institutional framework and from international agreements to which the EU is a member. As all applicant countries, the Czech Republic submitted its position papers[1] on all 31 dossiers of the accession negotiations with the EU in which it stated how and when it will transpose individual requirements of the *Acquis*, and if it will require a transition period for their implementation. Since March 1998, it has been engaged in accession negotiations with the European Commission. Since 1998, in regular reports to the Council the Commission has reviewed the progress of each Central and Eastern European candidate towards EU accession in light of the Copenhagen criteria, especially to which extent to it has transposed the *Acquis*.[2]

1.2.2 Energy Sector and Environment

Legislative and institutional harmonisation with the EU is quite extensive in the energy sector and for environment protection. Priorities are the preparation for the internal energy market, especially with respect to the electricity and gas directives, and energy efficiency improvements. The Czech Republic still has an energy intensity per GDP unit that is several times higher compared with EU countries. Even after conversion in purchasing power parities (PPP) it is more than twice as energy intensive. This reflects a considerable energy saving potential.

Priorities of the Czech energy policy include the adaptation of the domestic energy sector and related legislation with the *Acquis*. From the Czech perspective, the planned deadline for the completion of the harmonisation of domestic legislation with EU standards is 2003. In the pre-accession negotiations, the Czech Republic requested three transition periods for the energy sector for the complete adoption of the *Acquis Communautaire* and for the harmonisation of its energy legislation with EU requirements.

The Czech Republic requested these three transition periods in the energy sector:

- Directives 68/414/EC and 72/425/EC on maintaining minimum emergency stocks of crude oil and petroleum products (required transition period until the end of 2005);
- Directive 96/92/EC on the internal electricity market (transition period until 2005); and
- Directive 98/30/EC on the internal natural gas market (transition period until 2008).

The Czech position paper on the environment of July 1999 stated with respect to air quality that the Czech Republic will be capable of meeting all the relevant commitments resulting from the environmental *acquis communautaire* by 2003 or whenever EU accession will occur. The requested five year transition period for the implementation of the integrated pollution prevention and control (IPPC Directive)[3] for existing facilities is the only one in the field of environmental protection with a direct reference to the energy sector. The other six requested transition periods deal with waste management, water quality and conservation of natural habitats.

---

[1] See <http://www.euroskop.cz/cr_vyjedn_pozdoc.html>.

[2] See <http://europa.eu.int/comm/enlargement/czech/intro/index.htm>.

[3] Directive 96/61/EC on integrated pollution prevention and control. For the implementation of the provisions of this IPPC Directive for existing facilities, the Czech Republic requested a transition period of 5 years after 2007, that is up to 2012.

During the 1990s, much money was invested in the reduction of pollution resulting from energy industry. The CEZ power utility alone invested about 40 billion CZK (ca. 2.2 billion DM) between 1992 and 1998 to reduce air pollution and to meet the requirements of the emission limits of the Clean Air Act. During the 1990s, total emissions decreased dramatically and SO_2 emissions dropped to less than 20% of its prior level. In spring 2000, the compulsory emission limits for existing sources are nearly as strict as those required by EU legislation. With the approval of the proposed directive COM(98) 415 additional and stricter emission limits will be required for EU countries.

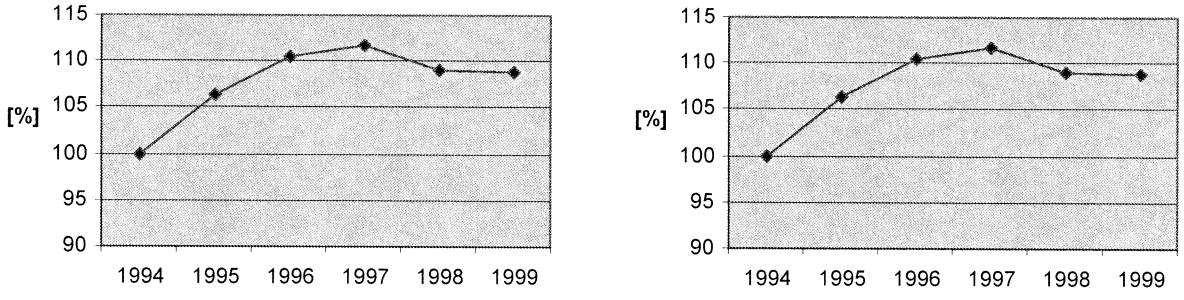
Most energy facilities, including power plants, industrial and municipal heat and power and district heating plants, were upgraded during the 1990s to meet national emission limits by end of 1998. In spring 2000, with few exceptions nearly all plants meet the new emission limits. This environmental upgrade included switching to higher quality fuel, major investments in energy plants to enhance its efficiency, upgrades of district heating networks and exchange stations.

1.2.3 Economic Development

Economic Growth and Employment

After a period of high growth in 1995 and 1996 (6% and 4% respectively) the Czech Republic went into recession. The bottom was reached at the beginning of 1999 and since then signs of a slow recovery have been observed. In the second half of 1999 GDP grew by 1% and for 2000 growth of 2% is expected. The unemployment rate has been growing fast in the last four years and in 1999 it reached almost 10%.

Figure 1.3: Development of GDP and Inflation Rate in the Czech Republic



Source: Komerční banka: "Czech Economy in 2000", in: *Economic Trends*, No.23 (Prague: Komerční banka, March 2000): 1.

Monetary Indicators

After 1994, inflation was around 10%, however, in 1999 it rapidly dropped to 2% (figure 1.2). This has also significantly decreased future inflation expectations in the business community. For foreign investors the relatively stable exchange rate of the Czech crown is also advantageous. It lost only 6% of its value against the German mark (DM) during the previous seven years. Another advantage are lower labour costs in comparison with those in EU countries. Although the Czech Central Bank has radically cut its key interest rate (2 week REPO from 15% in mid-1998 to 5.25% in April 2000), the volume of given credits is still stagnating. But

interest rates have significantly decreased and at the end of the year 1999 the PRIBOR 3M interbanking offer rate was approximately 6% and the average interest on credits about 8%.

Taxes

Since 1 January 1996, a new tax system exists based on the EU principles with the introduction of the Value Added Tax (VAT) levied on all goods and services, including imports sold in the Czech Republic, but exports are exempted. The basic tax rate for goods is 22% and the reduced rate of 5% applies to food, some services, heat from district heating systems and several ecological products. The income tax for business has gradually been reduced to a present level of 35 %. Income tax for individuals varies from 15% to 40% depending on the income. The compulsory social and health insurance for employees amounts to 12.5% of the wage. The employer must pay a part of both insurances what represents 35% of the wage.

1.2.4 Financial Sources for Energy Efficiency Projects

In the Czech Republic all standard commercial sources are available for financing energy and energy efficiency projects and energy businesses, such as loans, including project financing, leasing, equity financing, venture capital, and others. Non-traditional third party financing is also offered and implemented through Energy Performance Contracting.

Domestic banks and other financial institutions are in competition with foreign banks and investors and they must offer competitive terms of financing. Besides these commercial financial sources, several additonal financial schemes and funds supporting energy efficiency and renewable energy projects are available. The major domestic institutions that offer financial assistance for selected projects include the *State Environmental Fund* <www.sfzp.cz> and the *Czech Energy Agency* <www.ceacr.cz> that regularly update their annual assistance programmes. Other schemes include the *PHARE Energy Saving Fund* operated by the *CSOB bank*, and the *MUFIS scheme* for financing infrastructure related to housing.[4]

[4] The PHARE Energy Saving Fund partly subsidises interest of commercial loans and a MUFIS programme that actually was a state guarantee that was used to attract US private capital for long term financing for municipal infrastructure development.

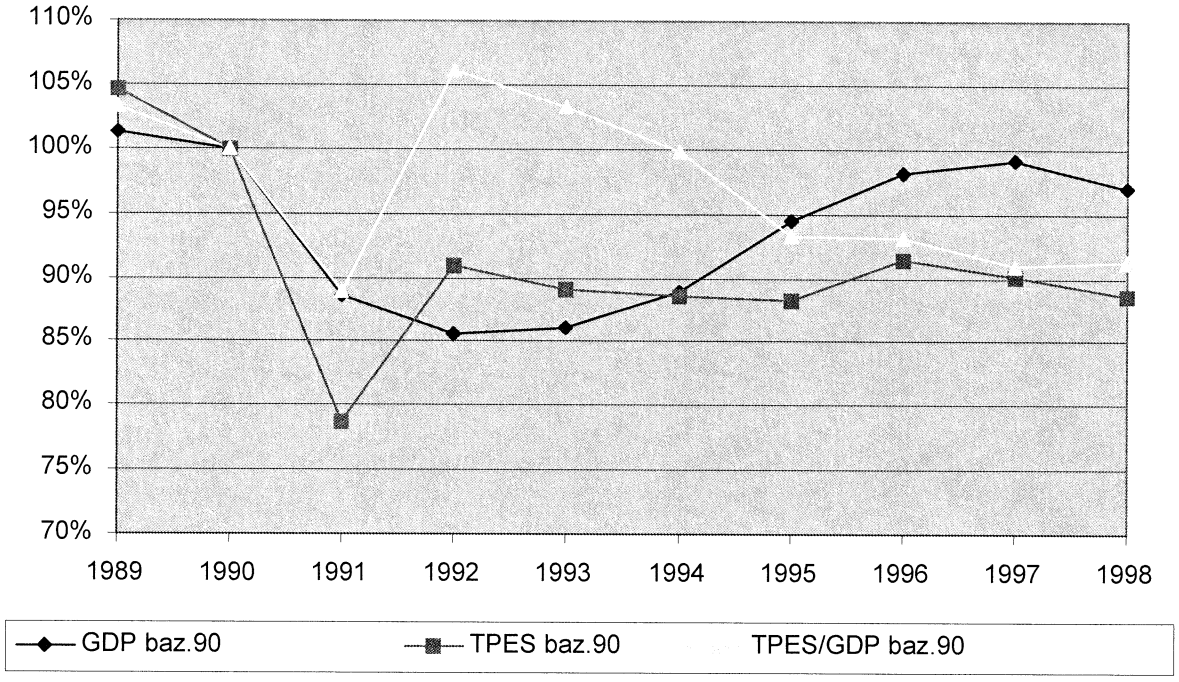
Chapter 2: Development and Current Situation of the Energy Industry

2.1 Energy Intensity

During the past decade, the development of its energy situation was influenced by the political changes in 1989. The following factors influenced the energy intensity in the Czech Republic:

- After 1989, the GDP declined until 1992, it reached the 1990 level again in 1997, then growth slowed downed and shrunk in 1998.
- Total energy demand dropped after 1989, with a sharp decrease in 1991, and a more-or less stable or slowly decline until 1998.
- Although energy consumption declined in the 1990's, GDP dropped too but later rose again, and thus energy intensity slowly declined (figure 2.1).

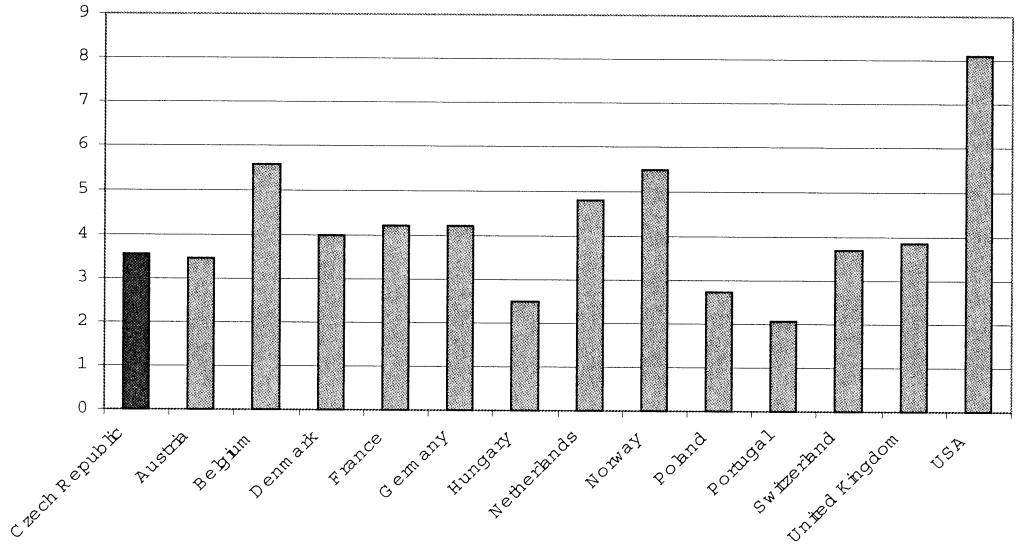
Figure 2.1: Development of Energy Intensity Indicators



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 4-5.

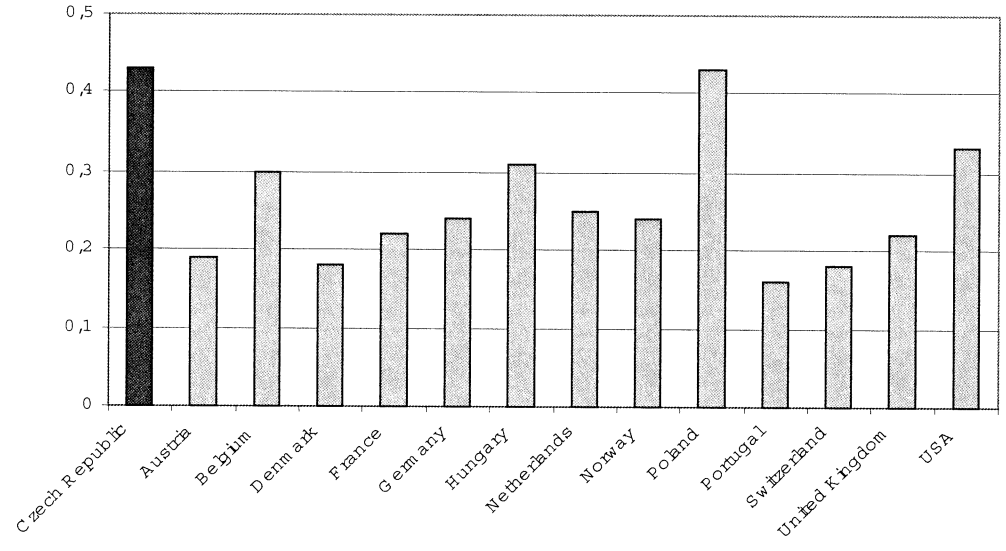
In the Czech Republic, domestic consumption of primary energy per person (3,94 toe/capita) is comparable with other European countries (figure 2.2). However, domestic primary energy consumption related to GDP in purchasing power parity is approximately twice the EU level (figure 2.3).

Figure 2.2: Total Primary Energy Supply per Capita



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 4-5.

Figure 2.3: International Comparison of Energy Intensity in 1997 (TPES/GDP (PPP), toe/1000, US $ PPP)



Source: International Energy Agency: *Key World Energy Statistics from the IEA, 1999 Edition* (Paris: IEA, 1999): 48-57.

There are several reasons for the high energy intensity of the Czech Republic:

- high proportion of energy intensive production with low added value;
- high proportion of domestic low quality fuel (lignite) that are used with relatively low energy efficiency in comparison with other types of fuel (e.g. natural gas); and
- lacking motivation and possibility to behave in an economic and energy efficient mode due to subsidised low energy prices in early 1990s, lack of responsibility for maintenance, shortage in investments, unclear ownership, and incomplete economic transformation.

Table 2.1: International Comparison of Selected Indicators

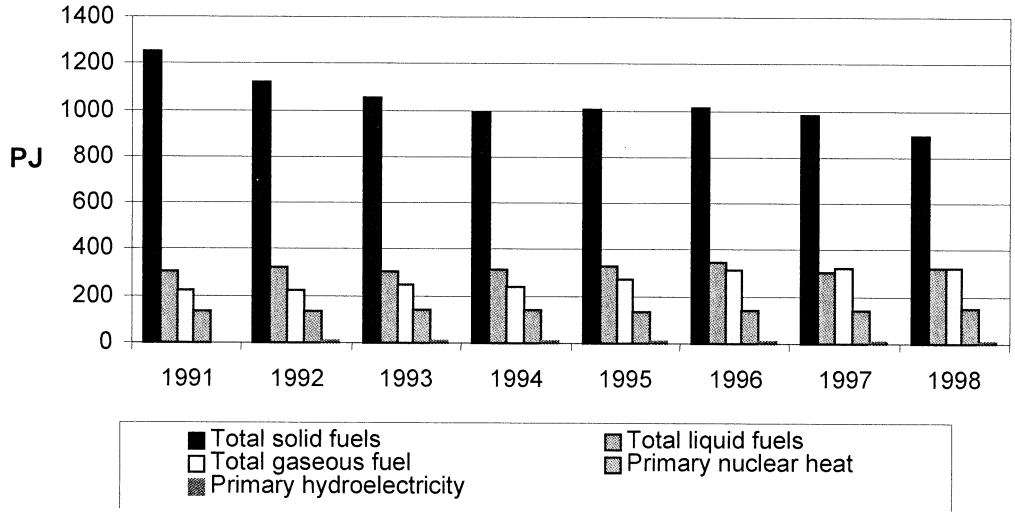
Indicator	Czech Republic	Austria	Belgium	Den-mark	France	Germany	Hungary	Nether-lands	Norway	Poland	Portugal	Switzer-land	United Kingdom
Population 1997	10.32	8.10	10.16	5.28	58.60	82.05	10.16	15.49	4.34	38.62	9.94	7.11	58.80
Population density [inhab/km^2], 1996	130.8	96.70	332.70	122.10	105.90	229.40	109.60	373.10	13.50	123.50	108.00	171.60	240.00
GDP [billion 90.US$], 1997	21.17	183.27	218.25	160.69	1 307.35	1 833.12	33.64	336.46	150.96	74.58	80.68	231.53	1 100.51
GDP(PPP) [billion 90.US $], 1998	94.75	149.90	190.09	114.23	1 103.53	1 443.59	68.02	293.97	102.46	245.57	125.12	148.85	1 055.63
Energy Production [Mtoe]	31.54	8.01	13.15	20.27	127.84	139.73	12.75	65.30	212.65	100.93	2.32	10.99	268.99
TPES [Mtoe]	40.58	27.36	57.12	21.11	247.53	347.27	25.31	74.91	24.23	105.15	20.40	26.22	227.98
TPES/population [toe/capita]	3.54	3.44	5.61	3.99	4.22	4.23	2.49	4.80	5.50	2.72	2.05	3.69	3.86
TPES/GDP [toe/1000 US $]	1.49	0.15	0.26	0.13	0.19	0.19	0.75	0.22	0.16	1.41	0.25	0.11	0.21
TPES/GDP (PPS) [toe/1000 90.US $ PPP]	0.43	0.19	0.30	0.18	0.22	0.24	0.31	0.25	0.24	0.43	0.16	0.18	0.22
Electricity Con-sumption [TWh]	58.22	52.90	78.43	34.99	409.76	527.30	32.81	95.56	107.03	123.90	33.82	52.25	336.59
Electricity Consumption/ Population [kWh/capita]	5 660.00	6 553.00	7 703.00	6 623.00	6 992.00	6 426.00	3 231.00	6 122.00	24 296.00	3 206.00	3 401.00	7 347.00	5 704.00
CO_2 emissions [Mt]	120.92	64.05	122.58	62.40	362.90	883.99	58.24	184.31	34.34	350.26	91.96	52.25	554.70
CO_2/TPES [t CO_2/toe]	2.98	2.31	2.15	2.96	1.47	2.35	2.30	2.46	1.42	3.33	2.55	1.71	2.43
CO_2/pop. [t CO_2/cap.]	11.74	7.94	12.04	11.81	6.19	10.77	5.73	11.81	7.79	9.06	5.22	6.29	9.40
CO2/GDP [kgCO_2/90. US$]	4.45	0.35	0.56	0.39	0.28	0.48	1.73	0.55	0.23	4.70	0.64	0.19	0.50

Source: International Energy Agency: *Key World Energy Statistics. 1999 Edition* (Paris: IEA, 1999): 48-57.

2.2 Total Energy Supply and Consumption

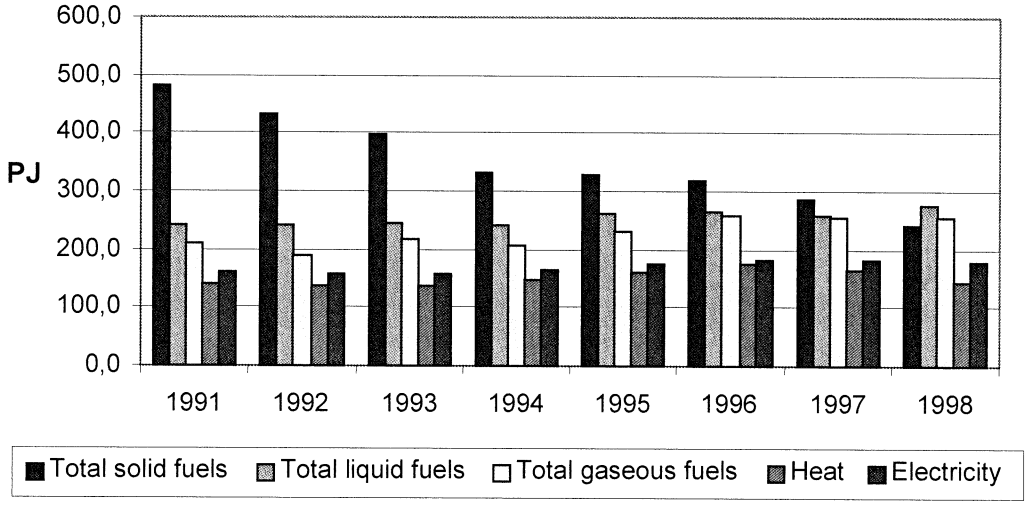
Energy supply and demand in the Czech Republic declined after 1989 (figures 2.4, 2.5). However, this slowdown differed among sectors. The largest decline occurred in coal consumption, especially with brown coal or lignite due to its replacement in heat generation. Natural gas plays an increasing role in the Czech energy economy both in private and public or municipal heat power plants especially in cogeneration. This shift from coal to gas was primarily driven by legislation and also by significant national financial support programmes such as the *National Programme for Healing the Atmosphere*.

Figure 2.4: Total Primary Energy Supply (1991-1998)



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 19.

Figure 2.5: Total Final Energy Consumption (1991-1998)



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 21.

Table 2.2: Primary Energy Supply

Item [PJ]	1991	1992	1993	1994	1995	1996	1997	1998
Hard steam coal	165.5	153.2	148.2	148.4	160.3	157.3	143.9	132.8
Hard coking coal	255.2	222.2	203.1	200.7	193.4	189.8	167.5	152.5
Brown coal/Lignite	857.4	761.8	727.8	656.5	672.4	694.9	663.8	608.9
Briquettes	-6.6	-3.8	-10.4	-7.8	-10.6	-13.7	-6.6	-5.1
Coke	-42.4	-34.5	-33.1	-34.0	-31.7	-35.2	-16.9	-23.8
Other solid fuels	21.9	21.5	21.1	20.6	21.9	22.7	24.8	24.6
Total Solid Fuels	**1251**	**1120.4**	**1056.7**	**984.4**	**1005.7**	**1015.8**	**976.5**	**889.9**
Light fuel oil/Gas oil	1.6	6	3.4	5.3	0.5	0.5	-0.9	0
Heavy fuel oil	19.3	13.2	19	5.1	-7.1	-4.7	-8.4	-1.2
Diesel oil	5.6	11.1	9.6	6.0	11.4	1.4	-0.5	4.7
Gasoline	2.8	7.5	14.6	24.6	25.4	26.8	27.8	29.1
Crude oil	266.6	277.5	258.6	274.5	289.0	317.2	293.2	283.7
Other luquid fuels	4.7	3.9	2.4	-1.6	7.2	2.0	-3.9	2.5
Total liquid fuels	**300.6**	**319.2**	**307.6**	**313.9**	**326.4**	**343.2**	**307.3**	**318.8**
Total gaseous fuel	**219.8**	**220.3**	**248.5**	**238.9**	**273.4**	**316.2**	**321.5**	**319.5**
Primary nuclear heat	**132.9**	**134.2**	**138.2**	**142.0**	**133.9**	**140.7**	**136.8**	**144.3**
Primary hydroelectricity	**3.6**	**5**	**4.9**	**5.3**	**7.2**	**7.1**	**6.1**	**5.0**
Total Primary Energy Supply	**1898.8**	**1788.2**	**1748.3**	**1684.5**	**1746.6**	**1823.0**	**1748.2**	**1677.5**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 19.

Table 2.3: Total Final Energy Consumption

Item [PJ]	1991	1992	1993	1994	1995	1996	1997	1998
Hard coal	62.5	52.6	48.5	44.4	45.0	40.0	38.0	38.8
Hard coking coal	16.7	8.7	8.2	1.4	6.2	6.0	3.9	0.3
Brown coal/Lignite	234.0	222.8	207.1	156.1	146.3	148.9	121.6	93.9
Briquettes	14.9	8.6	4.1	3.9	3.5	3.1	5.1	2.4
Coke	135.0	122.9	109.0	108.6	107.0	101.2	101.8	87.9
Other solid fuels	18.8	18.5	19.2	18.1	21.4	19.8	15.3	17.0
Total solid fuels	**481.9**	**434.1**	**396.1**	**332.5**	**329.4**	**319.0**	**285.7**	**240.3**
Propane butane	*	*	*	4.6	7.8	8.2	10.4	10.8
Gasoline	45.8	57.4	59.5	67.0	71.1	79.7	79.9	74.6
Diesel oil	77.5	74.5	68.6	71.0	84.9	92.6	99.2	102.6
Kerosene	*	*	*	6.2	7.1	4.9	6.7	3.8
Light fuel oil	17.6	16.5	15.4	15.4	10.5	12.4	10.2	5.3
Heavy fuel oil	50.9	45.0	44.5	32.2	23.7	27.7	14.2	22.2
Petrochemical products	*	*	*	26.1	34.8	22.1	20.1	19.7
Other liquid fuels	50.2	47	57	17.1	23.4	18.3	16.9	37.8
Total liquid fuels	**242.0**	**240.4**	**245.0**	**239.6**	**263.3**	**265.9**	**257.6**	**276.8**
Total gaseous fuels	**210.7**	**187.5**	**214.7**	**205.8**	**228.5**	**259.1**	**254.1**	**253.1**
Heat	**140.9**	**136.5**	**136.1**	**148.1**	**161.6**	**175.9**	**162.9**	**142.3**
Electricity	**159.7**	**156.9**	**156.4**	**162.7**	**173.9**	**182.8**	**180.1**	**176.8**
Total Fuels & Energy Cons.	**1235.2**	**1155.4**	**1148.3**	**1088.7**	**1156.7**	**1202.7**	**1 140.4**	**1 089.3**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 21.

Tables 2.2 and 2.3 show in detail the decline in consumption of solid fuels and the increase in supply and consumption of gas and liquid fuels. Between 1991-1999 these changes occurred:

- decline of primary supply of solid fuel by about 29%, decline in consumption of final energy from solid fuel by about 50%;
- increase of primary supply of liquid fuel by about 6.2%, increase of final energy consumption of liquid fuel by about 14%;
- increase of primary supply of gaseous fuel by about 45%, increase of final energy consumption of gas by about 20%.

2.3 Energy Balance

The total energy imports since 1991 are given table 2.4, of which liquids (crude oil) have a 50% share that rose by ca. 25% since 1991. In 1998, natural gas amounted to 40% that also increased by 40% between 1991 and 1998 while other fuels are less significant. Thus, natural gas and crude oil imports play a very significant role in the Czech economy. In 1998, natural gas amounted to 2.4% and crude oil to 3.8% of all imported commodities. Russia remained the main gas supplier with 85%, and 15% is imported from Norway. Crude oil is still imported mainly from Russia, 30% from EU countries and 30% from Slovakia. Coke is imported mainly from Poland.

Table 2.4: Total Energy Imports

Item [PJ]	1991	1992	1993	1994	1995	1996	1997	1998
Hard steam coal	54.1	35.6	31.0	23.5	40.0	51.4	41.8	33.3
Hard coking coal	27.1	6.9	12.8	16.1	26.3	25.3	10.5	4.9
Brown coal/Lignite	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0
Brown coal briquettes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Coke	0.0	1.2	1.4	5.6	8.8	3.9	9.8	6.4
Other solid fuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Total solid fuels	**81.2**	**43.7**	**45.4**	**45.2**	**75.1**	**80.8**	**62.1**	**44.6**
Crude oil	261.3	275.6	253.8	288.2	293.7	314.9	294.3	289.2
Propane, butane (LPG)	1.7	2.7	18.0	1.2	4.9	3.6	4.1	4.6
Gasoline	5.9	12.2	14.4	27.1	25.9	26.3	31.0	36.8
Diesel oil	23.1	19.7	12.3	21.7	22.7	20	25.0	39.5
Kerosene	*	*	*	1.2	0.9	1.1	2.1	3.6
Light Fuel Oil	5.9	12.2	14.4	13.7	2.8	0	0.0	0.2
Residual Fuel Oil	12	21.6	18	13.3	6.8	7.5	8.2	18.6
Other oils	4.5	4.2		0.1	0.8	0	0.0	0
Total liquid fuels	**314.4**	**348.2**	**330.9**	**366.4**	**357.7**	**373.4**	**364.7**	**392.5**
Natural gas	225.5	195.5	237.4	243.5	269.0	316.9	318.3	317.9
Other gaseous fuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Total gaseous fuels	**225.5**	**195.5**	**237.4**	**243.5**	**269.0**	**316.9**	**318.3**	**317.9**
Electricity	25.9	22.2	21.4	19.5	24.2	31.7	32.4	30.1
Total Imports	**641.2**	**597.2**	**635.1**	**674.6**	**726.0**	**802.8**	**777.5**	**785.1**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 17.

The total energy exports since 1991 are documented in table 2.5.

Table 2.5: Total Energy Exports

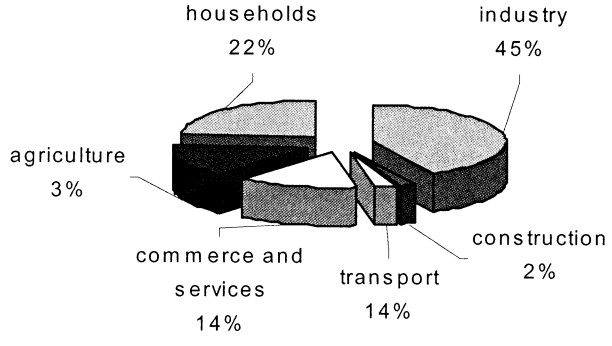
Item [PJ]	1991	1992	1993	1994	1995	1996	1997	1998
Hard steam coal	10.7	12.5	21.1	42.9	52.7	45.5	65.1	87.4
Hard coking coal	125.4	138.5	125.8	135.1	150.0	140.7	131.7	107.9
Brown coal/Lignite	121.3	109.1	108.3	81.8	87.6	75.3	60.5	52.7
Briquettes	6.7	3.7	10.4	7.9	10.6	13.8	6.7	4.5
Coke	43.9	36.1	36.8	39.1	40.1	37.9	28.4	27.8
Other solid fuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Total solid fuels	**308.0**	**299.9**	**302.4**	**306.8**	**341.0**	**313.2**	**292.4**	**280.6**
Crude oil	0.0	1.7	2.7	9.2	4.3	3.5	3.8	4.3
Propane, butane	0.0	0.0	0.0	0.0	0.0	1.9	1.3	0.7
Gasoline	0.1	0.9	0.9	1.2	3.5	0.0	0.0	2.5
Diesel oil	5.6	7.2	12.7	16.3	12.1	19.0	17.4	24.6
Kerosene	*	*	*	0.7	0.8	3.1	1.9	4.9
Light fuel oil	0.1	0.0	6.3	8.2	3.5	0.0	0.0	0.0
Heavy fuel oil	8.2	6.2	5.1	10.2	12.1	16.3	16.3	20.5
Other liquid fuels	1.5	1.5	0.8	0	0.7	0.0	6.3	0.1
Total liquid fuels	**15.5**	**15.8**	**28.5**	**45.8**	**37.0**	**43.8**	**47.0**	**57.6**
Natural gas	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Other gaseous fuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gaseous fuels	**0.0**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**
Electricity	**35.0**	**33.1**	**29.0**	**21.1**	**22.7**	**31.7**	**36.7**	**39.0**
Total Export	**358.5**	**348.9**	**360.0**	**373.8**	**400.7**	**388.7**	**376.1**	**377.2**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 18.

2.4 Energy Consumption in Sectors

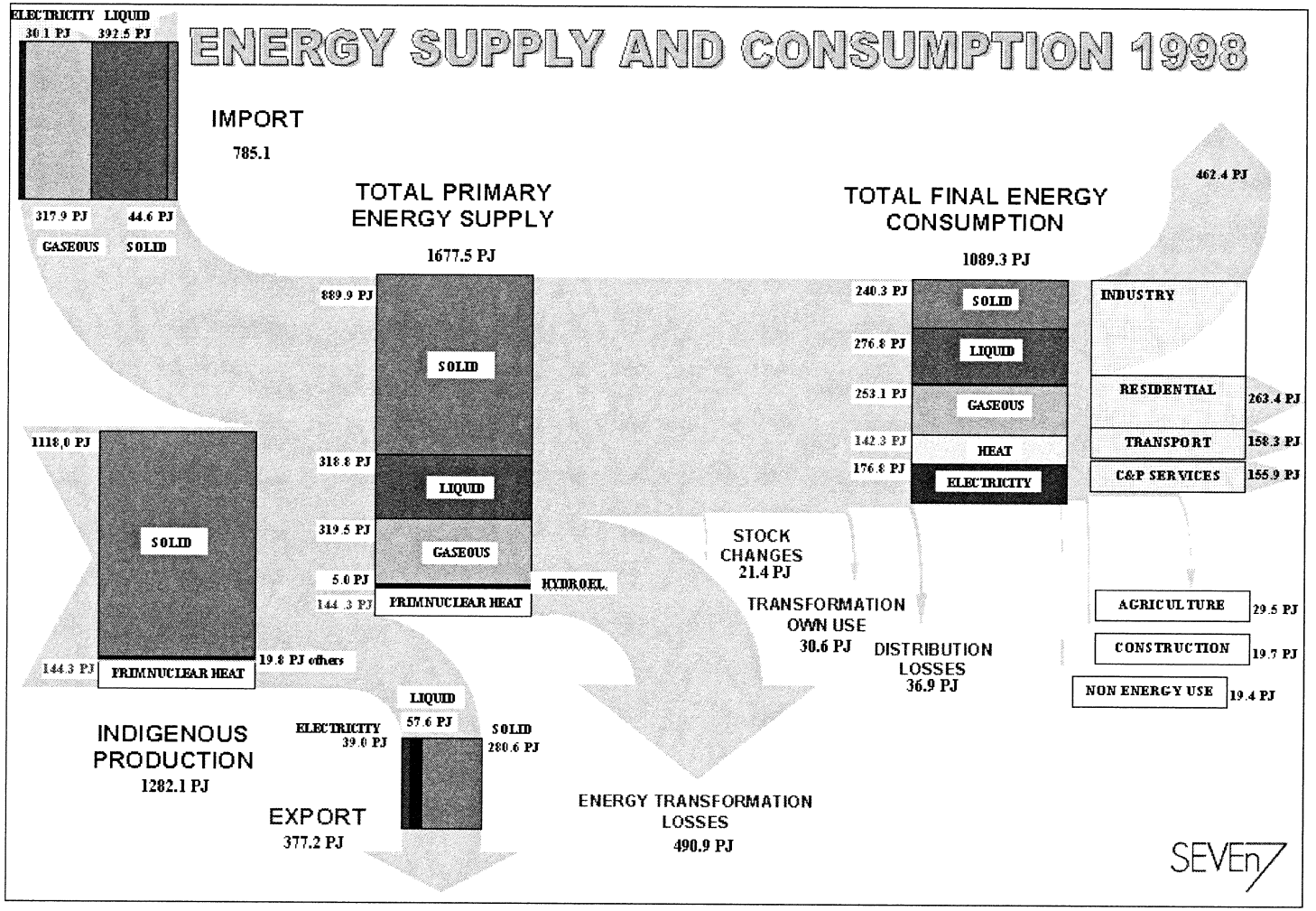
The economy is divided into several sectors: industry, construction, agriculture, transport, commerce and public services, and residential (figure 2.6). From 1991 to 1998, total energy exports remained almost unchanged, of which 74% are solid fuels (figure 2.7).

Figure 2.6: Total Final Energy Consumption in Sectors in 1998



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., Octber 1999): 24-29.

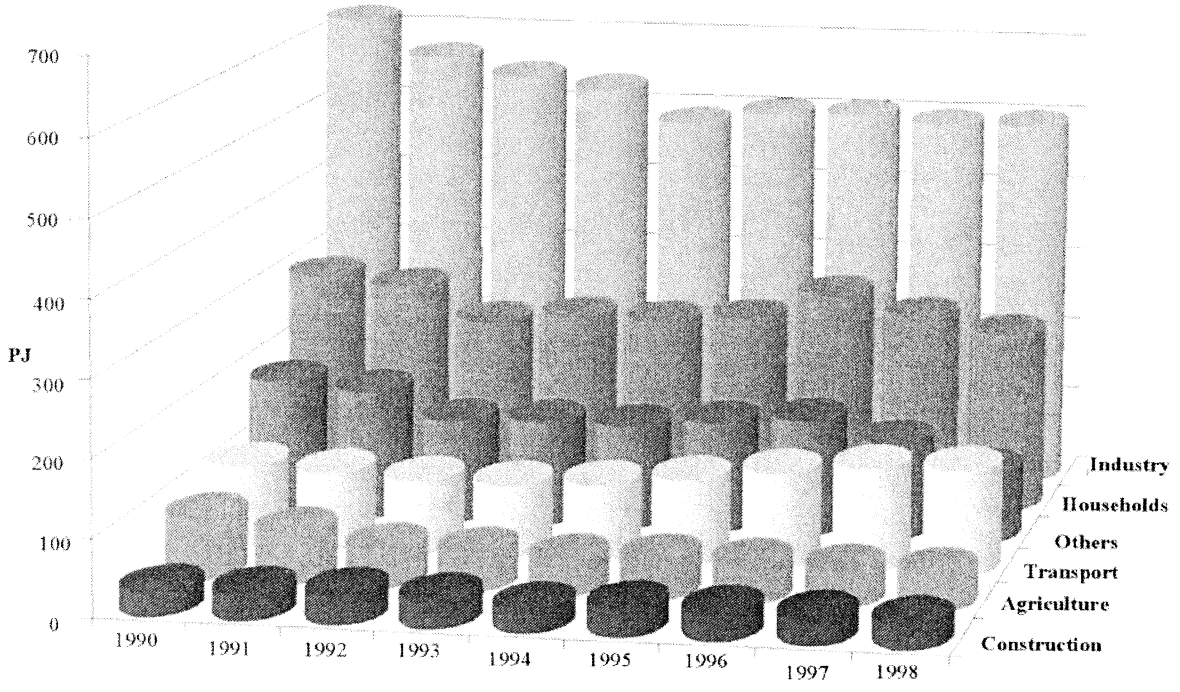
Figure 2.7: Energy Supply and Consumption in the Czech Republic in 1998



Source: Seven, 1999.

From 1991-1998, the consumption of fuel and energy in the industry sector declined due to the economic transformation. In the construction sector, in agriculture and for households only a minor decline occurred. Substantial changes in the structure of fuel and energy consumption resulted from a drop in consumption of brown coal for heating, while gas and electricity increased. In commerce and public services consumption increased but the share of solid and liquid fuels in final consumption declined. In recent years the number of private cars and lorries rose rapidly, as did the consumption of liquid fuels in the transport sector (figure 2.8).

Figure 2.8: Development of Final Energy Consumption in Sectors 1990-1998



Source: Czech Statistical Office: *Energy Balances 1990-1998* (Prague: Czech Statistical Office, 2000): 53-59.

2.5 Electric Power

Domestic consumption of electricity grew steadily until 1989 when is reached its maximum with 64,2 TWh. Since 1990 consumption dropped due to the declining industrial production and the performance of railway transportation. During the last decade, final consumption of electricity remained almost unchanged with an the average level of 52 TWh (table 2.6).

2.5.1 The Structure of the Energy Sector

Prior to 1990, the energy sector was integrated in the framework of the Czech Energy Utility CEZ (*Ceske energeticke zavody*). Since 1990, ownership was divided among CEZ jsc, the dominant generator and transmission grid, several independent producers, and eight distributors that experienced significant changes. On 1 July 1990, the regional electricity distribution companies became independent that were until then a part of the state monopoly enterprise CEZ. In May 1992, the joint-stock company CEZ was founded during the first wave of voucher privatisation. CEZ, jsc. is the major Czech electricity producer with a domestic share of more than 70% that operates 13 hydroelectric, 12 coal-fired and one nuclear power plant. The re-

maining capacity is supplied by independent plants operated by autoproducers and independent producers, by regional power distribution companies, and by imports and exports.

Table 2.6: Balance of Electric Power

Item [GWh]	1991	1992	1993	1994	1995	1996	1997	1998
Gross Electricity Production								
of which generation:								
steam	47 287	45 402	44 760	44 065	46 490	48 099	48 892	48 823
combined cycle	0	2	0	0	0	1 029	1 373	1 495
hydro	1 226	1 638	1 495	1 663	2 127	2 279	1 839	1 616
nuclear	12 132	12 250	12 627	12 977	12 230	12 850	12 494	13 178
Gross Electricity Production	**60 645**	**59 292**	**58 882**	**58 705**	**60 847**	**64 257**	**64 598**	**65 112**
Own Use of Power Plants								
of which generation:	3 366	3 138	3 112	3 014	3 161	3 544	3 839	3 981
steam	8	10	9	10	10	12	11	32
combined cycle	0	0	0	0	0	1	18	9
hydro	780	775	785	828	796	801	774	826
Total Own Use	4 154	3 923	3 906	3 852	3 967	4 358	4 642	4 848
Net Electricity Production	**56 491**	**55 369**	**54 976**	**54 853**	**56 880**	**59 899**	**59 956**	**60 264**
Imports	4 692	4 026	5 952	5 415	6 722	8 811	9 013	8 384
Exports	4 047	4 717	8 056	5 860	6 304	8 814	10201	10 845
Balance of Foreign Trade	645	-691	-2 104	-445	418	-3	-1 188	-2 461
Transfer Slovak Republic	-3 175	-2 345	0	0	0	0	0	0
Available for Consumption								
(Generation+Foreign Trade+ Transfer)	53 961	52 333	52 872	54 408	57 298	59 896	63 410	62 651
Total Supplied for								
Large consumers	26 781	25 007	23 809	23 394	24 261	24 365	23 532	23 324
Small consumers	16 147	16 418	17 354	19 188	21 339	23 000	22 330	21 482
Others	1 482	1 289	1 307	1 556	1 288	1 661	1 948	2 022
of which pumping stations	*442*	*325*	*314*	*436*	*375*	*596*	*517*	*654*
Consumpt. of Autoproducers	5 741	5 759	5 609	5 610	5 642	5 716	5 870	6 022
Network Losses	*3 811*	*3 860*	*4 793*	*4 660*	*4 768*	*5 154*	*5 088*	*4 953*
Total Electricity Supply	**57 136**	**54 678**	**52 872**	**54 408**	**57 298**	**59 896**	**58 768**	**58457**
Total Final Consumption	**52 883**	**50 493**	**47 765**	**49 312**	**52 155**	**54 146**	**53 163**	**52 850**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 82.

Act No. 222/1994 "on conditions of enterprises and on government functions in energy branches and on the state energy inspection" requires in Article 13, paragraph 5 from licence holders operating production plants with an output above 50 MW and from suppliers operating distribution systems of extra-high and high voltage the obligation to establish dispatching centres based on an association agreement. The Central Energy Dispatching Office of the Czech Republic was founded as an association of interested companies. Each year, it supplies data on the Czech electricity system. Presently, it has 27 members, i.e. electricity producers and suppliers, including the eight regional distribution companies (REAS).

The power plants of CEZ jsc using solid fuel has a capacity of 7 092 MW (31.12.1997). Since 1985, the Czech Republic has operated the nuclear power plant in Dukovany with a total capacity of 1760 MW. In 1998, for hydro power plants the installed capacity was 1 872 MW. A

new 2 000 MW nuclear power plant is under construction in Temelin that is planned to start operation in 2001 (table 2.7).

Table 2.7: CEZ jsc. Power Plants (31. 12. 1997)

Location	Installed capacity [MW]		Start of operation	Remarks
	capacity of units	total	year	
Coal Power Plants				
Prunerov I	4 x 110	440	1967-1968	brown coal
Prunerov II	5 x 210	1 050	1981-1982	brown coal
Tusimice I	3 x 110	330	1963-1964	brown coal
Tusimice II	4 x 200	800	1974-1975	brown coal
Melnik II	4 x 110	440	1971	brown coal
Melnik III	1 x 500	500	1981	brown coal
Tisová I	50	222	1959-1960	brown coal
Tisová II	1 x 100	100	1961	brown coal
Hodonín (part only)	1 x 105 ; 1 x 50	155	1954-1958	lignite
Porici (part only)	110	110	1957-1958	black coal
Chvaletice (part only)	2 x 200	800	1977-1978	brown coal
Detmarovice	4 x 200	800	1975-1976	black coal
Ledvice I	1 x 200	200	1967	brown coal
Ledvice II (part only)	1 x 110	110	1966-1969	brown coal
Pocerady, units 2.3,4	3 x 200	600	1970-1971	brown coal
Pocerady, units 5,6	2 x 200	400	1977	brown coal
Dvur Kralove *	1x 6,3 ; 1 x 12	18	1955; 1963	brown coal
Náchod *	1 x 5; 1 x 12	17	1950; 1969	brown coal
Total		**7092.3**		
HU- brown coal, CU - hard coal				
Hydro Power Plants				
Lipno I, II		120; 1.5	1959; 1957	
Orlik		364	1961-1962	
Slapy		144	1954-1955	
Hnevkovice		10	1992	
Korensko		4	1992	
Kamyk		40	1961	
Vrane		14	1936	
Mohelno		1	1977	
Zelina		1	1994	
Stechovice I		23	1943-1944	
Stechovice II		45	1947-1948	overdrawn
Dalesice		450	1978	overdrawn
Dlouhe Strane		650	1996	overdrawn
Stvanice		5.67		
Total		**1 872**		
Nuclear Power Plants				
Dukovany	4 x 400	1 760	1985-1988	
Temelín	2 x 981	2 000	in construction	
Wind Plants				
Mravenecnik		1.165	1998	
Dlouhá Louka		0.315	1993	
Photovoltaic				
Mravenecnik		0.010	1997	

Source: CEZ jsc: *Annual Report* (Prague: CEZ jsc., 1998):23.

Sources of independent producers of a public character (members of the Central Dispatching Office) have an installed capacity of 2 820 MW, which in this group represents a 70% growth compared with 1990. The highest increase has been in the building of new sources based on new technologies, e.g. the Vresova steam-gas power plant (The owner of Vresova gas power plant is the mining company *Sokolovska uhelna, Jsc*. The installed capacity is 370 MW).

Table 2.8: Independent/Auto Producers: Members of Central Dispatching Office in 1998

Company, Owner	Installed Capacity [MW]
Steam plant	
Elektrarny Opatovice	361.8
Energetika Trinec	86.0
Energotrans	342.0
Chemopetrol	307.2
Kaucuk	60.0
Moravskoslezske teplarny	262.1
Nova Hut	235.0
Plzenska energetika	84.0
Plzenska teplarenska	55.0
Prazska teplareska	136.0
První severozapadni teplarenska	236.0
Sokolovska uhelna	250.0
Synthesia	75.0
Teplarna Èeské Budejovice	66.2
Teplarna Usti nad Labem	88.0
Teplarny Brno	96.2
Vitkovice	79.0
Total steam plant	**2 820.0**
Steam gas plant	
Plzenska teplarenska	1.8
Sokolovska uhelna	370.0
Teplarna Usti nad Labem	70.0
Teplarny Brno	95.0
Total	**536.0**
All independent producers: non UED members	**3 357.4**

Source: Central Dispatching Office: *Annual Report of Electrical Distribution and Transmission Network, 1998* (Prague: Central Dispatching Office, 1999): 25.

Table 2.9 gives the sources for those independent producers that are not members of the Central Dispatching Office: Their total installed capacity (including steam power plants, gas power plants and water power plants) is 1 003 MW. The current electric power system reflects the changes that occurred during the last decade with respect to the production technologies and ownership structure. Three groups of sources emerged that differ regarding their possibilities to cover the electric loading diagram, and their ability to obtain economically favourable high values of annual consumption. In the production base the following types of sources may be distinguished, due to their relevance for the national energy supply:

a) Sources mostly belong to CEZ jsc. for covering both primary and secondary demands of the regulation work primarily for 400 kV and 220 kV networks and in some cases for 110 kV.

b) Sources of regional significance with a heat-generation component that, with few exceptions, do not feed-in to the grid. These sources work for networks up to a maximum of 110 kV, but often for high-voltage networks of 35 kV, 22 kV, and 10 kV. Only a small number

of sources are in traditional condensation blocks for coal with less than 500 MW. A great part of the output is for heat generation, about 850 MW directly (back-pressure output), and approximately 930 MW partially (output in collection machines).

Table 2.9: Independent and Auto Producers outside of Central Dispatching Office in 1998

Company, Owner	Installed Capacity (over 10 MW) [MW]
Steam Plants	
AssiDoman Sepap	94.0
Biuocel	41.0
Cukrovar arafinerie cukru Dobrovice	10.5
Cukrovar hrochuv Tynec	12.0
Cukrovar Hrusobvany nad Jevisovkou	12.0
Deza	16.0
ECK Generating	28.0
ECS	12.0
Energetika Tatra	24.0
Energzet	18.0
JIP - Papirny Vetrni	24.0
Kralovodvorske zelezarny Energo	6.0
Krkonosske papirny	4.0
Lovochemie	29.0
Pribramska teplarenska a.s.	37.0
Setuza	12.0
Spolana	77.2
SKO - Energo	70.0
Teplarna Liberec	12.0
Teplarna Otrokovice	37.0
Teplarna Strakonice	24.0
Teplarna Svit	49.3
Teplarny Karvina	91.0
Acthem	18.0
ZDAS	12.0
Total steam and gas plant	**770.6**
ECK Generating	66.9
Kralovodvorska zelezarny Energo	10.0
Krkonosske papirny	9.2
Termo decin	11.7
Total PPE	**97.8**
Hydro	
Hydrocez	14.6
Jihomoravska energetika	33.0
Povodi Ohre	15.1
První energeticka	12.6
Severoceska energetika	19.5
Vychodoceska energetika	16.5
Total Hydro	**111.3**
Others	23.2
Total independent producers	
-non members UED	1 002.9

Source: Central Dispatching Office: *Annual Report of Electrical Distribution and Transmission Network, 1998* (Prague: Central Dispatching Office, 1999): 25.

c) Industrial energy plants include larger sources that can supply only a limited amount of electricity to the grid since they serve production needs. They do not participate in system

services. The larger sources work for smaller 110 kV and for high-voltage networks. From their presently installed total capacity of approximately 1950 MW roughly 1000 MW is in collection machines, ca. 700 MW in back-pressure machines, 100 MW is represented by steam-gas or combustion technologies, and a minority is in traditional condensers.

2.5.2 Electric Power System Fuel Base of the Czech Republic

The dominant fuel type remains domestic brown coal, followed by nuclear fuel and bituminous coal. Nuclear fuel elements for the nuclear power plant are purchased abroad. Thus, the Czech Republic is fully dependent on nuclear fuel import. When the Temelin nuclear power plant will be fully operational electricity production from nuclear sources will reach approximately 25 TWh/year or about 40% of the total domestic electricity generation.

For the remaining 60% of domestic production, fossil fuels will serve as the main source, with hydro energy supplying only 2% to 3% of primary energy. A major portion consists of domestic brown coal and a partial share of domestic and Polish bituminous coal. For some time, lignite consumption for electricity production has been on the decline, and due to mining limits, no new deposits are presently added. High-grade fuels (natural gas and oil) are of greater importance for the regional energy sector and in the tertiary sphere. Here gas is increasing in connection with the possible development of steam-gas power plants and cogeneration units. However, this growth is accompanied with certain problems due to the seasonal nature of natural gas consumption and the necessity of its balanced take-off. A partial solution are provided by equalising gas bunkers, but most important for Czech energy policy is the need to harmonise and to co-ordinate the gas industry with the electricity sector.

2.5.3 Transmission and Distribution Electricity Networks

Presently, existing networks are used very intensively and networks are being strengthened and built in the vicinity of large urban and industrial zones. The impact of industrial recession on large enterprises can also be observed and these networks are less used. Of great importance are 110 kV networks from smaller independent sources. Between 1998 and 2000 about 1 100 MW was fed-in to the grid.

Table 2.10: Transmission and Distribution Electricity Grid

Grid Lenght in [km]	**1994**	**1995**	**1996**	**1997**	**1998**
Overhead Lines VHV - CEZ	**4501**	**4544**	**4562**	**4535**	**4535**
of which single	3438	3454	3468	3432	3429
double	1063	1090	1094	1105	1106
400 kV	**2817**	**2860**	**2875**	**2916**	**2916**
of which single	2336	2352	2363	2404	2404
double	481	508	512	512	512
220 kV	**1553**	**1553**	**1553**	**1485**	**1485**
of which single	1055	1055	1055	976	975
double	498	498	498	509	510
110 kV	**131**	**131**	**131**	**131**	**131**
of which single	47	47	47	47	47
double	84	84	84	84	84
Overhead Lines VHV Power Distribution Comp.	**10631**	**10626**	**10756**	**11118**	**11897**
Overhead and Cable Lines High Voltage Total	**71817**	**72327**	**72951**	**73864**	**76181**
Overhead and Cable Lines Low Voltage Total	**125081**	**126915**	**128528**	**129880**	**131000**

Source: Central Dispatching Office: *Annual Report of Electrical Distribution and Transmission Network, 1998* (Prague: Central Dispatching Office, 1999): 21.

This growth is significant while obsolete or ineffective production blocks are presently shut down. The large power plants are mostly connected to the 400 kV and 220 kV grid and in some cases to the 110 kV grid.

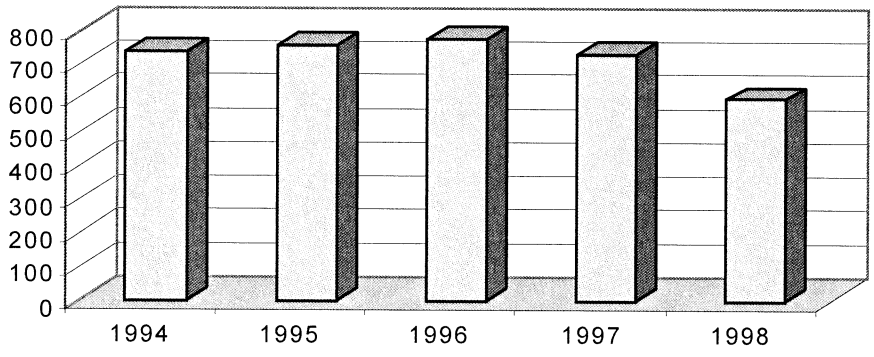
A relatively strong voltage system of 220 kV and 400 kV interconnects abroad. These voltage levels are also used in European countries that are members of UCPTE (Union for Cooperation of Producers and Transmitters of Electricity). In addition, there are international interconnections for 110 kV networks, to certain consumption areas, currently primarily for imports. But, since the volume of the power interchange and the length of transfers in these networks are limited, these exchanges have merely a regional character. Regarding the profitability of imports, the transfer capacities of interstate 110 kV transmission lines are fully used.

On 1 August 1999, the company CEPS jsc started its activity to carry out dispatching control, to maintain and to develop the transmission network systems as well as all interconnecting lines to neighbouring countries. But its scope of activity does not include electricity trading. It is a subsidiary wholly owned by the largest Czech electricity producer, CEZ jsc. The ownership of all 400 kV and 220 kV networks and of selected 110 kV lines was transferred to CEPS, a 100% subsidiary of CEZ.

2.6 Coal

After 1989, coal mining companies went through many changes including privatisation. The consumption of both hard and brown coal declined, and therefore these enterprises have had problems with selling their production. According to government plans - contained in the *Energy Policy* document - for restructuring the coal industry, the decline in coal consumption will continue. Figures 2.9 and 2.10 illustrate that after a sharp decrease in the early 1990s brown and hard coal production continued to decline in recent years.

Figure 2.9: Development of Brown Coal/Lignite Production (PJ)



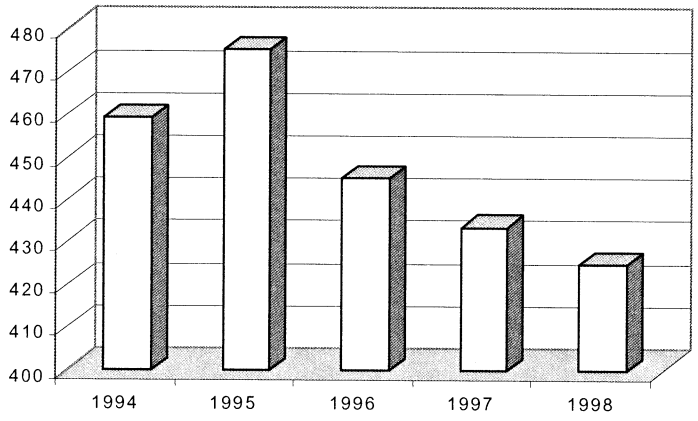
Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 41-45.

2.6.1 The structure of the coal sector

The process of shrinking and privatisation continues in all major coal mining companies in the Czech Republic: *Mostecka uhelna spolecnost* (Most Coal Company) in Most, *Severoceske doly* (North Bohemian Mines) in Chomutov, and *Sokolovska uhelna spolecnost* (Sokolov Coal Company) in Sokolov that mine brown coal in North-Western Bohemia. During the final privatisation process the black-coal mining companies *OKD, jsc* in Ostrava and *CMD, jsc* in Kladno were merged and transferred to the holding company *Karbon Invest*, jsc in Kladno. In both companies mining activity in uneconomic pits is being phased out with state support.

Simultaneously, the separation of the management of the productive and part of OKD continues. The management of the non-productive part is scaled-down with state subsidies.

Figure 2.10: Development of Hard Coal Production (TJ)



Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 36-40.

Table 2.11: Natural Gas Balance

Item [TJ]	1994		1995		1996		1997		1998	
	[mil.m^3]	[TJ]	[mil.m^3]	[TJ]	[mil.m^3]	[TJ]	[mil.m^3]	[TJ]	[mil.m^3]	[TJ]
Total Supply										
Import	7 165	243 446	7 904	268 270	9 314	316 723	9 368	318 282	9 343	318 129
Purchase										
from Moravian Oil Comp.	120	3 773	119	4 039	104	3 537	92	3 233	104	3 541
from OKD	130	4 223	135	4 545	132	4 365	8	3 734	10	341
Others							290	9 875	269	9 159
Total Supply	**7 415**	**251 442**	**8 158**	**276 854**	**9 550**	**324 625**	**9 758**	**335 124**	**9 726**	**331 170**
Own consumption	2	69	20	269	8	265	155	1 145	202	6 878
Replenishing underground storages	364	12 350	87	2 953	231	7 855	130	4 413	120	4 086
Losses	340	11 549	350	11 878	337	11 526	146	10 372	155	5 278
Total Own Consumption	**706**	**23 968**	**455**	**15 100**	**578**	**19 646**	**431**	**15 930**	**477**	**16 242**
Purchase										
Large Consumers	4 859	165 193	5 332	181 287	5 809	197 516	5 856	199 852	5 751	195 822
Small Cons.	430	14 616	645	21 939	872	29 647	871	29 614	928	31 598
Residential	1 507	51 269	1 918	65 202	2 371	80 619	2 529	85 986	2 554	86 964
Exports	2	52	1	34	1	34	15	26	0	0
Total Purchase	**6 798**	**231 130**	**7 896**	**268 462**	**9 053**	**307 816**	**9 271**	**315 478**	**9 233**	**314 384**
Statistical balance differences	-89	-3 656	-193	-6 708	-81	-2 837	57	3 716	16	544

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 71-75.

2.7 Natural Gas

Total consumption of gaseous fuels rapidly increased in the 1990s. Production of town gas ended in 1997. Table 2.11 offers a good survey on the import, production and consumption of natural gas and of the rapid growth of natural gas consumption in all branches of the economy and in households. In municipalities, town gas was replaced by natural gas. A major reason for this growth of natural gas consumption was an effort to reduce the impact of the pollutants from coal combustion for the environment. This shift from coal to natural gas was supported by state subsidies for the construction of gas pipelines in urban areas.

2.7.1 The Structure of the Natural Gas Sector

The exclusive supplier of natural gas to the Czech Republic is Transgas that has remained a state-owned enterprise. In spring 2000, its privatisation plan was under development. Transgas also transports natural gas through the Czech Republic to Western Europe via its very high pressure transit gas pipelines. The primary activity of the eight gas distribution companies (one per region) is the purchase and distribution of natural gas. Their property consists of gas pipeline networks up to the pressure of 4 MPa. Network density is unequal, it depends on the degree of gas utilisation in a particular region.

2.7.2 Transmission and Distribution Gas Networks

The network of high and very high pressure pipelines was developed primarily for natural gas. For town gas pipelines were also built and later they were adjusted for the transition from town to natural gas. The total length of the transmission pipelines and the number of consumers are given in table 2.12.

Table 2.12: Transmission and Distribution Gas Networks

Item	unit	1994	1995	1996	1997	1998
Pipelines Transmission Systems						
Transit Pipeline	[km]	2 120	2 240	2 321	2 368	2 399
VVTL Pipelines	[km]	1 000	1016	1 017	1 087	1 086
VTL Pipelines	[km]	11 009	11 385	11 634	11 918	12 154
Distribution Systems						
STL a NTL Pipelines (Natural Gas;Town Gas)	[km]	24 109	27 567	29 138	33 498	37 354
Number of Consumers						
Natural gas	[number $*10^3$]	1 902,0	2 039,5	2 276,7	2 376,1	2 456,1
Town gas*	[number $*10^3$]	199,3	116,2	0	0	0

*The productin of town gas was terminated
VVTL – very high pressure
VTL - high pressure
STL – medium pressure
NTL - low pressure

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 71-76.

Transgas has operated all domestic underground storage reservoirs, and it entered contracts with foreign private operators for the use of additional underground storage reservoirs abroad. Some reservoirs were built and are operated by foreign investors (SPP Slovakia) for their own purposes on Czech territory (Table 2.13).

2.8 Liquid Fuels

In the 1980s, motor fuels and heating oils were produced only from crude oil supplied by the former Soviet Union. This dependence on crude oil import from only one source ended in 1995 when a new pipeline was put into operation linking Ingolstadt (Germany) with Kralupy and Litvinov. The consumption of light and heavy oils for heating declined significantly in 1990s, while the consumption increases in the transport sector are considerable (table 2.14).

Table 2.13: Underground Storage Gas Reservoirs

Locality	Storage Capacity [mil.m^3/year]	Max. Extraction Output [mil.m^3/day]
Own Storage		
Tvrdonice	495	6.5
Dolní Dunajovice	695	8.5
Lobodice	140	2.7
Stramberk	420	6.0
Haje	40	6.0
Total Own Storage	**1750**	**29.7**
Lease Storage		
Láb (Slovakia)	500	6.0
Rehden (Germany)	491	4.1
VNG (Germany)	94	1
Total Lease Storage	**1085**	**11.1**
Total Undergroung Storage	**2 835**	**40.8**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 76.

Table 2.14: Liquid Fuels Consumption in Sectors

Sector	Consumption of liquid fuels [TJ]				
	1994	**1995**	**1996**	**1997**	**1998**
Industry	74 259	85 133	71 033	55 831	83 189
Construction	10 692	11 010	10 834	11 073	8 989
Agriculture	11 856	15 540	16 826	17 242	16 632
Transport	116 740	133 459	145 891	155 121	152 959
Commerce and Public Services	20 267	12 738	16 180	12 810	9 535
Households	5757	5500	5156	5560	5435

Source: KONEKO Marketing Co. Ltd.: *Energy Economy CR 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 24-29.

Since 1993, all Czech refineries were privatised. Construction of strategic reserves for crude oil started and the build-up of necessary reserves is a priority aim of the Czech energy policy with respect to the planned EU accession by 2003.

2.9 Heat and District Heating

District heating and cogeneration of heat and power have a long tradition in the Czech Republic and it has been widely used. About 32% of the households are connected to the grid. A large part of the heat is generated in large-scale combined heat and power (CHP) plants (table 2.16) that rely to a large extent on solid fuels with a growing share of natural gas. Since 1993,

district heating has experienced strong competition from individual gas heating. The government has supported gas heating to reduce emissions. District heating is supported by a reduced VAT tax of 5% instead of 22%. District heating utilities are both local, and in some cases regional enterprises, thus the number of companies in the heating sector is very high. The producers and distributors of district heating were privatised. In some cases municipalities own shares. Each district heating utility working commercially in heat production and distribution requires a licence as a heat producer or distributor.

Table 2.15: Production of Heat (1994 - 1998)

Item [TJ]	1994	1995	1996	1997	1 998
Net Heat Production					
Public Plants					
Production from combustible fuels	120 936	137 696	151 848	140 122	124 205
Production from nuclear fuel	487	493	558	544	544
Total	**121 423**	**138 189**	**152 406**	**140 666**	**124 749**
Autoproducer Plants	30 826	28 589	29 720	30 261	25 005
Total Net Production	**152 249**	**166 778**	**182 126**	**170 927**	**149 754**
Heat Supply					
Distribution Losses	4 176	5 222	6 232	8 022	7 407
Total Consumption	**148 073**	**161 556**	**175 894**	**162 905**	**142 347**
Combustible Fuel Input					
Solid fuels	140 899	164 652	150 972	142 931	127 823
Liquid fuels	20 007	21 836	20 506	17 063	13 601
Gaseous fuels	30 219	35 871	49 104	43 830	41 218
Total	**191 125**	**222 359**	**220 582**	**203 824**	**183 342**
Production Efficiency from Fossil Fuels [%]	**79.4**	**74.8**	**82.3**	**83.6**	**81.4**

Source: KONEKO Marketing Co. Ltd.: *Energy Economy Czech Republic 1994-1998 in Numbers* (Prague: KONEKO Marketing Co. Ltd., October 1999): 77-81.

2.9.1 The Structure of the Heating Sector

Until 1989, the state-owned electricity monopoly company CEZ owned all large public heating plants while the networks for long-distance heat distribution and the small heating facilities mostly belonged to "housing companies" that were administered by towns and municipalities. During the first phase of the privatisation process, all electricity distribution companies and large heating plants were separated from CEZ and afterwards privatised. In the first wave of voucher privatisation the large heating companies were privatised. During the second wave of privatisation the ownership of the privatised heating plants was transferred primarily to private shareholders rather than to municipalities. The heating networks - usually owned by "housing companies" - were also transferred to municipal ownership. For those heating companies that were privatised in the first wave, privatisation was completed with the concentration of ownership in joint-stock companies and with a change of ownership. Foreign capital entered many heating companies and in some cases it even gained a majority. Privatisation of the industrial energy systems was mostly carried out as part of the privatisation of the production facilities.

Those heating companies that were privatised in the second wave were either sold to private owners that also took over their management, or they remained in the hands of the municipalities. In 2000, these heating plants are mostly managed by private companies or they operate within the municipal organisational structure.

Usually large heat sources are coal power plants and gas heating stations in a simple or a combined steam-gas cycle. The coal sources for long-term operation were desulphurised and denitrified to meet strict legal requirements.

Natural gas became a new fuel for small sources for the hot water and heat transportation. It also allows centralisation of heat generation for smaller units. Through government programmes (e.g. the *National Programme for Healing the Atmosphere*, programmes of the *Czech Energy Agency*) and with the support of subsidies these small sources could replace obsolete systems with modern gas facilities and sometimes with cogeneration units.

2.9.2 Heat Networks

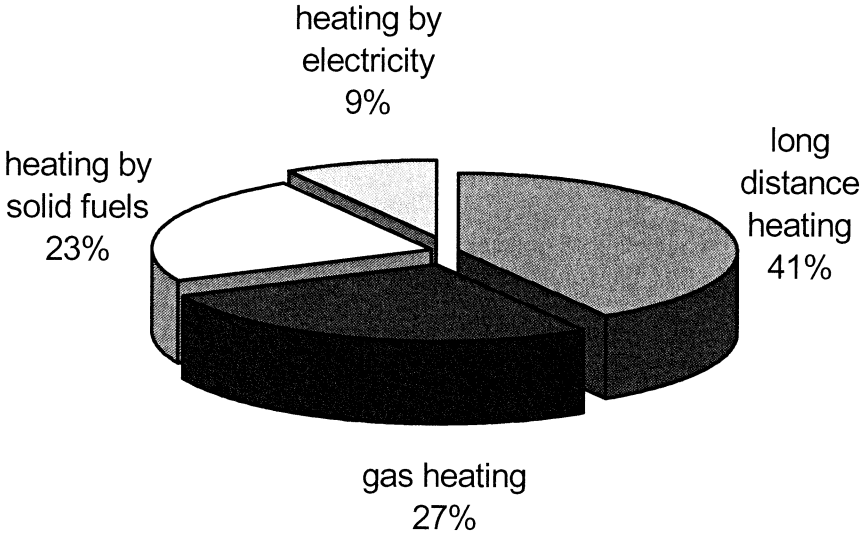
The majority of the heating systems use the primary transmission system and secondary distribution networks for heat transfer and distribution from the generation plant to the consumer. Most thermal energy for buildings comes from heat-exchange stations through a take-off place, the so-called "house bottom", where the central billing meter for the building is located. Measurement beyond this point is also required by law. Large consumers and industries are directly connected to the transmission system.

For billing purposes, consumption was initially measured in the individual flats. The basic costs for metering were then estimated at 10 000 to 15 000 CZK (or 555 to 833 DM). Although a state subsidy programme was launched, this form of metering was eventually abandoned. Thus, the official billing point for houses remains the meter at the "house bottom". Individual flats are billed based on heat cost allocators and partially on the size of the flats.

2.9.3 Heating Fuel Base

The primary source for heat generation are solid fuels with a 70% share. Thus, the heat sector contributed much to air pollution. Since 1990, the share of gaseous fuels has increased, and to a lesser extent has the share of renewables.

Figure 2.11: Share of Fuels for Heating



Source: Magazine *"Energie"* (Prague: Panorama Group, Jsc., 9/10, 1999): 47.

2.10 Combined Heat and Electricity Production

The use of cogeneration in several European states is compared in table 2.16 that refers to large scale power plants with combined heat and electricity production. The cogeneration share of gross electricity production in selected European countries can be seen in figure 2.12. With a 17% cogeneration share of gross electricity production (large-scale power plants) the Czech Republic belongs to those countries with developed combined heat and electricity production.

2.10.1 The Structure of the Sector

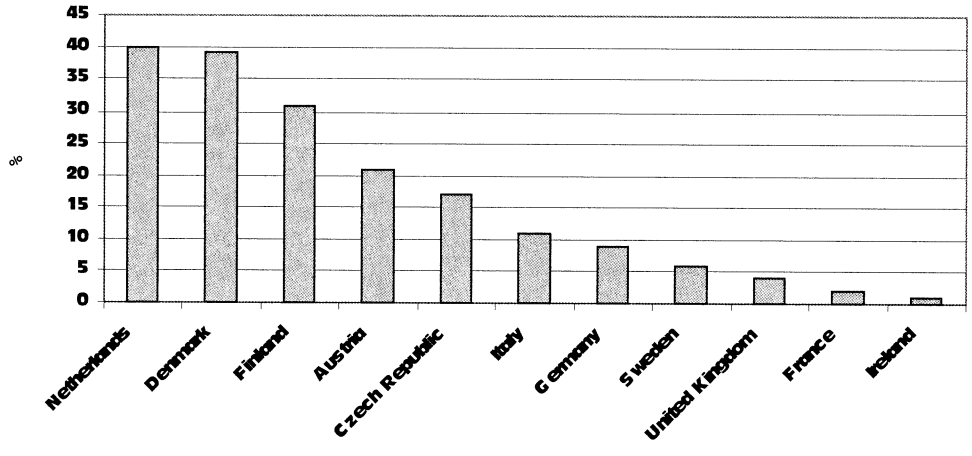
Since 1990, the ownership structure experienced extensive changes. In the early 1990s, among the public energy sources were 31 cogeneration plants owned by CEZ with an installed electricity capacity of 1944 MW_e that had generated a total of 8296 GWh in 1989.

Table 2.16: Cogeneration in the EU Countries (1998)

Countries	Total installed gross electrical capacity in MW	CHP Share	CHP Share %	Total gross electricity generation in GWh	CHP Share	CHP Share %
Austria	16032	3247	20	54645	11722	21
Czech Republic	15513	3470	22	65112	11253	17,2
Denmark	10604	7496	71	40096	15724	39
Finland	14143	4085	29	65546	20312	31
France	107232	3220	3	476337	9492	2
Germany	114811	26184	23	528229	47750	9
Ireland	4039	58	1	15147	192	1
Italy	64163	6328	10	231498	26477	11
Netherlands	18348	6148	34	79677	31543	40
Sweden	35917	2808	8	142850	9257	6
United Kingdom	69019	3042	4	325379	11996	4

Source: Magazine *"3T"* (Prague: Ortep Ltd., 1/1999) : 35.

Figure 2.12: Comparison of Cogeneration Share in Gross Electricity Production in Selected European States in 1998



Source: Magazine *"3T"* (Prague: Ortep Ltd., 1/1999) : 35.

In the early 1990s, among the industrial cogeneration plants 107 sources were in operation with a total electricity capacity of 1878 MW_e that produced 7191 GWh of electricity in 1989.

During the voucher privatisation the ownership of the heating sources changed fundamentally. From those public power stations that originally belonged to CEZ a group of independent district cogeneration plants were separated in *Kolin, Karlovy Vary, Ostrov, Plzen, Praha, Ceske Budejovice, Liberec, Otrokovice, Pisek, Strakonice, Tabor, Karvina* that operate only in the territory of their "home" town. Another group operates several cogeneration plants within a region that include *CEZ, J.s.c. Praha, Elektrarny Opatovice J.s.c, Jihoceska energetika Ceske Budejovice, Moravskoslezske teplarny Ostrava, První severozapadni teplarenska Most, Severoceske teplarny Most, Teplarna Usti nad Labem and Teplarny Brno.*

Industrial cogeneration stations were initially privatised with the parent company. Later, the energy sources were separated, as in the cases of *CKD Energetika Praha, Energeticke centrum Kladno, Energetika Tatra Koprivnice, Energetika Trinec, Kralodvorske Zelezarny Energo, SKODA Energetika Plzen, Sko-Energo Mlada Boleslav, Teplarna Svit Zlin, Teplo Silon Plana nad Luznici, Energetika TONASO Nestemice etc.* With respect to their parent company these enterprises now function as external energy suppliers. These firms have gradually changed their ownership and name. Simultaneously, new enterprises were founded that built new projects, as for example the construction of a heating source in the town of Kyjov where a large cogeneration plant is being constructed on the site of Moravia Glassworks both for the plant and the town that is owned by a consortium of firms. This complex of transformed industrial sources can be estimated at 400 MW_e of installed electric capacity, with a total of 1500 GWh of annual electricity generation and 25 000 TJ of supplied heat.

CEZ, jsc, operates 10 coal powered cogeneration plants that supply annually approximately 15 760 TJ to the central heat supply system without fully exhausting its heat potential. Since 1990, the use of cogeneration with natural gas started to a greater extent due to the developing activity of private companies. This improvement also resulted from new legislation (e.g. the Act 222/1994). According to this act, electrical utilities must purchase electricity produced in cogeneration facilities. For 1998, the use of cogeneration facilities for heat production is shown in tables 2.17 and 2.18 for gas engines and gas turbines.

Table 2.17: Utilisation of Gas Engines for Cogeneration in the CR (December 1998)

Engine output	Installed power	Share	Number of units	Share
	MWe	%		%
0 - 30 kW_e	4.71	6	219	54
30 - 75 kW_e	1.46	2	27	7
75 - 140 kW_e	9.00	13	67	16
140 - 200 kW_e	3.13	5	16	4
200 - 500 kW_e	13.46	19	43	11
500 - 1 000 kW_e	18.58	27	23	6
above 1000 kWe	19.1	28	8	2
Total	**69.44**	**100**	**403**	**100**

Source: Magazine "Energie" (Prague: Panorama group, jsc, 9/10, 1999): 72-73.

Since the turn, small cogeneration projects have experienced major progress because producers of such facilities exist and state subsidies and loans were granted for such projects in accordance with EU policies that strongly supports cogeneration. In the near future cogeneration units will rely more on gas. The advantage of small cogeneration is that it can also be used in municipalities in combination with district heating with a positive impact on air quality. The potential of cogeneration units and other facilities cannot be simply estimated. Their installation is determined in particular by actual economic and technical conditions. Czech statistics

only include those operators of cogeneration units that sell electricity and they ignore those that consume their own electricity, what frequently happens with small cogeneration. More extensive development of cogeneration is also limited by the current surplus of electricity and its relatively low production price.

Table 2.18: Utilisation of Gas Turbines for Cogeneration in the CR – March 1999

Turbine	Installed power	Share	Number of units	Share
	Mwe	%		%
up to 5 Mwe	28.68	6	9	56
5 - 50 MWe	15.00	3	2	13
50 - 100 MWe	211.90	42	3	18
above 100 Mwe	246.80	49	2	13
Total	**502.38**	**100**	**16**	**100**

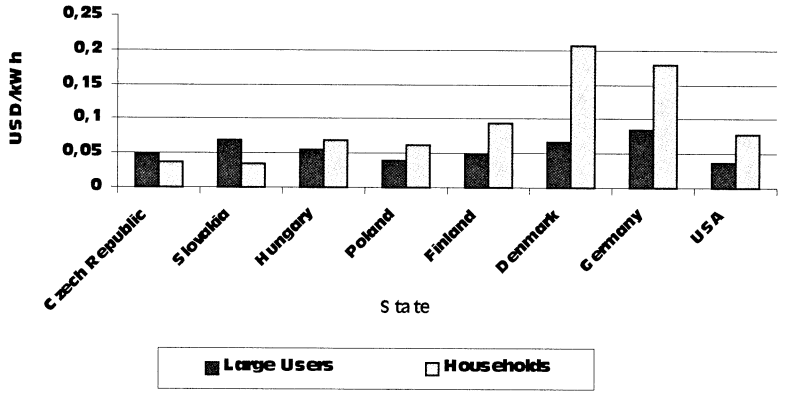
Source: Magazine "Energie" (Prague: Panorama Group, Jsc, 9/10, 1999): 72-73; Magazine "Energie" (Prague: Panorama Group, Jsc, 11/12, 1999): 54-59.

The privatisation process of heat generation attracted many investors also from abroad. In the case of the CHP plant in *Mlada Boleslav* that uses bituminous coal with an electrical capacity of 2 x 35 MW_e and a thermal one of 315 MW_{th}, a consortium of Czech and German firms invested 200 million DM. Through long-distance heat pipelines a thermal feeder supplies heat from the Melnik power plant over a distance of 35 km to large areas of Prague. Industrial companies also use their heat generation plants to produce electricity with new technical equipment.

2.11 Energy Prices

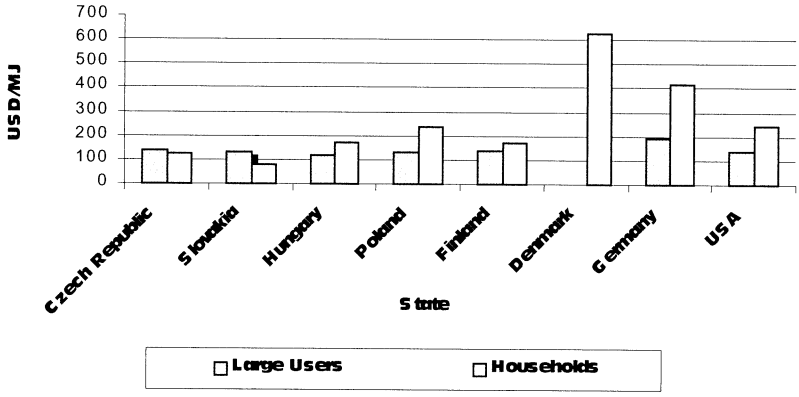
The prices of electricity and natural gas are regulated by the state authority based on the calculated costs. The prices for households are cross-subsidised and they are significantly lower compared with the prices for commercial consumers. Other prices for coal, oil or motor fuels are market prices. In comparison with average electricity (figure 2.13) and gas prices (figure 2.14) those for the Czech republic are on the lower end.

Figure 2.13: International Comparison of Electricity Prices in 1998



Source: International Energy Agency: *Energy Prices and Taxes* (Paris: OECD, 1998): 130, 137, 145, 164, 181, 255, 311.

Figure 2.14: International Comparison of Natural Gas in 1998



Source: International Energy Agency: *Energy Prices and Taxes* (Paris: OECD, 1998): 129,137, 145, 163, 181, 255, 311.

Table 2.19: Development of Average Energy Prices

Year		1991	1992	1993	1994	1995	1996	1997	1998
Average Prices of Coal [CZK/t]									
Hard Coal	Industrial	780	780	864	983	1 052	1071	1071	1100
	Household	840	840	966	1 510	1 661	1764	1764	1710
Brown Coal	Industrial	380	380	410	410	362	449	371	400
	Household	421	484	557	765	880	893	893	940
Average Price of Brown Coal Briquette and Coke [CZK/t]									
Briquette		580	641	738	1 192	1 320	1450	1450	1750.00
Coke	Industrial	2 058	2 200	2 558	2 697	2 786	2940	2940	3000.00
	Household	1 980	2 058	2 150	2 355	2 590	2835	2835	3200.00
Average Price of Liquid Fuels [CZK/l]									
Petroleum for Vehicles	Unleaded	18.00	18.9	19.20	21.6	19.1	21.14	20.42	22.46
	Gasoline 95	18.00	19.30	19.80	20.20	19.70	20.91	22.5	24.75
	Gasoline	16.00	17.30	18.80	19.20	19.00	20.13	21.3	23.43
Diesel Fuel		15.00	14.00	14.50	15.00	15.60	14.84	16.65	18.32
Heavy Fuel Oil [CZK/t]	Industrial	3 270	2 980	2 900	2 900	3 000	2915	3045	3350
	Household	2 000	2 000	2 900	2 900	3 000	3045	3330	3663
Light Fuel Oil [CZK/t]	Industrial	5 190	5 480	5 800	5 800	6 300	17702	17702	19472
	Household	2 500	2 500	5 800	5 800	6 300	16182	20040	23584
Average Price of Electricity [CZK/kWh]									
Electricity[1)]	Industrial[2)]	2.17	2.17	2.25	2.25	2.25	2.25	2.47	2.50
	Household[3)]	0.68	1.15	1.21	1.32	1.47	1.5	1.68	1.72
Prices of Natural Gas [CZK/m3]									
Natural Gas[4)]	Industrial	3.05	3.05	3.14	3.31	3.39	4.01	4.4	4.84
	Household	2.8	2.8	2.8	3	3.24	3.49	3.76	4.14

Legend: [1)] In the case of industry and households, only one representative tariff is chosen.
[2)] Industry: annual consumption 1.25 GWh, 2500 hours used annually, each quarter hour uses max. of 2500 kW
[3)] Households: standard consumption, annual consumption 1200 kWh (without heating and DHW)
[4)] Natural gas prices reflect the actual change in tariffs over the course of the year.

Source: Czech Statistical Office, Ministry of Environment, VUPEK, selling officials.

Cross-subsidies are gradually being removed and according to the *Energy Policy* document of January 2000 the government intends to end this process by end of 2002 at the latest. The pro-

posed average electricity and gas prices constitute the framework for changes in pricing policy based on present economic conditions of production, import, transmission and distribution of energy. However, they can be adjusted to reflect unexpected circumstances.

The Ministry of Finance foresees the following impacts of the changes in the maximum electricity and gas prices for households:

- From 2000 to 2002, these prices may affect the inflation rate by approximately 0.7 - 0.8 %.
- In 2000, the average monthly household expenses will increase by 128 CZK, in 2001 by 126 CZK and in 2002 by 123 CZK what the government considers as acceptable from a social perspective.

Table 2.19 relies on information published by the Czech Statistical Office, the Ministry of Environment of the Czech Republic, VUPEK, and by fuel and energy producers. The calculations use the IEA methodology and the prices refer to retail prices including all taxes.

2.11.1 Electricity Prices and Tariffs

The basic criterion for the classification of individual consumers is the voltage level at which take-off occurs (categories A, B, C, D). Within these categories, individual consumers are also placed in a specific tariff structure according to the volume of the consumed power output (technical maximum) or according to the strength of the current of the main circuit breaker. Among large consumers (A, B) there is a link to the period of the use of the power output. Four categories of electricity consumers are distinguished:

a) *Category A - consumers from extra-high-voltage networks*: Their take-off equipment is connected to the supplier's transmission system or supplier's distribution system with voltage between 52 kV phases.

b) *Category B – consumers from high-voltage networks:* Their take-off equipment is connected to the supplier's distribution station with voltage between phases from 1 kV to 52 kV.

c) *Category C – consumers at a low-voltage level*: Consumers taking off power from the supplier's plant with voltage between phases up to 1 kV. A supplier requires a license for electricity distribution.

d) *Category D - households.*

Category A includes major consumers from extra-high-voltage and *category B* from high voltage networks. Compared with the prices for 1999, the following changes occurred in the new tariff system for 2000:

- introduction of another criterion (besides voltage and technical maximum), utilisation of the maximum power output, i.e. each tariff, with the exception of special ones, has 2 to 4 rate groups depending on demand;
- the possibility to have individual rates negotiated with the consumer;
- abolition of the category of auxiliary supplies in for large consumers with their own sources (possible spare capacity is contractually agreed and will be respected in a contract).

C and D categories of consumers with low-voltage take-off: The proposed tariffs in this system considerably differ from the previous ones. For *category C* with a low commercial consumption, a tariff system consisting of 12 groups has been proposed, while for *category D* (households) there are 9 tariff groups. The tariff groups of category C are further divided and defined for the strength of current of circuit breakers.

For following changes occurred compared with the previous system:

- the level of fixed monthly payment is derived from the nominal breaking current of the take-off point's circuit breaker, i.e. payment for reserved output;
- abolition of the combination of rates and introduction of a definite one or multi tariff;
- introduction of a double-tariff with a 14-hour low-tariff period for combined hybrid systems of electrical heating;
- introduction of a rate with a high period of output use for take-off with electrical heating and air-conditioning;
- diversification of tariffs with a "fixed" or "free" low tariff period in case of double tariffs.

With respect to the used tariffs, three main groups of consumers are determined according to the nature of the utilised rate. It is vital that the rates consider some aspects, in particular:

- to reflect real fixed and variable costs connected with supply for a given consumer group;
- to link up to the existing structure;
- to encourage energy savings;
- to be acceptable to consumers in terms of social affordability.

Table 2.20: Estimates of the Development of Average Electricity Prices (1999 - 2002)

Consumers	1999	2000	2001	2002
Major consumers from vhv networks	1.46	1.52	1.59	1.66
Major consumers from hv networks	2.14	2.07	1.99	1.90
Low entrepreneurial consumption	2.52	2.56	2.61	2.66
Low household consumption	1.79	2.06	2.34	2.66

Legend: vhv –very high voltage; hv – high voltage

Source: Ministry of Finance: *Predikce zmen cen* [Prediction of Prices Development, 2000], in: <http://mfcr.cz/ ceny/Predikce Zmen.htm>.

In 2002, the prices for the small business consumption and for households should be at the same level what would reflect costs for electricity consumption in the low voltage network.

2.11.2 Gas Prices

The current tariff system for final consumers contains:

- double-item prices with differentiation depending on the peaks and the irregularity of take-off in summer and winter (with the exception of households, for whom the previous double item system is preserved);
- more detailed categorisation of consumers that better reflects the costs for gas supply.

The average annual natural gas price for households increased by 15% in 2000, compared with 1999. The current consumption category between 0 and 900 m^3 is divided into two subcategories: 0 - 180 m^3 and 181 - 900 m^3. A lower gas consumption results in increased fixed costs for gas supplies. By adhering to the principle of the gradual removal of distorted prices by 2002, in 2000 different costs are already at least partially reflected in gas prices. Estimates of average prices reflecting the gradual correction of natural gas prices by 2002 are based on an exchange rate between 34.00 and 36.00 CZK/US $. The new tariff system introduced market principles during price negotiations between sellers and purchasers of specific supplies.

Table 2.21 Estimates of Average Gas Price Developments from 1999 to 2002 (CZK/m^3)

Consumers	1999	2000	2001	2002
Major consumers	4.78	4.98	5.22	5.45
Medium consumers	4.81	5.36	5.65	5.90
Small consumers	5.08	5.63	6.03	6.38
Households	5.26	6.05	6.70	7.20

Source: Ministry of Finance: Predikce zmen cen [Prediction of Prices Development, 2000] in: <http://mfcr.cz/ceny/Predikce Zmen.htm>.

With regard to the linkage of natural gas prices to global crude oil and fuel oil prices and to the development of the Czech crown's exchange rate against US $ and EURO, more frequent changes in natural gas prices in the course of each year must be expected. Thus, the revaluation of the price proposals mentioned above is possible (table 2.21).

2.11.3 Heat Prices

Heat energy is on the list of goods with cost based regulated prices. Current heat prices differ among regions and individual locations, the average price is between 220 and 350 CZK/GJ (7-10 EURO/GJ). Within a cost based regulation system, heat prices are still annually regulated by the Ministry of Finance that sets possible price rises based on objective costs. Annual price increases are limited to approximately 3% - 4%, what is below the expected inflation rate. A persistent problem is the VAT rate, that is 5% for heat compared with 22% for other energy sources (gas, electricity and coal). These rates must be consolidated prior to EU accession what will lead to increased heat prices by 2001.

Chapter 3: Energy Policy and Legislation

3.1 Energy Policy

In January 2000, the Czech government adopted a new *Energy Policy* document. The former *Energy Policy* document was approved in 1992. The three main cornerstones of the new *Energy Policy* are stated in accordance with the EU objectives including:

- environmental protection and adherence to the principles of sustainable development;
- guarantee of secure energy supplies; and
- support for a competitive economy.

The Czech energy policy offers proposed solutions for the following problematic areas of the energy sector:

- Correction of price and tariff structures and removal of price deformations;
- procedure for completing the privatisation of the energy sector;
- establishment of an independent regulatory body;
- adoption of rules for a competitive electricity and gas market;
- establishment of a functional and transparent system of subsidies for energy savings, the use of renewable energy sources (RES) and combined heat and power (CHP) generation;
- support for a sustainable extraction of domestic energy raw materials; and
- creation of preconditions for the application of "clean coal technologies" and for the development of nuclear power engineering.

This *Energy Policy* document was approved by the Czech executive and not by the legislative branch of government. By law it requires an environmental impact assessment, the so-called *Strategic Environmental Assessment*. This assessment was made but the Ministry of the Environment expressed a negative opinion and claimed that this document does not comply with adopted environmental policies. But this statement is not binding for the cabinet, that approved the new *Energy Policy* despite of the negative opinion of the Environment Ministry.

After the political and economic changes in 1989, the first *Energy Policy* was approved in 1992. Since then, several proposals were submitted. The new *Energy Policy* document was prepared by the Ministry of Trade and Industry and approved by the cabinet in early 2000. It defines as the major and most urgent current problems that must be solved in order to stabilise the energy sector and to create the preconditions for EU admission of the Czech Republic:

- Completion of the process of correcting the price level and tariff structure for energy commodities and services, including the adjustment of depreciation rates and the valorisation of depreciation costs for energy facilities;
- effective privatisation of state shares in key energy companies while maintaining an adequate level of state influence on energy sources and on the relevant energy infrastructure;
- definition of a clear regulatory framework for individual energy sectors and legislative enactment of obligations that can be imposed on enterprises in the energy industry (e.g. reliability and safety of supplies, non-discriminatory conditions of supplies, quality standards for products and services, use of renewables, environmental protection etc.); and

- permitting competition in energy production and supplies with a gradual opening of the option for individual groups of consumers to choose a supplier in accordance with EU developments for applicant countries, with simultaneous respect for the trade balance.

3.1.1 Proposals for the Solution of Specific Problems

Rectification of the price and tariff structure of energy commodities. The annual price increases should reflect both the cost analyses and the policy declaration of the government on the removal of price subsidies for the population by 2002 and for a definite solution to the price and tariff structure by 2002. The correction of the prices should take the social acceptability of the proposal into consideration. The adjustment of the depreciation rates and the valorisation of the depreciation costs for energy facilities will be carried out.

Process of privatisation of state shares in key energy companies. The state shares should be decreased to about 34% and closely connected with price and tax policy, the establishment of a regulatory body and the enactment of obligations for public interest in the new energy law. The transmission network should be separated into a company that is independent of both electricity production and distribution, in which the state should retain a role. After the completion of the Temelín nuclear reactor the CEZ jsc should be fully privatised but the state should maintain influence on its strategic decision making. The state enterprise Transgas that operates the gas transmission lines, the vertebral high-pressure gas pipes and underground gas bins should also be privatised. Privatisation should include the refineries, besides the enterprises of strategic importance, Cepro, jsc. and MERO, CR jsc, for distribution of liquid fuels that should form one joint distribution system with Transgas.

Establishment of an independent regulatory body. The new energy law outlines requirements for the regulator. The tasks for economic regulation will be formulated, including the obligation of the regulated entities to contribute to its activity. During the transition period until 2002 the current regime will remain valid.

Definition of rules for establishing an internal electricity and gas market. These rules include by 2001 – 2002 an operational independent regulator and a gradual opening of the market. Access to the electricity grid will be granted by Third Party Access (TPA). In the gas industry a regulated TPA will prevail for distribution and a negotiated TPA for transmission.

Creation of a functional, non-discriminatory and transparent system of subsidies for energy savings. The objective is to fully implement the *State Programme for Energy Savings and the Utilisation of Renewable Sources* based on Government Decree No. 83´43/1998, to guarantee its effective control, to make it affordable for the state budget in the long run, and that the energy and ecological benefits will correspond with the invested means. A system of subsidies must not distort competition in the energy market and must be compatible with EU processes. For the energy savings programme support from international organisations will also be used.

Renewables. From the perspective of this *Energy Policy* document renewables are not considered as a principal energy source but their use should make a significant local and possibly regional contribution. The objective is to increase their share from currently 1.5% to about 6% by 2010 and about 8% by 2020. According to estimates by the Czech Energy Agency (CEA) based on implemented projects, this goal will require investments of about 242 billion CZK by 2010 and of additional 42.5 billion CZK by 2020. The CEA is in charge of the coordination of these activities. The use of international programmes was also assumed.

Support for acceptable extraction of domestic energy raw materials. Brown coal mining is projected in conjunction with the regional ecological limits as defined by the Government Directives No. 331/1991, 444/1991 and 490/1991. With the approval of the Ministry of the En-

vironment later corrections of these limits are possible after a consensus in the region is reached. The decision on continued brown coal mining depends on an agreement between relevant municipalities and the mining companies that must be approved by the Environment Ministry. A definition of the limits for coal mining is due by 2000. It is assumed that in the EU subsidies for domestic coal will end in 2002, prior to the planned Czech EU accession. This objective is a compromise between social, economic and environmental interests. A reassessment of previous governmental decisions is based on an agreement with the EU on the liberalisation of the uranium market from 2001 onward and on the prolongation of the slowdown in uranium extraction through the traditional deep mining method until 2004.

Nuclear energy. The Temelín nuclear reactor will be completed, and an assessment of the future development of the nuclear energy sector will be made in the context of the economic use of coal and of forecasts on future final energy consumption and of electricity demand.

According to the *Energy Policy* document, the main short-term objectives are:

- the removal of electricity and gas price distortions by 2002;
- the completion of both blocks of the Temelín nuclear power plant; and
- the start of project work on the modernisation of the Dukovany nuclear reactor.

Among the medium-term objectives, the *Energy Policy* document calls for the support of domestic energy sources. Among the long-term objectives this document refers to:

- the achievement of the maximum level of electricity production guaranteed from domestic energy sources and the optimal level of self-sustainability in electricity production; and
- the assessment to replace domestic with imported coal and to rely increasingly on other sources.

3.1.2 European Integration

The fundamental adjustments in the relations between the Czech Republic with the EU are based on the so-called European Agreement of 1 February 1995 that established an association between this country, the European Community and their member states. This European Agreement explicitly includes the obligation of the Czech Republic to guarantee within a 10-year period the gradual compliance of its legislation with EU legal acts.

During the pre-accession negotiations, the European Commission submitted the list of key EU regulations for managing the energy industry with an explanation of its main objectives. During the screening of its energy sector, the Czech Republic confirmed its obligation to fully transpose and implement the *acquis communautaire* prior to its EU accession with the exception of three areas, where it requested a transition period, that is for the implementation of the Directives 68/414/EEC, 96/92/EC and 98/30/EC. This refers to a delay in the achievement of the required emergency reserves of crude oil and its products (until 2005) and in the opening of the electricity (until 2005) and gas markets (until 2008).

In other energy areas changes in the Czech energy legislation are required, especially in the following areas where several specific and mutually interconnected EU regulations apply:

- establishment of compulsory reserves of oil and oil products, including rules for their use;
- creation of transparent and non-discriminatory conditions for enterprises in the energy industry with a limited advantage permitted for domestic companies;
- gradual liberalisation of energy markets for the electricity and gas networks, including third party access to these energy networks;

- agreed processes for information collection as a precondition for the internal market of the EU, especially information on energy imports and exports, on energy prices and taxation;
- adjustment of the rights and duties of energy producers and consumers that influence an efficient energy economy including assistance for the use of environmentally friendly energy sources, in particular renewables and cogeneration;
- achievement of nuclear safety as assured health protection for EU inhabitants;
- larger Czech participation in EU programmes (PHARE, SAVE II, JOULE-THERMIE, ALTENER, SYNERGY etc.) and in structural programmes for associated countries (ISPA, SAPARD).

Particular measures for achieving full compliance of the energy laws of the Czech Republic with the legal acts of the EU are elaborated in the *Energy Policy* document. In fulfilment of EU requirements, the Czech Republic has prepared the *National Programme for the Adoption of the Acquis Communautaire* that was approved by Government Decree No. 163/1998 and submitted to the European Commission at the start of the accession negotiations. On 12 November 1999, negotiations on the energy chapter (14) were initiated in a meeting of EU and Czech representatives. After its ratification, the Czech Republic will also fulfil its obligations under the Energy Charter and participate in the work of the agreement on energy transit. In 1999, the Czech Republic became a member of the International Energy Agency (IEA).

As background information, the analytical data and a prognosis of the macroeconomic indicators were elaborated for energy policy purposes. For economic and ecological reasons a scenario of real economic growth was including the regional economic limits for coal mining in conjunction with the medium-term economic policy goals of the Ministry of Industry and Trade.

According to this scenario, the operation of the Dukovany nuclear power plant will continue without any limitations for its entire lifetime and investments for its modernisation and continued operation until 2025 are being prepared. Two blocks of the Temelín nuclear power plant will gradually become operational and testing runs will start in 2001 or 2002 with a lower energy generation level. Besides the completion of Temelín, several combined heat and power generation facilities will gradually become operational. In addition, smaller cogeneration facilities are being built both in the public and industrial energy sector. In 2000, these sources will supply up to 1000 MW and after 2000 a slight growth in the output of independent producers is expected. The decrease in available sources of electricity will be replaced by new ones, that will rely primarily on domestic primary sources and partly on imported fuel. All existing and new power plants and heating facilities are, or will eventually be equipped with technologies complying with valid EU standards.

No construction of a large hydropower plant is expected. Electricity generation will thus rely on nuclear energy, the remaining domestic coal reserves, the use of gas in cogeneration units, current production in hydro power plants and on the use of renewables that will be stimulated by national programmes for energy savings and use of renewables.

Due to the limited domestic coal reserves not all present power plants can be used after the expiration of the operational permit of the desulphurisation equipment. Only a part of the existing capacity can be retrofitted between 2008 and 2020 and their life span can be extended for another 15 years until 2030 and 2035. The scenario does not assume that a part of the coal reserves will not be used due to ecological extraction limits. For these reasons, no new construction of large power plants using domestic coal is planned. Beyond 2015 or 2020, the construction of new sources must rely on the use of other sources than domestic coal.

This increasing demand for energy imports will require the construction of sufficient capacities for transportation, storage and transmission, especially the strengthening of electricity interconnection with neighbouring states. Energy trade will be directly dependent on the economic situation and the equilibrium of the state's trade balance. Currently, the export of solid fuels is not limited. Based on available reserves, exports of brown coal will continue until 2010 as will the export of bituminous carbonable and energy coal. No exports are expected for other types of solid fuels. Export of liquid and gaseous fuels is not limited but for gaseous fuels this refers only to the transit of Russian gas. The export of electricity will not be limited.

3.1.3 Transition Periods

Among the top priorities of the Czech energy policy are the adaptation of its domestic energy sector and related legislation to EU standards with the EU accession planned for 2003. During the accession negotiations, the Czech Republic requested these three transition periods for the harmonisation and full compliance of Czech energy legislation with the *acquis communautaire* of the EU in the energy sector pertaining to:

- Directives 68/414/EC and 72/425/EC on maintaining minimum stocks of crude oil and petroleum products (until end of 2005);
- Directive 96/92/EC on the internal electricity market (until 2005);
- Directive 98/30/EC on the internal natural gas market (until 2008).

A transition period for *maintaining minimum stocks of crude oil and petroleum products* was requested until end of 2005 because the present minimum crude oil reserves in the Czech Republic are below those required by the EU. The two year transition period will allow the Czech Republic to gradually increase its minimum stocks of crude oil, to postpone necessary investments, and to save the costs for the purchase and maintenance of reserve stocks of oil.

The transition periods in the *electricity and gas sectors* refer to a delay in the introduction of competition in the electricity (Directive 96/92/EC) and gas sectors (Directive 98/30/EC). The new draft energy legislation proposes a later opening of its electricity and gas markets than is required by these directives. The suggested terms might still be changed in the Czech Parliament what may affect the transition periods. The proposed terms for the opening of the electricity market come very close to EU requirements suggesting a full opening of this market to competition until early 2007. In the gas industry the delay of the proposed market opening by five years is rather significant. The Czech draft energy legislation proposes a market opening for more than 33% by August 2008, and it does not yet include a schedule for the full opening of the gas market for all final customers.

3.2 New Draft Energy Legislation

The government has prepared a new draft *Energy Act* and a draft *Energy Efficiency Act* that have been discussed in Parliament since January 2000. It is assumed that both laws will enter into force by January 2001. Both bills are closely linked with the priorities that were outlined in the national energy policy document. The Czech energy law will then consist of:

- the new *Energy Act,*
- the *Act on Energy Economy*, and
- the *Act on Emergency Oil Reserves.*

With regard to the EU accession negotiations, these laws must be in force at the latest by 2000 and 2001 to allow the energy sector a sufficient lead time to prepare itself for the conditions of

the EU internal market. The Czech legal framework for the energy sector will consist of these new energy laws that will adjust in particular:

- the position, rights and responsibilities of the independent regulatory body for industry;
- the creation of transparent and non-discriminatory conditions for the given technical operational regulations for energy enterprises in compliance with EU legislation; and
- the range, method and process of regulation in energy industry by the state, including the definition of progress in implementing economic competition in the electricity and gas sectors, the legislative enactment of bodies and organisations necessary for guaranteeing the reliable and effective functioning of energy systems (without regard to the selected market model which ensures access to networks) and of the supplies of energy and natural gas during the transition period.
- The law on the energy economy (*Energy Efficiency Act*) will be in full compliance with EU legislation by adjusting methods and tools for achieving energy savings, the possible use of renewable energy sources, and the combined power and heat production. It will also redefine the position of the Czech Energy Agency. This law will amend the process of regional energy plans, with the aim of an optimal use of regional sources.
- This will include the support for other legislative, economic and technical conditions for the incorporation of the Czech energy industry into the single energy market with a full implementation of the technical norms and of other secondary EU legislation.
- Finally, the laws refers to fundamental solutions to the entrepreneurial environment for cogeneration plants, including the determination of the methods of regulation at the regional level and of the relevant price policy, such as the subsidies for centralised heat supplies, especially from cogeneration plants.

The draft Energy Act defines conditions for entrepreneurial activity in the electricity, gas and heating sectors and introduces competition in the electricity and gas industries in accordance with EU Directives No. 96/92/EC and 98/30/EC on the internal electricity and natural gas market.

Table 3.1: Time Schedule for Market Opening in the Electricity Industry

Period	Customers (one take-off point)	Producers	Assumptions
2001			new Energy Act
1/2002 -	> 40 GWh	>10 MW	
1/2003 -	> 9 GWh	100%	removal of cross subsidies
1/2005 -	> 0.1 GWh	100%	
1/2007 -	100%	100%	

Source: Czech Government: *Navrh zákona o podminkach podnikani a vykonu statni spravy v energetickzch odvetvich a zmene nekterych zakonu (energeticky zákon)* [Proposed Energy Act] (Prague: Ministry of Industry and Trade, Ministry of Environment, December1999): 16.

In the *electricity industry* the proposed act requires:

- introduction of regulated Third Party Access (TPA) for producers and all final customers;
- gradual introduction of competition and opening of the market between 2002 and 2007 in four stages and from 2007 an unrestricted competitive electricity market should be open to all customers;
- granting of licences and authorisations for the construction of new sources and for individual activities in the energy industry, including trading; and
- concluding bilateral business deals or trade on the power exchange (table 3.1).

In the *gas industry* the draft act assumes:

- introduction of regulated Third Party Access (TPA) on the level of gas distribution networks and of a negotiated TPA on the level of the transit system;
- only partial introduction of competition and market opening in two stages, 2005 and 2008;
- granting of licenses and authorisations for the construction and for individual activities in the gas industry, including trading as for the electricity industry (table 3.2).

Table 3.2: Time Schedule of Market Opening in the Gas Industry

Period	Market opening
1/2005 -	>20%
10.8.2008 -	>33%

Source: Czech Government: *Navrh zákona o podminkach podnikani a vykonu statni spravy v energetickzch odvetvich a zmene nekterych zakonu (energeticky zákon)* [Proposed Energy Act] (Prague: Ministry of Industry and Trade, Ministry of Environment, December1999): 41.

During the Parliamentary deliberations on the draft act various amendments were presented that may modify the final wording of the act, including the extent and the terms of the market opening suggested in the government bill.

3.3 Price Liberalisation

Since the early 1990s, the objective of energy policy was to remove energy price subsidies and price distortions, and to enhance the gradual transition from centrally set prices to market prices, with the exception of regulated prices for monopoly activities. Most direct and indirect subsidies for energy prices have been removed during the past decade. In 2000, the biggest price distortions included cross-subsidies for electricity and natural gas prices between households and industrial consumers and the lower VAT rate (5% instead of 22%) for heat. In addition, programmes for the cutting back of coal mining are subsidised from the state budget.

Table 3.3: Average Annual Direct and Indirect Subsidies (1994-1998))

Fossil sources	20 billion CZK
Nuclear sources	4 billion CZK
Energy savings and renewable sources	1 billion CZK

Source: SEVEn: *Analýza dotací v energetickém sektoru* [Analysis of Subsidies in Energy Sector] (Prague: SEVEn, 1999): 20-23.

Although most price distortions have already been removed, the consequences of the past policy of cheap energy remain in the energy sector. According to an analysis of price subsidies in the energy industry between 1994 and 1998, the Czech Republic supported, directly and indirectly, fossil and nuclear energy sources compared with energy savings and renewables by 24 to 1 (table 3.3). Subsidies for fossil energy include support for the transition from coal to natural gas in the context of the *National Programme for Healing the Atmosphere*.[1]

Examples of subsidies for energy prices that were already removed during the 1990s include the lower VAT rate (of 5% instead of 22%) for energy with the exception of heat and direct

[1] Ministry of the Environment of the Czech Republic: *National Strategy of Protecting the Earth's Climate System* (Prague, Ministry of the Environment of the Czech Republic, 1999).

subsidies from the state budget for the heat price of households (up to 7 billion CZK a year). However, cross-subsidies in the electricity and gas sectors have remained. Besides the electricity prices for households, natural gas and heat, most energy prices are now made by the market.

3.4 Privatisation

As of April 2000, the Transgas utility remained a state-owned company, through the National Property Fund the state owns about 67% of the shares in the CEZ utility, and around 50% of the shares in eight regional power distribution and eight gas distribution companies. In eleven of these 16 distribution companies, the state (represented by the National Property Fund) together with the minority shares owned by CEZ and Transgas still controls a majority, in five distribution companies the state controls less then 50%. The remaining shares are owned by private investors, and in the distribution companies primarily by strategic investors.

At the present time, a strategy for completing the privatisation of the state shares in the electricity and gas companies is being prepared. In the heating sector privatisation was completed already in the early 1990s. In spring 2000, a strategy for completing privatisation of state shares in electricity and gas companies was under preparation in the Ministry of Industry and Trade in cooperation with the Ministry of Finance that was originally to be submitted to the cabinet by end of April 2000 for adoption. But until mid-May 2000 no decision was made. Two rival proposals existed:

- to privatise individual distribution companies, the Transgas gas utility, and the CEZ power utility separately, and
- to create a joint ownership of production, transmission and distribution utilities in both the power and the gas industry during the privatisation process.

Both of these basic alternatives were drawn up in partial sub-variants and in late April 2000 it was not yet known which solution would eventually be chosen for implementation.

3.4.1 Privatisation of Electricity and Gas Distribution Companies

On 10 May 1999, the Czech cabinet (session No. 471) requested additional procedures for the participation of the state in the privatisation of the state property in distribution joint-stock companies. The proposal was elaborated for both electricity and gas distribution companies. The nominal value of the shares of these companies owned by the Czech *National Property Fund* (NPF) amounts to approximately 15.5 billion CZK. In all companies the average property share owned by the NPF was 48.83% of their capital stock.

During the second phase of privatisation the National Property Fund founded eight electricity and eight gas distribution joint-stock companies that operated within the former regions and in Prague. Since 1993, when they were established, the portion owned by the NPF remained nearly unchanged. The NPF retained special privileges and without its consent it was impossible to abolish a company, to increase or decrease its capital stock, and to change its bylaws. Other shareholders are towns and municipalities. They own shares in their name that may only be transferred with the consent of the statutory bodies of the company. Many municipalities sold the execution of their voting rights to other subjects, and in several cases they sold their shares to other, and often foreign investors. The main activity of these electricity distribution companies is the purchase and the distribution of electricity. Their property mainly comprises low-voltage and high-voltage networks, including transformer stations up to 110 kV. The transmission of the very-high-voltage networks are the property of the CEPS, jsz, that is so far wholly owned by CEZ, jsc.

The primary activity of gas distribution companies is the purchase and distribution of natural gas. Their property consists of gas pipeline networks up to a pressure of 4 MPa. The density of these networks is unequal, depending on gas consumption in a particular region. Networks of very-high-pressure gas pipelines (above 4 MPa) remained the property of the state company Transgas that also owns the gas reservoirs.

3.4.2 Decision on the Privatisation Process

In March 1998, the government decided to choose advisers to support the state during the completion of the privatisation of the distribution companies. In April 1998, the government decided that the voting rights of the National Property Fund in the distribution companies would always be sold as a whole to partners that would be chosen by the government and that proposals for the selection of strategic partners would be submitted on the basis of public tenders.

On 22 May 1998, the Chamber of Deputies of the Czech Parliament approved Resolution No. 826 that requested from the government to submit a proposal of its long-term *Energy Policy* to the Chamber of Deputies before inviting tenders on the privatisation of energy companies. On 5 August 1998, in Resolution No. 514 the cabinet charged the Minister of Industry and Trade with the task to verify the submitted options for acquiring a majority of shares in gas and distribution companies. The Ministry of Industry and Trade requested Transgas to purchase the voting rights or shares from shareholders, with the exception of those owned by the National Property Fund. Thus, a large proportion of shares and rights was purchased, and together with the shares owned by the NPF, the state gained a majority in six gas distribution companies and in five power distribution companies. In April 2000, the purchase of voting rights and shares from electricity distribution companies continued, namely by CEZ whose shares together with those of the NPF exceeded 50%.

3.4.3 Fundamental Unresolved Problems with Privatisation

Until April 2000, several of the necessary preconditions have not yet been determined by law: the role of a regulatory body in the expected fully liberalised market; a long-term perspective based on the current situation in the Czech Republic, in the EU and in the rest of the world; assumptions on the further development in sectors that would protect its national economic interests. Privatisation must also reflect previous decisions on partial problems, such as the free transfers of state shares to municipalities, the completion of the Temelin nuclear power plant, and the gas import contracts, price and objective regulation etc. The following problems must still be solved:

- *Rectification of the price and tariff structures of energy commodities and services* (for electricity, natural gas and district heating). For a rational functioning of the market, price distortions for households must be eliminated and the process of price adaptations must be connected with the creation of new tariff structures. Price adjustments require also a system of social security benefits.
- *Establishment of an independent regulatory body* (regulator) and its relationship to entrepreneurial subjects (regulation framework), including the obligation of the regulated subjects to contribute to the regulator's activity. The regulator's activities and the objectives of regulation will be specified in the new energy act.
- *Adoption of the rules for establishing the internal electricity and gas market* based on EU directives. Gradual opening of the electricity market based on a regulated third party access (TPA), and in the gas industry on a negotiated (transit) and a regulated (distribution) TPA.

- *Adoption of a fundamental legislative framework for the energy sector*, i.e. of a new Energy Act, that will determine the rights and responsibilities of the independent regulatory body for the energy sector, and the creation of transparent and non-discriminatory economic, as well as technical and operational conditions for all enterprises in the energy sector in compliance with EU legislation.

However, a hasty completion of the privatisation of distribution companies without an evaluation of its wider repercussions could also have a negative impact on the entire Czech economy. If ill-considered gas and electricity supplies to the Czech Republic would be made that would bypass CEZ and Transgas and thus cause major losses, in the case of CEZ reductions of its profits could create problems for the repayment of loans with a state guarantee that would impact on connected branches. In the case of Transgas, losses from a lacking natural gas consumption could potentially exceed yields from privatisation of gas distribution companies and decrease revenues from the future privatisation of the state enterprise Transgas.

3.6 Energy Efficiency Act

In early 2000, the government prepared a new draft *Energy Efficiency Act* (or *Energy Economy Act*). In April 2000, the bill was discussed in Parliament in conjunction with the new *Energy Act*. An important part of this draft act in terms of the harmonisation of domestic legislation with EU standards are its provisions on labelling of energy appliances and energy efficiency standards. Besides these standard provisions, the bill contains some controversial measures that are subject to a wide discussion. They include the obligation to elaborate energy audits in buildings and in the energy industry if energy consumption exceeds a set limit. At the same time, the draft act gives accredited energy auditors the power to decide on compulsory investments in heat and electricity cogeneration facilities, especially on heat sources above 5 MW_t and electricity sources above 10 MW_{el}.

The draft *Energy Efficiency Act* also contains a proposal for the introduction of the so-called green heller. Pursuant to the act, each kWh of electric power sold should add one heller (i.e. 0.01 CZK) tax levied on it (i.e. approximately 0.6% of the average final selling price for end-users) that would be transferred to a special account (the average electricity price for final customers is about 1.6/kWh CZK). The *State Environmental Fund* would subsequently use this money to support the development of renewables and energy saving. The final approved Energy Economy Act may also differ significantly from the proposed version.

3.6.1 Potential of Energy Efficiency

The Czech Republic is a country with a high energy intensity per GDP that reflects its relatively large energy-saving potential. The *National Energy Efficiency Study* (1999) assessed the "market energy saving potential"[2] for the period 1995-2010. As illustrated below in figure 3.1 and in tables 3.4 and 3.5, the market potential with a payback period of 6 years is 18% of the total final consumption in selected sectors and with a payback period of 3 years it is 13%.[3]

Between 1995-2010, among the sectors with the highest market potential for energy efficiency improvements were households (24% and 18%) followed by transport (both 20%) and industry (19% and 11%). The smallest potential exists for municipal district heating systems (both 7%) and in agriculture (12% and 11%). At the same time, industry and households have the

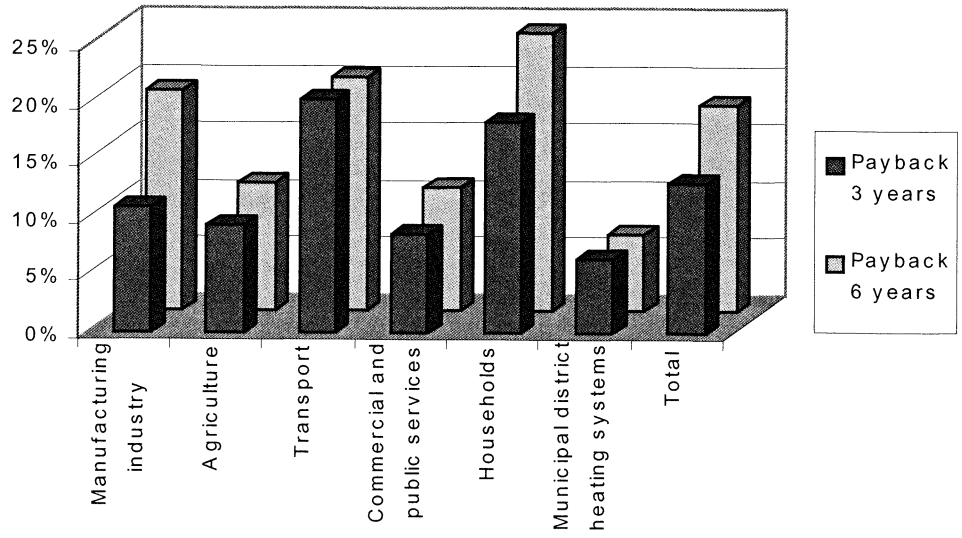
---

[2] The market energy saving potential is calculated using the annuity method with the discount rate of 10%.

[3] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 11-41.

highest share of the total final energy consumption in the Czech Republic and so here we can find the largest possibilities for energy conservation.

Figure 3.1: Energy Efficiency Potentials for Energy Savings (% of Final Consumption)



Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 11-41.

Table 3.4: Energy Efficiency Market Potential in Economic Sectors (Payback Period 3 Years)

	Payback period (years)	Manu-facturing industry	Agri-culture	Transport	Commercial and public services	House holds	Municipal district heating systems	Total
Sector share of total final consumption [%]		40%	4%	12%	13%	22%	8%	100%
Market potential [TJ/a]	3 years	49735	4259	27731	12838	46086	6072	146721
Market potential [%]	3 years	11%	9%	20%	9%	18%	6%	13%
Market potential/total final consumption [%]	3 years	4%	0%	2%	1%	4%	1%	13%

Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 11-41.

The total investment costs for the implementation of the market potential are in the range of 73-123 billion CZK. To illustrate the magnitude of the required investments they are compared with the annual GDP and the state budget. The implementation of the market potential during the next 10 years would require annual investments in the range of about 0.5-0.8% of the GDP. The average specific investment costs are 550 CZK/GJ; with the highest figure for transport (2100 CZK/GJ) and the lowest for households (13-18 CZK/GJ) and municipal district heating (17-149 CZK/GJ).[4] As the potential for the energy conservation in buildings rep-

[4] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 11-41.

resents a substantial part of the total, a more comprehensive analysis is given in Appendix A on "Energy Efficiency in the Building Sector".

Table 3.5: Energy Efficiency Market Potential in Economic Sectors (Payback Period 6 Years)

	Payback period (years)	Manu-fac-turing industry	Agri-culture	Transport	Commer-cial and public services	House-holds	Municipal district heating systems	Total
Sector share of total final consumption [%]		40%	4%	12%	13%	22%	8%	100%
Market potential [TJ/a]	6 years	86499	5103	27731	16198	60762	6244	202537
Market potential [%]	6 years	19%	11%	20%	11%	24%	7%	18%
Market potential/total final consumption [%]	6 years	8%	0%	2%	1%	5%	1%	18%

Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 11-41.

3.6.2 Barriers to Energy Efficiency

The most important barriers for the implementation of energy efficiency measures are listed below. The limited cost effectiveness of energy efficiency projects resulted so far from:

- the low prices of fuels and energy for households that contributed to insufficient revenues for energy efficiency projects in this sector;
- the difficulty to obtain suitable capital sources is due to the following reasons:
  - scarcity of in-house capital,
  - low credit-worthiness of Czech investors,
  - small size of most energy efficiency investments,
  - high risk perceived for energy efficiency investments and resulting higher capital costs,
  - lack of experience of Czech investors with energy efficiency investments,
  - lack of experience with the development of bankable project proposals;
- lack of motivation and of responsibility caused by the unclear ownership;
- lack of awareness and information, especially on:
  - energy consumption, its use and its structure,
  - energy efficiency benefits,
  - efficient schemes and technologies,
  - energy efficiency of the energy consuming appliances because labelling is still not obligatory.

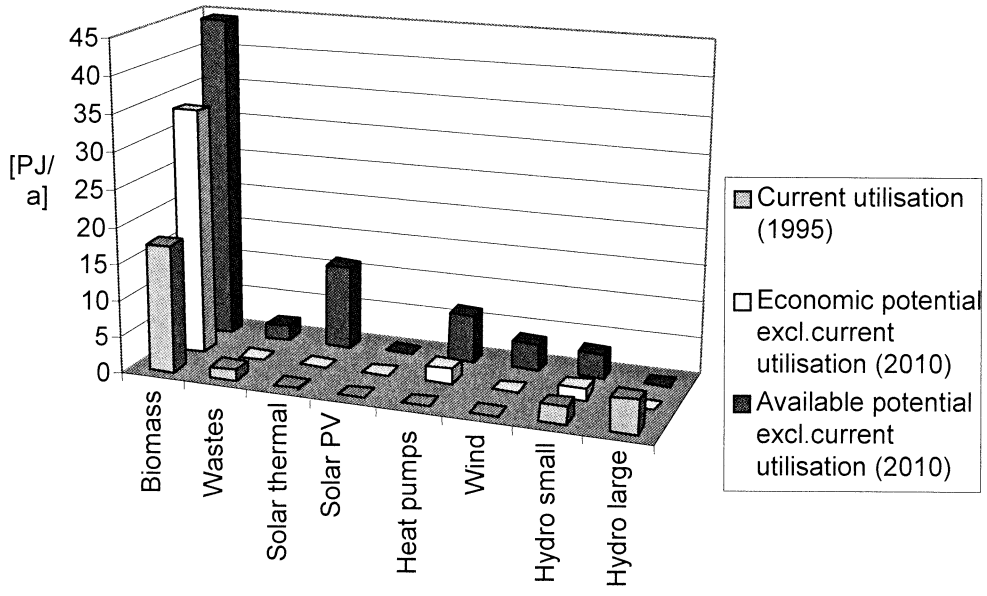
  Lack of information leads to poor energy and environmental management. Despite the existence of the EKIS network of local energy efficiency information centres managed by the Czech Energy Agency, a general information infrastructure is still missing.
- legal and institutional barriers such as legislative and administrative barriers for energy performance contracting in the public sector (financial rules for a certain type of organisations in the public sector do not allow to use money from saved energy costs for repaying the investment costs nor for other activities); and

- technical barriers on quality and reliability of new technologies, appliances, equipment etc. that must be guaranteed by increased R&D efforts and an assessment of demonstration projects.

3.7 Renewable Energy

The current use of renewables in the Czech Republic is very low and represents only 1.5% of total primary energy sources. For 2010, the Czech *Energy Policy* (2000) aims at a 3-6% share for renewables. As natural conditions are not very favourable for renewables, its technical and economic potential is quite low based on the current state of technological development (see below). At present, wider commercial opportunities can only be foreseen for the use of biomass. Generally, in the Czech Republic it is much more economically effective to use energy conservation than renewables for lowering emissions.[5]

Figure 3.2: Current Utilisation and Potential of Renewable Energy Resources



Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-34.

The *National Energy Efficiency Study* assessed the current utilisation (table 3.6), the available potential and the economic potential of renewables (figure 3.2). The "available potential" (70 PJ in 2010, 4% of TPES) indicates the highest possible level of use of renewables with currently available technologies and with existing administrative, legislative, environmental and other constraints, excluding economic ones. The "economic potential" (37 PJ in 2010, 2% of TPES) is the share of "available potential" of renewables that can be economically exploited

[5] SEVEn: *Strategie hospodaření s energií* [Strategy for Energy Conservation] (Prague: SEVEn, 1999): 15.

with current conditions.[6] The economic criterion assumes a limited payback period of 8 years (16 years for large hydro).[7]

By 2010, a significant economic potential was identified only for biomass (34 PJ), followed by the use of solar thermal energy (11PJ). However, it appears to be too expensive and thus no economic potential was foreseen. A rather small economic potential has been identified for small water plants (1.7 PJ), wind energy (0.06PJ), and for heat pumps (2,1 PJ). The energetical effective use of waste and photovoltaics is negligible in the short term.

Table 3.6: Current Utilisation and Potential of Renewable Energy Resources

	Current utilisation (1995)		Available potential (2010) excluding current use		Economic potential (2010) excluding current use	
	[PJ/a]	% TPES	[PJ/a]	% TPES	[PJ/a]	% TPES
Biomass	17,39	0,99%	44,38	2,54%	33,57	1,92%
Wastes	1,52	0,09%	2	0,11%	0	0,00%
Solar thermal	0,14	0,01%	11,36	0,65%	0	0,00%
Solar PV	0	0,00%	0,08	0,00%	0	0,00%
Heat pumps	0,03	0,00%	6,63	0,38%	2,09	0,12%
Wind	0,03	0,00%	3,68	0,21%	0,06	0,00%
Hydro small	2,34	0,13%	3,31	0,19%	1,7	0,10%
Hydro large	4,5	0,26%	0	0,00%	0	0,00%
Total	25,95	1,48%	71,44	4,08%	37,42	2,14%

Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-34.

3.7.1 Current Use of Renewable Energy

Hydro power. The overall electrical output and production of electricity from hydropower plants in the Czech Republic (including large hydropower) are shown in table 3.6.

Wind power. The overall installed capacity for wind power had a maximum of about 5,800 kW. The total volume of production in all operational wind power plants was estimated at 8,700 MWh per year based on an annual use of about 1,500 hours (17% utilisation rate).[8]

Solar thermal. In early 2000, about 100,000 m^2 of solar collectors were in operation. For this operational area the average annual yield was 400 kWh from 1 m^2, what amounts to an estimated annual production of thermal energy of 40,000 MWh (0.144 PJ).[9]

---

[6] This includes economic, fiscal and legislative conditions, state energy policy, capital and operating costs, equipment availability, capital availability, interest rates, etc.

[7] The following assumptions were made: If the actual payback period of given renewable technology is lower than 50% of the limited payback period, the market penetration is equal to the full available potential. If the actual payback period is equal to the limited payback period, the market penetration is equal to 50% of the available potential. If the actual payback period exceeds 200% of the limited payback period, the market penetration is zero.

[8] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 12-15.

[9] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 21.

Table 3.7: Use of Wind Power in the Czech Republic in 1999

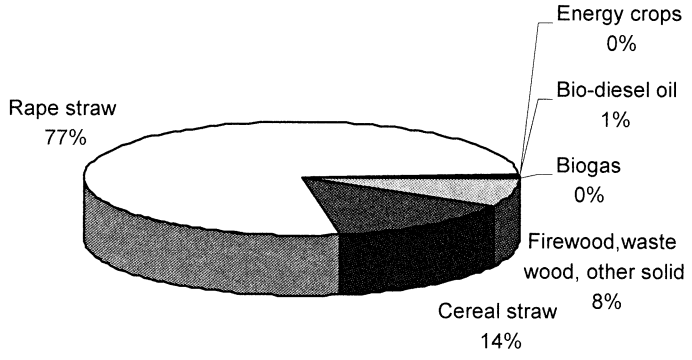
Locality	Installed Capacity [kW]	Start of Operation	Type of Technology
Dlouhá Louka, Krusné hory	315	1993	EWT 315 Czech
Mravenecník, Hrubý Jeseník	315	1995	EWT 315 Czech
Mravenecník, Hrubý Jeseník	630	1996	EWT 630 Czech
Strabenice u Kromerize	315	1993	WE 315 Czech
Mladonov u Sumperka	315	1993	WE 315 Czech
Borsice u Buchlovic	400	1994	EKOV Czech
Novy Hrádek, Orlické hory	4 x 400	1995	EKOV Czech
Nová Ves, Krusné hory	320	1994	MEDIT I
Mravenecník, Hrubý Jeseník	250	1993	W - 2 500 DK
Velká Krš u Vidnavy	225	1994	VESTAS
Hostýn u Kromerize	225	1994	VESTAS
Ostruzná, Hrubý Jeseník	6 x 500	1994	VESTAS
Total	**5 245**		

Source: Magazine "*energie*" (Prague: Panorama group, a.s, 1,2, 1999): 111 - 117; SEVEn, internal survey, 1999.

Geothermal. If the specification of the installed thermal output is restricted only to thermal water (water heat pumps using a low potential of geothermal heat and heat of the environment except surrounding air), then the number of geothermal plants was about 240 in early 1998, with a total thermal output of about 3,000 kW. If an average annual use of 3,000 hours/year is assumed, their total energy yield is 9.3 GWh, or 33.5 TJ per year.[10]

Heat pumps. The number of installed heat pumps has increased rapidly in recent years. During 1998, it was expected that additional 400 heat pumps will be installed. The target was set to have by end of 2000 about 2,000 - 3,000 heat pumps with an average unit thermal output of 12-13 kW, which would represent a total thermal output of 24-36 MW.[11]

Figure 3.3: Percentage Share of Current Biomass Utilisation



Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting,: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 25.

---

[10] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 21-22

[11] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting, 1999: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 22-23

Biomass. Solid biomass contributed at least 16 PJ to the primary energy supply. After adding liquid biofuels (biodiesel) of about 50,000 tons/year (1,900,000 GJ/year) and gaseous biofuels (biogas) of about 4.5 million m^3/year (1,000,000 GJ/year), the total share of biomass of the primary energy resources is about 19 PJ. The current use of biomass in the Czech Republic is given in table 3.8 and the percentage shares can be seen in figure 3.3.[12]

Table 3.8: Percentage Share of Current Biomass Utilisation

Biomass (biofuels)	Annual output	
	TJ/a	
Firewood,waste wood, other solid	16,2	7,7%
Cereal straw	30	14,3%
Rape straw	160	76,5%
Energy crops	0	0,0%
Bio-diesel oil	1,9	0,9%
Biogas	1	0,5%
Total biomass	209	100,00%

Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 25.

Waste incineration. In the Czech Republic there is only one waste incineration plant for heat production in Brno operated by the firm SAKO and owned by the city of Brno. This plant has a capacity for 240,000 tons of used garbage annually. The plant burns unsorted waste with an average heating value of 8 GJ/tons and a volume of 100,000 to 120,000 tons per year. The plant supplies heat for the district heating network of the city of Brno and for industrial enterprises amounting to 600,000 to 650,000 GJ of heat per year. In 2000, the Malešice incineration plant in Prague was in trial operation, and thus data on the total annual volume of processed garbage and delivered heat were not yet available. The capacity of the plant is 310,000 tons of mixed waste products (municipal and business waste) per year.[13]

3.7.2 Current Costs of Renewable Energy

The costs of energy produced by renewables depend not only on investments, but also on the mode of financing, operation, maintenance and on fuel costs, on the yearly utilisation rate and on the efficiency of the equipment. Thus, the price for the produced energy may vary widely. Table 3.9 shows the cost levels of electricity and heat produced by renewables in 1995. These costs are based on an analysis of real renewable energy installations by EkoWatt and on published results of demonstration projects supported by the Czech Energy Agency.[14]

3.7.3 Potential for Renewables

The available technical and economic potential for renewables in the Czech Republic was summarised in the table 3.6 and figure 3.2 above and more details follow below.

---

[12] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 15-19.

[13] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 23-25.

[14] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Netherlands: ECN, 1999): 26-27; EkoWatt: *Economic evaluation of renewable energy sources* (Prague, EkoWatt, 1995).

Table 3.9: Costs of Energy Produced From Renewables in the Czech Republic, 1995

	Cost range		Average costs	
	Electricity [CZK/kWh]	Heat [CZK/GJ]	Electricity [CZK/kWh]	Heat [CZK/GJ]
Small hydro	1.20-1.60		1.40	
Wind	3.30-4.00		3.60	
Solar PV	28.00-71.00		35.00	
Solar thermal		700.00-1,550.00		1,100.00
Geothermal heat pumps		185.00-336.00		260.00
Biomass-small boilers		80.00-150.00		110.00
Biomass-CHP		180.00-280.00		240.00
Average market price for final consumption (1997)			1.6	295

Source: SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 25; modified by authors.

Biomass. According to the analyses in the *National Energy Efficiency Study* the economic potential of biomass is very close to the available technical potential, so there is little room to extend the economic potential.[15]

Photovoltaics. Although cost reductions can be expected in the future, the estimated costs of solar photovoltaics remain too high until 2010. The use of photovoltaics in the near future is limited for demonstration applications and for off-grid applications as used in holiday homes, caravans, telecommunication equipment, traffic signs etc and their potential and possible contribution compared with other renewables was assumed as negligible.[16]

Solar systems. Almost no economic potential was estimated for solar thermal systems due to high investment costs, although the available potential is quite high. Solar thermal systems require an additional heating system to satisfy the demand beyond the performance of the solar panels. However, some solar systems were already introduced although most of them were unprofitable. Partly state subsidies played a role and partly the influence by other factors beyond economic ones, such as environmental consideration, image, fashion etc..[17]

Heat pumps. From an economic and environmental perspective it is reasonable to invest in the use of heat pumps only as an alternative to electric heating because investment costs are very high and problems of financing may be difficult.[18]

Wind energy. The economic potential for wind power is very low due to wind conditions in the Czech Republic. If protected areas and forests are excluded, the surface with an average wind speed between 5-6 m/s is about 770 km^2 and above 6m/s it is only 112 km^2.[19]

---

[15] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-35.

[16] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-35.

[17] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-35.)

[18] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-35.

[19] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-35.

Hydro power. A considerable proportion of the hydropower potential has already been used and the remaining available potential for small hydro power was assessed at 3.31 PJ and the economic potential at 1.7 PJ. There are two reasons not to exceed the economic potential, because it is quite close to the available potential and substantial barriers based on environmental legislation exist. It is assumed that no new large hydro-plants will be approved and built in the Czech Republic, mainly for environmental reasons.[20]

3.7.4 Barriers for the Use of Renewables

The *National Energy Efficiency Study* offered a comprehensive analysis of the barriers against a wider use of renewables. Based on its findings the most important barriers for the penetration of renewable are summarised[21]:

- *Low cost effectiveness of renewable energy projects results from*:
  - environmental externalities are internalised by only very small emission charges, no energy products apart from motor fuels are subject to any excise tax;
  - cross-subsidised prices of fuels and energy for households disadvantage the use of renewables in this sector;
  - previous long-term subsidies for non renewable energy sources;
  - high production costs of renewable energy technologies (due to lower performance of less mature technologies, small-scale production that result in high investment costs).
- *Financial barriers:*
  - scarcity of in-house capital;
  - low credit worthiness of Czech investors;
  - investors are often new companies with lacking guarantees;
  - high perceived risks in new renewable energy schemes;
  - lack of experience and shortage of trained and skilled staff to develop bankable project proposals;
  - limited experience of local banks with renewable energy schemes;
  - small size of renewable energy investments.
- *Technical barriers:*
  - limited maturity and compliance with technological standards of mainly locally produced renewable schemes;
  - system integration of constraints.
- *Lack of motivation and lack of responsibility due to unclear ownership.*
- *Lack of information:*
  - uncertainty about future energy prices and possible supporting schemes for renewables;
  - comprehensive information on cost effective technical schemes is missing.
- *Legal constraints:*
  - legal barriers mainly exist in site development;
  - ownership and rent issues are relevant for small hydro plants.
- *Negative environmental impacts:*
  - air pollution, noise, public disturbance, visual and landscape intrusion.

---

[20] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 21.

[21] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part II (Petten, Netherlands: ECN, 1999): 11-35.

3.8 Economic Framework and Support for Energy Efficiency and Renewables

3.81 Economic framework

In the past, the use of non-renewable energy was heavily subsidised and this is still one of the factors constraining the competitiveness of renewables in the Czech Republic. Since 1990, energy subsidies were significantly reduced, however, the energy prices for households are still cross-subsidised.[22] Some state subsidies for conventional sources still exist (e.g. support for mine closures). Negative environmental externalities are internalised only by extremely low environmental levies, some tax reliefs and slightly higher feed-in tariffs for renewable electricity (based on a voluntary agreement). The elimination of price distortions would significantly increase the price of non-renewable energy sources for households, and therefore this will be the crucial step for supporting energy savings and renewables in the household sector. Financial support for energy efficiency and renewable energy projects is provided by several limited public sources.

3.8.2 Standards and Legislation

In 1998, the government established an authority responsible for the creation of an Environment Management Audit System (EMAS). Its objective is to increase the competitiveness of domestic products on the EU market. The proposal for a *Energy Management Law* addresses the pertinent EU norms and includes relevant measures for energy efficiency. The technical standards for minimal efficiency requirements were not yet prepared with the exception of the proposed Energy Management Act that requires its application. Standards for heating equipment have not yet been worked out.

In 2000, no standards for the labelling of electric appliances existed in the Czech Republic. Such standards are only prepared for those appliances (refrigerators, freezers, washing machines, dishwashers, dryers and lamps) where EU requirements exist. Nevertheless, energy labelling is already applied for domestic and imported appliances in compliance with EU standards. Energy efficiency standards for the labelling of office equipment and appliances are required, but they have not yet been prepared.

For the construction of buildings, the Czech State Standard CSN 73 05 40 thermal-technical standard has been tightened. It may be assumed that the thermal-technical parameters of envelope structures (heat resistance, heat transfer coefficient) that were implemented in certain periods corresponded with those standards in force when the buildings were constructed.

Since 1964, the value of the required heat resistance for housing construction has increased for flat roofs from an original value of R = 1.1 m^2K/W to the present 3 m^2K/W and for outer walls from a value of R = 0.6 m^2K/W to 2 m^2K/W. The recommended values for structures that were designed for the future are R = 4.35 m^2K/W for flat roofs and R = 2.9 m^2K/W for external cladding.[23] Thus, it is then apparent that those structures built in the 1960s have more than a 100% high-energy demand from today's perspective.

---

[22] SEVEn: *Analýza dotací v energetickém sektoru* [Analysis of subsidies in energy sector] (Prague: SEVEn, 1999).

[23] R (thermal resistance) gives the heat-insulation characteristic of building structure. The dimension of thermal resistance is referred to as: m^2 Kelvin/Watt.

3.8.3 Financial Sources

The following financial sources for energy efficiency and renewables are currently available:

- in-house capital;
- commercial sources: bank loans, leasing, equity financing, third party financing (Energy Performance Contracting - EPC);
- governmental financial assistance and support funds; and
- international support programmes.

Table 3.10: Example for Interest Rates for Commercial Credits (legal persons, in %/p.a.)

Bank	Short-term loans	Medium-term loans	Long-term loans	
Ceska sporitelna	8,7	9,1	9,4	legal and physical persons
	8,2	8,2	8,3	municipalities
Ceskoslovenska obchodní banka	7,05	7,1 - 7,4	7,80 - 8,00	long-term>3years

Source: Internal survey by SEVEn.

3.8.4 Energy Performance Contracting in the Czech Republic

Since 1992, EPC has been gradually implemented in the Czech Republic. However, this approach has developed only step by step. Information on EPC came primarily from the United States and Canada where extensive EPC programmes were then in progress in the public sector, especially in government and army buildings. The first opportunity for Czech experts in the energy field to acquaint themselves with these methods was in late 1992. Shortly after the EPC methods became known in the Czech Republic, Energy Service Companies (ESCOs) gradually were set up. Several energy service firms emerged having EPC as their area of interest. The first was the company EPS CR, Inc. that was founded in the autumn of 1993 and that received its first energy service contract in early 1994.

A major milestone in the development of EPC was the training of firms that indicated interest in this activity that was organised with the assistance of the EU's PHARE programme and by end of 1996 more than 19 firms had gone through the training, at least half of them began to include EPC among their business activities. The Czech Energy Agency (CEA) has also joined in supporting EPC. CEA supported EPC and between 1994 and 1999 a government programme to reduce energy consumption offered grants for such projects (table 3.11).

Table 3.11: Support Provided by the Czech Energy Agency for EPC Projects 1994-1996

Project	Grant (in millions of CZK)	Project Costs (in millions of CZK)	Grant Share
Jilemnice Hospital	2.2	21	10%
Bulovka Hospital	5.0	72	7%
Industrial Plant: Morav. samot. a lupkove zavody	2.2	22	10%
DHS*) City of Vrchlabi	5.8	76	8%
Elementary School: Jindrichuv Hradec	5.0	13	38%

Legend: *) DHS – District Heating System,

Source: Based on a communication from the Czech Energy Agency.

In spring 2000, only a few companies dealt with EPC as their main activity. They have already completed such projects. In the Czech Republic the number of projects that were realised or are in preparation exceed about fifty, primarily in schools, health facilities and in industrial companies. The main barriers for implementing EPC projects in the Czech Republic were:

- *Financial and tax related barriers:* A firm offering EPC services must obtain sufficient capital to finance the investment for energy efficiency measures. Tax burdens on firms significantly influence their development. Energy-saving equipment generally has a depreciation period of more than 8 years what is quite unfavourable, especially for new firms.
- *Energy prices:* for energy and their carriers.
- *Economic barriers* include:
  - lack of long term finances,
  - loan guarantees,
  - investment priorities.
  - heavy indebtedness on the part of the enterprise.
- *Legislative, contractual or procedural barriers:* Necessity to submit the project for public tender and regulations for the financial management of government funded institutions.
- *Psychological barriers*: The EPC approach is so unconventional in initial negotiations and energy consumers often do not understand its principles.

3.8.5 Activities of Energy Service Companies and a Survey in the Czech Republic

In the Czech Republic, Energy Service Companies (ESCOs) are active in the public (schools, hospitals) and in the private sectors (industry, services, housing). The public sector is more stable and does not immediately react to business cycles. Thus, the public sector is especially suitable for the application of EPC. The principal constraints are primarily administrative barriers, especially the strict rules for treating investments, requirements for public tender (e.g. Act 199/1994) or complicated management structures. Most suitable are those public sector institutions that can make their own investment decisions and thus have a real interest in energy savings. In other cases, when the client (ministry, district, town, and municipality) decides on investments, the application of the EPC approach is more complicated.

Schools. According to the current economic regulations, the EPC method can be applied without problems in schools that are contributory organisations (as legal subjects), i.e. some primary schools and all universities. Experience with projects implemented so far illustrated that investments in schools of average size usually amounted to about 1-2 million CZK and only rarely they exceeded 10 million CZK. Thus, relatively small projects involve higher transaction costs. These barriers can to a certain extent be overcome by combing projects since there are schools of a certain building type in a given conurbation for which a uniform process can be applied.

Health system. According to the current economic regulations, the EPC method can also be applied without problems in most facilities of the health services because the state health service facilities in most cases function as contributory organisations (are legal subjects). Non-state health facilities are usually administered on a commercial basis. Health service facilities are mostly financed by health insurance companies. Payments from insurance companies are not bound for specific purposes, the director of the health facility decides on their allocation. The Ministry of Finance and the Ministry of Health participate in the decision making on large investments from the state budget. The application of EPC in the health sector can be con-

strained by a high insolvency and low credit standing.[24] The advantage is that especially in hospitals the costs for projects can amount to tens or even hundreds of millions of CZK what at the same time results in a reduction of transaction costs of the EPC method.

Private sector. The private sector represents an extensive area for the application of EPC. EPC services in this sector generally comply with the valid regulations of Act 513/1994 of the Commercial Code and with other regulations for investments. Compare with the public sector, managerial structures are usually simpler and more straightforward, that is why decision making on investments is faster. But the private sector is more sensitive to business cycle fluctuations and the risk of bankruptcy is higher than with public institutions.

Industry. EPC in industrial companies usually yields higher profits than in the public sector, however, with a significantly higher risk. A suitable candidate for an EPC project is a medium-sized or large company with high-energy consumption, financial stability, and solvency and with an assured sale of its products. Fundamental problems of many industrial companies include incomplete privatisation and unclear production programs. This is the reason why enterprises do not want to implement large projects of reconstruction of energy sources and distribution.

Services. In this sector businesses and hotels are best suited for EPC. The suitability of a company for EPC partly depends on its size. The recent dividing up of large enterprises into smaller ones did not favour EPC. Large department stores or chains of shops, wholesalers with a high energy consumption are among the primary candidates. With respect to accommodation, suitable candidates for EPC are big hotels of higher category with a high energy consumption. The incorporation of a hotel into an international chain can be advantageous for EPC, because of increased booking rates and decreased risks for commercial failure. But the majority of the hotels in the Czech Republic are concentrated on the lower- and medium price hotel category that face the problem of high booking rates to a larger extent than luxury hotels.

Housing construction. Housing represents one of the largest energy consumers in the Czech Republic. Because many houses were constructed between 1950 and 1990, many buildings are based on similar plans what permits uniform solutions. Especially suitable for EPC is the municipal housing fund that permits projects based on the amount of achievable savings but also smaller projects in larger privatised residential houses. As payments for heat must be made through a contractual facility, this guarantees repayment of credit and services. In this sector towns have recently expressed an interest to implement energy saving projects in selected flats but it is still unclear whether the conditions for these contracts allow EPC.

The Czech market offers a significant potential for energy saving projects by EPC but it is not yet ready for this modern type of service and the acquisition of contracts in this area will require great efforts (and also relatively high transaction costs). Due to the state support for EPC the Czech market will gradually develop and opportunities for contracts will grow. But competition has also increased. To remain in the market will require not only high qualifications and a certain financial base but also a suitable and effective strategy that not only meets the needs and wishes of the customer and that may use very effectively the possibilities and capabilities of the firm offering EPC. Such a mutually advantageous cooperation would lead to a double victory both for the customer and the ESCO and thus produce an enduring success.

---

[24] Most hospitals are owned by the municipalities and the state. They cannot grant any guarantees for financial institutions. EPC firms do not want to take any risk.

The following survey of Energy Service Companies focuses on selected companies that offer energy performance contracting for energy efficiency primarily on the demand side. Several other organisations specialise on contracting with long term contracts for heat delivery.

- *MVV EPS CR, Ltd.* was set up in October 1993 as a subsidiary of the American Energy Performance Services, Inc., and in 1999 it was purchased by the German utility MVV that specializes almost exclusively in providing energy services in the form of EPC.
- *Landis & Staefa ESCO (CZ), Ltd.* was established in 1999 after its acquisition by Siemens.
- *Stredisko pro uspory energie, Ltd.- SUE (Center for Energy Savings)* is a small Czech firm specialised in energy services in the form of EPC in the public sector, mainly in schools.
- *Energy Services Company, Ltd. (ESCO)* is a Czech firm that is engaged in consultancy and turnkey deliveries of Performance Contracts.
- The following companies have been trained in EPC under the PHARE project: *DHV CR, Ltd., EGF, s.r.o., EGU Praha, Jsc., Terranova-Industrie, Ltd., Thermodat, Ltd.*

3.8.6 Financial Support

Each year the government offers a *State Programme to Support Energy Efficiency and Renewable Energy*. Its main programmes are those of the Ministry of Industry and Trade that are implemented by the Czech Energy Agency and those of the Ministry of the Environment that are carried out through the State Environmental Fund of the Czech Republic. The budget for their joint programme for 1999 was 300 million CZK. In addition, programmes for repairs and reconstruction of apartment houses were launched by the Ministry of Regional Development with the subsidy of 1 million CZK. There is another programme for renovation and reconstruction of prefabricated blocks of flats owned by municipalities and the infrastructure project financed by the municipalities. In addition, the State Programme Supporting Small and Medium-sized Companies (SMES) also includes energy projects that result in energy savings.

Programmes for Energy Saving are annually announced by the Czech Energy Agency (CEA). They are assessed by independent experts on an annual basis, especially with respect to the achieved savings, and the capital expenditure for energy savings are compared based on the methodology applied by the International Energy Agency. Since 1995, when the first programme evaluation was carried out, the assessment procedures for projects financed from the State Programme of Energy Saving have significantly improved both with respect to results and administration. The ongoing projects are monitored and evaluated by CEA specialists or accredited experts once a year (for a more details on CEA programmes see: <http://www.mpo.cz> and <http://www.ceacr.cz>). The CEA maintains a network of advisory and consultation centres (EKIS) throughout the country that are actively involved in the problems of energy savings and greater use of renewables.

The Ministry of the Environment with the assistance of the State Environmental Fund has also carried out, managed and monitored projects on electricity and heat generation and on introducing cogeneration for electricity and heat aimed at reducing environmental impacts of heat generation. The State Environmental Fund (SFZP) was founded in 1991 with the goal to create a supplementary financial source for supporting environmental protection and improvement. In 1997, the Fund's activity was restructured and reassessed. At present it is an institution of a revolving type. The Fund gains its income from environmental charges, instalments of already provided loans, and from interest on deposits. It also received 1 500 million CZK from the National Property Fund to implement the *Programme for Air Restoration*. Important activities of the Fund include international co-operation with Central European environmental funds and also with partners from OECD and EBRD. This form of financing for domestic

projects is analogous to that of similar Western European institutions (for more details on the activity of the SFZP see: <http://www.env.cz> and < http://www.sfzp.cz >).

Projects financed and managed by the CEA and the SFZP have their own methods of project evaluation and requirements for elaboration of energy audits as part of the applications for subsidies. The CEA publishes these requirements in professional journals and in official publications. Details on the government programme for 2000 are offered in *Appendix B* below.

The savings that were achieved in these projects are high. Nevertheless, there are certain problems to evaluate the support for energy prices for households through cross subsidies and the regulated heat prices for households and public buildings. Obviously their real contribution may even be greater.

Projects that are co-financed by these two institutions cover only a part of the energy saving activities and of their effective use. In addition, the Czech government established a system of state guaranties for support and development of activities of Small and Medium Enterprises (SMEs) that are included in special regional programmes. The *Czech-Moravian Guarantee and Development Bank* is responsible for the realisation of these programmes.

Although the situation in other areas has improved, several tools for a greater effectiveness from energy savings are lacking. Significant savings can be achieved through new technologies what can currently be observed with the replacement of heating systems in buildings. They are also increasingly expected in industrial facilities where a big role may be played by demonstration projects resulting from certain programmes for this area. However, so far no comprehensive programme for supporting research and development on new energy efficient technologies has been announced. But one sub-programme the CEA offers subsidies up to 40% of capital expenditure for demonstration projects on energy saving and renewables. Foreign programmes supporting energy efficiency are also used (for details see *Appendix E*).

In 1999, the Ministry of Agriculture - as a part of the state programme for subsidies - granted 60 million CZK for the production and use of renewables and for energy savings on farms. These programmes include interest rate subsidies for commercial lending guarantees for lenders. Another form of grant support is for raising energy crops (1998-2002).[25]

Since 1992, the Energy Saving Fund - founded by the EU Phare Programme - supported the interest rates for commercial loans for several energy efficiency projects. Integrated public transport systems are also supported for by subsidies of the central government that are given to cities and regions through budgetary grants and to transport companies through grants for equipment and vehicle maintenance.[26]

3.8.6 Tax relief

To support energy savings and renewables, the following tax reliefs have been implemented:

- Lower value added tax rates (5% instead of 22%) for environmentally sound products and goods related to energy savings.
- Income tax relief for energy efficiency and recycling installations. Taxpayers can deduct 10% of the purchase price from the income tax for installations such as thermal pumps, electric generator aggregates for CHP up to 2.5 MWe and other electric equipment.

---

[25] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 54-56.

[26] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Petten, Netherlands: ECN, 1999): 54-56.

- A real estate tax relief for five years for house owners who modernise their heating system by switching from coal to natural gas, to electricity or any renewable energy source.
- Combined transport is completely or partially exempt from road taxes for transport contractors who use this type of transport.
- Renewables (such as small hydro power, wind power and solar plants, biomass installations, geothermal facilities and heat pumps etc.) are subject to several tax reliefs. Legal persons operating these schemes do not pay income tax for 5 years of operation, or do not pay real estate tax. Biofuels (including biogas) and selected renewable energy technology components are subject to a lower VAT rate (5%).
- Biofuels (including biogas) are exempt from excise tax on motor fuels.[27]

3.8.7 Feed-in Tariffs

In the Czech Republic, no law based support system for renewable electricity exists. However, feed-in tariffs for renewable electricity were increased by 15-20% (to 1.13-1.20 CZK/ kWh, i.e. 0.03 US $/kWh) through a voluntary agreement among the Ministry of Industry and Trade, the Ministry of Environment, regional power distributors and renewable energy associations.[28]

3.8.8 Joint Implementation

Marginal abatement costs of greenhouse gases in the Czech Republic are still relatively low compared to other OECD countries. This leaves a certain potential for Activities Implemented jointly/Joint Implementation Projects (AIJ/JI).[29] The official requirements for AIJ/JI projects were prepared by the Ministry of Environment and they will be quite restrictive.

3.9 Changes in Approaching Legislation, Norms and Technical Standards

In connection with the EU accession of the Czech Republic, fundamental changes in the approach towards legislation, in the responsibilities of the state, the activities of its administration and testing departments are needed that hitherto performed this activity. In particular, the activities of testing departments are significantly changed (by the Act No. 30/1998 Coll. on state testing, the performance of state administration), and these tasks will now be carried out by a paid customers service, since entrepreneurs are those responsible for the safety of products on the market.

In June 1998, a comprehensive analysis of the Czech legislation was carried out with respect to technical trade barriers (TBT) as part of the preparation for the harmonisation of national legislation with the *acquis communautaire* of the EU. The Czech Republic stated that by 2001 it would complete this complicated process of adapting a vast amount of legal regulations. This will obviously require an acceleration of certain legislative procedures since with the current speed of the legislative process this national commitment may be challenged. In addition, certain obstacles in the minds of some responsible persons must be overcome. This mainly concerns the method of carrying out inspection activities in the market economy, and

---

[27] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Netherlands: ECN, 1999): 59.

[28] SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting: *National Energy Efficiency Study – Czech Republic*, Part I (Netherlands: ECN, 1999): 54-56.

[29] A foreign investor invests in a joint implementation project that considerably lowers greenhouse gas (GHG) emissions and gets in turn emission credits from the country hosting the project. Emission credits can be used to fulfil the investor's country national GHG emissions limit stated in the Kyoto Protocol. Activities implemented jointly are projects conducted in the pilot phase and without any credit allocation.

in general the organisation of the budget process. Technical trade barriers significantly affect the introduction of products on the market by manufacturers and suppliers. This refers to a great degree to standardisation which is the task of *the Institute for Standardisation, Metrology and State Testing*.[30] The government charged this office with the responsibility for all technical trade barriers.

3.9.1. Need for a New Approach on Market Opening

The ongoing harmonisation of the Czech legislation with the *acquis communautaire* requires amendments to the Act No. 22/1997 on technical requirements for products, on descriptions of their impact and on the adopted method for solution in the field of metrology with an emphasis on the hitherto unresolved area of the so-called ready packed goods. The *Act on Technical Requirements for Products* should contribute to the establishment of a competitive entrepreneurial environment that already exists in other developed countries. The main principle is that the responsibility of the state for preventive operation in the given area is shifted over to entrepreneurs that are responsible for products they supply to the market.

The state sets only fundamental, generally defined requirements related only to health protection, safety of persons, property or the environment ("legitimate interests"). Everyone who wants to produce or import products must know not only the status of current technical knowledge but also the risks connected with the use of products and the principles of protection against risks.

The activity of supervisory bodies will also significantly be changed. The amendment to the *Act on Czech Business Inspection* will lead to a change of principles during sampling. This service will now require payment and the entrepreneur will not receive compensation unless the product's safety is proven. In the case of justified suspicions that a product is not safe it will be possible to stop the sales of this product.

The aim of the amendment to Act No. 22/1997 on technical requirements for products will introduce the EU system into Czech legislation in order to be able to sign an agreement with the European Commission on conformity assessment, the so-called PECA (Protocol on European Conformity Assessment). Thus, a system compatible with EU procedures will be established that will enable Czech producers to mark their products with the CE sign that is mutually respected for products from countries of contracting parties.

3.9.2. Necessity of Amendments in Legislation for Metrology

Recommendation No.1 of the *Organisation Internationale de Métrologie Légale* provided the baseline for the Act No. 505/1990, that opens a path for the adoption of EU directives on metrology and ready packed goods through a government degree or regulation by the Ministry of Industry and Trade. This Act was updated and published as Act No. 119/2000 of 6 April 2000.

Amendments to this Czech legislation concentrate on the following criteria:

- achievement of full compatibility with the development of legal amendments concerning metrology in the EU and globally;

---

[30] The term "metrology" was missing in most British English dictionaries, such as Collins, Longman, Duden Oxford. The 7th edition of the *Concise Oxford Dictionary of Current English* (London: Guild Publishing, 1985): 638 defined metrology as: "science or system of weights and measures". The 2nd edition *of Webster's Unabridged Dictionary* (Cleveland: Dorset & Baber, 1983): 1135 offered this definition: "1. The science of weight s and measures, 2. A book devoted to this science, 3. pl. *metrologies*, a system of weights and measures". *Webster's Ninth New Collegiate Dictionary* (Springfield: Merriam-Webster, 1984): 749 gave a similar definition: "1. the science of weight s and measures or of measurements, 2. a system of weights and measures".

- application of deregulation and liberalisation in the activities of the state towards business, especially, producers of measuring devices, in accordance with the requirements of a developed market economy (removal of technical trade barriers);
- obligatory specific national adjustments only for measuring devices that have already been put into operation, and only in the case of public interest;
- reduction of the public interest activities that must be carried out by the state itself and transfer to a state body (e.g. the Institute of Standardisation, Metrology and State Testing);
- furthermore, launching of the transformation of the current Czech Metrology Institute.

The national metrological body - the Czech Metrology Institute - has been working on a number of measures concerning national standards. Their successful implementation will allow the accession to the agreement on the mutual approval of standards that is currently being prepared by the bodies of the Metric Convention (mainly by the *International Institute for Weights and Measures* BIPM) that was signed at the 31st conference on weights and measures held in October 1999. The document has been the basis for the mutual recognition of all other certificates issued by calibration and testing laboratories and, at the same time, will be a precondition for the accession of individual countries to multilateral and bilateral business contracts (e.g. EU - USA).

One of the principal assumptions of international acknowledgement of national standards is the existence of quality systems according to the ISO 9000 series, possibly to EN 4500, which so far did not existed in Czech metrology institutes. In 1997, the Czech Metrology Institute completed the setting up of basic elements of this system and the gradual confirmation of individual laboratories was launched. In April 2000, for most guaranteed measurement subjects, regional Inspectorates in Liberec, Brno, Pardubice and Prague were accredited, as well as the centre for the certification of the personnel of the Czech Metrology Institute. The entire process is being carried out in accordance with the adopted time schedule and should culminate in the international acknowledgement of the certification of the Czech Metrology Institute's quality system by the end of 2000.

Chapter 4: Energy Sector and the Environment

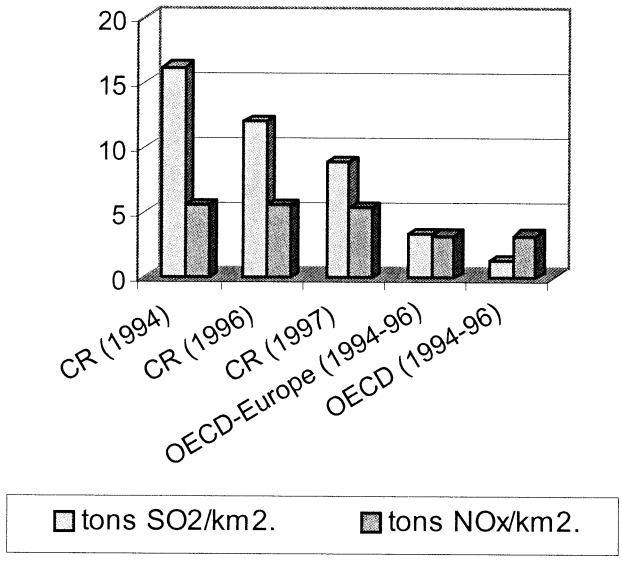
4.1 Development and Current Situation of the Environment

The political changes since 1989 have created new conditions that have significantly influenced the solution of environmental problems. The environmental situation and environmental protection in the Czech Republic differ from those in EU member states. The gradual removal of these differences depends not only on the modification of the legislation in the Czech Republic, but also on major investments to achieve the technical level of environmental protection in the EU. Although since 1990 remarkable improvements in environment protection were achieved and in some parts even significant actual improvements occurred, the degree of individual environment burdens remains different. The environmental policy that was adopted between 1990 and 1995 was characterised as one of enforcing legal tools that resulted in major reductions of air and water pollution. These important improvements were very costly and they were primarily achieved by measures at the end of the manufacturing processes.

During the preparation process for EU accession, environmental protection issues are a top priority. The Czech government is fully aware of the different levels of environmental protection in the Czech Republic and in the EU member states, of the numerous legal provisions of the "*environmental acquis*" to be transposed and implemented, and of the large investments that are required to reach the EU level of environmental protection.

Between 1987 and 1997, a significant decrease in emissions of traditional pollutants (solid particulates and sulphur oxides) occurred in the Czech Republic. But the specific emissions of traditional pollutants per unit of GDP still are amongst the highest in OECD countries. But the emissions per capita are comparable with other OECD countries. Due to the projected increase in transport it will not be easy to reduce NOx emissions.

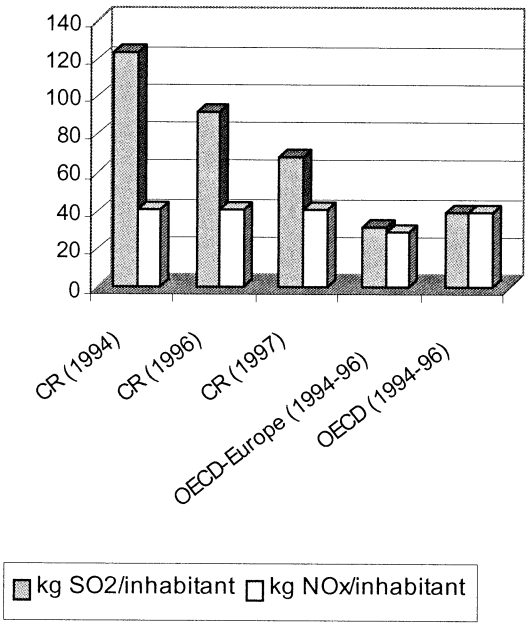
Figure 4.1: International Comparison of SO_2 and NO_x Emissions per km_2



Source: Ministry of the Environment: *State Environmental Policy* (Prague: Ministry of the Environment 1999): 30.

Figures 4.1 and 4.2 illustrate the specific emissions in the Czech Republic and the average level in OECD countries. According to figure 4.1. in 1997, the level of SO_2 emissions (tons SO_2/km^2) in the Czech Republic was still about 2,7 times higher and for NO_x specific emissions (tons NO_x/km^2) about 1,7 times higher than the average levels in OECD and EU countries. Figure 4.2 illustrates the international comparison of specific emissions per capita of SO_2 and NO_x. The SO_2 emissions have significantly decreased during the 1990s, and are already comparable with average per capita emissions of OECD countries.

Figure 4.2: : International Comparison of SO_2 and NO_x Emissions per Capita



Source: Ministry of the Environment: *State Environmental Policy* (Prague: Ministry of the Environment 1999): 30.

4.2 Environmental Impact of the Energy Sector

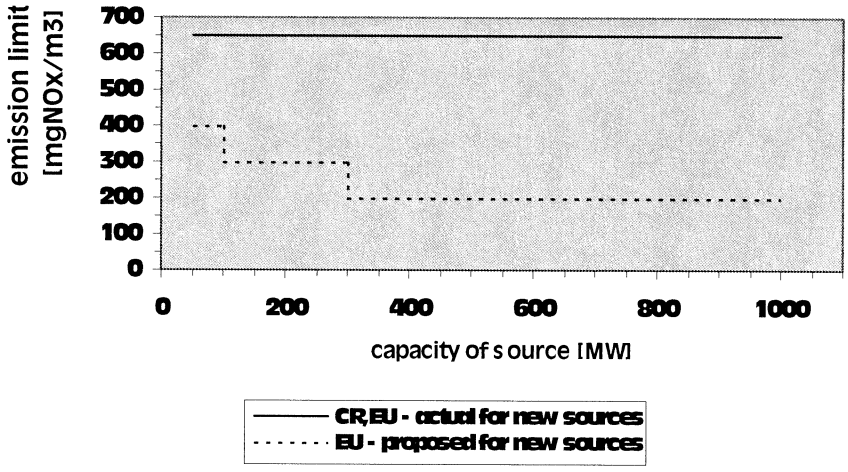
The energy sector has a negative environmental impact on the entire cycle from the extraction of primary raw materials to energy consumption. Production, transfer and consumption of energy affect all environmental segments, but the air is affected worst by emissions of pollutants, especially from fuel combustion. Despite the fact that during the last ten years solid fuels, particularly brown coal with high sulphur content, have been to a significant extent replaced by more environmentally friendly fuels, the share of solid fuels remains high since they are an important domestic raw material. Before 1989, the level of environmental pollution was very high, in some regions of the Czech Republic it was even hazardous for the health of the population.

The improvements essentially resulted from new legislation that came into force in 1991 – 1992, especially the *Clean Air Act*, the act on nature and landscape protection, the act on land resources, the act on wastes, the act on environmental impact assessment and the act on the Environment that defined the most crucial concepts in the environmental area. Other important laws were adopted between 1995 and 1998. Of great importance for energy production is Regulation No.117/1997 of the Ministry of the Environment that defined emission limits and other conditions for the operation of stationary sources of pollution and air pollution control. This regulation amends the *Clean Air Act* No. 309/1991, in the wording of later regulations. It requires stricter, generally obligatory emission limits for plant operators of combustors with

an installed heating capacity higher than 0.2 MW and listed operators of industrial plants. After a transition period, it entered into force on 1.1.1999. From the perspective of SO_2 and NO_x emissions, the sources with an installed capacity above 50 MW were most important.

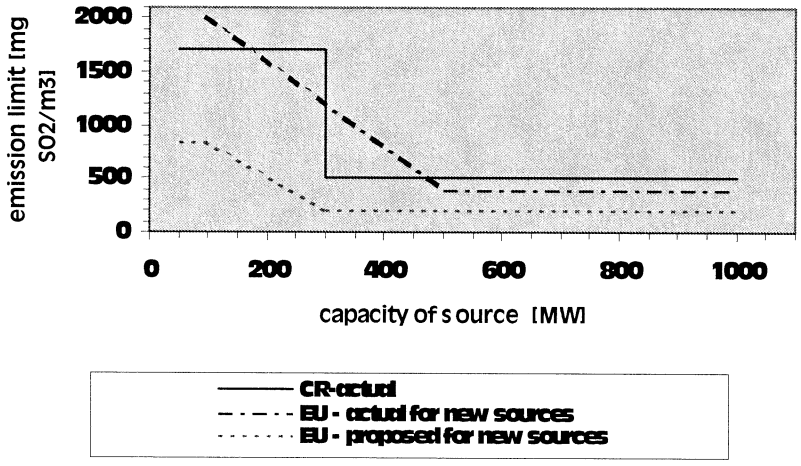
The values for SO_2 and NO_x emission limits and comparison of those with values valid in the EU are shown in figures 4.3. and 4.4. It is evident that the structure of SO_2 emissions, valid for small-scale sources currently differ in the Czech Republic from those in EU countries. But emission limits for installed capacity of sources above 500 MW are practically the same. NO_x emission limits are identical. Both figures show the proposed EU emission limits for new sources.

Figure 4.3: Comparison of SO_2 Emission Limits for Solid Fuels in Energy Industry



Source: SEVEn: *Specifikace a rozsah požadavků k plnění protokolů EHK OSN k Úmluvě o snižování přenosu znečišťujících látek přes hranice států* [Specification of the requirements to the fulfilment of the UN ECE Convention on the Long-range Transboundary Air Pollution Protocol] (Prague: SEVEn, 1999): 38.

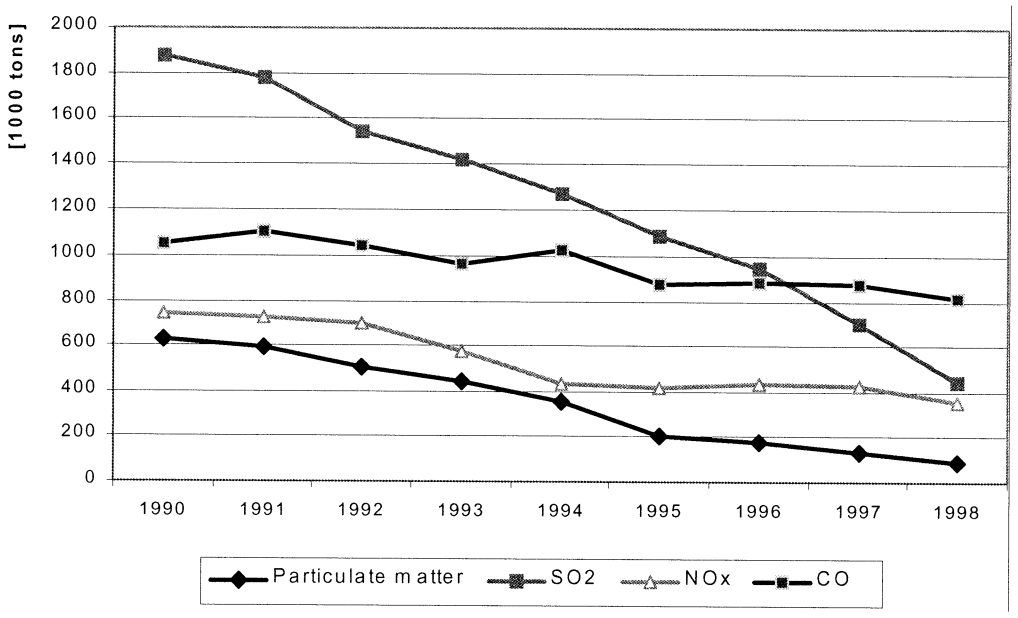
Figure 4.4: Comparison of NO_x Emission Limits for Solid Fuels in Energy Industry



Source: SEVEn: *Specifikace a rozsah požadavků k plnění protokolů EHK OSN k Úmluvě o snižování přenosu znečišťujících látek přes hranice států* [Specification of the requirements to the fulfilment of the UN ECE Convention on the Long-range Transboundary Air Pollution Protocol] (Prague: SEVEn, 1999): 38.

Legal measures have resulted in significant improvements in national air quality: in the period 1990 - 1998 sulphur dioxide emissions were reduced by almost 80%, airborne dust (dust aerosols) by almost 90%, and carbon dioxide emissions by 20%. This was partly achieved by an emission reduction that was caused by the restructuring of industry and by the decrease in GDP. The overall development of airborne dust (dust aerosol), SO_2, NO_x, and CO emissions is shown in figure 4.5 that shows the rapid reduction of SO_2 and dust aerosol emissions from 1990-1997. Concerning NO_x and CO emissions, a slight growth occurred after 1995. Although NO_x emissions from large stationary sources were reduced, their increase was caused particularly by the rapid growth of road transport.

Figure 4.5: Total Emissions of Major Pollutants in the Czech Republic (1990 - 1997)

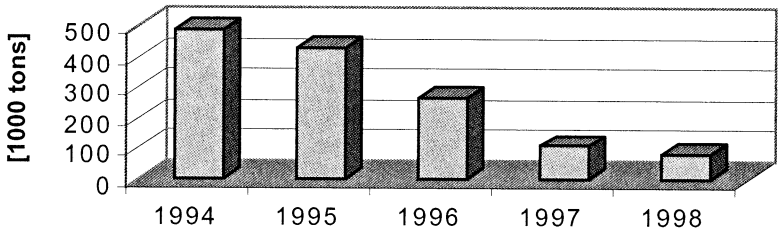


Source: Ministry of the Environment of the Czech Republic: *The Czech Republic Report to the CLRTAP Secretariat, 1997* (Prague: Ministry of the Environment of the Czech Republic, 1998). The data for 1998 are based on an internal survey by SEVEn.

The reduction of SO_2 emissions from combustion processes was mainly affected by the following two factors:

- the replacement of coal by natural gas or other, more environmentally friendly fuels; and
- the implementation of technical measures for major air pollution sources.

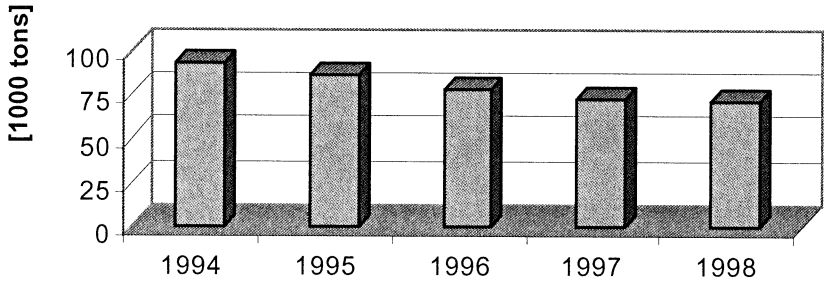
Figure 4.6: Sulphur Dioxide Emissions from Power Plants (1994 - 1998)



Source: KONEKO Marketing Ltd.: *Energy Economy, Czech Republic 1994–1998 in Numbers* (Prague: KONEKO Marketing Ltd., 1999): 9.

The replacement of coal by natural gas for heating purposes considerably improved the environment in both industrial and urban areas of large towns, as well as in small towns and villages. Major air pollution sources were desulphurised and in some cases modernised. In the Czech Republic this primarily applies to large power plants whose total capacity is above 10,000 MW_{el}. The dominant domestic power utility is the CEZ jsc, with a total capacity of 7,267 MW and approximately 74% of total electricity generation in the Czech Republic. As part of this programme of modernisation and desulphurisation of coal sources, by 31 December 1998 CEZ had built desulphurisation units in 12 power plants with a total output of 5,930 MW and shut down 12 obsolete power units with a total output of 2,020 MW. As part of this programme, five boilers for fluidised combustion with a total capacity of 532 MW were put into operation. This programme required investments of 46 billion CZK. The significant reduction of SO_2 emissions in all Czech power plants (including those outside CEZ) between 1994 and 1998 is shown in figure 4.6. The development of NO_x emissions between 1994 and 1998 is shown in figure 4.7. As a result of the measures mentioned above, NO_x emissions were also reduced, but in the last two years these emissions have stabilised.

Figure 4.7: Nitrogen Oxides Emissions from Power Plants (1994 - 1998)



Source: KONEKO Marketing Ltd.: *Energy Economy, Czech Republic 1994–1998 in Numbers* (Prague: KONEKO Marketing Ltd., 1999): 9.

4.3 Policy for Air Pollution Control and Climate Protection, Related Legislation and International Obligations

The Czech Republic ratified the UN Framework Convention on Climate Change (UNFCCC) in 1994 and issued two National Communications.[1] In 1998, it signed the Kyoto Protocol to the UNFCCC that requires from selected industrialised countries quantitative reductions in greenhouse gas emissions which would in the first stage during the commitment period of 2008 - 2012 ensure a 5.2% reduction in global emissions compared with their 1990 level. The protocol requires from the Czech Republic a 8% reduction in total greenhouse gas emissions until 2008 - 2012. The same reductions apply also to EU countries. In the Czech Republic, the inventory of greenhouse gases for 1990 was carried out in accordance with the internationally recommended IPCC/OECD methodology and its results were verified by calculation. *A National Strategy of Protecting the Earth's Climate System* was also prepared (substantial extracts of this strategy are reproduced in *Appendix F* below).

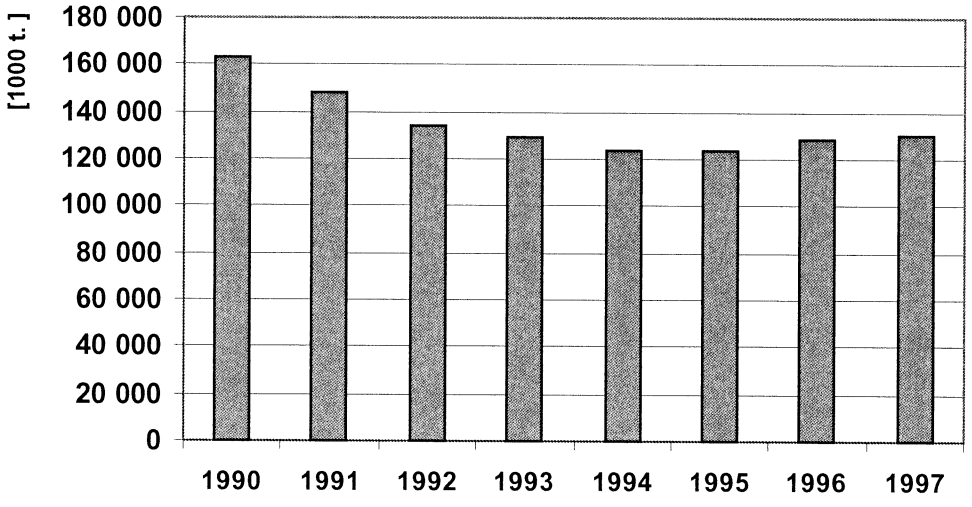
---

[1] Ministry of the Environment of the Czech Republic, Ministry of Industry and Trade of the Czech Republic: *The Czech Republic's First Communication on the National Process to Comply with the Commitments under the UN Framework Convention on Climate Change* (Prague, 1994); Ministry of the Environment of the Czech Republic: *The Czech Republic's Second Communication on the National Process to Comply with the Commitments under the UN Framework Convention on Climate Change* (Prague, 1997).

The main source of greenhouse gas emissions is the energy sector due to the combustion of fossil fuels. In the Czech Republic, the current gross consumption of primary sources per capita is still high. Due to the structure of domestic primary sources (mainly lignite) the level of total greenhouse gas emissions per capita with 14.4 tonnes of CO_2 is also high, while in OECD countries this level is presently below 13 tonnes of CO_2 per capita. Besides the energy industry, greenhouse gas emissions are also produced in other sectors (transport, agriculture, commerce and housing). Methane as the second major greenhouse gas is released from waste disposal sites, from transport, waste processing and incineration.

Between 1990 and 1994, greenhouse gas emissions in the Czech Republic were reduced by approximately 24%. In 1995, they did not increase, but in 1996 they once again rose by 4.6 % compared with the previous year. In 1997, growth slowed down to an increase of 1.6 %. The development of CO_2 emissions is shown in figure 4.8. In 1990, the total greenhouse gas emissions reached 187.5 million tonnes of carbon dioxide equivalents, whereas in 1997 the figure was 151.6 million tonnes.

Figure 4.8: Total CO_2 Emissions in the Czech Republic (1990 - 1997)



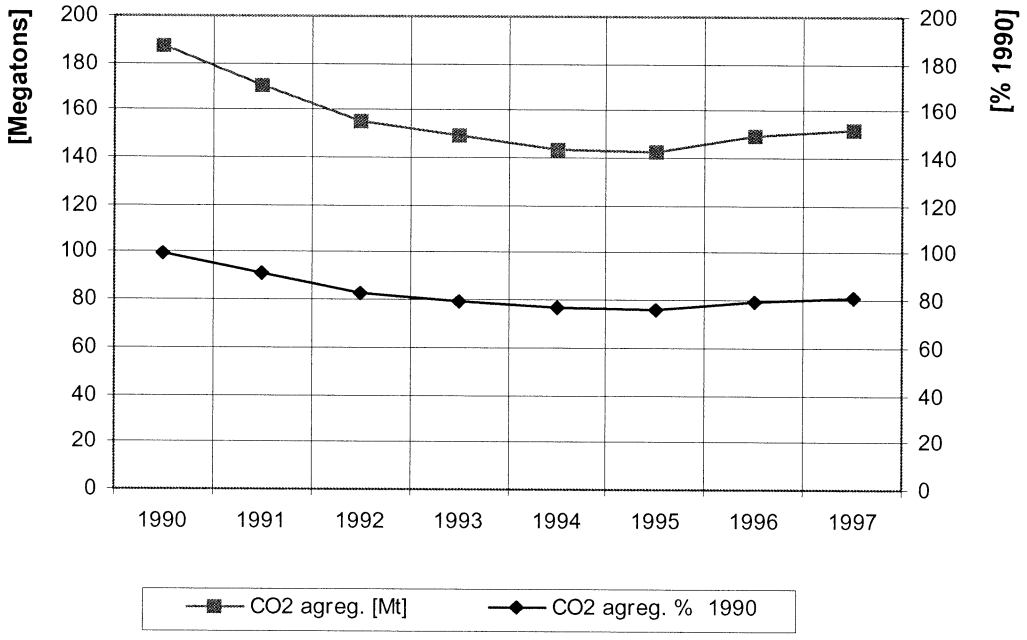
Source: Czech Institute of Hydrometeorology: *Inventory of Greenhouse Gases in the CR for 1990 –1997* (Prague: Czech Institute of Hydrometeorology, 1998): Part 3.

The reduction in greenhouse gas emissions between 1990 and 1995 was a consequence of the overall economic slowdown from 1990 to 1993, of the partial restructuring of industry, a replacement of obsolete technologies by modern ones with higher energy efficiency and application of environmental legislation. Although the growth of greenhouse gas emissions after 1995 is not dramatically high, it led to the proposal for a gradual stabilisation and reduction measures in sectors of the national economy. The Czech government discusses approaches to protect the global climate with the European Commission and EU countries. These approaches are gradually being harmonised, as is the relevant legislation. This area of environmental protection was included among the national development objectives.

The current total share of the energy sector, i.e. of all national production, transfer and consumption of energy, in the total aggregate balance of greenhouse gas emissions is approximately 85%, with energy production accounting for roughly 39%, industrial power engineering for 30%, transport for 8% and the commercial sector and housing together for about 8%. The fundamental task is to reduce energy demand and its consumption. It is also important to implement measures that motivate producers and consumers to save energy and to use renew-

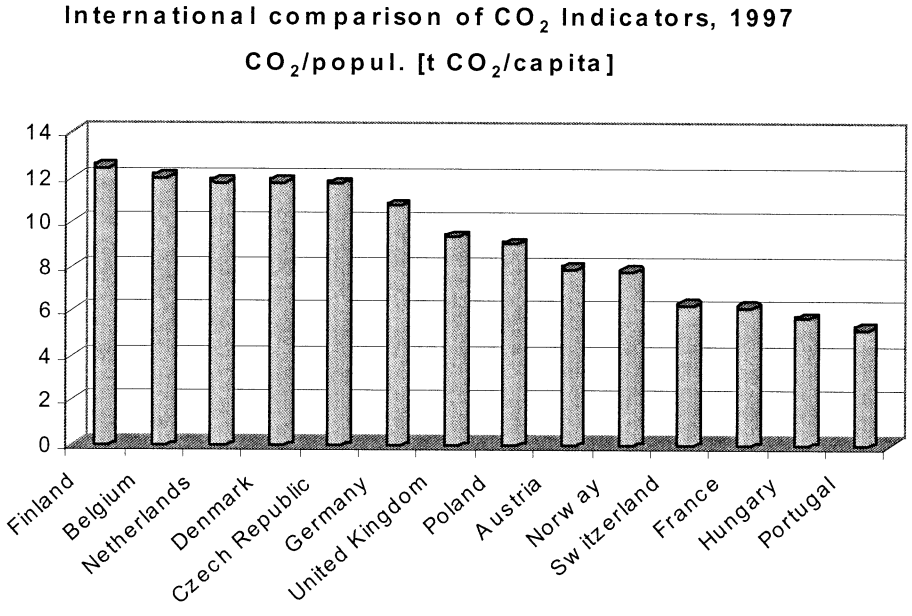
ables. Total greenhouse gas emissions in CO_2 equivalents and in percentage compared with 1990 are shown in figure 4.9.

Figure 4.9: Development of Greenhouse Gases Emissions (1990 - 1997)

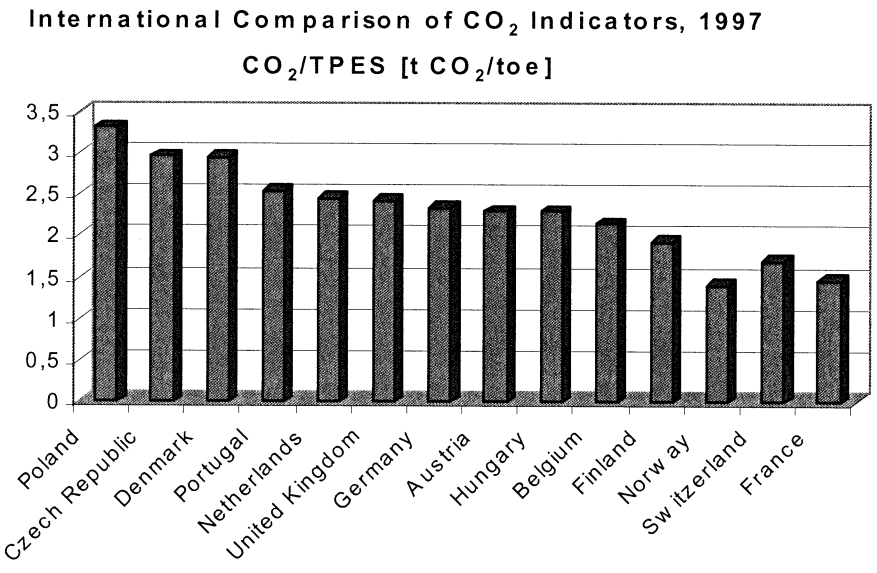


Source: Czech Institute of Hydrometeorology: *Inventory of Greenhouse Gases in the CR for 1990 –1997* (Prague: Czech Institute of Hydrometeorology, 1998): part 3.

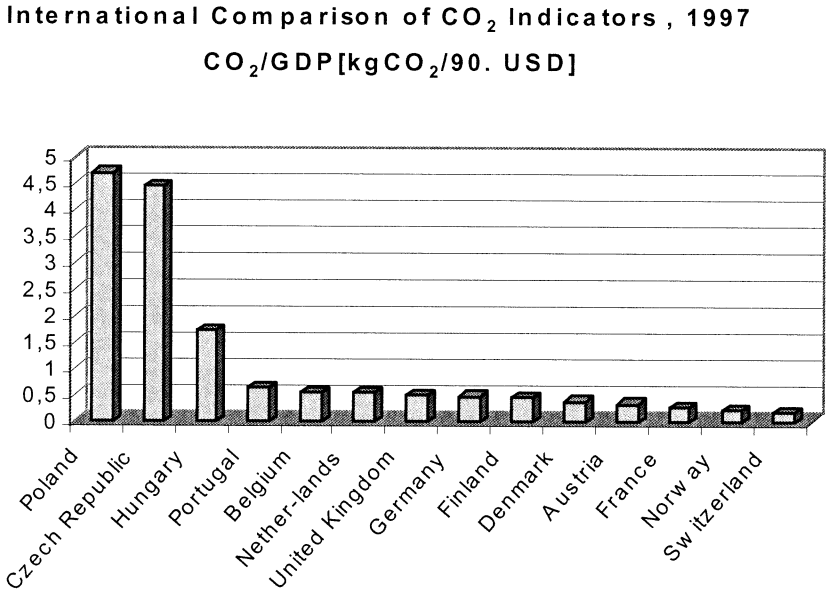
Figure 4.10: International Comparisons of CO_2 Indicators



Source: International Energy Agency: *Key World Energy statistics from the IAE. 1999 Edition* (Paris, IEA, 1999): 49 - 57.



Source: International Energy Agency*: Key World Energy statistics from the IAE. 1999 Edition* (Paris, IEA, 1999): 49 - 57.



Source: International Energy Agency*: Key World Energy statistics from the IAE. 1999 Edition* (Paris, IEA, 1999): 49 - 57.

In 1997, two scenarios for the reduction of greenhouse gas emissions were specified based on estimates of the growth of the GDP. According to the high scenario, between 1990 and 2010 greenhouse gas emissions would be reduced by 10 %, while the low scenario - based on lower GDP growth - assumed a 15% reduction of these emissions for the same period.

Figure 4.10 offers an international comparison of CO_2 emissions per capita and compared with primary energy supply. While the per capita values for the Czech Republic are comparable with other European countries, the emissions per unit of GDP are still much higher and in purchasing power parities still about twice as high.

4.4 Environmental Policy of the Czech Government

From 1990 to 1995, environment policy focused primarily on developing and enforcing legal tools by adopting and implementing new legislation. These legislative efforts resulted in significant reductions of emission released into the air and of pollutants for water. These improvements were quite costly. They were achieved through measures at the end of the manufacturing processes. Current environmental policy is realised through rather complex legislation activities that establish normative, economic, information and institutional tools and international obligations. These laws are implemented both through state institutions at the administration level and by institutions that offer specialist support and advice for the environment administration. The *State Environmental Fund* and the *Fund of National Property* with programmes funded from the state budget assist in the implementation of these laws. This new policy focuses at increasing the total effectiveness of measures prepared and implemented within this framework. It mainly deals with prevention, intervention into technological processes and calls for a larger role for voluntary measures. These are the result of joint procedures among bodies responsible for the environment and other sectors, as well as by the entrepreneurial and industrial spheres.

The *State Environmental Policy* is a strategic document for the preparation of detailed programmes for individual environmental media and for tackling individual environmental issues.[2] The unsatisfactory environmental quality in numerous areas, the preparation for EU accession, the increasing tension caused by global environmental issues were instrumental for updating the previous *State Environmental Policy*. The *Environmental Policy* deals not only with environmental problems but also with environmental principles, objectives and measures. Based on the goal of a sustainable development, this new *Environmental Policy* is not only a policy within the competence of the Ministry of Environment. Such an environmental policy and the realisation of its objectives requires a close cooperation with other economic and social sectors of the national economy based on joint procedures for those bodies that are responsible for the environment and other sectors including industry and the business community.

The *State Environmental Policy* document enumerates the continuing environmental problems in the Czech Republic. For the energy sector the following problems were mentioned:

- high emissions of sulphur dioxide and of other air pollutants and
- a high degree of damage to forests (*acid rain*) due to pollution of the atmosphere.

If no effective measures are adopted, environmental problems can be foreseen due to high CO_2 emissions and other greenhouse gases. The *State Environmental Policy* document especially identified as urgent structural problems for environmental protection:

- persisting inadequacies of Czech environmental legislation, e.g. undue compatibility of environmental impact assessment, air and water protection, and in waste management with EU legislation;
- the necessity for a rapid transposition of the *acquis communautaire* (especially in relation to genetically modified organisms (GMOs) and industrial accidents);
- the need for new legislation on water protection;
- inadequate restructuring of industry, high energy and raw material intensity in relation to the GDP;

---

[2] Ministry of the Environment of the Czech Republic: *State Environmental Policy* (Prague: Ministry of the Environment of the Czech Republic, 1999).

- transposition of the Directive 96/61/EC on integrated pollution prevention and control (IPPC) dealing with the use of the best available technology in major industrial facilities and equipment.

The main objectives of the *Environmental Policy* document focus on increasing the total effectiveness of measures, prepared and implemented within its framework. It mainly concentrates on prevention, intervention to technological processes and on the wider application of voluntary measures. This document contains general goals, measures and objectives for individual environmental media and sectoral policy measures. Among the major general goals are:

- to aim at sustainable development principles;
- to apply direct and indirect tools to guarantee and to strengthen the environment;
- to cooperate internationally and to contribute to the solution of global problems;
- to integrate concerns of environmental protection into the decision making processes of other sectors;
- to clarify responsibilities, authorities and cooperation in the environment area, and to revise jurisdiction in the field of land planning, with respect to forests and water protection;
- to intensify environmental education, training and public information, to strengthen the support for citizens in efforts to solve environmental problems; and
- to prepare a strategy for financing energy policy measurements.

For individual environmental aspects, the main goals and measures of environmental policy are outlined, and with regard to efforts to improve air quality, the main goals are:

- to realise the goals of the *National Programme for Preparation of the Czech Republic for EU accession*;
- to decrease the emissions from small-scale stationary sources;
- to tighten NO_x emission limits for large scale enterprises in compliance with EU requirements;
- to decrease emissions of NO_x and of volatile organic materials from mobile sources;
- to decrease specific emissions of volatile organic materials in the production, trade and distribution chain;
- to continue with the integration of environmental aspects for policies in other sectors;
- to develop a broad strategy for an economical transportation and for a minimisation of transport needs;
- to use economic tools more effectively including emissions trading;
- to intensify the data collection on heavy metals and other risk materials including fine dusty elements and persistent organic pollution in the air.

4.5 Main Environmental Legislation in the Energy Sector

From 1990 to 1995, 14 new acts were adopted, as well as a series of amendments and several dozen regulations that establish the system of normative, economic, institutional and information tools for environmental protection. In Czech legislation the following main acts and regulations deal with environmental problems:

- *Act No. 17/1992, "on the environment"*, defining basic concepts and principles of environmental protection. This act basically fulfils its function but is formulated rather generally and does not state exact responsibilities of relevant bodies with respect to sanctions and the economic extent of ecological damage.

The generally obligatory fundamental legal regulations concerning emissions include:

- *Act on Air Protection against Pollutants (Clean Air Act) No. 309/1991,* amended by Act No.218/1993 and Act No.158/1994. The full wording is in Act No. 211/ 1994. These are further specified by the following additional legal documents:
  - Decree of FVZP (*Federal Committee for the Environment*) of 1.10.1991 specifying the Act No.309 of 1.7.1991 on *Air Protection against Pollutants* (in the wording of the Measure of FVZP of 23.6.1992 published in Amendment 84/1992., in the wording of Decree No.122/1995;
  - Decree of the Ministry of the Environment No.117/1997 of 12.5.1997 (in the wording of Decree No.177/1997, published in Amendment 41/1997, setting emission limits and other conditions pertaining to operating stationary sources of air pollution and protection);
  - Act No.389/1991 on State Administration of Air Protection and Pollution Fees amended by No.212/1994 and by Act No.86/1995, which determines the level of annual fees for emissions and the method of their calculations. For nitrogen oxides the rate of 800 CZK/t and for sulphur dioxide 1000 CZK/t has been set.

On a general level, the *Air Quality Act* adjusts rights and obligations of legal subjects operating air-polluting sources. By setting emission limits and conditions for operating stationary sources, the Act formulates requirements not only for their operation but also for their construction. According to the law, stationary pollution sources are divided in terms of heating capacity, the level of the technological process, and on the impact and extent of air pollution (Decree of the Ministry of the Environment No. 117/1997):

- *Large pollution sources*, with a heating capacity of 5 MW and higher and also specific technologies listed in the Decree of the Ministry of the Environment No. 117/1997.
- *Medium-sized pollution sources*, including facilities for fuel combustion with the heating capacity from 0.2 MW to 5 MW and selected technologies.
- *Small pollution sources* that include facilities for fuel combustion with a heating capacity below 0.2 MW and facilities of technological processes not belonging to the category of large and medium-sized sources.

Technological processes from the category of large and medium-sized sources include:

- the fuel-energy industry;
- industrial production and processing of metals;
- production of non-metal mineral products;
- the chemical industry;
- waste treatment facilities;
- other industries and economic facilities which are further divided in detail according to the character of the technological process.

Concerning those processes for which specific emission limits have not been set (Annex No. 2 to Decree No. 177/1997), a regulation is valid for nitrogen oxides according to which sources of NO_x emissions are founded and operated so that with the mass flow of NO_x emissions above 10 kg/h their concentration in the carrier gas does not exceed 500 mg/m^3. Both values are expressed as NO_x. Waste management is regulated by a new act on waste No.125/1997 that entered into force on 1 January 1998 along with a several implementing decrees. Legislation on water protection is based on acts from the 1970s (*General Water Act* No. 138/1973).

Despite numerous amendments in recent years, a radical legislative change is needed. In spring 2000, a new Water Act is under intensive preparation.

4.6 International Commitments of the Czech Republic

The Czech Republic is a member of a number of international organisations with activities in the sphere of environment and sustainable development. The Czech Republic is a party to most relevant conventions, such as the UN Framework Convention on Climate Change (UN FCCC), the Convention on Biological Diversity, the Vienna Convention on the Protection of the Ozone Layer, the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal, the *Convention on Long-Range Transboundary Air Pollution* (CLRTAP) and to many others. Among these the Kyoto Protocol to the UN FCCC is particularly significant. For implementation of the principle of sustainable development, the Czech Republic employs the documents that were accepted in 1992 in Rio de Janeiro at the UN Conference on the Environment and Development (the *Rio Declaration* and *Agenda 21*).

4.7 Preparations for EU Accession in the Environment Area

The transposition of the environmental *acquis communautaire* into Czech legislation will require exceptional attention in the coming years. The modification of current legislation, especially in the sphere of water protection and waste management will be more complex and will require intensive inter ministerial cooperation. In spring 2000, about 60 to 70 % of the domestic environmental legislation has already been harmonised with EC legislation. However, none of the EC Directives was fully transposed. It will be necessary to pass new legislation or at least to amend existing legislation in order to achieve full harmonisation.

In cooperation with other ministries, the Ministry of the Environment has prepared a *Strategy for the Approximation in the Environment Area* to specify in more detail the steps contained in the *National Programme for the Preparation of the Czech Republic for Accession to the EU.* This Strategy is based on a detailed analysis of the process of transposition and implementation of the individual items of the *acquis*. This strategy incorporates the following areas:

- horizontal measures;
- air quality;
- waste management;
- water quality;
- nature protection;
- industrial pollution control and risk management;
- chemical substances and genetically modified organisms;
- noise from machinery and equipment;
- nuclear safety and radiation protection;
- climate change; and
- civil defence.

A timetable for passing of the key environmental legislation is included in table 4.1 below.

Table 4.1: Timetable for Passing Key Legislation

Legislative item	In rem intent		Draft legislation		Approval		Entry into force
	Draft	Final draft	Draft	Final draft	Government	Parlament	
Act on Environmental Impact Assessment (EIA)	03/1999	06/1999	08/1999	10/1999	10/1999	04/2000	07/2000
Clear Air Act	12/1999	03/2000	09/2000	12/2000	01/2001	06/2001	11/2001
Act on Technical Requirement for the Operation of Vehicles on Roadways			04/1999	06/1999	10/1999	05/2000	01/2001
Decree to Act No.334/92 on Protection of the Agricultural Land Fund			11/1999				01/2001
Waste Act	09/1999	12/1999	03/2000	06/2000	09/2000	06/2001	01/2002
Amendment to Decree No.301/98 to Act No.157/98 on Chem. Substances (PCB inventories)			06/1999	10/1999			01/2000
Act on Packaging	03/2000	06/2000	12/2000	03/2001	04/2001	05/2001	01/2002
Water Act		02/1999	12/1999	03/2000	04/2000	12/2000	01/2001
Act on Water Supply and Sewerage		03/2000	12/1999	03/2000	4/2000	12/2000	01/2001
Public Health Act				09/1999	10/1999	01/2000	07/2000
Act on Fishing		03/2001		03/2002			01/2003
Amendment to Act No. 114/92 on Nature and Landscape Protection			07/2001	12/2001	02/2002	06/2002	01/2003
Amendment to Act No.16/97 on Conditions sor the Import and Export of Endangered Species			07/2001	12/2001	02/2002	06/2002	12/2002
Act on Integrated Pollution Prevention and Control	09/1999	05/2000	09/2000	02/2001	03/2001	09/2001	01/2003
Act on Prevention of Serious Accidents Caused by certain Hazardeous Substances					04/1999	10/1999	12/1999
Act on Genetically Modified Organism			06/1999	11/1999	01/2000	06/2000	12/2000
Act on Biocides	03/2000	07/2000	01/2001	09/2001	12/2001	04/2002	07/2002
Regulation of the Government of CR to Act No.22/97 (Noise from Means of Transport and Machinery)			11/1999	03/2000	04/2000		06/2000
Amendment to act 18/97 on Peaceful Use of Nuclear Energy and Ionising Radiation	10/1999			02/2001	2/2001	12/2001	07/2002
Ratification of the Kyoto Protocol			08/1999	12/1999			01/2000
Act on Crisis Management				09/1999	09/1999	12/1999	01/2000

Source: Ministry of Environment of the Czech Republic: *Aproximacni strategie pro oblast zivotniho prostredi* [Strategy for Approximation in Environment] (Prague: Ministry of the Environment of the Czech Republic, 1999): 99.

4.7.1 Implementation of the Directive on Integrated Pollution Prevention and Control

The directive on integrated pollution prevention and control (IPPC Directive: 96/61/EC) to a great extent determines the entrepreneurial environment in Europe and, thus, also in the Czech Republic. The spirit of the directive explicitly derives from the principle of sustainable development and requires a sound utilisation of sources and environmental friendliness through a minimisation of pollutants emitted from entrepreneurial activity. Only enterprises that meet the requirements of the directive that are outlined in the Best Reference Documents/Best Available Technique (BREF/BAT) will have the chance to obtain a licence for operation. There will be many industrial participants because for industry alone documents for approximately 32 industrial branches must be elaborated (for information see: <http://www.eippcb.jcr.sp>, Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control, Annex I).

This IPCC Directive requires a new form for granting permissions for large and medium-size installations. This will be especially important and, at the same time, demanding. The Czech Republic pays attention to this directive in the framework of its preparation for EU accession. Several studies that were prepared for the Ministry of the Environment will be used for estimating the impact of this Directive for industrial sector. The *Project for Cleaner Production* as a one-time task has the main objective to find out where and why waste and pollution originates and how both can be prevented. The implementation of the IPCC Directive represents a serious challenge because it requires a high degree of cooperation among various state bodies. In spring 2000, the draft legislation for the implementation of the IPPC was developed and was subject to review.

Chapter 5: Strategy Proposal to Promote Energy Efficiency and Renewable Energy

In 1998, SEVEn prepared a "Strategy Proposal to Promote Energy Efficiency and Renewable Energy" for the Ministry of the Environment. The amended version of this proposal is summarised in table 5.1 and in the text below.

Table 5.1: Strategy Proposal to Promote Energy Efficiency and Renewables (Summary)

Category		Instrument
Systemic measures		• Removal of all fuel and energy price distortions; • internalisation of environmental externalities in fuel and energy prices that can be provided by the following instruments: – an improved system of levies for emissions from fuel combustion (substantial increase in levies, also on small sources), or alternatively introduction of a system for emission trading; – excise taxes levied on non-renewable energy use; – high levies on raw materials to create incentives for recycling and energy savings; and – implementation of road tolls and similar methods in transport.
Offset measures	**Transition period until prices have been adjusted**	• Grant and information programme to reduce energy demand in the residential sector where subsidised energy prices exist that undermine the implementation of energy conservation, and • mandatory energy consumption standards for new residential construction to be (co)financed from public sources (incl. mortgage).
	Transition period until external costs have been largely internalised	• Grant programmes for projects in the area of energy conservation (including recycling of materials) and renewable energy sources (ideally for selected types of projects with partial funding for all that qualify); • financial support for selected types of mass transportation; • energy efficiency standards for appliances and means of transport; • information programmes to familiarise consumers with the negative impact of energy processes and on efforts to gradually include these costs in energy prices with the subsequent recommended alternatives: energy conservation and renewables.
Permanent instruments	**Market development**	• Demonstration approaches for new technical approaches; • demonstration projects for new applications of familiar technologies and approaches; • demonstration projects for new approaches to fund and organise the introduction of energy efficient technologies and renewables; • introduction of "green" energy pricing for energy produced from renewables.

Permanent instruments	**Information dissemination**	• Nation-wide campaign explaining the necessity and benefits of the strategy; • labelling of the energy appliances; • passenger car labelling; • energy labelling for buildings(sale of real estate only with an audit and verified statements for consumed energy); • programme supporting energy audits in small and mid-sized companies (educational materials, training, initial and further grants); • information centres built in small regions (local and independent, with municipal government support); • comprehensive educational programme for the young: energy use, the environment, and sustainable development.
	„Government by example"	• Obligatory energy audits for the modernisation of all public facilities (buildings) and subsequent installation of energy efficiency technologies; • removal of legal and administrative barriers to third-party financing (*Energy Performance Contracting*) in the public sector and implementation of energy efficiency measures in selected government facilities; • programme for introducing energy management in government facilities linked to education of energy specialists.
Other		• Support for technologies through the tendering process (technology procurement); • support for voluntary agreements with industrial concerns/business associations; • organisation of product competitions and granting of registered trademarks for energy efficiency.

Background

Let us imagine an ideal economic environment where all external costs are internalised and where no price distortions exist, and competitive markets with perfect information exist. Such a situation would offer an economically optimal behaviour that includes all environmental costs and uncertainties. However, such a state is unattainable not only in the Czech Republic but also elsewhere. This ideal state can provide a reference point for a somewhat more realistic picture. With slight simplifications it may be claimed that most countries in Western Europe and in North America come closer to this ideal situation than the Czech Republic. In spring 2000, the situation of the Czech economy still differed significantly. For launching such a strategy the political obstacles to price rectification, unfinished privatisation, problems of economic growth and restructuring, etc. must be reflected. If a liberal economy as a long-term goal is assumed, it is possible to start from there and establish the criteria for selecting a strategy. Another factor must be the compatibility with EU legislation and trends. This especially applies to EU energy policy with the directives for the liberalisation of the electricity and gas market and other documents relating to conservation, renewable sources and the environment.

Criteria

The primary aim of this strategy remains the reduction of fossil fuel consumption. This provides a quantifiable criterion for evaluating the contribution of a specific measure in fulfil-

ment of the goal, and thus the main direction for selection of instruments is chosen. Furthermore, the following criteria for comparing individual measures were finally adopted:

- Benefits for the *cost-effectiveness* of the strategy rely on the cost-effectiveness of individual measures, but it is not easy to foresee how they impact on each other. Put simply, cost-effectiveness may be expressed as a share of returns (contribution to fulfil the goal) and of costs.
- Relevance for the *economic, institutional and legislative situation* in the Czech Republic;
- conformity with the *liberal market environment*; and
- *compliance with EU legislation* and strategy, including support for a strategy of sustainable development.

Strategy

The actual strategy was based on the *systemic measures* that emerged relatively clearly from the analysis conducted:

- *Removal of all fuel and energy price distortions*;
- *internalisation of environmental externalities* for fuel and energy prices what may be achieved with these instruments:
  - An improved system of *emission levies* for emissions from fuel combustion (substantial increase in levies, levies on small pollution sources),
  - alternatively an *emission trading system* can be used but in Europe little experience with these instruments exists;
  - *excise taxes* levied on the non-renewable energy use;
  - high *levies on raw materials* what would create an incentive for recycling and thus saving the energy;
  - *road tolls* and similar methods in the transport sector.

If both systemic measures are evaluated from the perspective of established criteria, no discrepancies will be found. During implementation, however, a problem will arise primarily with two aspects: the timeframe and the actual extent to which externalities may be internalised. Both measures may only be implemented gradually, while the internalisation of externalities will probably never be perfect. The schedule for internalising externalities (especially if energy taxation is involved) must be coordinated with EU countries, with whom the Czech Republic will share one market after its accession. The removal of price distortions will take the next few years and a situation with largely internalised externalities is at least a decade away. After a transition period, the strategy must use different means or "offset measures". The intention is to focus the strategy at least partially before systemic measures fully take effect.

Until prices were adjusted these *offset measures* were proposed for a transition period:

- A grant and information programme to reduce energy demand in the residential sector with subsidised energy prices what undercuts the implementation of energy conservation; and
- mandatory energy consumption standards for new residential construction that are (co)financed from public sources (including mortgages).

The transition period until external costs will be largely internalised will last much longer. Therefore measures were chosen that do not require major government assistance, such as:

- grant programmes for energy conservation projects (including recycling of materials) and renewables (ideally selected projects with partial funding available for all that qualify);
- systemic financial support for selected types of mass transportation;

- energy efficiency standards for appliances and means of transport;
- information programmes that familiarise consumers with the negative impact of energy processes and on efforts to gradually include these costs in energy prices with subsequent recommended alternatives: energy conservation and renewables.

These measures would be either relaxed or removed if the environmental externalities become a direct part of energy prices (by taxes). But the process of assigning future monetary value to environmental quality within a standard market economy model may never be complete. The internalisation of externalities is the internalisation of values (if it can be assigned at all) of a collective in nature that may only with difficulties be transformed into the economic interests of decision-makers that could determine or influence the market price. But any arbitrary setting of prices for pollution will always create problems. It is also difficult to quantify them because we would have to estimate (often with low reliability) a future value that we cannot predict. Present appraisals of damage and subsequent factoring into externalities may only serve as an estimate of future costs actually associated with externalities. Furthermore it is impossible to offer any precise monetary evaluation of human health and lives.

At the same time societal development must be redirected towards sustainability and when decisions are made that are not entirely clear economically to favour an approach that will be beneficial for sustainability. Both arguments let us conclude that at least several of the offset measures could work even for a longer period than the mentioned transition period.

Independent of these offset measures, a group of measures are defined that could play a permanent role in the government programme by including steps that accelerate the desirable trends for implementing new energy efficient technologies and that are in line with the chosen criteria. They can be divided into measures that directly develop the market for energy efficient technologies and renewables and into measures favour the development of basic conditions for a proper decision-making and for sufficient information.

Among the measures *to develop a market for energy efficient technologies and renewables* are:

- demonstration approaches for new technical approaches;
- demonstration projects of new applications of familiar technologies and approaches;
- demonstration projects on new ways to fund and organise the introduction of energy efficient technologies and renewables ; and the
- introduction of "green" energy pricing for energy produced from renewables.

Among the measures to *disseminate information and to support education* are:

- nation-wide campaign explaining the necessity and benefits of such a strategy;
- labelling of the energy appliances;
- passenger car labelling;
- energy labelling of buildings (sale of real estate only with an energy audit and with verified statements on the consumed energy);
- programmes to support energy audits in small and medium-sized companies with educational materials, training, and possibly both initial and further grants;
- local and independent regional information centres supported by municipal governments;
- comprehensive educational programme for the young on energy use, the environment, and sustainable development.

A separate and still neglected area refers to those measures that can generally be characterised as "government by example". In order to persuade investors on the prospects of a government programme in the area of energy conservation and renewables, the government should first apply the recommended measures on its own property:

- *Energy audits* as a required part of the modernisation of all public facilities (buildings) and subsequent installation of energy efficiency technologies;
- removal of legal and administrative barriers against third-party financing (*Energy Performance Contracting*) in the public sector and subsequent implementation of energy efficiency measures in selected government facilities;
- programme to introduce *energy management* in government facilities linked to education of energy specialists.

These proposals are primarily directed at the industrial and transportation sector. The Czech Republic still lacks sufficient experience in this area to select an effective strategy, but it will be necessary to launch such of a programme also for these sectors. At any time the strategy presented can be expanded to include some of the following measures:

- *support of technologies* through the tendering process (technology procurement);
- *support for voluntary agreements* with industrial concerns/business associations;
- *organising product competitions* and granting registered trademarks for energy efficiency.

The choice of suitable measures in the transportation area must be preceded by the formulation of a long-term transportation policy with specific implementation steps. This policy should then be reviewed whether it is compatible with the chosen energy efficiency measures. This strategy proposal offers the groundwork for further work on a specific programme in the area of energy conservation and renewables. Individual measures should to be elaborated, refined, and the entire strategy must be re-evaluated or in some points even be altered.

Part II: Regional Reports: Energy Situation in Northern Bohemia, Northern Moravia and in Prague

Detailed analysis of the energy situation in the regions of Northern Bohemia, Northern Moravia and Prague

Three important regions of the Czech Republic have been selected for a more detailed analysis of energy supply, consumption and production. These three regions are specific with regard to developed coal mining, to heavy industry, and intensive transport and related environmental problems.

- *Northern Bohemia* is known as the raw material basis of the state where brown coal mines and power plants generating electricity for the whole country are concentrated.
- *Northern Moravia* is a region with a developed heavy industry.
- The capital city of *Prague* is an important centre of industrial production, trade, and of tourism with intensive and still increasing transport problems.

Figure II.1: Territorial Units of the Czech Republic

Source: H. König, SEVEn (Prague:, SEVEn, 2000)

As the energy economy of these three regions must be assessed in a wider context, the following aspects will be analysed in more detail in the subsequent three chapters:

- the economy of the region, its development and the state of energy industry;
- the environmental conditions, including the current priorities for its protection;
- the trends in the development of the region; and
- an analysis of the strong and weak points of the region.

The objective of the following chapters is to provide information on opportunities in these regions for possible activities related to the energy and the environment sector.

Northern Bohemia and Northern Moravia traditionally had a developed heavy and energy intensive industry and coal mining. The economic transition from a centrally planned economy to a market economy had significant impacts also on heavy industry and coal mining, and on its international competitiveness. The demand for coal and other products of the steel and other heavy industry is declining, and the industry must adapt to the new situation and underwent a restructuring process. These two regions have relatively high unemployment rates due to severe economic problems, and there are also serious environmental problems caused in the past by the contamination of the ground that must be solved.

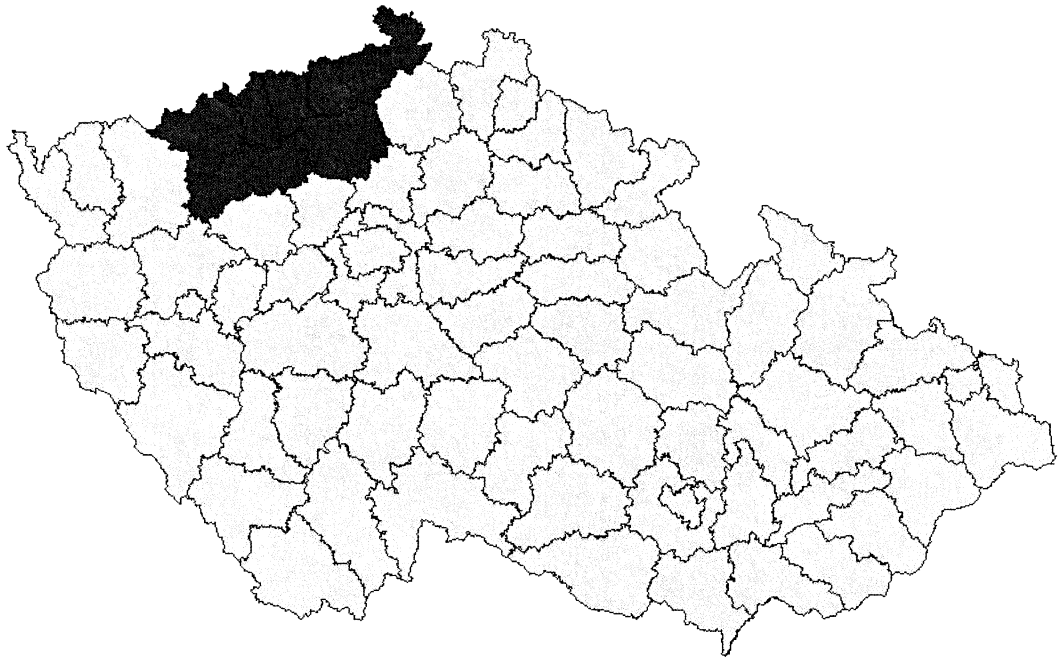
The Prague region, on the other hand, is a region with the highest per capita GDP of all 50 regions in the Central European associated countries. In 1999, its GDP reached 119% of the EU average.[1] As the capital, Prague is the political and economic centre with a high concentration of primarily commercial organisations and services, but also with some industry, and with a highly developed tourism sector.

[1] Eurostat, EU Business Week, 2000/31, see also: <eubusinessweek@eubusiness.com>.

Chapter 6: Northern Bohemia

Northern Bohemia is situated in the north-western part of the Czech Republic. The new administrative arrangement of the Czech Republic that is in force since January 2000 established the *Usti nad Labem* region that is divided into 7 districts: *Most, Teplice, Chomutov, Usti nad Labem, Decin, Louny, and Litomerice*.

Figure 6.1: Usti Region in Northern Bohemia



Source: Prepared by SEVEn based on: Arcdata Praha, s.r.o: GIS [Geographic Information Source)]: *Czech Republic* (Prague: Arcdata Praha, s.r.o, 1997), electronic version.

Table 6.1: Basic Characteristics of Northern Bohemia

	Usti nad Labem Region	Czech Republic
Area:	5334 km^2	6.7 % of the total territory
Population:	826 852 inhabitants	8 % of the total population
Population density:	155 inhabitants per km^2	130 inhabitants per km^2

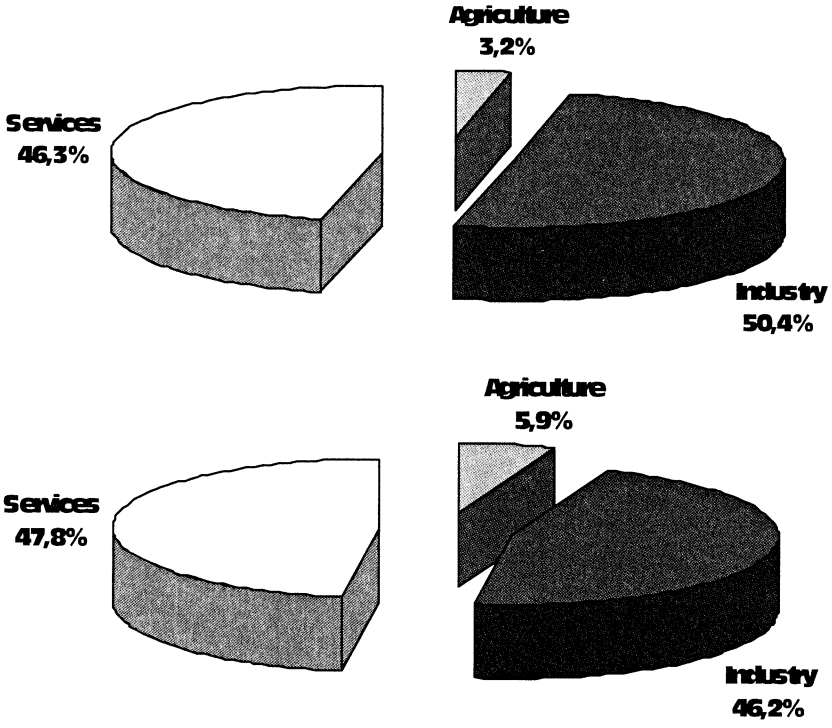
Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 6-19.

Two mountain ranges, *Krušne hôry* (Erzgebirge) and *Krkonose* (Riesengebirge) with fairly low but steep slopes dominate the topography of the region. The wide and long valley between them is called the North Bohemia Lignite Basin that is one of the most urbanised territories in the country. The region has a long border with the Free State of Saxonia in Germany.

6.1 Economy

Throughout history, North Bohemia was a very strong economic region due to its industrial base and infrastructure, mainly in its central part with the coal mining area. It is the most industrialised region in the Czech Republic. However, the economic transformation of the heavy industry and of coal mining was more difficult than in other regions and sectors.

Figure 6.2: Structure of the Employment in North Bohemia and in the Czech Republic



Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 46-65.

The lignite basin area is typical for a high concentration of industry, a high population density in large towns and for its economic specialisation on energy, coal mining and chemical industry. The industrial districts are *Chomutov, Most, Teplice* and *Usti nad Labem. Litomerice* and *Louny* are districts with a relatively higher share of agriculture. The *Decin District* is both an industrial and an agricultural district but it is economically less developed due to its peripheral location. Many large companies, some of them among the 100 top Czech companies, are located here. Since the early 1990s, economic growth has slowed down due to the delayed start of the restructuring process in its regional economy.

The traditional specialisation in coal-mining, chemical industry and power generation is being restructured into other activities based on manufacturing and productive services. During the restructuring process the unemployment rate rose, and in spring 2000 it was one of the highest in the Czech Republic. Small and medium size businesses are developing in the area, especially in the service sector as well as food processing and construction industries. The transportation industry traditionally focused on the construction and production of riverboats, on railway and mining equipment repairs and it has moved into producing components for large European car companies.

Table 6.2: Registered Employees and Wages

	Usti District	Czech Republic
Number of employees	255 199[1]	7.6% of total employees
Average monthly wage per employee	11 132 CZK/month (ca. 600 DM/month)	95% of the average wage in the Czech Republic
Unemployment rate	13.33 %	7.48%

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 46-65.

6.2 Environment

6.2.1 Air Pollution

In Northern Bohemia, the fundamental sources of air emissions are power plants, heating stations, open-cut mines and the chemical industry. In 1997, compared with 1996, there was a further reduction of emissions from stationary sources due to new environmental legislation: The emissions of solid substances decreased by 40.6 %, of SO_2 by 46.0 %, of NO_x by 4.3 % and of CO by 18.6 %.

Table 6.3: Specific Emissions of Main Pollutants (Sources over 5MW in capacity, tons per year per km^2)

Pollutants	Usti Region	Czech Republic
Solid (dust)	**3.0**	0.7
SO_2	**39.7**	7.6
NO_x	**11.8**	2.1
CO	1.9	**3.3**
C_xH_y	**1.1**	0.3

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 98-107; Ministry of the Environment, Czech Statistical Office: *Statistical Environmental Yearbook of the Czech Republic* (Prague: Ministry of Environment, The Czech Environmental Institute, 1998): 109-110.

Table 6.3 on the emissions of five pollutants per km^2 from large energy sources above 5 MW capacity illustrates the high share of large sources of emissions (power and heating plants) burning low quality brown coal or lignite. Thus, the specific emissions per km^2 of solid particulates, SO_2 and NO_x are much higher than the country average, and only for CO the emissions are below the national average.

[1] The figures refer to the business sphere (excluding small enterprises and unincorporated entities) and the government sphere irrespective of the number of employees. Hence they refer to the businesses submitting their returns, i.e. companies with 20 or more employees and businesses classified with no employment limits.

6.2.2 Geological Environment

In North Bohemia, due to the occurrence and extraction of raw materials, the geological and the ecological situation are closely linked. In recent years, coal mining has been partially scaled down while the extraction of minerals for construction materials (i.e. rubble with gravel-sand) has increased due to the economically advantageous exports, in particular to Germany. The most expensive problem that remains to be solved is the remediation of the territory that was damaged by open-cast coal mining. A significant contribution to environmental improvement occurred with the already completed recultivations of areas that were damaged by mining. Waste management in this region is characterised by perennial problems. Although much private and public investment occurred in the necessary remediation and decontamination of areas of former hazardous waste dumps, the decontamination has not yet been completed in all areas.

6.2.3 Priority Problems in Environmental Protection

In the region of North Bohemia, the major environmental problems are related to:

- electric energy generation in heating power stations, fly ash and ash deposits;
- creation of man-made landscapes in the former coal mining areas;
- forests damaged by acid rain in Krusne hory require recultivation efforts;
- concentration of the chemical industry operations, and remediation of contaminated sites;
- freight truck transport in border areas;
- mining of rubble in the protected landscape area and its export;
- health hazards for the population due to the devastated environment in the basin areas;
- demographic consequences and environmental impacts due to the general shrinking of agriculture in border areas.

6.2 Energy Situation

The power plants in North Bohemia supply half the electricity produced in the Czech Republic. The combustion of low-quality brown coal with high sulphur and ash contents is the main factor for environmental problems in this region. Since 1 January 1999, all big power plants have fulfilled the strict emission limits set up by the Clean Air Act and related legislation.

6.2.1 Electricity

In North Bohemia electric energy is supplied by the regional power distribution company *Severoceska energetika, a.s. (SCE).* This company distributes electricity to the North Bohemian region with an area of 7 902 km^2 and with 1 178 000 inhabitants. The distribution network is supplied mostly from the CEZ transmission network and partly from independent producers.

Table 6.4: Structure of electricity consumption in Northern Bohemia

Category	Consumption (GWh)	Share of consumption
High voltage customers	3 681	60%
Low voltage customers	917	15%
Households	1 572	25%
Total	**6 170**	**100%**

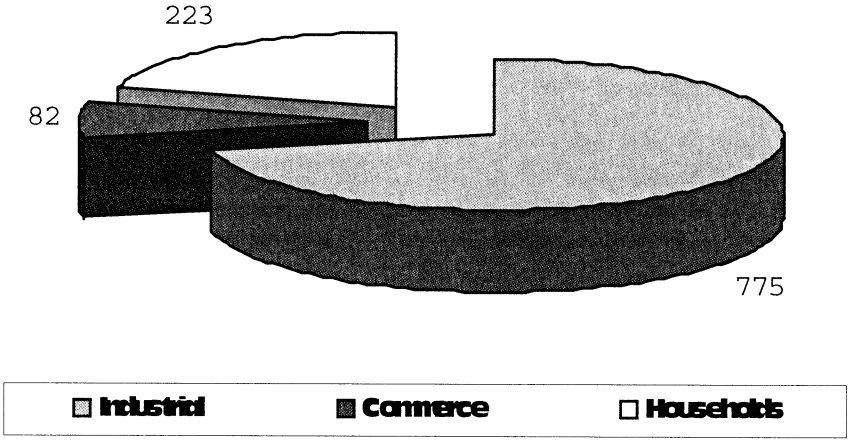
Source: Severoceska energetika: *Annual Report, 1998* (Decin: Severoceska energetika, a.s., 1999): 14.

6.3.2 Natural Gas

The company *Severoceska plynarenska, a. s., (SCP, a.s.)* is the dominant natural gas supplier in Northern Bohemia, where it covers almost 100% of natural gas supplies for all categories of customers. The total area of its entrepreneurial activity in North Bohemia is 7 799 km^2 with 505 towns and municipalities. Natural gas is supplied through high-pressure, medium-pressure and low-pressure gas lines with a total length of 5 033 km. In the 1998, for the third year, total sales exceeded the level of one billion of cubic meters with reaching 1,080,556,000 m^3. The company maintained its position as the fourth largest seller of natural gas among the Czech regional gas distribution companies. The major sales of natural gas were to industrial customers that purchased a total of 774,939,000 m^3 (73%). The company experienced a relatively favourable development also in sales of natural gas to commercial customers, where it sold 82,368,000 m^3, an increase of 5 % above 1997.

But in 1998, sales in the category of households stagnated. Here, the total sales were 223,249,000 m^3, what was the same quantity sold in 1997. This lower level was influenced by the average air temperature (especially in the first quarter of 1998), by some conservation measures taken by customers (such as insulation of buildings), as well as the continuing tendency to use less natural gas because of the increase of the VAT rate and of the selling price. But these developments were offset by new customers who started to purchase natural gas predominantly for the heating of family houses.

Figure 6.3: Gas Sales by Severoceska Plynarenska in 1998 (million m^3)



Source: Severoceska plynarenska: *Annual Report, 1998* (Usti nad Labem: Severoceska plynarenska, a.s., 1999): 15.

6.3.3 District Heating System

The district heating companies have a local or a regional focus. *Severoceske teplarny, a.s. Most* is a district heating company operating heating plants and supplying district heat in several cities primarily in North Bohemia. The joint stock company *Teplarna Usti nad Labem* maintains one of the largest central heating systems in the Czech Republic with an installed capacity of cogeneretion facilities of 577 MW_t of and 88 MW_e. The company supplies mainly the area in the vicinity of Usti nad Labem and Decin. The consumption by industry represents 42% of total sales while housing estates represent 36% of total heat supply. In 1997, the company supplied almost 3 700 TJ of thermal energy.

6.4 Strengths and Weaknesses of the Region North Bohemia

The regional strengths and weaknesses have been developed and defined by a panel of experts with public participation during the preparation of the *Regional Development Strategy*. Among the strong points for the North Bohemian region were noted:

- border crossing points in the region mean short transportation distances to Germany;
- a developed local supply base allows local sourcing and easier supply logistics;
- the tradition of heavy, chemical, energy and mining industry;
- key raw materials are available within the region meaning lower transportation costs;
- range of worker skills available, including young assembly workers and bilingual staff;
- large open areas without any infrastructure (15 000 ha after reclamation);
- available empty industry buildings and areas;
- cost of living are approximately 18% lower than in Prague, as are labour costs and this offers a buffer for future wage increases;
- experiences with international cooperation through the Euro regions, and connection into the cross-border activities.

The following weaknesses were listed for the North Bohemian region:

- one-sided specialisation of industry;
- low domestic demand;
- out-dated technologies;
- image of the region;
- low number of small and medium enterprises, disadvantageous influence of big enterprises;
- lower GDP than average level in the Czech Republic;
- insufficient economic assistance from the national government.

6.5 Support for Regional Development

The *Regional Development Agency (RDA)* is an organisation supporting and coordinating the economic, social and cultural development of the North Bohemian region. The Agency is based on models that operate successfully in EU countries. The goals, structure and activities have been accommodated to the specific conditions of the North Bohemian industrial region. The Agency cooperates with the public and with the private sector. The RDA has regular contacts with state administration bodies in the region, municipalities, the Delegation of the European Commission, Euroregions, Chambers of Commerce and Agrarian Chambers. The RDA also provides services for foreign investors coming to the region.

Contact:

Regionalni rozvojova agentura Budovatelu 1830 434 37 Most Czech Republic	Phone: +420-35-6206538 Fax: +420-35-24980 e-mail: rra@rra.cz

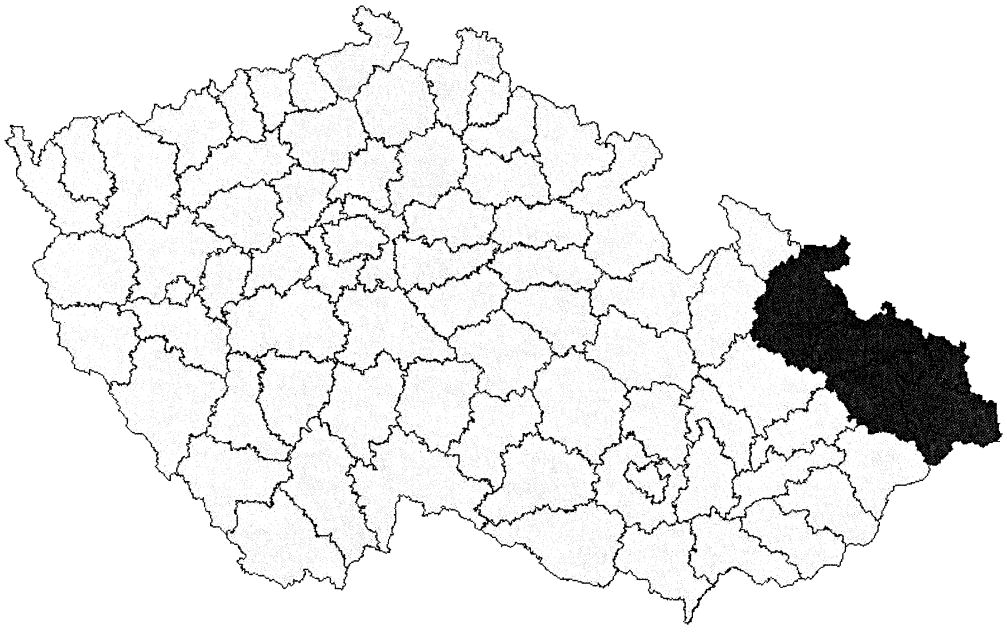
The municipalities in the region are members of 3 Euroregions:

- The International Association of Municipalities *Euroregion Krušne horí/Erzgebirge* has its seat in *Cesky Jiretin* (district Most). Both Czech and German parts represent the following districts:
  - Czech part with the seat in Most: *Chomutov, Most, Louny, Teplice, Litomerice*;
  - German part: MEK (Mittel Erzgebirge Kreis) *Annaberg, Freiberg, Stollberg.*
- The *Euroregion Labe/Elbe* is part of the international association of municipalities from both sides of the border and it has its seat in *Pirna*. Their members represent the following districts:
  - Czech part (Usti nad Labem): *Teplice, Litomerice, Ustí nad Labem*, southern part of *Decin*;
  - German part (Pirna): *Meissen-Radebeul, Dresden, Weiseritzkreis, Sächsische Schweiz.*
- *Euroregion Nisa/Neisse* (established on 11 December 1992) is part of the international association of municipalities from the Czech Republic, Germany and Poland. The International Association of Municipalities Euroregion Neisse-Nisa-Nysa has its seat in Zittau. Since February 1994, the Chamber of Commerce in Liberec is also member of the Association. The *Euroregion Neisse-Nisa-Nysa* represents the following districts:
  - Czech part (seat in Liberec): *Liberec, Decin, Jablonec nad Nisou, Ceska Lipa, Semily*;
  - Polish part: *Bogatynia, Zgorzelec, Luban, Boleslawiec, Lwowek Slaski, Jelenia Gora, Kamenna Gora*;
  - German part: *Zittau, Löbau, Gotlitz, Niesky, Bautzen, Kamenz, Bischofswerda, Hoyerswerda, Weisswasser.*

Chapter 7: Northern Moravia

The region and the district of Ostrava are the core industrial areas of Northern Moravia. The district of Ostrava consists only of the town itself and is the second smallest district in the Czech Republic. It is the centre of an industrial agglomeration and the administration centre of the North Moravian and Silesian region. The actual area of the district is 218 km^2 what represents only 0,3% of the territory of the Czech Republic. The Ostrava region includes six districts and belongs to the region with the highest population density. It represents only 0,7% of the total area of the Czech Republic but 12,5% of its population. The city of Ostrava is the third largest city in the Czech Republic. The Ostrava Region includes these six districts: *Bruntal, Frydek-Mistek, Karvina, Novy Jicin, Opava, and Ostrava City.*

Figure 7.1: The Ostrava Region in Northern Moravia



Source: Prepared by SEVEn based on: Arcdata Praha, s.r.o: GIS [Geographic Information Source)]: *Czech Republic* (Prague: Arcdata Praha, s.r.o, 1997), electronic version.

Table 7.1: Basic Characteristics of the Ostrava District and Ostrava Region

	Ostrava District	**Czech Republic**
Area	218 km^2	0,3% of total Territory
Population	323 177 inhabitants	3.1% of total Population
Population density	1 482 inhabitants per km^2	131 inhabitants per km^2
	Ostrava Region	**Czech Republic**
Area	5 555 km^2	7% of CR Total Territory
Population	1 339 936 inhabitants	13% of CR Total Population
Population density	241 inhabitants per km^2	131 inhabitants per km^2

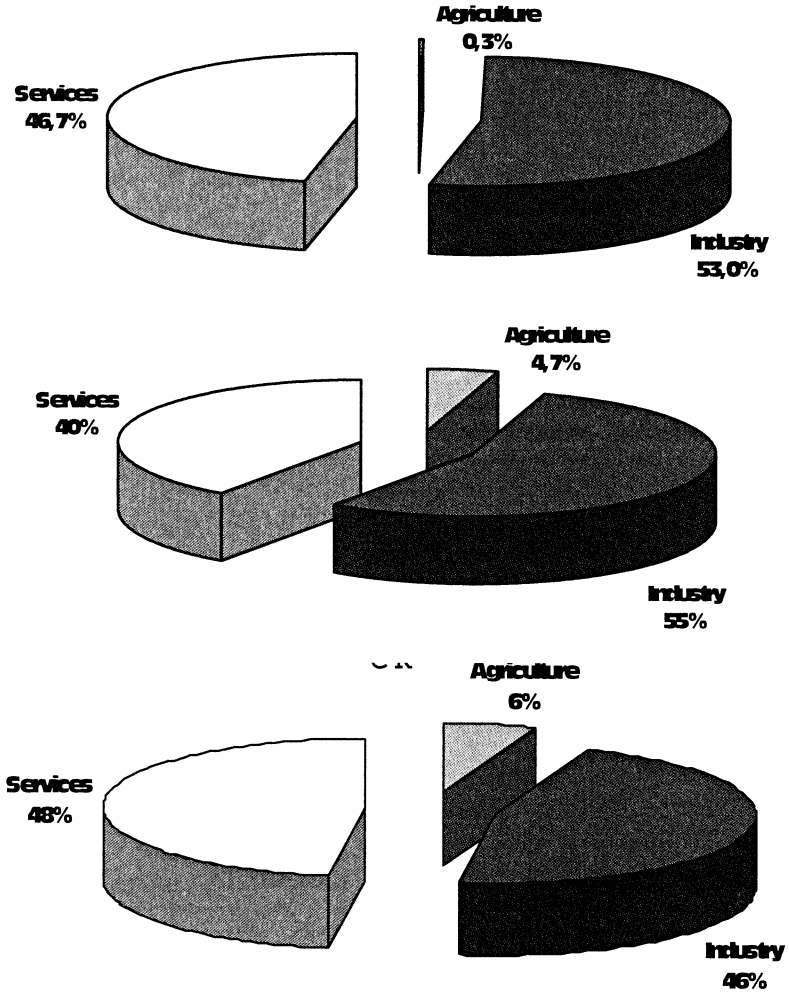
Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 6-19.

The landscape around the city of Ostrava is strongly influenced by anthropogenic activity primarily mining and heavy industry. The central part of Ostrava has often thermal inversions what makes the environment situation often worse despite their short and moderate duration. The average height above sea level 233 m puts Ostrava on the 4th position among the lowest located state districts. Within Central Europe, the Northern Moravian and Silesian region has an important political and geographical location, with relatively good transport connections including the international Ostrava-Mosnov airport, the location at the border to Poland. The distance from Prague is approximately 400 km.

7.1 Economy

The Ostrava region has a long industrial tradition that historically contributed significantly to the national GDP. More than 50% of the labour force is employed in industry, and nearly half of the labour force is employed in mining, in utilities and in metallurgical industries.

Figure 7.2: Structure of the Employment in the Ostrava District, in the Ostrava Region and in the Czech Republic



Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 46-65.

The structure of the regional economy related to employment shows a high share of industry and an undeveloped service sector. The largest employer in the region is represented by metallurgy, heavy chemistry and heavy engineering. All industrial companies are of a nation-wide importance while only the food industry is of regional importance.

Table 7.2: Registered Employees and Their Wages

	Ostrava District	Ostrava Region
No. of employees	135 086[1] 4% of CR total	410 122 12.3% of the CR total
Average monthly wage per employee	12 634 CZK/month 108% of the Czech average	11 096CZK/month 75% of the Czech average
Unemployment rate	12.02 % Czech average 7,48%	11,15% Czech average 7.48%

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 46-65.

According to data from 1998, the actual average monthly wage of the Ostrava District represented 12 634 CZK what was the third highest average wage among the 77 districts of the Czech Republic and it represented 108% of the average wage in the Czech Republic.

7.2 Environment

7.2.1 Air Pollution

The unsatisfactory level of air pollution in this region is in particular caused by the emissions from large sources of the metallurgic primary production, of the steel industry and of the energy sector. Local small combustion stoves with inefficient combustion of low-quality fuel are practically uncontrollable with current legislation. They contribute significant emissions from organic substances with carcinogenic effects as are solid substance emissions.

Table 7.3: Specific Emissions of Main Pollutants (sources over 5 MW in capacity, tonnes per year per km^2)

	Ostrava District	Czech Republic	Ostrava Region
Solid	**30,0**	0,7	2,6
SO_2	**105,7**	7,6	9,4
NO_x	**59,8**	2,1	4,4
CO	**727,3**	3,3	38,4
C_xH_y	**7,4**	0,3	0,5

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 98-107; Ministry of the Environment, Czech Statistical Office: *Statistical Environmental Yearbook of the Czech Republic* (Prague: Ministry of the Environment, The Czech Environmental Institute, 1998): 109-110.

[1] The figures refer to the business sphere (excluding small enterprises and unincorporated entities) and the government sphere irrespective of the number of employees. Hence they refer to the businesses submitting their returns (companies with 20 or more employees and businesses classified with no employment limits).

The growing emissions from car traffic occurs mostly in densely inhabited urban settlements and in the municipalities near the border. In total, in 1997 compared with 1996 the emissions from stationary sources were further reduced, solid pollutants decreased by 20.7 %, SO_2 by 17.7 %, NO_x by 22.9 %, CO by 4.9 % and C_xH_y by 19.2% (table 7.3).

Reductions in air pollution are driven primarily by a fuel switch from coal to natural gas, and by the shift of centralised district heating to other kinds of high-grade fuels with a significant permanent decrease of emissions from solid substance. With the progress in the development of gas pipelines and the shift from coal to natural gas in 20 municipalities and town districts, the emission load of solid substances from stationary sources has been decreasing in individual places. As the main problems of environmental protection in the Ostrava region remain the local combustion stoves burning low-quality fuel, the increasing emissions from mobile sources and the fulfilment of emission limits.

7.2.2 Geological Environment

The most important raw material in the region remained bituminous coal from the Moravian or Czech part of the upper Silesian basin which represents the only significant source of this raw material in the entire Czech Republic. The volume of mining is no longer significantly changing, in comparison with other European countries, direct mining subsidies have been eliminated or significantly reduced and economic pressures have led to a lower use of resources from the open parts of the deposit.

7.2.3 Waste

In the Ostrava region, vast amounts of waste originated, mostly waste from metallurgical production and from mining. Waste disposal is mainly done through deposits in landfills, only a negligible part is recycled or burned. The reduction of waste water production continues. Almost 70 to 80 % of the released pollutants are effluents from town sewage facilities.

7.2.4 Priority Problems for Environmental Protection

The priority problems for environmental protection of The region were defined and published by the Ministry of the Environment in its annual *Report on the Environment of the Czech Republic*:[2]

- air pollution caused by a high concentration of pollution sources (metallurgical works and coking plants, the chemical industry, the energy sector);
- anti-erosion measures and securing of slide areas;
- insufficient water drainage and purification;
- securing of old and liquidated mine seads in terms of their impact on the surface and prevention of uncontrolled outlet and ignition;
- devastation of mining areas and lack of finance of mining organisations and of the state for the elimination of the damage to the landscape;
- significant concentration of special and hazardous industrial waste, contamination of groundwater, soil and of the basement rock in former and still operated industrial facilities.

---

[2] Ministry of the Environment: *Report on the Environment of the Czech Republic 1997* (Prague: Ministry of the Environment, 1998).

7.3 Energy situation

As for electricity supplies, the region is an importing territory since more important electricity sources are represented only by six generation plants that use fossil fuel and that have a total installed capacity of 973 MW, what represents 9.6 % of total Czech capacity. As a result of the urbanisation of this region, central district heating supplies exist to a significant extent.

7.3.1 Electricity

Electricity supplies in the region of North Moravia and Silesia are provided by a regional power distribution utility *Severomoravska energetika a.s. (SME)*. The distribution network is mostly powered by the CEZ transmission network. The Ostrava division of SME (*Rozvodny zavod Ostrava*) operates in the Ostrava district (see table 7.4 for electricity supplies in 1998).

Table 7.4: Share of Electricity Customers in the Ostrava District

Category	Number of customer	Supply (GWh)	Share of supply
High voltage customers	678	365	37%
Low voltage customers	38 625	192	19%
Low voltage - Households	255 206	436	44%
Total	294 509	993	100%

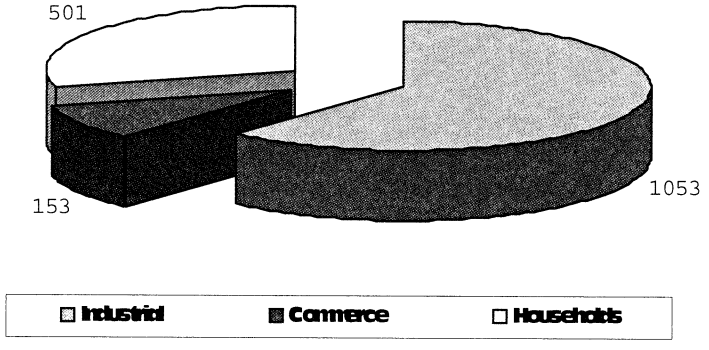
Source: Severomoravska Energetika: *Annual Report* 1998 (Ostrava: Severomoravska Energetika, a.s., 1999): 19.

The Ostrava division of the SME distribution utility supplies the territory of Ostrava and Karvina with a total area of 565 km^2 and 608 895 inhabitants.

7.3.2 Natural Gas

In view of the number of consumption points, ranges of networks, sales and revenues, the North Moravian Gas utility *Severomoravska plynarenska, a.s.* (SMP) is the second largest gas distribution company in the country. Since the company owns and operates the gas distribution pipe network and regulation stations, it holds a monopoly position in the entire area covered by the network. The company also supplies natural gas to some border areas of Poland. In 1998, the share of natural gas sales in the Czech Republic was 19%, and the share of the total consumers was 21%. The company supplies almost 508 000 consumers with natural gas.

Figure 7.3: Gas Sales of Severomoravska Plynarenska in 1998 in Million m^3



Source: Severomoravska Plynarenska: *Annual Report*, 1998, (Ostrava: Severomoravska Plynarenska, a.s., 1999): 26.

The largest total proportion of gas consumption comes from industries (more than 70%). The majority of households in the Ostrava region use gas for space heating and hot water services while the proportion for cooking is negligible. In 1998, the company purchased a total of 1.744 million m^3 of natural gas, of which 732 million m^3, i.e. 99.3% was purchased from the state enterprise Transgas, the principal gas supplier. The rest was purchased from local sources. The length of gas distribution network in the Ostrava region is 10,627 km.

7.3.3 Central Heating System

In the Ostrava region, the development of district heating began after 1946. The heating networks and heat supplies gradually grew to the present situation where the Ostrava system of centralised heat supply is one of the largest in the Czech Republic. The operator of heating sources and networks is *Moravskoslezska Teplarenska* and the division *Teplarny Ostrava* in the town area. In 1997, consumers were supplied with 9 495 TJ of heat and 396 GWh of electricity. The installed capacity of a total of 23 boilers is 1 121 MW_t, electrical output of three turbogenerators is 92.8 MW_e. The most significant position among consumers is taken by households. Through its distribution organisation, Teplarny Ostrava supplies heat to 94 400 flats. The itemisation of the heating network and the heterogeneity of heat sources provide large scope for the optimisation of production and for heat and electricity supplies, the reduction of expenses and the increase in efficiency.

7.4 Strengths and Weaknesses of the Ostrava Region

The objective is to transform Ostrava into a commercial and industrial centre with an important position in the region, a town of science and culture in which heavy industrial production would be reduced and ecologically sound light industry would be supported and developed. In the energy sector special efforts were launched to support programmes that would offer ecological and energy relief for the region and lead to a reversal of the unfavourable environmental development through the elimination of pollution sources.

Great emphasis is given to the development of transport communications and to the planned construction of the automobile highway connection to Brno and Prague. The strong industrial position of North Moravia and Silesia is expected to be preserved also in the future, within the Czech-Polish-Slovak Euroregion and the plan is to establish a new generation of innovative companies using advanced technologies that will enable the development of small and medium-sized companies in this area. Regional strengths and weaknesses have been developed during the preparation of the Regional Development Plan.

Among the strong points for the Ostrava region were noted:

- developed industrial potential, tradition, good technical level in some industries;
- availability of a skilled labour force;
- relatively high financial evaluation of employees in the industrial sector;
- proximity to the state border and possibility to create a relatively strong Euroregion linkage with Slovakia and Poland;
- existence of an administrative centre in a very densely populated area due to tradition and long-term interconnections;
- spatial possibility for building development both in the centre and the outskirts of the town;
- occurrence of natural gas deposits;

- high percentage of forest land (35.8%) (biomass);
- access to international industrial markets due to a strategic position on two separate communication systems North-South (Poland - Hungary) and East-West (Germany - Russia);
- international development of entrepreneurial activity in the area of innovations and new technologies through the scientific-technological park in Ostrava.

The following weaknesses were listed for the Ostrava region:

- concentration of industries in decline (mining, metallurgy);
- peripheral position on the edge of the state;
- valley-like character of the territory, that supports the emergence of temperature inversions;
- motorway network still under construction;
- unfavourable level of the environment;
- use of obsolete technologies and necessity to restructure the industrial basis as a consequence of the one-sided orientation of industry;
- lack of available flats and limited housing construction;
- low birth rate and danger of an ageing population;
- existence of a numerically strong group of people with low qualifications and lower capability of incorporation into the working and existential independent process;
- delays in the privatisation process of the large, dominant companies in the region;
- mining subsidence of the area which increases requirements for financial coverage of the construction and repairs of the housing and technological fund of the region.

7.5 Support for Regional Development

In 1993, a Regional Development Agency was established in the Ostrava Region as a pilot project of the EU in North Moravia and in the Silesia Region. The Regional Development Agency (RDA) was established as a supplier of specialised services for municipal governments, state administration bodies and as a provider of publicly accessible information services for small and medium-sized entrepreneurs. One important task of the RDA is to search for and to obtain financial resources and grants from EU programmes. The mission of the RDA is to contribute to the coordination of projects for the economic and social transformation of the region and for regional development. To be able to provide its services, the RDA uses the resources acquired from EU international assistance funds (Phare, bilateral assistance), of public national sources, of the Ostrava district, of local communities and some private funding.

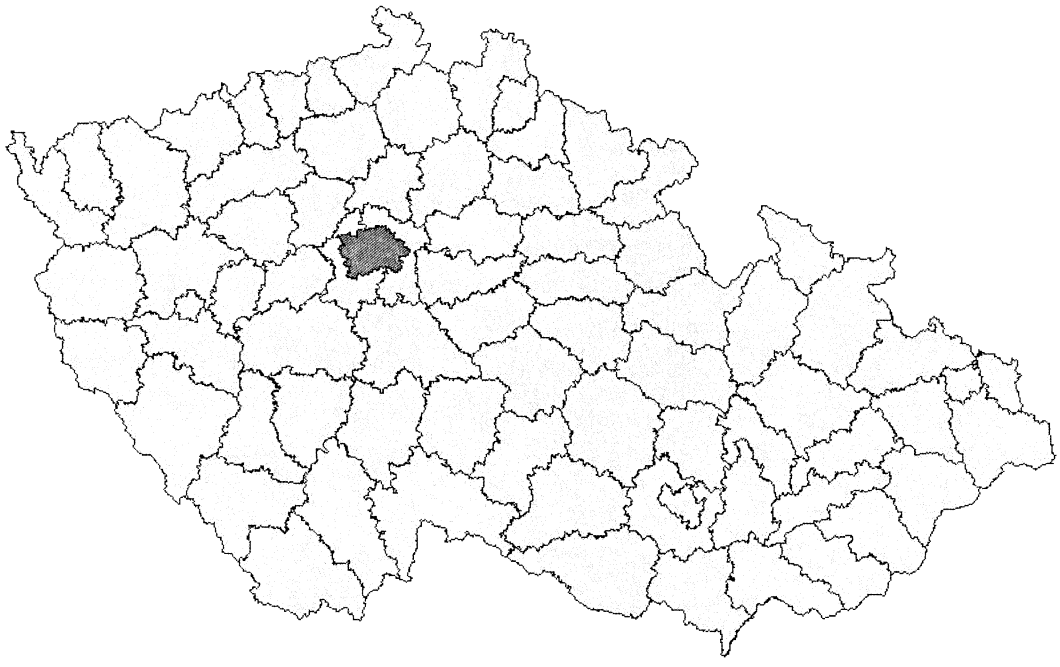
Contact:

Agentura pro regionální rozvoj Podebradova 16 702 00 Ostrava Czech Republic	Phone: + 420-69-6270411, +420 69-611 1058 Fax: +420-69-6270 404 e-mail: arr@rdaova.cz

Chapter 8: Prague

The capital city of Prague has a special status. The city council has basically the function of a district. The division of responsibilities between the town districts and the city council is defined in the statutes of the city of Prague.

Figure 8.1: Location of Prague



Source: Prepared by SEVEn based on: Arcdata Praha, s.r.o: GIS [Geographic Information Source)]: *Czech Republic* (Prague: Arcdata Praha, s.r.o, 1997), electronic version..

The city of Prague is located in the very centre of Bohemia, in the Western part of the Czech Republic. The distance to the border with Germany is approximately 100 to150 km. The most distant region from Prague is Northern Moravia with the city of Ostrava that is approximately 400 km away. With its population of 1.2 million people, Prague is the largest city in the Czech Republic.

Table 8.1: Basic Characteristics of the Prague Region

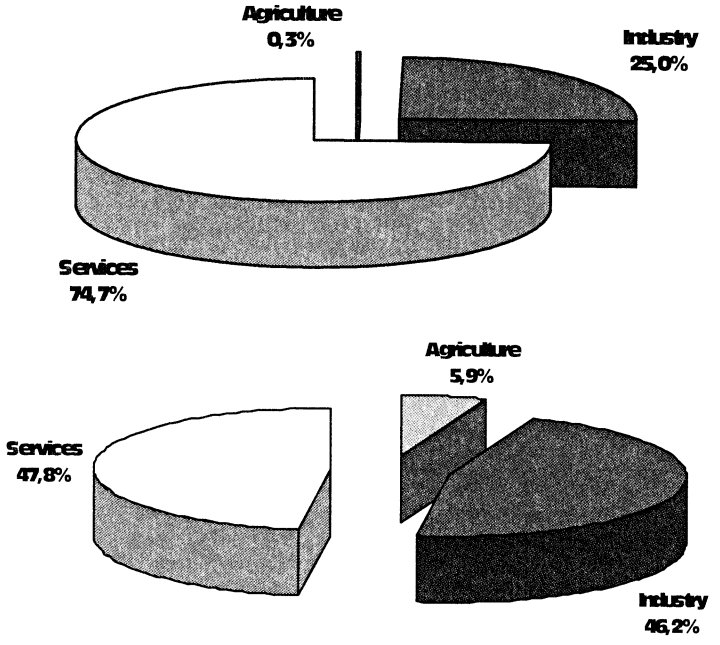
	Prague	**Czech Republic**
Area	496 km^2	0.62 % of total territory
Population	1 193 270 inhabitants	11.6% of total population
Population density	2 406 inhabitants per km^2	130 inhabitants per km^2

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 6-19.

8.1 Economy

Prague produces approximately 20 % of the gross domestic product (GDP) of the Czech Republic. In the territory of the capital also roughly 1/5 of all investments in the Czech Republic occurred. Prague is the region with the highest economic development and growth in the Czech Republic, partly because of the centrally organised economy with headquarters of many companies in Prague, and partly because of its advantageous location, its developed infrastructure, and also its intensive tourism. The city of Prague is the most visited region of the whole country. The GDP per capita produced in Prague is above the average GDP per capita in the EU.[1]

Figure 8.2: Economy Structure (related to employment)



Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 46-65.

Table 8.2: Registered employees and their wages

	Prague	Czech Republic
Number of employees	482 167[2]	14.4% of Czech employees
Average monthly wage per employee	15 874 CZK/month 850 DM/month	136% of the average Czech wage
Unemployment rate	2.31 %	7.48%

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 46-65.

---

[1] Eurostat, EU Business Week 2000/31; in: <eubusinessweek@eubusiness.com>.

2 The figures refer to the business sphere (excluding small enterprises and unincorporated entities) and the government sphere irrespective of the number of employees. Hence they refer to the businesses submitting their returns (companies with 20 or more employees and businesses classified with no employment limits).

A characteristic feature of the economic basis of Prague is the strengthening of the service sector and the decreasing share of manufacturing industries. About three quarters of the GDP is produced in services, and only one quarter in industry (figure 8.2). This stabilised sector structure of Prague is already comparable with the economy of a typical EU member state.

Within the framework of the Czech Republic, Prague has the most extensive regional labour market. In the 1990s, its share of national employment has slightly increased and it accounts for 14%, while the total estimated number of working people exceeds 760 000 of which about 100 000 are in a supervising position and 50 000 are foreigners. A high number of job opportunities has been the major reason for the low unemployment rate (less than 1% in 1997, and in 1999 below 3% with the average unemployment rate for the Czech Republic close to 10%). Although further growth of unemployment might occur, the economy of Prague has all the preconditions even for the future to guarantee an acceptable level of employment.

8.2 Environment

8.2.1 Air Pollution

Prague is still classified among the heavily polluted industrial and residential urban centres, the main pollutant being nitrogen oxides (No_x). In spring 2000, in Prague there were 237 large and roughly 2 790 medium-sized stationary air pollution sources in operation. In recent years, emission parameters of sources have significantly improved, with most large, medium and a considerable number of small sources having switched to natural gas heating. Thus, in contrast with the original situation with coal heating, emissions of solid substances and of sulphur dioxide have significantly decreased.

Table 8.3: Specific Emissions of Main Pollutants (sources over 5 MW in capacity, tons per year per km^2)

Major Air Pollutants	Prague	Czech Republic
Solid	2.35	0.7
SO_2	14.71	7.6
NO_x	6.44	2.1
CO	1.17	3.3
C_xH_y	0.93	0.3

Source: Czech Statistical Office: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office, 1999): 98-107; Ministry of the Environment, Czech Statistical Office: *Statistical Environmental Yearbook of the Czech Republic 1997* (Prague: Ministry of the Environment, The Czech Environmental Institute, 1998): 109-110.

In 1997, in comparison with 1996 there was a further reduction of emissions from stationary sources, for solid substances by 40.6 %, for SO_2 by 31.8 %, for NO_x by 9.8 %, for CO by 29.7 % and for C_xH_y by 23.1 %. But emissions of carbon oxides have significantly grown for mobile sources. Substances that are emitted especially from road traffic significantly contribute to the typical phenomenon for large residential areas with a high traffic density, i.e. the creation of photochemical smog characterised by high concentrations of ground ozone. In general, according to most indicators the air quality has constantly improved in recent years. Currently, sulphur dioxide and fly ash do not represent a significant ecological burden for Prague com-

pared with the situation 10 years ago, the problem of nitrogen oxides emitted mainly from mobile sources remains.

8.2.2 Geological Environment

The centre of Prague is heavily urbanised and raw material extraction (marble, limestone and gravel) is concentrated in the peripheral parts of the city. The contamination of rock in the territory of Prague resulted from human activity (since the Middle Ages), leaky sewage networks and old loads containing dangerous substances.

8.2.3 Waste

Waste management in the region is characterised with perennial problems. A new waste energy plant in Praha - Malesice has been put into operation in 1999. However, only a small fraction of domestic waste is recycled. Waste-water from the central part of the city and from the newly built residential quarters flows through the sewage network into the central waste-water treatment plant that after its modernisation in 1996, has the capacity of the average flow rate of 7 m^3/s. Apart from this central purification plant, in the territory of Prague there are 24 small waste-water treatment plants in operation or under construction that deal with in-flows from the sewage network of the peripheral quarters.

8.2.4 Priority Problems with Environmental Protection

The major problems for environment protection in Prague consist of:

- growth of traffic (increase in cars, inadequate system of thoroughfares and ring-roads;
- air pollution from NO_x emissions from the steadily growing road traffic and, partially, from remaining combustion of solid fuel in unsuitable facilities (heaters, inefficient boilers etc.);
- continuing absence of a composting plant (introduction of the separated collection of household waste);
- decrease in non-built-up areas (areas of urban parks, forests and agricultural land) due to commercial pressures;
- bad condition of water mains and sewage networks in Prague.

8.3 Energy

With respect to energy supply, in 2000 all media were used, including low-quality solid fuel. However, the share of solid fuels declined dramatically in the city and represented only 4.6% of total energy consumption in 1998. The city supported the use of high-grade fuel (switch from coal to natural gas, or district heating) through subsidies and supervises the development of centralised heat supplies (51% of households), as well as the increasing efficiency of production, distribution and energy consumption. From 1994 until 2000, the city subsidised 34,400 households by supporting improvements of their heating systems what equals 7% of all households in Prague.

8.3.1 Electricity

The primary distributor of electricity in Prague is the regional power distribution company *Prazska energetika, a.s.* In 1998, with a 95% share the major electricity supplier was the power generating company CEZ a.s. (table 8.4).

Table 8.4: Share of Electricity Consumption

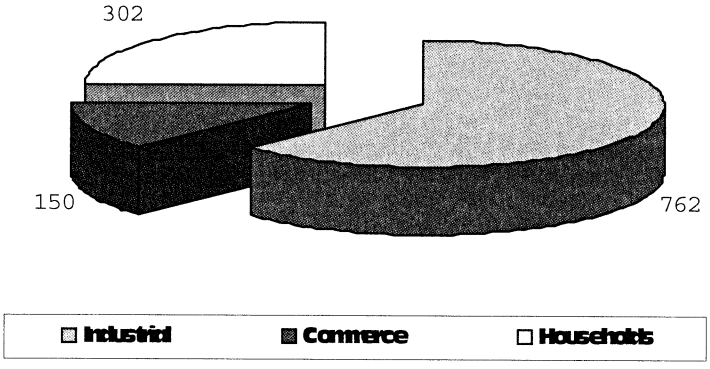
Category	Number of customers	Consumption (GWh)	Share of consumption
High voltage customers	1 726	2 182	49%
Low voltage customers	112 276	877	20%
Low voltage (households)	547 110	1 365	31%
Total	**661 112**	**4 424**	**100%**

Source: Prazska energetika: *Annual Report, 1998* (Prague: Prazska energetika., a.s., 1999): 4.

8.3.2 Natural Gas

In 1998, natural gas contributed about 42.26 % to the total volume of the heat generation market in Prague. The regional distributor is the natural gas company *Prazska plynarenska, a.s.* that is the third largest natural gas distribution company in the Czech Republic. It held a 14% share of total natural gas sales in 1998 and of 17.5% of the total number of customers. The company supplies natural gas to more than 420 000 customers in Prague and in the adjoining areas of the districts of Prague East and Prague West. 71% of the households in Prague are linked to the gas grid, of which only a small part is for cooking. The length of the gas distribution network is 3,323 km. The largest industrial natural gas customer is a cogeneration plant of a local heat distribution company.

Figure 4.3: Gas Sales by Prazska Plynarenska in 1998 (million m^3)



Source: Prazska plynarenska: *Annual Report, 1998,* (Prague: Prazska plynarenska, a.s., 1999): 17.

8.3.3 District Heating System

In 1998 in the territory of Prague, heat supply through centralised district heating represents 36% of the total volume of the heat market. The major heat producer in Prague is *Prazska teplarenska, a.s.* In the territory of the capital it operates four cogeneration power stations and 86 large district heat-exchange stations, block and district boiler plants. The company supplies heat to approximately 250 000 households, industrial plants, administration areas, education, health service, cultural and sports facilities.

The main activity of the company is the purchase, generation and selling of heat energy. Installed capacity in its own plants is 2,300 MW_{th} and 138 MW_{el}. Electricity is generated in the four power and heat plants. In 1998, annual sales of electricity were about 150 GWh. Thermal energy amounting to ca. 16 000 TJ was produced in the generators of the company (70%) or purchased from the Melnik-Prague heat network system (30%). The interconnection and heat

supply from the Melnik-Prague network system continued to be developed in 1999, and its share will increase in the future.

8.4 Strengths and Weaknesses of the Prague Region

In the energy sector, the major objective of Prague is to use primary energy resources and media efficiently and in a sustainable way. The city supports efforts to reduce energy consumption, to use the savings as supplementary sources, to eliminate the use of solid fuel on its entire territory with the exception of the large sources that abide by emission limits in compliance with the *Clean Air Act*.

In industry, an important restructuring phase is being undertaken. Specific sectors were selected and manufacturing programmes are to guarantee a growth in efficiency and aim at competitiveness. New technologies and applications of "know-how" are being sought and implemented. Companies are releasing superfluous labour forces and operation spaces. The interest of investors in new accommodation facilities is continuing. New hotels are rapidly increasing the supply of lacking types of accommodation. Tourism is being established as a significant development element of the Prague economy, the supply range of tourist activities is being extended. The low quality of some services is gradually being reduced.

In a service sector, a well developed competition exists, and a strong and stable core with the participation of foreign firms is being established. The transformation is strengthening advisory services (accounting, legal, public relations, advertising, marketing etc.).There is a continuing strong demand for improving the real estate market (in particular, office and business space, and to a lesser extent in the area of industrial space). One remaining problem is the insufficient use of the scientific and research basis and its interconnection with the production (application) basis.

Among the strong features on behalf of Prague were mentioned:

- its position in the centre of Europe and of Bohemia, the rapid restoration of prestige and the ongoing "attractiveness" of the city for tourism;
- open entrepreneurial environment, high evaluation of the investment stability of Prague;
- completed reorganisation of the basic service sector, sufficient universality and diversity of the economic basis;
- stable and professionally diversified labour market, a still relatively cheap labour force, low unemployment rate;
- good accessibility for the major part of the surrounding regions (radial road and railway network);
- above-average labour force qualifications, capability to receive new stimuli, strong potential of science and education;
- attractiveness for tourism, still unexhausted genius loci of the city, rapidly growing basis for tourism;
- increasing quality and incorporation of Prague into the global communication network;
- available technical infrastructure in most parts of the city, usable energy reserves;
- existence of free operation facilities sufficiently dimensioned for a number of activities;
- territorial reserves for the development of entrepreneurial activities, housing, and other activities in most parts of the city and in its regional hinterland;

- continued planning of the land-use development in Prague;
- interest of the city representatives in the preparation of a long-term strategy for Prague.

But Prague has also several weaknesses among them are:

- low level of its communication with other towns (both within the framework of broader structures and bilateral relationships), lack of communication with the regional hinterland;
- overloaded historical centre and insufficiently developed district and local centres;
- absence of prestigious international institutions (unclear intentions of central bodies with respect to the acquisition of international activities to be located in the city);
- incomplete restructuring of some sectors and companies, high living costs for entrepreneurs in national comparison;
- inefficiently developed relations between the city administration and entrepreneurial structures;
- inexpressive international marketing presentation of the city and of all subjects operating in its territory, hardly identifiable municipal investment policy;
- tough competitive environment.

There is no special development agency in Prague, and its tasks are managed by the municipality of Prague.

Chapter 9: Conclusions

This report provides readers with a focused information on the present situation and on recent developments in the Czech Republic in the field of energy and environment issues related to energy use and production. It describes both the main statistical data, as well as major relevant policies and the legislation related to these issues.

During the 1990s, the Czech Republic has made major progress in cleaning up the environment even in international comparison. The Clean Air Act and its strict emission limits that are comparable with EU standards came into effect for new and existing sources of pollution by end of 1998. Practically all power and heat plants in the Czech Republic, including boilers with a capacity above 0.2 MW, went through a major environmental upgrade, retrofit, reconstruction, or at least a fuel change so that they would meet the new emission limits.

But despite of this major effort that was accompanied with high investments in environmental upgrades and the resulting significant decrease of emissions (for example SO_2 emissions declined during the 1990s by more than 80%) there remain many problems the Czech Republic must solve.

One of the main environmental priorities for the near future is the cleaning up of waste water what will require significant investments for waste water treatment plants. The Czech economy still remains very energy intensive in terms of energy spent for production of a unit of GDP, and thus energy efficiency is one of the priorities of Czech energy policy. There are several financial mechanisms and funds that use both local governmental funds and foreign grants to support energy efficiency and renewable energy projects in the Czech Republic (for example the Czech Energy Agency, the State Environmental Fund, the PHARE Energy Saving Fund, the MUFIS programme etc).

The Czech Republic prepares new energy laws and new legislation in the environmental field to harmonise its domestic legislation with EU regulations and directives. The new draft energy law includes a time-schedule for the implementation of competition into the electricity and gas sectors. A privatisation plan for energy utilities is being prepared and discussed by the Ministry of Finance and the Ministry of Industry and Trade. However, this process is accompanied also with many uncertainties and delays in governmental decisions what may discourage some of investors.

There are numerous examples of successful German - Czech projects, joint ventures, and acquisitions, in both large-scale as well as middle- and small-scale projects. These joint projects include investments for the development of new 100 MW cogeneration plants in the country side, the privatisation and acquisition of existing energy utilities, entering the market and developing own projects in energy supply and energy contracting, as well as investments in energy efficiency projects. For example, two major German investors Siemens and MVV utility have recently purchased two main local energy efficiency and energy service companies that offer third party financing and energy performance contracting projects in the Czech Republic.

This report is focused at companies that are looking for opportunities to do business in the energy and environmental field in the Czech Republic. The main aim of this report is to supply these potential investors with relevant information that is necessary for their decision to enter the market and to develop new activities in this field. At the same time this report also intends to provide information for decision makers at governmental and regional levels, as

well as for all other interested parties. If the information in this report will help investors to make their decision to develop joint projects in the energy or environmental field in the Czech Republic, and to identify new opportunities for cooperation, the aim of the authors and of all project partners would be fulfilled.

Bibliography

3T, 1999: (Prague: ORTEP Ltd.) .

Brauch, Hans Günter, 2000: *Osterweiterung der Europäischen Union - Energie- und Umweltpolitik der Tschechischen Republik, Energy and Environment Policy in the Czech Republic*, Vol. 1 (Berlin: Umweltbundesamt).

Brauch, Hans Günter, 2000: *Liberalisation of the Energy Market for Electricity and Gas in the European Union: A Survey and Possible Implications for the Czech Republic*, Vol. 3 (Berlin: Umweltbundesamt).

Central Dispatching Office, 1999: *Annual Report of the Electrical Distribution and Transmission Network, 1998* (Prague: Central Dispatching Office).

Czech Government: *Navrh zakona o pominkach podnikani a vykonu statni spravy v energetickych odvetvich a zmene nekterych zakonu (Energeticky zakon)* [Proposed Energy Act] (Prague, Ministry of Industry and Trade, Ministry of Environment, December, 1999):

Czech Institute for Standards, 1999: *Seznam českých technických norem 1,2,3* [Catalogue of the Czech Technical Standards, ISBN 80 - 85111 - 72 - 1-3] (Prague: Český normalizační institut).

Czech Institute of Hydrometeorology, Department of Climate Change, 1994: *Inventory of Greenhouse Gas Emissions 1995. Czech Republic* (Praha: Czech Hydrometeorological Institute, April).

Czech Institute of Hydrometeorology, 1998: *Inventory of Greenhouse Gases in the Czech Republic for 1990 – 1997* (Prague: Czech Institute of Hydrometeorology).

Czech Statistical Office, 1994: *Domovní a bytový fond podle výsledků SLBD v r. 1991* [Number of Houses and Dwellings According to Census in 1991] (Prague, Czech Statistical Office).

Czech Statistical Office, 1995: *Statistical Yearbook of the Czech Republic, 1995* (Prague: Czech Statistical Office).

Czech Statistical Office, 1996: *Statistical Yearbook of the Czech Republic, 1996* (Prague: Czech Statistical Office).

Czech Statistical Office, 1997: *Statistical Yearbook of the Czech Republic, 1997* (Prague: Czech Statistical Office).

Czech Statistical Office, 1998: *Statistical Yearbook of the Czech Republic, 1998* (Prague: Czech Statistical Office).

Czech Statistical Office, 1999: *Districts of The Czech Republic, 1998* (Prague: Czech Statistical Office).

EkoWatt, 1995: *Economic evaluation of renewable energy sources* (Prague, EkoWatt).

Energie, 1999: (Prague: Panorama Group, Jsc).

International Energy Agency, 1998: *Energy Prices and Taxes* (Paris: OECD).

International Energy Agency, 1999: *Key World Energy Statistics from the IEA* (Paris: IEA).

Komerčni banka, 2000: "Czech Economy in 2000", in: *Economic Trends*, No.23 (Prague: Komerčni banka, March 2000).

KONEKO Marketing Ltd., 1998: *Energy Economy, Czech Republic 1994 – 1997 in Numbers* (Prague: KONEKO Marketing Ltd.).

KONEKO Marketing Ltd., 1999: *Energy Economy, Czech Republic 1994 – 1998 in Numbers* (Prague: KONEKO Marketing Ltd.).

KONEKO Marketing Ltd., 1999: *Energy Economy, Czech Republic in Figures, 1994-1998* (Prague: KONEKO Marketing Ltd.).

Ministry of Industry and Trade, Ministry of Regional Development, 1999: *Program podpory oprav bytových domù* [Programme for Support of Residential Houses Reparation] (Prague: Ministry of Industry and Trade, Ministry of Regional Development).

Ministry of Industry and Trade, Ministry of Environment, Ministry of Regional Development, Ministry of Agriculture, 1999: *State Programme of Support for Energy Saving and Renewable Energy Sources* (Prague, Ministry of Industry and Trade, Ministry of Environment, Ministry of Regional Development, Ministry of Agriculture).

Ministry of Regional Development, 1998: *Strategy of Regional Development*, (Prague: Ministry of Regional Development).

Ministry of the Environment of the Czech Republic, 1997: *Report on Environment of the Czech Republic* 1996 (Prague: Ministry of the Environment).

Ministry of the Environment of the Czech Republic, 1997: *The Czech Republic Report to the CRLTAP Secretariat, 1997* (Prague, The Ministry of the Environment).

Ministry of the Environment of the Czech Republic, 1998: *Inventory of Greenhouse Gases in the Czech Republic for 1990 – 1997* (Prague: Ministry of the Environment of the Czech Republic).

Ministry of Environment of the Czech Republic, 1999: *Aproximacni strategie pro oblast zivotniho prostredi* [Strategy for Approximation in Environment] (Prague: Ministry of the Environment of the Czech Republic).

Ministry of the Environment of the Czech Republic, 1999: *Inventory of Greenhouse Gases in the Czech Republic for 1990 – 1997; Preliminary data for 1998* (Prague: Ministry of the Environment of the Czech Republic).

Ministry of the Environment, 1999: *Strategie ochrany klimatického systému Země v České republice* [Strategy of protection of Earth Climate System in the Czech Republic] (Prague: Ministry of Environment).

Ministry of the Environment, Czech Statistical Office, 1998: *Statistical Environmental Yearbook of the Czech Republic* (Prague: Ministry of Environment, The Czech Environmental Institute).

Prazska energetika: *Annual Report, 1998* (Prague: Prazska energetika., a.s., 1999).

Prazska plynarenska: *Annual Report, 1998* (Prague: Prazska plynarenska, a.s., 1999).

Prazska teplarenska: *Annual Report, 1998* (Prague: Prazska teplarenska, a.s., 1999).

Resolution No. 480 of the Government of the Czech Republic of 17. 5.1999: *Strategy of Protecting the Earth's Climatic System* (Prague: Government of the Czech Republic, 1999).

SEVEn, 1998: *Dlouhodobá strategie pro státní programy podpory úspor energie a obnovitelných zdrojů energie* [Long-term Strategy for State Programmes for Support of Energy Saving and Utilisation of Renewable Energy Resources, for the Ministry of the Environment of the Czech Republic] (Prague: SEVEn).

SEVEn, 1998: *Long-term Strategy for State Programmes for Support of Energy Saving and Utilisation of Renewable Energy Resources, for the Ministry of the Environment of the CR*, (Prague: SEVEn).

SEVEn, 1999: *Analysis of Energy Price Subsidies* (Prague: SEVEn).
SEVEn, 1999: *Analysis of Subsidies in Energy Sector* (Prague: SEVEn).
SEVEn, 1999: *Analýza dotací v energetickém sektoru* [Analysis of subsidies in the energy sector] (Prague: SEVEn).
SEVEn, 1999: *Specifikace a rozsah požadavků k plnění protokolů EHK OSN k Úmluvě o snižování přenosu znečišťujících látek pres hranice států* [Specification of the requirements to the fulfilment of the UN ECE Convention on the Long-range Transboundary Air Pollution Protocol] (Prague: SEVEn).
SEVEn, 1999: *Strategie hospodaření s energií* [Strategy for Energy Conservation] (Prague: SEVEn).
SEVEn, 1999: *Umweltpolitische Instrumente und Handlungsmöglichkeiten im Rahmen des Annäherungsprozesses der EU-assoziierten Staaten im Bereich Umwelt und Energie, Legal Gap Assessment, WP3 CR* (Prague: SEVEn).
Severoceska energetika, 1999: *Annual Report 1998* (Decin: Severoceska energetika, a.s.).
Severoceska plynarenska, 1999: *Annual Report 1998* (Usti nad Labem: Severoceska plynarenska, a.s.).
Severomoravska energetika, 1999: *Annual Report 1998* (Ostrava: Severomoravska energetika, a.s.).
Severomoravska plynarenska,1999: *Annual Report 1998* (Ostrava: Severomoravska plynarenska, a.s.).
SRCI CS, SEVEn, RAEN, ECN, DHV AIB, DHV CR, SEO, March Consulting, 1999: *National Energy Efficiency Study – Czech Republic* prepared for the World Bank (Prague: Ministry of Industry and Trade, Ministry of the Environment of the CR).
The Czech Environmental Institute, The Ministry of the Environment, 1994: *Environmental Yearbook of the Czech Republic 1993-94* (Praha: The Czech Environment Institute).
The Czech Environmental Institute, The Ministry of the Environment, 1996: *Environmental Yearbook of the Czech Republic 1995* (Praha: The Czech Environment Institute).
The Czech Environmental Institute, The Ministry of the Environment, 1996: *Environmental Yearbook of the Czech Republic 1996* (Praha: The Czech Environment Institute).
The Ministry for Environment of the Czech Republic; Czech Statistical Office, 1997: *Environmental Yearbook of the Czech Republic 1997* (Praha: The Czech Environment Institute).
The Ministry of the Environment of the Czech Republic, Czech Statistical Office, 1998: *Statistical Environmental Yearbook of the Czech Republic 1998* (Praha: The Czech Environment Institute).
Zasobovani teplem Ostrava, 1999: *Annual Report 1998* (Ostrava: Zasobovani teplem Ostrava, a.s.).

Internet Sources

„Česká republika a Evropská unie“ [Czech Republic and EU], in <http://www.euroskop.cz/cr_ pripravacr_narprog99_13.html>.
Centrum pro zahraniční pomoc [Centre for Foreign Assistance], in: <http://www.mfcr.cz/Phare-MF/Home_CZP.htm>.

Informace o zahraniční pomoci pro eskou republiku [Information about Foreign Assistance for the Czech Republic], in: <http://www.mfcr.cz/Phare-MF/zakl-pop.htm> and <http://www.mfcr.cz/Phare-MF/Brozura>.
Information about grants, funds and programmes, in: <http://energie.panorama.cz/html>.

Ministry of Finance: Predikce zmen cen [Prediction of Prices Development, 2000], in: <http://www.mfcr.cz/Ceny/ PredikceZmen.htm>.
Ministry of Foreign Affairs of the Czech Republic: *Position Paper of the Czech Republic on Chapter 22: Environment*, in: <http://www.euroskop.cz/cr_vyjedn_pozdoc.html>.
Ministry of Regional Development*: Strategie regionalniho rozvoje kraju CR* [Strategy of Regional Development of CR´s regions], in: <http://www.dhv.cz/regstrat/>.
PHARE PMU Energetika [Phare PMU Energy], in: <http://www.energo.cz/phare/index.html>.
Programy EU [EU Programmes], in <http://www.crr.cz/eic/programyeu/index.htm>.
Programy Phare pro energetiku [Phare Energy Programs], in: <http://www.energo.cz/info1.html>.
Projekty v rámci CBC Phare [Cross Border Cooperation projects in the CR], in: <http://www.crr.cz/phare/projekty/.htm>.
Současné zkušenosti z využití podpurných programù EU [Current experiences from EU programmes], in: <http://www.mfcr.cz/Phare-MF/EU_Prog.htm>.
Strukturální fondy Evropské unie [EU Structural Funds], in <http://www.mmr.cz/funds/kap3.htm>.
Účast České republiky v programech Evropských společenství [CR´s Participation in EU Programmes], in: < http://www.mfcr.cz/Phare-MF/Brozura/Standards.htm>.

Part III: Appendices

Appendix A: Energy Efficiency in the Building Sector

Appendix B: State Support Programme for Energy Saving and Renewables

Appendix C: Technical Standards - System of Changes

Appendix D: Information Resources and Investment Possibilities in the Czech Republic

Appendix E: International Programmes

Appendix F: Strategy for Global Climate Protection in the Czech Republic

Appendix G: On the Project

Appendix A: Energy Efficiency in the Building Sector

The requirements for energy efficiency in new and modernised buildings are covered in various acts, regulations and decrees but no clear procedures exist how they should be carried out. The same legislation applies both for public and residential buildings. Measurement of heat consumption were made in houses with district heating but so far they are not required for each final consumer due to the costs for documenting the measurement. The government programme by the Ministry of Regional Development refers to buildings owned by municipalities. However, so far no programme for house owners exists (both for insulation and heating systems). Through a sub-programme the CEA supports changes of heating systems in residential houses and flats, and in 1998, about 80 million CZK were allocated for this project.

A.1 Basic Description

The number of residential and family houses in 1991 is given in tables A.1 and A.2.

Table A.1: Basic Data on Residential Houses for the Czech Republic in 1991

Item	Unit	Number
Number of family houses	thousand	1605
Number of dwellings	thousand	1795,5
Number of resident persons	thousand	4450,8
Resident area	m2/person	19,46
Number of resident rooms/dwelling	room/dwelling	3,18
Resident area	mil. m2	86,6
Useful area	mil. m2	130,8
Average age of house	years	57
Average number of dwellings/house	dwelling/house	1,13
Dwellings by building material		
stone and bricks	thousand	1418,3
wood	thousand	29
unburned bricks	thousand	58,9
other, panels	thousand	19,2
Period of construction of houses		
to the year 1899	thousand	303,4
1900 - 1919	thousand	225,3
1920 - 1945	thousand	485,9
1946 - 1970	thousand	227,1
1971 - 1980	thousand	166,5
1981 - 1991	thousand	117,2

Source: Czech Statistical Office: *Domovní a bytový fond podle výsledků SLBD v r. 1991* [Number of Houses and Dwellings According to Census in 1991] (Prague, Czech Statistical Office, 1994).

In 1999, there were about 2.1 million dwellings in the Czech Republic. Of these, about 40% are in family houses and 60% in residential buildings and in blocks with flats. Heating ac-

counts about 71% of final energy consumption, hot water preparation for about 17% and cooking for about 6%. Household appliances and light consume the remaining electricity. The characteristics and the quality of residential houses in the Czech Republic differ according to the periods of construction. The technical quality of some buildings that were built after World War II is rather bad due to insufficient maintenance for many years and the construction material and building deficiencies. Thus, a huge potential exists for improvements in the housing sector, especially for implementing energy conservation measures. Energy consumption in dwellings is mainly used for heating, hot water and various kinds of appliances. Various large scale technology measures are reviewed that could be applied during the next few years. The condition and equipment of houses is monitored every ten years during the census of people, houses and dwellings. The last general monitoring occurred in 1990.

Table A.2: Basic Data on Apartment Buildings for the Czech Republic in 1991

Item	Unit	Number	Specific units
Number of apartment buildings	thousand	223,6	
Number of dwellings /1/	thousand	2150	9,6 dwelling/house
of which in tenanted houses	thousand	1456,7	67,75 % from number of dwellings
cooperative houses	thousand	697,8	32,42 % from number of dwellings
Number of resident persons	thousand	5708,3	2,66 person/dwelling
Number of residental households	thousand	2292,6	1,07 house/dwelling
Number of resident rooms per flat	room./dwelling	2,29	2,29 room/dwelling
of which in tenanted houses	room./dwelling	2,17	2,17 room/dwelling
cooperative houses	room./dwelling	2,55	2,55 room/dwelling
Resident area	mil. m2	82	38,2 m2/dwelling
of which in tenanted houses	mil. m2	54,7	37,6 m2/dwelling
cooperative houses	mil. m2	27,3	39,4 m2/dwelling
Useful area	mil. m2	128,5	59,8 m2/dwelling
of which in tenanted houses	mil. m2	85,7	58,9 m2/dwelling
cooperative houses	mil. m2	42,8	61,7 m2/dwelling
Average age of dwelling	year	35	
of which in tenanted houses	year	43	
cooperative houses	year	16	
Average number of overhead stories (estimate)	story	5,8*	
Dwellings by building material			
stone and bricks	thousand	981,8	
wood	thousand	2,4	
unburned bricks	thousand	0,6	
other, panels	thousand	1165,2	
Period of construction of houses	thousand		
to the year 1899	thousand	134,7	
1900 - 1919	thousand	123,1	
1920 - 1945	thousand	259,4	
1946 - 1970	thousand	680,2	
1971 - 1980	thousand	557,9	
1981 - 1991	thousand	394,7	

Source: Czech Statistical Office: *Domovní a bytový fond podle výsledků SLBD v r. 1991* [Number of Houses and Dwellings According to Census in 1991] (Prague, Czech Statistical Office, 1994).

The statistical data give the number of the dwellings that are completed each year and of those under construction. They also refer to quality aspects of dwelling construction. According to expert estimates on heating:

- 30% of the flats in apartment houses and 0.3% of family houses are connected to the district heating distributors;
- 21% of the dwellings in apartment houses and 41.6 % of family houses use boilers inside the houses. Boilers for central heating exist for dwellings (10%) and family houses (31%);
- 10% of dwellings in apartment houses and 27% of family houses have local sources of heating.

No statistical data exist for other types of buildings, and only some information is available for school buildings and hospitals. Due to these lack of data estimates on the potential for energy savings are difficult. The Czech commercial and public sector is the third-largest energy consumer with approximately 13% in 1997. The largest consumers are offices, schools, health facilities and government and public buildings. Heating represents roughly 49%, hot water about 33% and electricity approximately 18% of the total energy consumption in this sector (table A.3). Specific annual indexes for heat consumption are contained in Directive No.85 (30.3.1998) of the Ministry of Industry and Trade. For heating and hot water they amount to 1.05 - 1.25 GJ/m^2 of the floor area of the clearing unit. In households, energy services are required for spaces heating, cooking, hot water, and various electrical appliances, such as washing machines, refrigerators and lamps.

Table A.3: Consumption of Fuel and Energy in the Commercial and Public Services Sector (1992 - 1998)

Item [TJ]	1992	1993	1994	1995	1996	1997	1998
Hard coal	5345	852	4465	4369	3725	2621	2411
Hard coking coal	16	0	0	0	0	0	0
Brown coal/Lignite	13522	13197	11782	9736	10193	10418	8395
Briquettes	240	114	1375	484	118	164	150
Coke	8531	5526	10323	10154	10909	9288	9272
Other solid fuels	385	228	262	210	183	124	37
Total solid fuels	28039	19917	28207	24953	25128	22615	20265
Propane butane	*	*	511	1420	1458	2040	2127
Gasoline	932	822	800	775	910	950	980
Diesel oil	2630	2309	2280	2235	2335	2500	2796
Kerosene	*		1182	1040	478	957	280
Light fuel oil	5636	6569	7295	2811	5507	3149	1248
Heavy fuel oil	5012	4786	8199	4457	5492	3214	2104
Other liquid oils	3886	829	0	0	0	0	0
Total liquid fuels	18096	15315	20267	12738	16180	12810	9535
Natural gas	39613	46023	30051	43900	45851	51026	57294
Town gas	2908	2903	2925	2799	1131	0	0
Other gaseous fuels	0	0	0	0	0	0	0
Total gaseous fuels	42521	48926	32976	46699	46982	51026	57294
Heat	27823	28456	30085	32917	33235	30466	26557
Electricity	17986	20344	31853	34790	38848	40592	42214
Total Consumption - Commerce and Public Services	**134465**	**132958**	**143388**	**152097**	**160373**	**157509**	**155865**

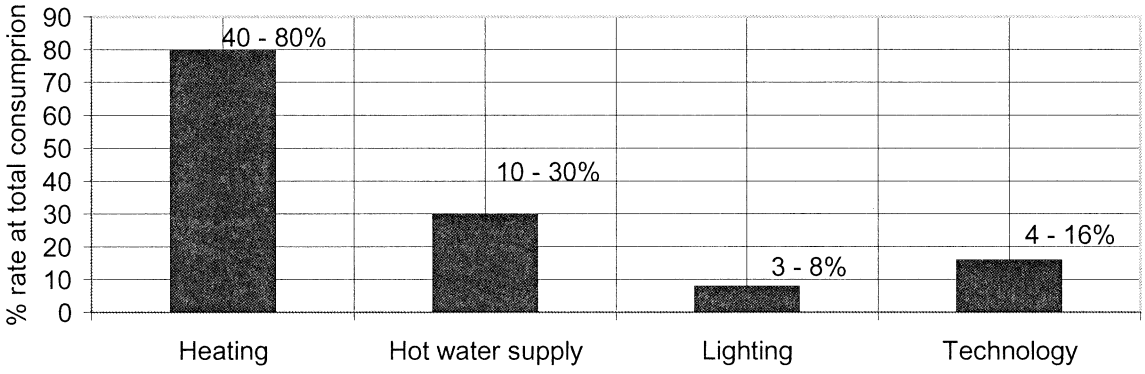
*included in Item "Other Oils"

Sources: VUPEK: *Energy Economy of the Czech Republic* (Prague: VUPEK jsc, 1996): 33; KONEKO Marketing Ltd.: *Energy Economy in the CR in Figures, 1994-1997* (Prague: KONEKO Marketing, Ltd., 1998): 28.

A.1.1 Billing for Heat

All consumers have installed individual hot water meters. Metering of heat depends on the source of heat. The electricity, natural gas and other fuels are individually metered, district heating systems have one meter installed in each of the supplied buildings. The individual bills are based on the number of the square meters or according to heat indicators. The allocation of the total energy consumption in buildings differs according to the building type and its use as will be shown in figure A.1.

Figure A.1: Total Energy Consumption in Buildings



Source: SEVEn: *Internal survey* (Prague: SEVEn, 1999).

A.2 Panel Blocks with Flats

About 1,116,000 flats or 31% of all permanently occupied apartments are in panel blocks with flats. Their largest number was built in Northern and Southern Moravia, in Northern Bohemia and in Prague. Such panel buildings exist in 14 fundamental construction designs with several variants. A total of approximately 67 construction systems have been registered. The average size of these apartments is between 55 and 60 m^2 of useable floor space. In co-operative buildings they are slightly larger than in municipal ones. These buildings were constructed with four and eight storeys.

Table A.4: Number of prefabricated houses being built between 1955 and 1980

Period	Number of houses
1955 - 1960	31365
1961 - 1965	104113
1966 - 1970	201541
1971 - 1975	311624
1975 - 1980	369844
Total	**1018487**

Source: Czech Statistical Office: *Domovní a bytový fond podle výsledků SLBD v r. 1991* [Number of Houses and Dwellings According to Census in 1991] (Prague, Czech Statistical Office, 1994).

Technical State of Panel Blocks with Flats

With regard to the construction one must distinguish between panel blocks with flats that were built before 1970 and those that were built later. A lack of experience and knowledge charac-

terise facilities built during the first period. In addition, the average age of these houses exceeds 30 years. The main defects of these houses are:

- imperfect construction with the consequence that in extreme situations (e.g. gas explosion) a serious danger exists for a chain collapse of a part or even of the whole house;
- insufficient integrity of construction with the danger that interior layers of sandwich panels or other parts of the construction that are exposed to weather conditions are falling off;
- unsuitable construction and material solutions, insufficient technological discipline during the realisation along with inappropriate systems of heating, ventilation and use of flats contributed to an undesired climate that contributed to an environment harmful to health;
- construction defects leading to cracks in construction elements, in contacts between elements of the load-bearing frame, of the interior layout and of peripheral casings, and in contacts between elements of the bearing frame and non-bearing constructions;
- unsuitable construction solution of ferroconcrete elements that are exposed to the effects of temperature fluctuations, which due to cyclic exertion are liable to faster degradation;
- disproportionately high-energy consumption for the operation of flats;
- low level of protection against noise propagation inside the flats and between them; and
- unsatisfactory quality of products that to a large extent do not meet fundamental requirements for products listed in § 47 of the Czech Building Act (safety in case of fire, use, etc).

Table A.5 Cost for Complex Modernisation for one Typical Flat in 1999 (A-average, B-minimum, C-maximum)

Measure	Cost for average flat (CZK/flat)			Savings/ flat*year
	A	B	C	D
Foundation, basement, ceilings, stairs	0	11469	26800	
External walls, reparation under thermal insulation	20000	33152	41400	0
Reparation of loggie under thermal insulation	0	16367	0	0
Exchange of balcony	41500	718	0	0
Replacement of balcony for loggie	0	3435	66100	0
Modernisation of heating system	16800	13440	16800	1400
Modernisation of hot domestic water system	9000	3584	0	1450
Modernisation of sanitary unit	0	9632	0	0
Complex rebuilding of sanitary unit	0	14616	97500	1570
Exchange gas range to electricity one	0	9016	0	0
Modernisation of electricity instalation	0	2464	0	0
Modernisation of electricity instalation	0	28956	54000	0
Thermal insulation of walls	69500	55552	69500	2360
Termal insulation of roofs	17700	10606	17700	760
Window tighting	5800	3032	0	380
Exchange of windows	0	10494	94100	660
Loggie glazimg	0	2240	22400	500
Elevator exchange	0	32256	80700	0
Insulation of floors	0	3360	8400	0
Total	**180300**	**264389**	**595400**	**9080**

- CZK/year

Source: *Moderni obec,* in: *Hospodarske noviny* [Modern commune: monthly periodical of the magazine: Economic News (Prague, June, 1999): 8-9.

In addition, citizens have very negative perceptions of the homogenous appearance of these panel buildings and the unsuitable town-planning concept. The defects of the panel buildings can be divided into four types according to their significance:

- *Type I - defects*: are threatening the safety of the construction or its parts in terms of solidity and stability, fire safety and effects of extreme loading. They also include defects preventing the safe and healthy use of these buildings.
- *Type II - defects*: are affecting the functionality of the facility, mainly caused by physical attrition.
- *Type III - defects*: are affecting the utility value of the buildings and apartments. Defects are mainly caused by moral attrition of construction parts.
- *Type IV - defects*: are affecting the operational costs of the construction, especially energy and water consumption, and defects caused by neglected maintenance.

If these defects are not systematically removed, a further deterioration of the panel buildings may occur. With investments in an average neglected panel building its serviceability may be extended by 50 years. One problem are the long-term loans for a 20 year period.

A.3 Potential Energy Efficiency Measures

It is assumed that up to 40% of energy can be saved in this sector. The greatest saving potential exists in the heating area. Due to a lack of serious statistical data for public buildings, only estimates by specialists on possible savings are available. These can be realised by:

- *improving the thermal-technical qualities* (walls, roofs, doors, windows), and *reducing of penetration* in construction;
- a better *regulation of heating systems*, automatic central control and regulation, individual possibilities of regulation and measures concerning heat sources, such as installation of *boilers with better attributes and higher efficiency*, modernisation of heating stations equipment, insulation of piping and boiler fittings;
- use of modern *energy efficient equipment for hot water*;
- modernisation of *ventilation and air-conditioning systems*; and
- system measures, such as the establishment of *energy management*, installation of saving lamps, use of household appliances with lower energy consumption, measures for reducing cold water consumption.

Besides contributing to energy savings, these measures could also eliminate neglected house maintenance and avoid the possible danger of larger damages.

A.3.1 Investment Costs of Energy Efficiency Measures

Depending on material, technology services, and so on, investment costs are very different even for the same type of measure. Thus, only tentative average prices will be given for:

- **thermal insulation of the outside walls**
  - *External walls application of thermal insulation,* on the outside cover of the buildings

Polystyrol thickness	20 mm:	930 CZK/m^2
	100 mm:	1115 CZK/m^2
Mineral insulation - thickness: 40 mm:	1048 CZK/ m^2	
	100 mm:	1293 CZK/m^2

– *External walls* – application of thermal insulation, on the inside of the surface

Polystyrol thickness	25 mm:	446CZK/m^2
	100 mm:	574CZK/m^2
Mineral insulation + vapour barrier + plastercarton thickness:	40 mm:	930 CZK/m^2
	100 mm:	1059 CZK/m^2

♦ **Windows**

- Single windows exchange to wood, 3-glasses: 8 350 CZK/m^2
- Couple window- additional glass: 1 300 CZK/m^2

♦ **Roofs**

– *Thermal insulation*

Polystyrol + plastercarton 10 mm: thickness 160 mm:		1161 CZK/m^2
Flat roof – one roof cladding, polystyrol + PVC foil:		
thickness of thermal insulation	80 mm:	1655 CZK/m^3
Mineral insulation with a thickness of	40 mm:	1048 CZK/m^2
	100 mm:	1293 CZK/m^2

♦ **Ceilings** with the application of thermal insulation on the upper surface

Polystyrol with a	thickness of 25 mm:	459 CZK/m^2
	thickness of 100 mm:	586 CZK/m^2
Mineral insulation with a thickness of 100 mm:		480 CZK/m^2

♦ **Heating system**

– central control system regulation based on outside temperature, zoning: investment costs (boiler house, heat station) 250 000 - 450 000 CZK, savings 5 – 10%
– individual regulation of inner temperature with thermovalves: investment costs of 600 – 1300 CZK/piece, 3 000 - 6 500 CZK/dwelling, savings 5 – 15%;
– central control system and hot water regulation, investment costs: 90 000 CZK/dwelling.

♦ **Installation of measurement equipment in dwelling:** 2 000– 8000 CZK/dwelling.

♦ **Pipe insulation:** 80 – 300 CZK/m;

Appendix B: State Programme to Support Energy Efficiency and Renewable Energy Sources for 2000

The *State Programme to Support Energy Efficiency and Renewable Energy Sources* was adopted in November 1999 by Decree No. 1261 (29.11.1999) of the government of the Czech Republic. The programme consists of four parts. *Part A* is implemented by the Czech Energy Agency, *Part B* by the State Environmental Fund of the Czech Republic, *Part C* by the Ministry of Agriculture and *Part D* by the Ministry of Regional Development.

Objectives of the Programme 2000

Specific objectives for energy saving and use of renewables until 2010 aim in particular at:

- annual energy saving of between 120 and 225 PJ and
- annual production of energy from renewable sources of between 70 and 86 PJ.

As the current production from renewable energy sources (RES) is approximately 26 PJ, it follows that for achieving the goals of the state environmental policy and the state energy policy in the framework of this programme the following specific objectives are set:

- to annually implement new energy saving measures with a total volume of between 6 and 15 PJ/year (including savings resulting from administrative measures); and
- to annually put into operation new plants for using of renewables which will produce between 2.5 and 6 PJ/year.

To achieve these objectives, annually approximately 8 to 20 billion CZK are necessary to invest and it will require annual subsidies of between 2 and 5 billion CZK.

Specific Objectives of the Programme 2000

- Improvement of co-ordination between individual departmental programmes and approximation of methodologies for assessing applications for support;
- extension of possibilities for funding projects;
- increase in the efficiency of using funds in the framework of improving co-ordination of individual departmental programmes;
- reduction of central decision-making on the selection of projects suggested for funding through a simplification of the administrative demands for the programme;
- enhancement of the significance of the criterion of greenhouse gas emission reduction;
- increased support for education, public information, training and advisory services.

Part A: Programmes of the Czech Energy Agency

The main aim of these programmes is to launch energy-saving measures in the area of energy production, distribution and consumption, and to support greater use of renewable and secondary energy sources, as well as to minimise the environmental burdens from emissions. Emphasis is placed on support for advisory services, education and public information, and also on advertisements on savings and use of renewable and secondary energy sources for the general public. The proposed measures must be carried out within three months after the elaboration and approval of energy audits with an assessment of the benefits until end of 2001, for drawing up of energy certificates that document efficient energy use.

With the exception of sub-programmes 8 and, financial support is granted primarily for the elaboration of energy audits by organisations that fall under the authority of the central state administration bodies with the goal to reduce the energy intensity in individual sectors, including housing, accommodation, health-care and educational facilities.

The programme of the Czech Energy Agency contains ten sub-programmes:

1. Sub-programme of support for efficient operation of apartment and family houses

Energy-conscious modernisation of apartment houses with the use of solar-power systems, building of low-energy apartment houses and low-energy family houses. It includes the elaboration of energy audits (without linking them to the immediate implementation of proposed measures) and drawing up of energy certificates for new or refurbished houses.

2. Sub-programme of support for the efficient operation of buildings and their equipment for the needs of the education system

3. Sub-programme of support for the efficient operation of buildings and their equipment for the needs of the health-care system

4. Sub-programme of support for the efficient operation of buildings and equipment of public utilities and institutions

For these sub-programmes it means energy-conscious modernisation of buildings and their technical equipment with the use of waste heat from technological facilities and utilisation of renewable and secondary energy sources. It includes the elaboration of energy audits (without linking them to the immediate implementation of proposed measures) and drawing up of energy certificates for new or modernised houses.

5. Sub-programme of support for higher use of renewable and secondary energy sources

Support for combined heat and electricity generation in plants using biomass, installation of several plants for using renewables and secondary energy sources as the sole source for thermal and electric energy to meet the energy demands of municipalities and possibly also of housing entities.

6. Sub-programme of support for an optimisation of energy supply to housing estates

Support for energy sources: combination of several small heat sources into one larger one with combined heat and electricity generation up to a maximum output of 5 MW, modernisation of the heat sources through cogeneration facilities with a maximum thermal power of 50 MW, and transition to a different type of fuel or manner of combustion.

Support in the area of energy distribution: modernisation of the heat supply network, reconstruction of the steam network for hot or warm-water systems, modernisation of transfer connected with a decentralisation of preparation of warm service water, and modernisation of measurement and regulation.

7. Sub-programme of support for energy saving in industry, transport and agriculture

7.A. Energy saving in industry

7.B. application of modern technologies and materials for energy-efficient measures

7.C. energy-efficient measures and alternative sources in transportation

7.D. energy-efficient measures and alternative sources in agriculture

The subject is to support measures to reduce energy intensity of technological procedures or equipment of industrial companies, including additional measures (e.g. insulation of buildings, modernisation of heating systems) in industry.

Support for the application of modern technologies for energy-saving measures is focused on verification and completion of systems and their components. The support in transport is oriented at energy-efficient equipment, use of renewable and secondary energy sources and reduction of the energy intensity of transportation means and of the technical equipment of utilities. The support in agriculture is aimed at the implementation of a set of measures for a decrease of energy intensity for agricultural operations and utility equipment, use of renewable sources, such as biomass, biogas stations using cogeneration units and waste incinerators. Elaboration of energy audits for operational or producing plants in industry, transport and agriculture (without link-up to the immediate implementation of the proposed measures) and drawing up of energy certificates for operational or producing plants in these areas to document the efficient use of energy.

8. Sub-programme of support for counselling and education to advertise energy efficiency aimed at improving the environment

Offer of free advisory services for the public, organisation of educational events for energy efficiency and advertising of activities resulting in energy savings.

8.A. Counselling on energy efficiency aimed at improving the environment

8.B. Education on energy saving aimed at improving the environment

8.C.1. Supporting counselling for specific products – a comprehensive publication series of the Czech Energy Agency for 2000

8.C.2 Materials for education on energy saving

8.C.3 Advertising of energy efficiency and renewable energy sources aimed at improving the environment

9. Sub-programme of support for elaboration of energy plans of towns and villages

Subsidies granted for towns and villages in the Czech Republic, or for associations of villages with a minimum population of 2000. Draft solution and an open model of the recommended pattern of energy forms for supplying particular regions, created on the basis of an optimisation of the use of all available energy sources.

10. Sub-programme of support for the development of energy service companies

The objective of this sub-programme is to implement energy-saving measures by energy service companies in facilities of the education and health care systems and of social services operating with state grants. All further information is available on the website of the State Environmental Fund of the Czech Republic <http://www.ceacr.cz>.

Part B: Programmes of the State Environmental Fund

The programmes are based on the Decree No. 1261 (29.11.1999) of the Czech government reflecting the economic conditions in 2000. Grants are focused primarily on projects using renewables and projects replacing combustion of prevalently fossil fuels. The following fundamental types of measures will be supported:

B.1. Support for investment projects using renewable energy sources

B.1.A.a: Support for investments to replace solid and liquid fossil fuels in heating and preparation of warm water by biomass, possibly in combination with solar-power systems, for flats, family houses, residential buildings, public utilities, social care and mass recreation facilities; support also for such newly built facilities.

B.1.1.A.b: Support for investments to replace solid and liquid fossil fuels in heating and warm water with biomass, e.g. in combination with solar-power systems, for flats, family houses for the applicant category E, possibly support for such newly built facilities.

This programme focuses exclusively on local systems. In the selection process facilities will be preferred that bear the labels "Environmentally friendly product" and "Czech made".

B.1.2.A Support for investments to replace heating with solid and liquid fossil fuels or electrical heaters in the municipal sphere with central supply systems for heat and warm water.

The programme for municipalities or their parts include the following categories of measures:

B.1.3.A Support for the use of renewables in the education and health care system, in public facilities and in buildings of the non-profit sector

B.1.4.Aa.. Support for investments to partially replace heating with electrical direct heaters and solid or liquid fossil fuels with heat pumps in residential buildings (including family houses) and public buildings (including social care). Support for investments in such newly built facilities

Support will be limited exclusively to local heat pumps for heating of one building or a small group of buildings.

B.1.4.A.b. Support for investments to partially replace heating with electrical direct heaters and solid or liquid fossil fuels with heat pumps in residential buildings (including family houses). Support for investments also in such newly built facilities

Again exclusively local heat pumps for heating of one building or a small group of buildings will qualify for financial assistance.

B.1.5.A.a. Support for investments to partially replace heating of water with solid or liquid fossil fuels with solar-power systems for housing and public utilities. Support will also be offered for investments in newly built facilities

B.1.5.A.b. Support for investments to partially replace heating of water or heating with solid and liquid fossil fuels and electrical direct heaters with solar-power systems for housing of the applicant category E. Support also for such newly built facilities

B.1.6.A. Support for investments to build small waterpower plants (up to 5 MW output)

B.1.7.A. Support for investments to build wind-power plants

B.1.8.A. Support for investments to build plants for combined production of electricity and heat from biomass

B.1.9.A. Support for investments to install solar-power systems and heat pumps in purpose-built facilities

B.1.10.A. Support for the use of renewables in municipalities and independent buildings in national parks, in nature reserves and in zones with protected landscape

B.2. Support for selected non-investment entities in the area of using renewables

B.2.1.B. Support for public information and counselling by the state and related organisations

B.2.2.B. Support for public information and counselling by non-governmental organisations

B.2.3.B. Support for education, counselling and advertising, including book publications

All further information on the State Environmental Fund of the Czech Republic is available on its website <http://www.sfzp.cz>.

Part C: Programmes of the Ministry of Agriculture

Programmes of Part C aim at energy saving and use of renewables in agricultural basic production, their producing and non-producing functions and on agricultural research and education. These programmes are methodologically managed and implemented by the Czech Ministry of Agriculture that participates in the co-ordination with other parts of the programme. This part primarily deals with synchronising grants supporting the establishment of plantations of fast-growing tree species (afforestation of agricultural land, grassing of arable land) with other partial programmes, especially of part B, and in Part 2.A on the replacement of solid and liquid fossil fuels or electrical direct heaters in the municipal sphere by systems of long-distance heating and warm water supply from renewable energy sources, and 1.8.A on building of plants for the combined production of electricity and heat from biomass. Programme C includes the following partial programmes:

C.1. Subsidiary programmes of direct support for agriculture granted pursuant to Article 2 of Act No. 252/1997 on agriculture

C.1.1. Programmes supporting non-producing functions of agriculture

C.1.2. Programme supporting science and research

C.1.3. Programme supporting counselling and public information

This programme will be co-ordinated with the corresponding programmes of Parts A and B.

C.2. Subsidiary programmes of indirect support for agriculture

C.2.1. Farmer Programme

Sub-programme to reduce energy intensity in agricultural companies.

Within the framework of the sub-programme, co-ordination with the corresponding sub-programmes of Parts A and B will be achieved through joint funding of projects. This programme aims at improving the structure of agricultural and forestry companies by supporting projects to decrease their energy intensity. It focuses especially on projects for investments in energy saving and use of renewables.

C.2.2. Operation Programme

Within the framework of the programme, support can be used to obtain seed for sowing or seedlings for biomass cultivation for energy purposes.

Further information is available on the website of the Ministry of Agriculture of the Czech Republic: <http://www.mze.cz>.

Part D: Programmes of the Ministry of Regional Development

For the implementation of all partial programmes of part D, those parameters and criteria that were adopted for partial projects A and B are also authoritative in all cases, if not defined otherwise. It is also possible to take into account whether domestic products labelled "Environmentally Friendly Product" or "Czech made" will be used during the implementation. Measures may also be carried out with co-funding from foreign sources from the EU, the World Bank etc. Current sources include the EU funding programmes ISPA and SAPARD and the Global Environment Facility (GEF) of the World Bank that require a submission of the applications for funding for projects that are concentrated on the minimum number of possible applicants.

D.1. Programme of rural recovery

Co-funding with projects of Parts A and B of the Programme is assumed if they also fulfil the criterias of sub-programme D1.

D.1.1 Subsidies for activities of local village recovery programmes

Subsidies for activities aimed at recovery of public utilities owned by municipalities, be it repairs or construction. This involves support for activities that are too small-scale to be dealt with by other programmes.

D.1.2. Subsidies for interest on loans

This applies to subsidies for projects on infrastructure development. Concurrent subsidies for interest payments from several sources are not permitted (subsidies for payment of interest from the Ministry and direct subsidies from another source are not ruled out).

D.1.3. Assistance from the PHARE Programme of Cross-Border Co-operation (PHARE CBC)

Support in selected districts in border regions.

D.1.4. Integrated projects of rural microregions

Preparation of so-called integrated projects of rural microregions involving several villages. Subsidies will be granted for project documentation dealing with the energy supply for several villages (biomass heating stations, biomass cogeneration, biogas stations, wind-power plants, and small hydro power plants). Project co-ordination will be carried out through the databases of the Czech Energy Agency and the State Environmental Fund.

D.2. Programmes of state financial support for housing and repair of the housing stock

D.2.1 Measurement and regulation

Within Programme 2000 preferential support will be provided to activities supporting the installation of consumption metering in main nodal points and for final consumers, as well as to implement effective regulation systems.

D.2.2. Use of renewables for repair, modernisation and extension of the housing stock

Support for investments in heating by heat pumps, heating of water by active solar systems and biomass heating, including plants for the combined production of electricity and heat from biomass if criteria of Parts A and B of the Programme are fulfilled.

D.2.3.Programme of granting state loans for repair, modernisation and extension of the housing stock

Returnable interest-free loans for municipalities that can offer advantageous loans to owners of houses and flats.

D.2.4. Programme of support for the repair of the housing stock

Programme 1998 for repair of the most serious defects in prefabricated blocks of flats.

D.2.5. Long-term programme of support for repair of the housing stock

Targeted harmonisation of the repair of the housing stock with measures to reduce energy intensity and to use renewables (improvement of the thermal properties of building structures of houses, reconstruction of the technical equipment of buildings and selected

structural parts with a parallel choice for a suitable alternative to energy supply if it is economically reasonable and technically feasible.

D.2.6. Programme of regeneration of prefabricated housing estates

A newly proposed programme aimed at support for transformation of prefabricated housing estates into polyfunctional and attractive quarters. With regard to the necessity of reconstructing energy systems, co-ordination is presumed with Parts A and B of the State Programme of Support for Energy Saving and Utilisation of Renewable Sources.

More detailed information is available on the website of the Ministry of Regional Development <http://www.mmr-cr>.

Appendix C: Technical Standards - System of Changes

Technical standards in the former Czechoslovakia were obligatory and violations resulted in sanction. On 15 May 1991 Act No. 142/1991, and Act No. 632/1992, on Czechoslovak technical standards came into effect according to which technical standards are issued in general as voluntary. This act allows authorised central bodies of the state administration - obligatory, non-omittable participants (defined in § 4 of the mentioned Act) - during negotiations about the proposal of a technical norm to make compulsory some regulations, possibly the entire standard, concerning the activity in the area of public interest. The survey of standards is published in the Bulletin of the *Office for Technical Standardisation, Metrology and State Testing*.

Some technical standards have a statement on the front page that their selected articles, or the entire standard, are obligatory according to the Czech Office for Safety at Work and other authorities. It must be emphasised that Czech national standards have lost their obligatory character but not their validity. A technical standard represents a standard solution and is not obligatory so that it does not become a barrier to a more progressive, modern and better solution. However, producers and assembly organisations still follow technical standards.

The unification of national standards on the basis of international standards is carried out in accordance with Act No. 142/1991 "On Czechoslovak Technical Standards". Standards issued by some global organisations, e.g. ISO, IEC etc., or regional European organisations have the same structure as European standards issued by European standardisation institutions CEN, CENELEC and ETSI are the basis for national standards. Thus, the national standardisation system of the Czech national standards is already being adjusted to EU standards.

In the area of electro-technical regulations, it concerns a set of IEC 364 international standards. Electrical installations in buildings which has been introduced according to the HD 384 harmonisation document. Czech national standards respect division of the mentioned standards into parts and chapters and add national details and explanations to requirements of these standards. Levels of conformity of Czech national standards with international or European standards, put in specific terms by the year of issue, are given in brackets, under the standard's name and is expressed in abbreviations:

idt the standard's wording is identical with the wording of IEC, ISO, EN, and CISPRR standards;

eqv the standard's wording is equivalent to IEC, ISO, and EN;

neq the standard's wording is not equivalent to IEC, ISO, and EN;

mod the wording of the Czech national standard is a modified wording of IEC, ISO, and EN standards;

har harmonised;

zap the standard includes the wording of IEC, ISO, and EN standards;

obs the standard's wording included the wording of IEC, ISO, EN standards.

Act 22/1997 "on technical requirements for products" and on amendments of some legislation has cancelled both acts mentioned above. However, rights and duties of legal and natural persons have remained that are authorised for activities in accordance with this act related to the creation and implementation of Czech technical standards or with state testing.

The Czech Standardisation Institute has assumed guarantees for harmonisation between EU and Czech national standards. Table shows technical requirements for products and equipment, which should support exchange of goods between EU countries. The corresponding columns list numbers of harmonised standards.

Table C.1: Harmonised European and Czech National Standards

Government Regulation No.	Name	Number of standards
168/1997	Technical requirements for electrical low-voltage equipment	293
169/1997	Technical requirements for products in terms of electromagnetic compatibility	76
170/1997	Technical requirements for machine equipment	114
171/1997	Technical requirements for toys	6
172/1997	Technical requirements for personal protective aids	110
175/1997	Technical requirements for simple pressure vessels	4
177/1997	Technical requirements for gaseous fuel appliance	78
178/1997	Technical requirements for building products	1104
180/1997	Technical requirements for health technology devices	90

Source: Prepared by SEVEn based on the Czech Standard Catalogue, Parts 1-3 (Prague,: Czech Standard Institute, 1998).

Table C.2: Standards Elaborated According to EU Methods

Sector.No	Sector	Number of state
8310	Biotechnology	7
8321	Protection of head, eyes, ears etc.	14
8322	Protection of respiratory organs	6
8323	Protection of arms and hands	13
8324	Protection of eyes	18
8325	Protection of legs and feets	11
8330	Safety of machine equipment	4
8332	Safety of machines	12
8333	Safety and protection systems of machines	7
8346	Methods and instruments for solid emissions measurement	2
8347	Methods and instruments for gas emissions measurement	8
8350	Air quality	8
8357	Methods and instruments for gas imissions measurement	1
8361	Soil quality	10

Source: Prepared by SEVEn based on the Czech Standard Catalogue, Parts 1-3 (Prague,: Czech Standard Institute, 1998).

In the Czech Republic the standard sector number 83 includes the area of environmental protection, work and personal hygiene, safety of machine equipment and ergonomic. Table C.1 shows individual sub-groups and the number of standards corresponding with global or European standards. The Czech Republic, as a member of the standardisation CEN a CENELEC commissions, fulfilled the harmonisation of standards according to the time schedule. In this

respect, the Czech Republic has no deficit. The catalogue of Czech technical standards is edited by written and electronic form, modification are made on an ongoing basis and are published in professional journals.

More information about Czech technical standards is obtainable at:

CESKY NORMALIZACNI INSTITUT Biskupsky Dvur 5 113 47 Prague	Tel.00420 2 21 802 301 (switch board) Fax: 00 420 2 21 802 301 <http://www.csni.cz> (currently in Czech)

Appendix D: Contact Places for Information and Investment Possibilities in the Czech Republic

D.1 Ministry of Industry and Trade

Ministry of Industry and Trade	
Ministerstvo prumyslu a obchodu Na Frantisku 32 110 00 Praha 1	Tel: 2485 1111* - (switchboard) <http://www.mpo.cz>

Promotion of small and medium-sized enterprises

Enterprise Development Agency	
Agentura pro rozvoj podnikani Letenska 3 110 00 Praha I	Tel: 00420 2 530 288 <http: //www.arp.cz/>

The creation of incentives for foreign investors and the stimulation of the economic development of the Czech Republic before its EU accession is the object of the activity of the Czech Agency for Foreign Investment: *Czechinvest* and of the *Czech Trade Promotion Agency.*

Czechinvest

Czechinvest Politickych veznu 20 110 00 Praha 1	Tel: 00420 2 24221540 e-mail: <czechinvest@czechinvest.com>

Czech Trade Promotion Agency - CzechTrade - focused on export support.

CzechTrade Politickych veznu 20 110 00 Praha 1	Tel: 00420 2 24224586 e-mail: <infoc@czechtrade.tpo.cz>

An important organisation for the integration of the Czech Republic into the EU, in terms of technical requirements, is the Office for Technical Standardisation, Metrology and State Testing under the Ministry of Industry and Trade. The office is responsible for the process of approximation of technical regulations, standards and procedures for the assessment of the conformity of product properties with the requirements determined in regulations (or technical standards) aimed at removing technical barriers to trade within the EU. This is a very important area of the preparation for EU accession and for the EU internal market.

Office for Technical Standardisation, Metrology and State Testing Biskupsky dvur 5 110 02 Praha 1	e-mail: <unmz_b@mbox.vo.cz>

Detached Departments

U Sovovych mlynu 9 118 00 Praha 1	Tel: 00420 2 532140 Fax:00420 2 530710 e-mail: <unmz_k@mbox.vol.cz>
Ing. Libor Dupal, Head of the Department of International Relations	Tel: 00420 2 2324430, 00420 221802187, Fax: 00420 2 2324373 e-mail: <unmz@comp.cz>
Czech Energy Agency Vinohradska 8 120 00 Praha 2	Tel: 00420 2 2421 7701 e-mail: <info@ceacr.cz> <http://www.ceacr.cz>

D.2 Ministry of Regional Development

Ministry of Regional Development Ministerstvo pro mistni rozvoj Staromestske namesti 6 110 15 Praha 1	Tel: +00420 2 2486 1111* <http://www.mmr.cz>

Centre for Regional Development

The objective of the *Centre for Regional Development* is the distribution of information on current development (transnational, national, regional and municipal) programmes and projects, and supporting their activity and establishment of regional development agencies.

Centre for Regional Development of the Czech Republic

Centrum pro regionalni rozvoj Ceske republiky Staromestske namesti 6 110 15 Praha 1	Tel: reception - 00420 2 2486 1565 Fax: 00420 2 2486 1320 nebo 2486 1364 e-mail: <crr@crr.cz>
Staromestske namesti 6 110 15 Praha 1 Ing. Vladimir Jezek, CSC	Tel: 00420 0 2486 1344 Fax: 00420 2 2486 1320 e-mail: <crr@crr.cz>

Regional Development Agencies

Regional Development Agency Ostrava JSC	
Regionalni rozvojova agentura Ostrava, a.s. Contact: Ing. Zdenek Fischer Podebradova 16 702 00 Ostrava	Tel: 00420 69 627 0411 Fax: 00420 69 627 0404 e-mail: <fischer@rdaova.cz> <http://www.rdaova.cz>
Czech Secretariat of Euroregion Glacensis	
Cesky sekretariat euroregionu Glacensis Contact: Ing.Radomir Morawiec	Tel: 00420 445 531054 Fax.: 00420 4450531054 e-mail: <radomir.morawiec@euro-glacensis.cz>

Sumava – Bavorsky les (Bohemian Forest - Bavarian Forest)	
Regionalni rozvojova agentura Sumava, o.p.s. Regional Development Agency Sumava p.b.c. Director: Milos Picek Stachy 182 384 73 Stachy – okres Prachatice	Tel/Fax: 00420 339/93 242 e-mail: <rra@vi.bohem-net.cz> <http://www.horni.otava.rz/rr>
Regional Development Agency for Central Moravia, s.p.o.	
Regionalni rozvojova agentura pro rozvoj Stredni Moravy p.b.o. Director: Ing. Frantisek Kastyl Horni namesti 5 772 00 Olomouc	Tel:00420 68 5528 698 Fax: 00420 68 5228 581
Regional Development Agency JSC (Northern Bohemia)	
Regionalni rozvojova agentura, a.s. (Severni Cechy) Ing. Manfred Hellmich, MBA Budovatelu 2830 434 37 Most	Tel: 00420 35 3465 38 Fax: 00420 35 249 80 e-mail: <rra@mail.mus.cz>
Regional Development Agency of Eastern Moravia, s.p.o.	
Regionalni rozvojova agentura Vychodni Moravy p.b.o. Director: Ing. Jaromir Schneider Stefanikova 167 760 30 Zlin	
RegEX - Agency for Regional Development in the Czech Republic	
RegEX v.o.s. Agentura pro regionalni rozvoj v CR Tech.nical Director: RNDr.Petr Sajdl Zatisi 1018 01 Kralupy nad Vltavou	Tel/Fax: 00420 2 679 11 829 e-mail: <regex@login.cz>
Agency of Regional Development Ltd.	
ARR NISA – Agentura regionalniho rozvoje, s.r.o. Director: Ing. Robert Korselt V jezu 2 460 01 Liberec	Tel:00420 48 522 62 62, 522 62 80 Tel/Fax: 00420 48 522 62 73, 522 62 49 e-mail: <arr@mbox.vol.cz>

Regional Development Agency Egrensis – RRAE p.b.o	
Regionalni rozvojova agentura Egrensis - RRAE, s.p.o. Director: Ing.Zdenek Vyborny T.G.Masaryka 12 360 01 Karlovy Vary	Tel/Fax: 00420 17 268 64 e-mail: <euregrensis@iol.cz>
Regional Development Agency of Western Bohemia p.b.c.	
Regionalni rozvojova agentura Zapadni Cechy, o.p.s. Director: Ing. Filip Uhlik Riegrova 1 306 25 Plzen	Tel: 00420 19 7235 379 Fax: 00420 19 7235 320 e-mail: <uhlik@bic.cz> <http://info.plzen-city.cz/rrz>
Regional Development Agency of the White Carpathians – Moravian Field Cottages p.b.c.	
Regionalni rozvojova agentura Bile Karpaty - Moravske kopanice, o.p.s. (Director: RNDr. Pavel Kuca	Tel/Fax: 00420 633 696 181, 961 89 e-mail: <upossgeo@avonet.cz>
Regional Development Agency of Southern Moravia p.b.o.	
Regionalni rozvojova agentura Jizni Moravy, s.p.o. Director: Ing.Petr Bajer,CSC Vystaviste 1 – areal BVV 684 04 Brno	Tel: 00420 5 4115 9538 Fax: 00420 5 4115 3055 e-mail: <rrajm@ohkbrno.cz> <http://www.ohkbrno.cz>

These centres function as a contact place for foreign assistance programmes.

The *Euro-Info Centres* (EIC) support business contacts between companies in the Czech Republic and the EU and they offer advisory services and give support to entrepreneurs.

Euro-Info Centre Prague Staromestske namesti 6 110 15 Praha 1	Tel: 00420 2 2486 1314 Fax: 00420 2 2486 1364 e-mail: <crr@crr.cz> <http://www.crr.cz>
Business-Info Centre BIC CVUT Praha Plzenska 221/130 150 00 Praha 5	Tel: 00420 2 5721 2870 – 2 Fax:00420 2 5721 2340 e-mail: <komarek@bic.cvut.cz>

Regional advisory and information centres mainly provide an advisory and information service for small and medium-sized companies, as well as training under advantageous conditions.

Enterprise Development Agency Letenska 3 118 00 Praha 1	 Tel: 00420 2 531514 Fax: 00420 2 537949

D.3 Ministry of Finance

Ministry of Finance of the Czech Republic	
Ministerstvo financi Letenska 15 118 10 Praha 1	 Tel: 5704 1111* <http://www.mfcr.cz>

Within the Ministry of Finance the Centre for Foreign Assistance is responsible for the co-ordination of all PHARE programmes.

Centre for Foreign Assistance	
Centrum pro zahranicni pomoc Washingtonova 11 19100 Praha 1	 Tel : 00420 2 5704 4559 Fax: 00420 2 5704 4570
Contacts for bilateral co-operation programmes	
for: France, Canada, Germany, Sweden, Great Britain, USA Ing. Jirina Frühbauerova	Tel: 00420 2 5704 2287 Fax: 00420 2 5704 2407 e-mail: <jirina.fruhbauerova@mfcr.cz>
for: Belgium, China, Denmark, Italy, the Netherlands, Austria Ing. Jana Podivinska	Tel: 00420 2 5704 2508 Fax: 00420 2 5704 2407 e-mail: <jana.podivinska@mfcr.cz>
for: Japan, Switzerland Mgr. Alena Kilianova	Tel: 00420 2 5704 2287 Fax: 00420 2 5704 2407

D.4 Ministry of the Environment

Ministry of the Environment	
Ministerstvo zivotniho prostredi odbor pro styk s verejnosti (Department for Contact with the Public) Vrsovicka 65 110 00 Praha 10	 Tel:0042 2 67122040, 67122417, 67122314 Fax: 00420 2 67311496 <http://www.env.cz>
State Environmental Fund of the Czech Republic	
Statni fond zivotniho prostredi CR Kaplanova 1931/1 148 00 Praha 4	Tel:00420 2 679 94 300 – 367 Fax: 00420 2 793 65 97 e-mail: <kancelar@sfzp.cz> <http://www.sfzp.cz>

The State Environmental Fund has seven regional offices, namely in *Brno, Ceske Budejovice, Hradec Kralove, Chomutov, Olomouc, Ostrava and Pilsen.*

Agency for Nature Conservation and Landscape Protection of the Czech Republic	
Agentura ochrany prirody a krajiny CR (AOPK) Kalisnicka 4 – 6, P.O.Box 85 130 23 Praha 3	Tel: 00420 2 697 00 13 Fax: 00420 2 697 00 12 <http://www.nature.cz>

The Agency is charged with tasks that it fulfils on the basis of the requirements of the founder - the Department of Nature Conservation of the Ministry of the Environment of the Czech Republic. This Agency also handles the applications for support from the State Environmental Fund. It is possible to address it within the framework of the Landscape Management Programme and the Programme for River System Revitalisation.

Agency of the EMAS Programme	
Agentura Programu EMAS Cesky ekologicky ustav (Czech Environment Institute) Vrsovicka 65 100 10 Praha 10	Tel: 00420 2 6712 2577 Fax: 00420 7173 7721 e-mail: <jurkecho@ceu.cz>

D.5 Financial Institutions

Information contact for the MUFIS project	
MUFIS JSC Ing. Josef Vanik, Ing.Jirina Cifrincova, Ing. Jiri Dvorak Ceskomoravska zarucni a rozvojova banka (Czech-Moravian Guarantee and Development Bank) Jeruzalemska 4 111 21 Praha 1	Tel: 00420 2 2423 0734 Fax: 00420 2 260 621
PHARE Energy Saving Fund - ESF	
Ceskoslovenska obchodni banka (Czechoslovak Commercial Bank) investicni odbor (Investment Department) Jankovcova 2 170 00 Praha 7	Tel: 00420 2 667 838 24

D.6 Other Contacts

Economic Chamber of the Czech Republic	
Hospodarska komora CR Argentinska 38 170 05 Praha 7	Tel: 00420 2 6679 4853 Fax: 00420 2 804 894
District Heating Association	
Teplarenske sdruzeni Belehradska 458 POBox 17 530 09 Pardubice 9	Tel: 00420 40 423 86, 45678 Fax: 00420 40 444 62, 417 55 e-mail: <tepsdru@tepsdru.cz> <http://www.tepsdru.cz>

Economic parks

The objective of establishing economic parks or industrial zones is to create conditions for doing business in selected, especially border regions and thus strengthen their economic potential. For investors, buildings grounds equipped with engineering networks are being prepared in which they can develop economic activities. The grounds can be either be leased or purchased. The most developed is the international economic park *Ceske Velenice-Gmünd.* The park has been established on both sides of the border under the auspices of the Ministry of Regional Development of the Czech Republic and the Austrian Ministry of Public Works, Transport and Culture through the companies *Hospodarske parky, s.r.o. Praha* (Economic Parks LTD Prague) and Gesellschaft des Bundes für Industriepolitische Maßnahmen, GmbH, Vienna. The total area is 83 hectares, implemented in several stages on the Czech and Austrian sides. A second park is being established in As and is based on the strategic position of this town on the border with Germany. The park will be located in the border zone, covering a total area of 80 ha.

Contact addresses:

Hospodarske parky, s.r.o. (Economic Parks Ltd.) Sumavska 30 120 00 Praha 2	Tel: 00420 2 2425 46 79, 2425 3031 Fax: 00420 2 2425 5244
Hospodarsky park Ceske Velenice a.s. (Ceske Velenice Economic Park JSC) Ceskoslovenskych legii 271 378 10 Ceske Velenice	Tel: 00420 333 95 294. 95 586 Fax: 00420 333 95 584
Hospodarsky park As, a.s. (As Economic Park JSC) Kamenna 52. 35 201 As	Tel: 00420 16 92 50 43

D.7 Contacts to Institutions Related to the European Union

Information Centre of the European Union	
Informacni centrum Evropske unie (ICEU) Rytirska 31 110 00 Praha 1	Tel: 00420 2 2161 0142 Fax: 00420 2 2161 0144 e-mail: <info@iceu.cz> <http://www.evropska.unie.cz>

D.8 Economic Relationships

Centre for Foreign Economic Relations	
Centrum vnejsich ekonomickych vztahu Politickych veznu 20 P.O. Box 791 11 21 Praha 1	Tel: 00420 2 2406 3025
Czech Trade Promotion Agency	
Ceska agentura na podporu obchodu Director: Ing. Judita Stouracova P.O.Box 791 Politickych veznu 20 111 21 Praha 1	Tel: 00420 2 2882 Fax: 00420 2 2406 2862 e-mail: <infoc@czechtrade.tpo.cz> <http://www.tpo.cz>

D.9 List of Other Institutions Supporting Enterprises

- Agentura pro rozvoj podnikani (Enterprise Development Agency)
- Agrarni komora (Agrarian Chamber)
- Asociace inovacniho podnikani (Association of Innovative Enterprise)
- Ceske centrum cistsi produkce (Czech Centre of Cleaner Production)
- Ceskomoravska zarucni a rozvojova banka (Czech-Moravian Guarantee and Development Bank)
- Fond rizikoveho kapitalu (Venture Capital Fund)
- Hospodarska komora CR (Economic Chamber of the CR)
- Okresni hospodarska komora Brno (District Economic Chamber Brno)
- Okresni hospodarska komora Ostrava (District Economic Chamber Ostrava)
- Svaz obchodu CR (Union of Trade of the Czech Republic)
- Ministerstvo prumyslu a obchodu – programy podpory podnikani (Ministry of Industry and Trade - enterprise promotion programmes)
- Svaz prumyslu a dopravy (Union of Industry and Transport)
- Technologicke centrum Akademie ved CR (Technology Centre of the Academy of Sciences of the Czech Republic)
- Ceska spolecnost pro jakost (Czech Society for Quality)

Appendix E: International Programmes

E.1 The PHARE Programme

E.1.1 Development of the PHARE Programme in the Czech Republic

Initially in 1990, the PHARE programme of the EU for the former Czechoslovakia was restricted to the environmental sector and to the TEMPUS programme, i.e. to the collaboration among universities and colleges. Unlike all other programmes, the state bodies of the recipient fully implemented this programme (including financing). Since 1990, experience was gained on both sides.

During the next period from 1991 to 1993, PHARE concentrated on support for the reform process; especially on the modernisation of the economy and the creation of the private sector. During this period, the European Commission was the donor and Czechoslovakia was the recipient. After independence of the Czech Republic, experience for an independent republic was gathered and then the related Czech institutions were established (National Co-ordinator and Foreign Assistance Centre).

Since 1993, a gradual change in the orientation of the PHARE programme occurred. It was now directed at the support of the reform process for the implementation of the European Agreement and for the modernisation of the infrastructure that will link the Czech economy with European networks. As a part of this process, programmes for the support of the European Agreement were initiated with an emphasis on harmonising legislation.

In 1993, the PHARE programme for Cross Border Cooperation (CBC) with Germany (and also with Austria) was launched that permitted for the first time the use of funds for investments in infrastructure (mainly in transportation and environment), at a ratio higher than 40% of the total EU financial contributions for the Czech Republic. The highest amount was assigned to the private sector: from a total of 9,065 million CZK that were granted in from 1990 to 1994, the support of the private sector amounted to 2,393 million CZK. The programme area for SME (850 million CZK) was of great importance because the guarantee and the establishment of the Risk Capital Fund opened access to financial sources for 245 newly established businesses and contributed to the promotion of 430 enterprises in foreign and domestic exhibitions. A network of regional consulting and information centres was set up that offers consulting services for newly established enterprises during their foundation phase. The programme for the support of the financial and banking institutions (455 million CZK) was directed primarily at the transformation of banking and information systems and at computer technology.

Other programmes were directed at the strengthening of institutions: of the customs offices, the statistical service, implementation of technical standards, certification, testing, metrology, and evaluation of quality in accordance with related EU standards. The programme for assistance of the privatisation and reconstruction of industry was the second largest programme (780 million CZK). Initially, this programme was directed at the privatisation of larger state enterprises; later it concentrated on the restructuring of medium-size and larger enterprises by providing short and long-term consulting services to more than 70 enterprises. In early 1995, this programme was re-oriented towards supporting exports.

With respect to financial contributions, other large programmes are the support for regional development (400 million CZK), especially for Northern Moravia and Northern Bohemia. The

programme for Northern Moravia was very much developed, and it produced positive results for the regeneration of the regions in Upper Silesia and Northern Moravia. This support is provided by two institutions: the *Regional Entrepreneurial Fund* that invests in prospective small and medium-size enterprises; and the *Regional Development Agency* that coordinates regional higher development projects and guarantees consulting and other support services for local and medium-sized enterprises. Similar activities were also initiated in Northern Bohemia through the establishment of the *Regional Agency for Northern Bohemia.*

One additional programme supported foreign investments by acting as an effective and flexible tool in the area of market surveys, the arrangement of fast and direct contacts with foreign investors, and assurance of promotion and training. Much financial support (2,686 million CZK) was provided for the development of the infrastructure, including the environment.

PHARE Funding for the Environment

The PHARE programme funded several projects in the environmental area, among them were the purchase of top-quality laboratory and monitoring equipment; a sample project on investments financed by international financial institutions through a local Centre for Liquidation of Waste, Ostrava; a study for the solution of selected problems, e.g. the safety of nuclear power stations; the liquidation of sludge in the Prague sewage plant, etc.; the complex assessment of the influence of the environment on the health of the population; and data collection. Ecological education was also expanded. The *Environmental Fund* was established that provides loans, bank guarantees and subsidies for activities on environmental priorities.

PHARE Funding for the Energy Sector

The programme supported the up-dating of Czech energy policy and the creation of principles for regulation. A programme of energy-saving measures in the glass and paper industries was prepared, and a study dealing with improvements of the thermal and technical properties of buildings was carried out. In addition, technical assistance was provided for optimising energy supply on a regional scale. The *Energy Saving Fund* was established that primarily offers favourable loans for small and medium-sized enterprises with the aim of saving energy.

PHARE Funding for Transportation

In the first stage, funds were provided for the development of a transportation policy in a market economy. Based on a previous analysis, proposals for key changes in management activities were prepared that contained suggestions for restructuring the procedures in decisive areas of important transportation companies. Later, the programme concentrated on the preparation of a documentation for the implementation of transportation infrastructure projects, with regard to financing investments through international financial institutions. After the initiation of the programme of cross border cooperation, new programmes were launched for the development of the Czech border regions neighbouring with Germany and Austria.

PHARE Funding for Other Sectors

With regard to mail services and the telecommunications sector, support was directed primarily at the use of a state-of-the-art technology, expansion of educational capacities and at the improvement of telecommunication services. The funds for the transformation in agriculture were spent on land registration. Surveying offices were gradually equipped with high-quality computers and networks that considerably helped to successfully implement the agricultural reform.

Current Activities

In the long-term programme for 1995-1999 that was approved by the Czech government and the European Commission, these basic PHARE priorities were listed:

- support for the institutional integration into the EU, with a special emphasis on the implementation of the European Agreement; the approximation of Czech legislation; and the reform of the Czech public administration;
- support for infrastructure primarily through the development of cross border cooperation through investments in transportation, energy and environment;
- support for the participation of the Czech Republic in EU programmes and support for integration into European structures; the transfer of knowledge, and professional contacts.
- In accordance with the needs of the Czech government, the support for activities in the social and economic areas will continue, primarily for small and medium-sized enterprises; for export, selected regional activities; for direct foreign investments; the development of human resources, and for the social sector.

Based on mutual agreement, a temporary PHARE programme for 1997 aimed at three areas:

- support for institutional development;
- development of the society;
- economic and social cooperation and competition.

The energy sector was included in the first topic that is divided into the following two parts:

a) support for the public sector (energy policy, establishment of regulation institutions and support for amending energy legislation);
b) participation of the Czech Republic in EU programmes (SAVE II and others), acquaintance with EU working mechanisms and strengthening of European integration.

In 1998-1999, changes in the orientation of the EC programme occurred, with regard to the priorities for which assistance will be granted based on the specifications for priorities by the European Commission. These priorities overlap with those of the Czech Republic. For the entire PHARE programme for the 10 candidate countries, approximately 1.2 billion Euro (43 billion CZK) are scheduled per year. In 2000, the PHARE programme focused on the needs of the Czech government to achieve three objectives in its pre-accession phase:

- acceptance of *acquis communautaire*;
- consolidation of the integration of the Czech infrastructure with that of other EU countries;
- strengthening of the Czech economy for its integration into the EU internal market.

The PHARE national programmes are directed to fulfil these objectives.

Within the Ministry of Finance the *Foreign Assistance Centre* was established that coordinates all PHARE programmes. The National Coordinator prepares basic documents and, on behalf of the government, coordinates the preparation of new programmes (including internal and foreign discussions on basic documents), and the implementation of all projects. The Foreign Assistance Centre develops the common agenda, and it prepares and coordinates all new foreign assistance programmes. The future development of the PHARE programme depends on how the Czech Republic is prepared to submit related projects in the energy sector in accordance with the new principles outlined by the Commission.

E.1.2 Basic Forms of PHARE Programmes

National Programmes

From 1990 to 1993, national programmes concentrated on the support for sector policies that contributed to the transformation of the centrally managed economies into market economies. The assistance has been provided for those areas that are necessary for long-term revival and economic growth. Since 1994, the support for the integration process was emphasised. Afterwards, assistance concentrated on support for the reform process. Then, the highest funding went to the private sector amounting to 2,393 million CZK, of a total of 9,065 million CZK.

List of National Programmes

European integration
- Customs administration
- European agreement
- Finances
- Technical Assistance Fund
- Industrial ownership
- Standardisation
- Statistics
- Public administration

Infrastructure
- Clean technologies for coal processing
- Transportation
- Ecology programmes for small and medium-sized enterprises
- Energy sector
- Funds for financing energy-saving projects
- Telecommunications and post offices
- Transeuropean networks
- Agriculture and land registrations
- Environment

Development of human resources
- National Education Fund
- Renewal of the education system
- Reform of the labour market
- Secondary professional educational system
- TEMPUS – education programme for universities and colleges

Social sector
- Development of a civil society
- Social protection
- Health care

Private sector
- Small and medium-sized enterprises
- Regional entrepreneurial fund
- Regional development for Northern Bohemia
- Regional development for Northern Moravia
- Regional Development Fund
- Restructuring enterprises and developing exports
- Development of the banking sector
- Foreign investment
- Pilot programmes for the structural fund in the Czech Republic

Cross Border Cooperation Programmes – PHARE CBC

Since 1994, a part of PHARE funds were reserved for the cooperation in border areas with EU members. Here investments were directed at infrastructure projects, such as transportation and the environment and at the development of economic cooperation. In the Czech Republic in 1995, implementation of a new PHARE programme was initiated. The PHARE CBC programme was directed primarily at the support for the development of the Czech border areas with Austria and Germany. It is implemented by a mutual financing of investments projects. Such programmes were directed mainly at:

- support for the Czech transformation process and simplification of the procedure for the integration of the Czech Republic into the EU;
- support for and development of the economic potential of border areas and a gradual revival of border areas;
- strengthening of existing structures;
- revival of economic life on both sides of common borders;
- overcoming problems that constrained the development of border areas (primarily improvement of the quality of the environment on both sides; insufficient infrastructure; stabilisation of the population, and support for all forms of cooperation);
- reducing the character of these areas as frontier areas; increasing the living standards of the inhabitants, and create cooperative structures on either side of the border.

Declarations of intent were signed between the Czech Republic and both countries that were the basis for the coordination of cross border activities with respect to their participation in the EU INTERREG II programme for cross border cooperation and PHARE CBC. The following seven priority areas were stressed for a selection of projects:

- transportation;
- environment;
- social and economic development;
- agriculture and development of rural areas;
- human resources;
- interdisciplinary studies, technical assistance.

In 1994, 25 million ECU were reserved to complete the following projects: the Zelezna highway by-pass, the reconstruction of the railway station in Cheb, and a sewage collector in Usti nad Labem. Since 1995, the programme was implemented as a multi-annual initiative programme for the period from 1995 to 1999 that was approved by the governments of the Czech Republic, of Germany, Austria and by the European Commission. The budget of the programme was 170 million ECU. The programme also includes a specification by funding priorities, measures and years. 30% of the funds are reserved for the environment in the cooperation between the Czech Republic and Austria, and 33% in the cooperation between the Czech Republic and Germany.

Due to a difference between the Czech Act on tenders and PHARE rules in a few cases the approved funds could not be used. This discrepancy was removed in mid 1997. Based on a memorandum with the European Commission of December 1997, programmes were coordinated by the Regional Development Centre at the Ministry for Regional Development of the Czech Republic. With the initiation of the activity of this new implementation unit the delays were gradually removed. By 31 July 1998, it managed all contracts and funds with Germany

(21.5 million ECU), and 37% of the funds with Austria (2.18 million ECU). Gradually the projects are implemented on the basis of approved tender documentation.

Until 1997, large investment projects were funded primarily in transportation, environment and city infrastructure. Not as much attention was paid to other areas, e.g. to economic development, agriculture and human resources. Since 1996, when funds for smaller projects were made available, the ratio of projects that were realised increased. These projects were managed by regional authorities and the regional development agencies operated as secretariats for these funds. The level of the support for investment projects is limited to 50,000 EUR (about 1.7 million CZK). Similar rules applied for 1998. Multi-annual programmes are updated each year in the form of annual programmes.

For these reasons and because no regional policy for the Czech Republic existed, the programme for 1998 was prepared based on a reduced budget of 8.9 million ECU. The proposal concentrated on the continuation of the Small Project Fund; it set up a Forest Renewal Fund on the border with Germany; and co-financed the countryside renewal programme. In 1998, the activity concentrated on updated regional operational programmes for the Czech part of the Euroregions that were also the basis for the programmes in 1999. The 1999 programme of cross border cooperation included:

- investment projects;
- Small Project Fund;
- Small Infrastructure Project Fund;
- Forest Renewal Fund;
- Countryside Renewal Fund.

Within the Countryside Renewal Fund the co-financing of investment projects had the following structure: 49% of funding came from PHARE CBC; 30% from the state budget for the Countryside Renewal Programme; and 21% from private investors for projects based on the specified criteria of both programmes. The budget for the 1999 programme is based on approximately 60 million ECU. In 2000, the programme is expanded to the co-operation with Poland and Slovakia.

Multinational PHARE Programmes

These programmes support the planning and implementation of activities that involve several former CMEA (Council of Mutual and Economic Assistance) countries with similar problems that require a close cooperation. These multinational PHARE programmes support a multilateral dialogue among these states and facilitate a common planning and implementation of joint projects. A steering centre was established in the Ministry of Industry in Bucharest. Among the main programmes in the energy sector with relevance for the Czech Republic are:-

1992

- Technical assistance for the CENTREL to UCPTE electrification project;
- linking the gas network to that of states participating in the PHARE programme;
- training and exchange of experience in the area of crude oil refining;
- Energy Charter.

1993

- International cooperation on the improvement of energy efficiency in city clusters and exchange of experience in Stetla nad Sazavou;
- continuation of the technical assistance project with the CENTREL - UCPTE project;
- energy legislation and regulation (continuation of Energy Charter project.

1994

- Linking gas-water networks: creation of tariffs and prices;
- linking gas-water networks: harmonising the policy for the creation of transit fees;
- strategy of "clean coal" for Central and East European (CEEC) countries;
- convergence of energy policies;
- training programmes, and programmes for teaching courses for energy advisors;
- training programmes for ministry clerks in the area of regulation of the energy sector.

1995

- Programmes for the reduction of energy demands in collaboration with cities and local communities (Brno, Caslav, Prague - Jizni Mesto);
- training of management in the area of energy investments (linkage of energy networks);
- legislative and regulatory framework in the area of heat supply;
- harmonisation of energy statistics;
- integrated energy and environmental strategy for the area of the "Black Triangle".

E.1.3 PHARE Programme for the Energy Sector

One area that requires a mutual coordination of project implementation is the energy sector.

PHARE Multicountry Programme

The PHARE Multicountry Energy Programme was founded with the goal to strengthen the cooperation among the energy sectors of the CEEC, to establish cooperation and to exchange experiences with EU countries, and to develop direct contacts with the European Commission. Projects with a Czech participation are listed in the chapter "PHARE Multicountry Projects".

National Programmes

The energy sector was a part of the infrastructure segment. In the national programme this sector received a total funding of 11.2 million ECU for 1991-1996 for investment projects. PHARE funds in this area were spent for these priorities:

- updating and implementing the energy policy for the Czech Republic, and compliance with the obligations of the Czech Republic resulting from international agreements;
- achievement of competitiveness in the area of efficient energy production and consumption;
- modernisation of energy industry infrastructure at the national and regional levels;
- reduction of the impact of energy production and consumption on the environment, and achievement of emission limits, valid on 1 January 1998, in energy conversion facilities.

Among the related activities were as follows:

- support for the successful integration of the Czech Republic into the regional European energy supply and demand, and the creation of legislative and technical conditions in the

energy sector for the EU accession of the Czech Republic based on the European Agreement and the Energy Charter;

- increase the qualification and professional level of employees in the energy sector and state administration employees;
- coordination with other EU programmes in the energy sector that expanded their scope to EU applicant countries (DG XVII programmes: SYNERGY, SAVE and ALTENER).

From the beginning, projects were developed based on energy policy principles and these were also a tool for their implementation. The programme concentrated mainly on the primary problems of the sector that is on updating the principles of a prepared energy policy, on regulating natural monopolies, on liberalising prices and on increasing efficiency. On the supply side these projects included: creating regional and municipal energy concepts, diversifying sources, and the use of domestic deposits of coal, and increasing qualification. All activities were performed with an effort to limit the negative influences on the environment and based on the gradual acceptance of EU standards and legislative measures.

E.1.4 PHARE Energy Saving Fund (ESF)

In February 1993, the EU proposed in its Financial Memorandum to give the Czech Republic 5 million ECU for energy efficiency projects within the PHARE energy programme. Thus, the EU provided the seed money for the creation of the PHARE Energy Saving Fund that was established in March 1997, with a total deposit of 9.0 million ECU (315.0 million CZK) of which 4.5 million ECU were provided by PHARE and another 4.5 million ECU by the Ceska obchodni banka (CSOB).

On the basis of a tender, the Ceskoslovenska obchodni banka (CSOB) was selected as the administrator of the Energy Saving Fund. A contract between the Ministry of Industry and Trade and CSOB was signed in 1997 after it was approved by the European Commission. For nearly 10 years the CSOB offered favourable loans for projects that lead to important energy savings. The standard criteria of the bank for these loans are to assess the viability of the project and the ability of the applicant to repay the loan. Loans are granted with lower interest rates than those offered by the bank. The repayment of the support is being achieved through savings in the energy costs. The ESF is open to any solvent applicant in the state and private sector that can repay a loan. Applications may be submitted directly or jointly by any firm dealing with energy services (RSCO). The loan may finance any project that:

- has proven cost savings for the project owner (costs for operation, maintenance, fees), of which at least 40% of the total cost savings must originate from a decrease in the consumption of energy (saving itself may be lower);
- requires investment at a volume of 2 million to 50 million CZK;
- requires financing for a period longer than four years (except the implementation period); up to a maximum of ten years;
- granting of a grace period for instalments that must not be longer than 20% of the agreed length of the loan up to a maximum of 2 years.

E.1.5 National PHARE Programmes for Support of Regional Development

As the EU accession of the Czech Republic will be structured according to particular sectors of the economy, short-term and long-term objectives are specified for this process because the Czech Republic must be ready to comply with a structure specified by the EU. Thus, an important task for the near future is the adaptation for the use of EU structural funds, that will be made available by the new EU funding facility ISPA. Their objective is to gradually overcome

the regional differences in the economic development among member states. These funds are to contribute to a social balance. From a financial perspective, structural funds are the second largest programme group after those for the common agricultural policy. The most important funds are the *European Regional Development Fund* (ERDF), the *European Social Fund*, the *European Agricultural and Guarantee Fund*, and the *Cohesion Fund* that is an additional fund for countries with a lower GDP that is oriented at environment and infrastructure projects.

In April 1998, the Czech government approved a concept for regional development that is to ensure the balanced development of regions and the support for economic and social growth to qualify for the use of financial assistance from the EU with the participation of the state. In the area of regional policy, six basic objectives were specified:

- development and structural change of under-developed regions (68% of the budget for countries with a GDP lower than 75% of the EU average);
- conversion of regions which are in economic regress (11%);
- struggle against long-term structural unemployment and adaptation of the labour force to industrial change (11%);
- structural change of agriculture, and adaptation of rural regions (9%);
- development of regions with a low population density.

From 1994 to 1999, a total of 140 billion ECU was made available, and the first objective required almost 96 billion ECU. For the other tasks various funds are available. From the beginning in 1991, the PHARE energy programme included regional aspects. The goal of regional projects was to develop a relationship between developing and restructuring programmes and programmes for the slowing down of production and mining for regions, towns and areas, and the energy policy of the state.

The Ostrava and Most regions were not selected by chance. The government attributed a high priority to the development of these two regions. Primarily in Northern Bohemia, it succeeded to implement the results of the studies. For regional development the following objectives were specified for the energy sector:

- formulation and approval of basic concepts;
- elaboration of a system of motivation tools for a reduction in energy demand in industry;
- development of the same system for households with respect to the environment;
- coordination of efforts for the implementation of energy efficient technologies; and
- support for a greater use of non-traditional and secondary energy sources.

Regional Development Fund

The Regional Development Fund was set up and funded with approximately 95 million CZK (2.5 million Euro). The Regional Development Fund (RRF no. CZ 960-01) was set up based on the approved Financial Memorandum COP 96 no. 9602-9603. This fund succeeded a former fund, that was established in 1993 in collaboration with the former Ministry of the Economy, Czechinvest and an American partner, represented by George Mason University that was funded by USAID, the Andrew Mellon Foundation and PHARE. The goal of that programme was to create necessary conditions in Czech towns for a successful presentation of their investment possibilities to possible foreign investors and to support their economic development.

Funds from the *Regional Development Fund (RRF)* were assigned for investment projects in cities that received economic development certificates, like *Plzen, Brno, Olomouc, Novy Jicin,*

Pardubice, Hradec Kralove and for other cities that achieved the same level in the preparation and implementation of new investments for industrial zones (i.e. town and cities with Regional Development Agencies that are comparable to certified cities). It is assumed that these cities will employ professionals that can prepare suitable conditions for investors, and co-ordinate the necessary activities with the specified departments of related authorities. Funds will be granted based on concrete, and well-prepared investment projects that will improve the local infrastructure. From the vantage point of investment possibilities, projects supported by this fund should improve local conditions and attract investors that introduce modern technologies and create local jobs.

With the *Regional Development Centre* (PMU) this programme has an executive unit that will administer the funds of the RRF through a selected bank. The assistance will be granted in the form of loans with a lower interest rate that will be made available from a revolving fund that was set up by PHARE and from the funds of the selected bank. At the same time, the ratio of the project costs that will be paid from PHARE funds will be specified. The maximum subsidy for one project may be 0.4 million EURO but this ratio may be higher if the funds of the selected bank are added. Feasibility studies will be re-paid to applicants from PHARE sources through grants of up to 10,000 EURO, provided that at least 25% of the costs will be financed from local sources.

Support for the Region of Northern Moravia and Silesia

The support for this region started in 1993 and it continued until 1999. It focused mainly on the establishment of the *Regional Development Agency, Ltd. in Ostrava*, and on the *Regional Development Fund of Upper Silesia and Northern Moravia, Ltd.* that have their headquarters in Ostrava. The Regional Development Agency has contributed to the creation of conditions for a coordinated development and transformation of the region. It also supported the establishment of a regional *Information Centre for Economic Development*. The PHARE contribution for this activity reached 2,028 million ECU (about 69 million CZK) of which 43 million CZK was already spent until 1999. The PHARE programme granted additional funds (2 million ECU) for the support of regional development that were used to continue projects to improve the regional infrastructure, to support activities for the regional social transformation and for other activities to involve the regions in European structures.

The *Regional Entrepreneurial Fund Ostrava* (RPF) enables the region to implement the business plans of small and medium-sized enterprises, that are considered as risky by the traditional procedures of financial institutions. The fund invests in enterprises with a development potential. It is a pilot project to stimulate small and medium-sized companies through risk capital that are to result in long-term investments in the regions of Northern Moravia and Silesia. Until the end of 1999, 220 million CZK were approved for investments of which 120 million CZK were already spent. In spring 2000, a transformation of the PHARE Regional Development Fund is under way in connection with an increase of its capital base and an expansion of the scope of its activity.

In addition to these activities that were directed exclusively at the region of Northern Moravia and Silesia, other projects were also funded by PHARE, the most important was support for an engineering service and the delivery of equipment for the liquidation of centres with dangerous waste products in the Ostrava region. For the environment programme 65 million CZK, and for the regional energy study Ostrava another 11.56 million CZK were appropriated from the energy programme.

E.1.6 PHARE Programmes for Support of the Private Sector

Supporting Foreign Capital Inflow to the Czech Republic - CZECHINVEST

Among the priorities of the firm CZECHINVEST are to attract foreign capital for the production sphere to assist the considerable restructuring of the Czech industry, and to contribute to the growth of its export opportunities. Czechinvest relied on PHARE funding to finance the following activities:

- marketing;
- financing foreign representation of CzechInvest;
- elaboration of sector studies of the Czech industry;
- training agencies employees;
- legal and computer services;
- support for regional representation;
- projects directed at regional development (PHARE 96 programme; development of SEDAP programme; Brno 2000 study; communication interface of Czechinvest with its regional representation).

Support for Business

In principle, this is the function of the *Regional Consulting and Information Centres* (RIPC) and of the *Business Innovation Centres* (PIC) within a system for development of Small and Medium-sized Business (SME). In 1992, the PHARE programme launched a system of support for SME through the institutions mentioned above. This programme focused on the support and stabilisation of existing firms and on the establishment of new companies by:

- competitiveness;
- development of innovation;
- social and economic stability.

Since 1993, the system for SME support was implemented through RPIC and BIC. These are private organisations, whose management and some employees, were trained by experts from EU countries. Since 1996, there are 23 such organisations covering 85% of the Czech territory in the RIPC network. The consulting services that were supported have to comply with certain rules and prices per consulting hour.

In 1997, the services for about 7,500 entrepreneurs and 85 regional bodies were supported with subsidies. The RIPC network also participated with subsidies in the assessment of the damages of SME in the flooded areas, and in the promotion of the PHARE Technos and Jakost (ISO 9000) projects. A database for the entrepreneurial sphere was also developed. In the Czech Republic, five entrepreneurial innovation centres were set up:

- in *Prague*, at Czech Technical University (CVUT) and at the Academy of Sciences (AV);
- *Brno*;
- *Plzen*;
- *Ostrava*.

These centres are members of the BIC network that function as incubators for SMEs by offering favourable leasing of production areas, and other professional services. By end of 1997, some 60 firms were a part of these BIC incubators that were supported with a total of 97 million CZK. The efficiency of these support measures must be compared with tax contributions

that considerably exceeds the level of subsidies. In 1997, some 90 million CZK were spent for this activity from the PHARE programme.

The Agency for the Development of Entrepreneurial Activity developed a new system of SME support that is oriented primarily at the establishment of firms and at the quality control of consulting services. In accordance with EU requirements, the Agency requests a co-financing of consulting activities for the SME sector from the Czech Republic.

Fund for Supporting Export Activities

In the Czech Republic, this Fund was also established based on the PHARE programme with the objective to co-finance the distribution of products and services of public, governmental and non-governmental institutions that develop products and services for the support of Czech exports, and that stimulate the purchase of products and services of these institutions. Its funds amounting to about 100 million CZK are provided as grants for the support of exporters when they purchase the above mentioned products and services. These grants will cover a certain portion of their costs while the remainder will be covered directly by the grant recipients. Grants covered the following areas:

- QUALITY – implementation of ISO 2000 quality control systems;
- INFORMATION – provision of information on products for exporters;
- PROMOTION – consulting and promotional services for Czech producers.
- CERTIFICATION of products – technical assistance on EU regulations and certification of Czech products;
- COOPERATION – cooperation among experts and support for the admission of enterprises into the Sub-supplier Centres.

From the total allocation of 100 million CZK, 50% was assigned to the QUALITY programme, with the remainder being divided among the other programmes. By end of 1999, all financial sources were spent.

E.1.7 Experience with the PHARE Programme

The PHARE programme became the largest source for obtaining know-how in the Czech Republic in areas that belong to the common activities of the state in the economy. It played an important role for the exchange of experience, for cooperation and understanding among countries by responding to new objectives and priorities.

However, in many cases the effort and the financial sources that were spent did not achieve the expected results. In most cases, delays were caused by the strict emphasis on formal and financial procedure and reporting. Sometimes, the preconditions for the transfer of know-how were not created. Some projects were not well prepared, and customers were not sufficiently informed, and thus, delays in finding solutions occurred. In addition, there was no link between these various programmes and the Czech state policy what caused inefficiency. Programmes that were directed at training and courses for experts were very important. But in most cases, the experts did not use their knowledge and their training and activities were not monitored. The importance of the PHARE programme was substantial. It produced not only concrete results, but it also introduced new methods of work and organisation and facilitated the direct co-operation with EU countries. Demonstration also projects produced positive results including new approaches and techniques. The PHARE funding was supplemented with funds from international financial institutions (IFIs) such as the EBRD, EIB and others. In the Czech Republic, many of these activities and projects were implemented within a relatively short period.

E.2 Other Programmes of the European Union

E.2.1 New Programmes ISPA and SAPARD

Starting in 2000, with *ISPA* and *SAPAR*D two new funding programmes were launched that are reserved for the countries in their pre-accession stage. Whereas SAPARD (Special Accession Programme for Agriculture and Development) is for agriculture and the renewal of the countryside, money from ISPA (Instrument for Structural Policies for Pre-Accession) should be directed towards the environment and infrastructure. On the basis of the Competence Act and the Agreement on Cooperation, the Ministry of Agriculture was assigned with the management of the SAPARD programme, and is also the main co-ordinator with the EU.

ISPA

In the EU budget for 2000-2006, each year a total of 1.040 billion EURO (about 36 billion CZK) are reserved for the *Instrument for Structural Policies for Pre-Accession* of which about 50% of the funds are directed at transportation. During 1999-2000, the preparation for ISPA occurs and the funding will be spent between 2000-2010. In the Czech Republic, the Ministry of Finance is the responsible programme coordinator. The National Programme and Monitoring Committee for economic and social structural policies (NPC/MC - ESC) was established. The establishment of a Regional Steering and Monitoring Committee (RMMC) for the NUTS II Northwest region is also important that will be responsible for the preparation and monitoring of the regional model and operational programme in this region. During 1999, the Regional Steering and Monitoring Committees (RMMC) and their secretariats for regional operational programmes for all territorial units NUTS II were established.

It is assumed that the ISPA funds will be used to finance projects in key problem areas, such as for the protection of water, against air pollution and for waste management. During the first years, water protection will have the highest priority. The overall investment strategy was prepared during 1999. The estimation of the total co-financing for the Czech Republic is 25-28 billion CZK for 2000-2010, and considerable grants from the EU budget are expected (EU 75%, Czech Republic 25%). In the implementation of the ISPA funded projects the specialised agencies and the regional development agencies will play an important role for regional development, their network should be complete by the end of 2000.

SAPARD

The total annual amount for the SAPARD programme for all 10 EU-accession countries amounts to 520 million EUR (about 18 billion CZK) for the budget period from January 2000 to 2006. The source of funds for SAPARD is a guaranteed section of the European Agriculture Guidance and Guarantee Fund (EAGG). The SAPARD programme differs from other current EU programmes, e.g. PHARE, with a clearly defined plan: to make the candidate countries acquainted with the use of EU structural funds. Thus, the emphasis is not on the amount of funds that are not very high, but on the fact that they will be prepared in sufficient time in advance, and the necessary tools for the use of structural funds will be built and tested. It is a pre-accession tool that requires necessary institutions and a legislative framework.

E.2.2 SAVE II Programme

On 27 November 1998, the Czech Republic was officially invited to participate in the SAVE II programme. The Czech Republic received 386,260 ECU, including administrative expenses for the domestic management of the programme. The contribution from the European Commission represents about 50% of the budget for projects and in extraordinary cases even 100%

for activities that are directed at the application of EU directives. In 1998, the following selected projects received support from the European Commission:

- Good practice guides for local authorities in the Czech and the Slovak Republics;
- Analysis of obstacles to CHP implementation in the Czech and Slovak Republics;
- National programme for monitoring and targeting in the Czech and Slovak Republics;
- Study for support of the implementation of legislation on labelling and standardisation of large household appliances in the Czech Republic and Poland.

Proposals for projects on the framework the SAVE II Programme included for 1999:

- rational use of energy in buildings;
- rational use of energy for consumer appliances;
- rational use of energy in transportation;
- rational use of energy in industry;
- consumption management and integrated planning of sources;
- support for combined production of electricity and heat;
- study directed towards implementation of EU directives;
- monitoring progress in the area of energy efficiency;
- dissemination of information;
- establishment of regional and local energy agencies.

E.2.3 Third Multi-Annual Programme for Small and Medium Enterprises

This Programme supports activities of small and medium-sized enterprises in the EU. It was adopted in 1996, and is valid for 1997 to 2000. The basic objectives of the programme are:

- simplification and improvement of administration and of the business legal environment;
- improvement of the financial environment for entrepreneurs;
- assistance for small and medium-sized enterprises, bringing their strategy in harmony with European and international strategies, primarily through better information services;
- increase competition between small and medium-sized enterprises, and improve access to research, innovation and training;
- initiation of business and support for special target groups.

Through national representatives (co-ordinators) the European Commission directly manages this project. The programme comprises five smaller sub-programmes that are directed at: EuroInfo Centres, enterprises, distributive trade, EU partnership; and craft. The Czech national coordinator for the EuroInfo Centre has already been appointed. Its function will be carried out by the Centre for Regional Development of the Czech Republic. The Ministry of Industry and Trade will appoint national coordinators for the other sub-programmes.

E.2.4 Fifth EU Framework Programme for Research and Development (1998-2002)

Since 1999, the Czech Republic has participated in this programme, with many rights and obligations that include the payment of contributions to the EU, whose level is specified on the basis of the GDP. It is assumed that the Czech Republic will receive grants of 20-30 million CZK. Under the programme for sustainable growth, the following topics are covered:

- clean technologies, including recoverable energy sources;

- economical and efficient use of energy in Europe. This includes the reliable, effective and secure energy supply. Attention will be paid to the entire cycle, from production through transmission to consumption.
- Research and technological development of activities in the area of a generic nature. Study of the socio-economic aspects of energy, with a perspective on sustainable growth.

E.2.7 JOULE-THERMIE Programme of the EU

This programme was set up by the EU for 1995-1998 and will be extended. Since early 1998, he Czech Republic may participate in this programme as an associate EU member. The programme supports the efficient use of energy in the EU.

E.3 Foreign Assistance Programmes Outside the EU

E.3.1 Programme for Financing the Municipal Infrastructure (MUFIS)

The programme was initiated and concluded in 1994 on the basis of an agreement between the governments of the Czech Republic and the United States. Over the years, the Czech Republic has received loans amounting to 100 million US $ (i.e. an average of 20 million US $ annually); with a favourable maturity of the 30 years, and a relatively favourable interest rate that is slightly higher than the rate for 30-year US government bonds. The money comes from the activity of the Housing Guarantee Programme of the Private Investment Company *Lazard Freres* that are guaranteed by both governments. The Czech Republic will receive the loan in several batches. The central creditor of the funds from the USA is the *Municipal Financial Company, jsc.* (MUFIS) which was founded for this purpose by *Ceskomoravska zarucni a rozvojova banka* (CMZRB) as its subsidiary. The Union of Cities and Towns owns 2% of MUFIS, the Ministry of Finance 49%, and CMZRB (*Czech-Moravian Guarantee and Development Bank*) owns 49% of MUFIS shares.

MUFIS provides funds for commercial banks involved with the implementation of the programme. These banks offer long-term loans to cities and towns that can be used for financing infrastructure and related to housing. The ratio of the housing sector in this project must be above 50%. Cities and towns submit projects proposals to banks and negotiate with them the basic terms for future loan contracts. These loans may not be used for the purchase of land, real estate or the construction of flats. Loans may be provided for:

- gas connections, distribution lines and measurement technology for residential structures and improvement or change of heating systems;
- heating of residential buildings with the aim of decreasing energy consumption;
- construction and modernisation of water distribution lines, including measurement technology;
- sewage networks and sewage treatment plants serving residential quarters;
- local communications serving residential structures;
- equipment for the liquidation of solid communal waste products within the housing sector.

E.3.2 U.S. Supported Programmes

In 1991, the United States Agency for International Development (USAID) opened its offices in Prague and launched its activities. In the initial stages of their development, USAID programmes were proposed for the introduction of economic reforms and for the support of democratic institutions. In agreement with the Czech government, the following priorities were specified:

- privatisation;
- development of the private sector;
- growth of the financial sector;
- system of financing for the municipal infrastructure;
- support for democratic institutions, including municipal and national bodies and non-profit organisations;
- quality of the environment with a focus on health and social needs concerning damages, protection of health, environment and problems in the energy sector.

Assistance was given to the Ministry of Industry and Trade and the Ministry of Finance to create a governmental legal structure and mechanism for the creation of prices, the production and distribution of energy. In addition, there was assistance in the area of the creation of new laws. Very important were several activities by the American partner on nuclear energy especially with respect to the revision of the legal system in this area, the assessment of risks, the operating instructions and training of nuclear station personnel and the introduction of Western security standards for the Dukovany Nuclear Plant, which operates Russian reactors. USAID financed two energy concepts for Cesky Krumlov and Plzen that dealt with Demand Side management problems and with measurement in the area of energy savings with respect to expected future energy demand in these towns. These studies also analysed the obstacles for the measurement of energy savings and non-traditional methods of financing were tested.

E.3.3 Bilateral Programmes with European Countries

Bilateral programmes are implemented on the basis of mutual agreements that were concluded between the Czech Republic with several states and international organisations. The Ministry of Finance of the Czech Republic manages these programmes. Bilateral cooperation agreements were concluded with the following countries:

- Great Britain;
- Germany;
- the Netherlands;
- France;
- Austria.

Great Britain

a) British Know-how Fund

This fund is a programme of the British government provided for Central and Eastern European countries. The main objective is to help establish and develop institutions of a democratic society, and the necessary framework of a market economy. Projects were implemented in the form of consulting, training and study stays. The main areas have been the financial sector, the environment, small and medium-sized enterprises, the state administration, local self-administration, employee policy, and training for managers.

b) Programme of British-Czech Collaboration

The programme was begun in 1995, and is to complement the British Know-How Fund. It provides funds for smaller projects and supports the development of a pluralistic society. The programme supports projects of non-governmental and non-profit organisations, and also accepts projects from governmental institutions. For fiscal year 1998-1999, five priority areas were specified: development of the non-governmental sector, human rights, matters of mi-

norities, the environment, prevention and education in the area of drug dependency. The project is managed by a department of the Know-How Fund at the British Embassy, and welcomes projects requiring British collaboration. It may also support projects which are a contribution to transformation and do not contain British elements.

c) Other British programmes

Pre-Investment Feasibility Studies (PIFS)

This is a programme of grants for proposed, long-term transactions in the territory of the Czech Republic. It is in support of prepared, in-detail studies for British enterprises that have already performed market investigations and that consider establishing subsidiaries in the Czech Republic, or want to enter into a joint venture with a Czech partner.

Training for Investment Personnel Scheme (TIPS)

This programme refers to grants for investment transactions on the Czech Republic, and is designed to help British enterprises manage costs for training Czech employees for the management of local transactions.

British Partnership Scheme

The Scheme is a very flexible source for smaller projects including support for non-governmental and non-profit organisations and small projects that complete the activity of the Know-how fund. They include a project of gifts to heads of a mission, and presentation of books, equipment and other items for non-profit organisations based on the decision by the British Ambassador in Prague.

Charity Know-how

It finances a many small projects by British non-profit organisations help Czech partners.

The Netherlands

a) The Dutch Programme for Collaboration with the Czech Republic

The programme is implemented on the basis of a Memorandum of Understanding for 1998 that was concluded by the Ministry of Finance of the Czech Republic as a co-ordinator with the Dutch Ministry for Economic Affairs. The Dutch programme for Collaboration (PSO) tries to support the further transition of the Czech Republic into a fully independent, market economy; i.e., the development of a market economy, strengthening of its ability to compete, and the modernisation of the Czech economy, the transfer of know-how, and the development of modern production procedures. Support was at a level of 1 million NLG for 1998. For 1998, the following priorities were specified:

- renewal of areas damaged by flooding in 1997;
- energy and environment;
- preparation for EU accession.

b) MATRA Programme

This programme is to support the process of social transformation in the following areas: media, human rights, environment, justice, the health system and housing.

c) Programme for Economic Projects (PESP)

There are special funds of the Dutch government for the support of economic projects related to the development of activities of Dutch companies that would contribute to the achievement of this objective. The activities are directed towards preliminary phases; i.e., implementation studies, the preparation of investment studies, and the exchange of professional experience in the form of training of up to 450,000 NLG for each project:

Germany[1]

a) TRANSFORM Consulting Programme

Priorities of the programme have been:

- support of the orientation towards a market economy;
- support for small and medium-sized enterprises;
- support of state administration;
- preparation for EU integration.

In 1998, in comparison with 1997, the programme was reduced to 1.5 million DM (50% of the funds), and therefore priority was given to ongoing projects.

b) Investment Programme of BMU/DtA

The German Federal Ministry for the Environment, Nature Protection and Nuclear Safety (BMU) in cooperation with "Deutsche Ausgleichsbank" has launched a fund for partially financing larger investment projects in the Czech Republic. The main support of this fund consists in the allocation of soft loans and the grant of direct subsidies for the realization of

- air pollution control projects
- water-quality control projects
- ecological heat and power supply projects
- renewable energy transformation projects

Thus especially projects in the boarder region to Germany have been supported as:

- Chemopetrol Litvinov power station T 700
- Flue-gas de-sulphurisation plant at Prunerov I power station
- Cheb ecologically friendly heat and power supply plants
- Waste-water treatment plants in Roudnice n.L., Česka Kamenice, Usti nad Labem, Dečin
- Further small projects concerning air pollution control

The total amount of subsidies granted for these projects is about 85 Mio. DM.

---

[1] Hans Günter Brauch: *Osterweiterung der Europäischen Union - Energie- und Umweltpolitik der Tschechischen Republik*, Energy and Environment Policy in the Czech Republic, Vol. 1(Berlin: Umweltbundesamt, 2001): 171-176; 242-259.

c) Subsidies for the EU-Cross-Border-Programme "Black Triangle"

In this tri-lateral Czech-German-Polish cooperation project concerning the Euroregions Egrensis, Krušne hory, Labe, and Nisa the German side has been participating in co-financing this 25 Mio. DM-EU-project with a reasonable contribution. The German subsidies have been sponsored by

- Federal Ministry for the Environment, Nature Protection and Nuclear Safety
- Saxonian State Ministry for the Environment and Agriculture
- German Federal Fund for the Environment

The main target of this project was to set up pilot projects for emission-reduction in the border areas

d) Financial supports by the German Federal Fund for the Environment (Bundesstiftung Umwelt)

By means of the "Deutsche Bundesstiftung Umwelt" several workshops and conferences on issues in the fields "Energy and Environment" have been sponsored since 1993.

France

The French programme supported cultural, educational, scientific, and technical assistance. The programme is directed at the training of state administration clerks in European matters, and on issues related to local administration. It was initiated in 1996 (437,330 FF), and continued until 1998. The total level of funds that were granted amounted to 1.21 million FF.

Switzerland

Financial assistance was directed at projects on energy savings at the local level with a focus on the environment. A contract was concluded with five towns (*Prague 3, Jablonec nad Nisou, Kraslice, Krabcice, Celakovice*) on the change of heating from fossil fuel to natural gas in public buildings (schools, house for pensioners), and in residential units.

Austria

Austrian Ecological Fund

This fund was established to support and finance projects on measures for the improvement of the environment in countries neighbouring Austria. Between 1992 and 1997, about 71 projects were supported from this fund, with a total cost of about 402 million ATS. Support up to 100% of the costs was granted. In this framework the following studies and projects were implemented in the energy sector, e.g.

- energy concepts for Brno, Kladno and Trebon;
- possibilities for the installation of boilers burning biomass, and installation of cogeneration units;
- installation of equipment for the reduction of emissions from operations in border regions.

E.4 Cooperation with International Financial Institutions

E.4.1 Global Environment Facility (GEF)

The Global Environment Facility is an international financial programme that grants subsidies and favourable loans to cover incremental costs for projects and programmes that protect the

global environment, and contribute to a permanent sustainable growth. Activities are concentrated in four areas:

- climatic change;
- biodiversity;
- international water;
- stratospheric ozone.

The activities of the GEF must be in addition and not a substitution of regular assistance programmes. GEF covers incremental costs; i.e. differences between the costs of the project that takes into consideration global environmental objectives, and the costs of another project that would be implemented without respect to these priorities. GEF projects and programmes are managed through three implementation institutions: a) the UN Development Programme (UNDP), b) the UN Environment Programme (UNEP) and c) the World Bank. Project proposals must be submitted to one of these three institutions.

E.4.2 European Investment Bank (EIB)[2]

There is a priority for the granting of loans for EIB projects for restructuring and modernisation of technological equipment, and for investments in energy saving and security of security. EIB granted MERO, Jsc. a loan that financed a 350-km oil pipelines between Kralupy nad Vltavou in the Czech Republic and Ingolstadt in Germany. This loan included support for investment in fuel stations, storage equipment, in telecommunications and security equipment.

In December 1996, a loan of 200 million ECU was granted for CEZ jsc to assist in the implementation of a nation-wide programme against air pollution that permitted the modernisation of six coal power plants to reduce their emissions to meet international standards. This investment focused primarily on the installation of desulphurisation equipment. This enabled a reduction of SO_2 emissions, and considerably improved the air quality in the so-called Black Triangle. A loan of 55 million ECU was also provided for the replacement of equipment for the combined production of electricity and heat for Mlada Boleslav, and for Skoda enterprises in the same town. In addition to these large direct loans, EIB offered indirect finances through banks that support small infrastructure projects in the area of energy production and energy saving. As a rule, these types of loans are provided for projects with a total cost of 45,000 to 25 million EURO, and the loan may reach up to 50% of the cost of the project.

E.4.3 International Finance Corporation (IFC)[3]

The first large investment of the International Finance Corporation in the private sector in Central and Eastern Europe was made in the Energy Centre in Kladno in the Czech Republic. The project included the replacement of an old heating plant with a very small energy output that did not meet the Czech emission limits of 1 January 1998, with a new production unit that also satisfied the demand of the town for heat. This heating plant is co-owned by the Central Bohemian Power Distribution Enterprise (STE), that has an 11% equity share. The total costs were 400 million. The IFC granted a loan for 85 million US $, with a 15-year period for repayment.

---

[2] Brauch: *op.cit.*: 164-167; 239-240.

[3] Brauch: *op.cit.*: 152-154.

E.5 Other Projects of Cooperation

E.5.1 Joint Implementation

According to the UN Framework Convention on Climate Change (1992) and its Kyoto Protocol (1997) Activities Implemented Jointly (AIJ) or Joint Implementation (JI), may be one of three flexible mechanisms for dealing with emissions. In the Czech Republic, these projects are not implemented to the extent as was expected. Many barriers exist for the wider development of such projects and until spring 2000, only three projects were approved.

In 1994, the first project in Decin – Bynov was initiated and prepared by the Centre for Clean Air Policy, an American non-profit organisation, and co-financed by loans from three American investors. This project met problems to be confirmed by the Czech Ministry of Environment as a AIJ due to administrative and other problems. The project was not previously discussed with the Ministry of Environment level, but only between the investors and Decin. In 1997, the project was acknowledged as an AIJ project, and then it was immediately announced to the UN FCCC secretariat. The methodology of monitoring the project was elaborated, that is compatible with the required procedures. This project implied the replacement of coal with natural gas as the fuel for a boiler house for long-distance heating in Decin, a part of Bynov. It included the installation of cogeneration units, and investments for an increase of the efficiency of the heating system. Experience with this project could have impact impacts for a further development of the AIJ project. The second project, that was prepared by the Dutch Government referred to a reforestation of Krkonose. The first part of this project was announced to the UN FCCC Secretariat in 1996, and the second part in 1997. Three other AIJ projects are under way. The AIJ project on retrofitting the power station and fuel switch in the Skoda Company in Mlada Boleslav was approved by the Czech government in early spring 2000.

Appendix F: Strategy of the Earth Climate Protection in the Czech Republic

This Appendix is a substantial extract from "*Strategy of the Earth Climate Protection in the Czech Republic*". The strategy was prepared by the Ministry of the Environment in 1999.

Climate Change and its Risks

At the end of the 20th century there is sufficient proof of the effect of the human activity on the global climatic system. According to data from the International Panel on Climate Change (IPCC), during this century the average temperature of the planet has increased by 0.3 - 0.6^0 C and, at the same time, the sea level has risen by 10-25 cm. In several regions, the risks of extreme weather occurrence have also increased. Prognoses on the assumed further development until the end of the 21st century indicate a further 2^0 C average increase in temperature and a rise of the sea level of 50 cm.

According to climate scenarios, the risk of climate change may also affect the Czech Republic. A 3-4^0 C growth in average temperature in our territory by the end of this century cannot be ruled out, with warming being higher in the winter and lower in the summer. In the same period, a 6-7% increase in the annual total precipitation may be expected, especially in winter. It was also estimated what impacts such a climate development could have on the vulnerability of water resources, on agriculture and forestry in the Czech Republic (10-25% decrease in runoff values depending on the hydrological character of basins, significant accumulation of groundwater in summer, a shift of the vegetation period, increased risk of damage to plants by autumn frosts, acceleration of the ripening and cropping periods of plants by 10-14 days, decline in yields in the most productive regions in the Czech Republic, more favourable conditions for the development and operation of agricultural pests and diseases, disruption of the ecological stability of forest stands etc.). The currently available scientific knowledge is so convincing that the international community is becoming increasingly aware of the danger resulting from the present social development.

Activities of the International Community

Within the framework of the activities of the United Nations Organisation (UNO) and with the aim of lowering the risk of climate change, the *United Nations Framework Convention on Climate Change* was approved in 1992 and the Czech Republic joined this convention on the basis of the Resolution No. 323 of the government of the Czech Republic of 16.6.1993.

According to Article 2 of the Convention, its main objective is the "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". It is based on principles of common but differentiated responsibilities of individual states for the future development of the planet and, among other things, requires contracting states to formulate, implement, publish and regularly amend *national programmes* containing measures to alleviate impacts of such change. They can be summed up in two fundamental categories:

- *Measures to reduce greenhouse gas emissions* (CO_2, CH_4, N_2O, PFCs, HFCs, SF_6) and increase the level of their drops (absorption of gases due to land use changes).
- *Adaptation measures* increasing the capability to change those sectors of human activity that will be most affected by climate change (forestry, agriculture and water management).

In December 1997, at the 3rd conference of state parties the Kyoto Protocol to the UN Framework Convention on Climate Change was adopted. It requires from the so-called Annex B countries (listed in the Annex to the Kyoto Protocol) a total of 5.2% in *quantitative emission limitation or reduction commitments* of the six global greenhouse gases until the first commitment period (2008-2012) compared with the 1990 level. It also agreed on methods and flexible instruments as to how this could be achieved. The requirement for reduction concerns six greenhouse gases expressed in the form of the so-called aggregate balances of CO_2 emissions, i.e. the emission value that with the help of global radiation gas effectiveness factors assesses their different impact on total climate change. The resulting balance value also includes emission drops. In case that during the first commitment period a contracting state has reduced the resulting emissions by a greater amount than required by the Kyoto Protocol, it can use these reserves to comply with its commitment during the next period and, if the rules for international emissions trading are approved, it may even sell a certain amount of this "hot air" at a market price.

To fulfil the reduction commitments, according to the Protocol it is necessary to use primarily approaches and measures resulting from real national reductions. As flexible mechanisms, *joint implementation* (JI) may also be used; their principle would be to direct reduction activities to those countries in which the related costs are significantly lower. The Protocol also allows *emission trading* among the Annex B states. International rules for such trading are currently being negotiated that would guarantee sufficient transparency and controllability of these transactions. The Protocol also states a number of basic mechanisms that must be applied in national strategies in order to comply with the reduction objectives.

Position of the Czech Republic and Presuppositions for Fulfilment of Obligations

The Protocol requires that the Czech Republic must achieve until the first commitment period an 8% reduction of its greenhouse gas emissions compared with the 1990 level, i.e. the same reduction value as required for EU states. Through resolution No. 669 of 12.10.1998, the Czech government agreed to sign it and charged the ministers of the environment, foreign affairs, industry and trade, agriculture, transport and communications and finance, after the document comes into force, to assure its implementation and to submit the strategy of climate protection in the Czech Republic (points III/2 and III/3 of the Resolution) to the government. The Czech Republic signed the Kyoto Protocol on 23 November 1998.

The current energy intensity in the Czech Republic is among the highest in the world. Gross consumption of primary energy resources is approximately 170 GJ per capita what, with regard to the structure of energy resources, also results in a high level of total greenhouse emissions per capita of 14.4 t of CO_2 (the current average in economically advanced states is less than 13 tons of CO_2). This is also the reason for an increased responsibility of the Czech Republic to achieve the required emission reductions.

Between 1990 and 1994, greenhouse gas emissions in the Czech Republic decreased by 24%, in 1995 they stabilised and in 1996 showed a 4.6% growth that slowed down to a 1.6% increase in 1997. In 1990, total emissions in the CO_2 equivalents were 187.5 million tons, in 1997 they had dropped to 151.6 million tons. This almost 20% reduction until 1997was due both by the decline of economic activity and a series of investments in modern technologies with higher energy efficiency.

In 1996, assuming a 4-5% annual growth in GDP, two scenarios for emission development were elaborated based on the assumptions that the Clean Air Act would be fully and timely applied and the Temelín nuclear power plant would enter into operation. The basic scenario (without any specific reduction measures) projected a gradual emissions growth until 2010 to

the level of the reference year 1990. The optimistic scenario (with a full application of all available potential measures) projected for the same period reduced emissions by almost 20%. These scenarios formed the basis for the Czech negotiations position at COP 3 in Kyoto. By end of 1997 these scenarios were adjusted based on the new economic development:

- *The "high-growth" scenario* (in the next few years current economic stagnation will lead to medium economic growth rates) *leads to a resulting 10% reduction.*
- *The "low-growth" scenario* (economic slowdown will continue and later be followed by medium economic growth) *leads to a reduction of more than 15%.*

These modified scenarios shift the growth part of the emission curve by several years. This is due to the economic slowdown since emission projection depends on the rapidity of technical and economic changes in energy consumption, on the investments devoted to replacement of technologies and on the total GDP development. Resulting projections of greenhouse gas emission development significantly depend on the accuracy of the estimates of the macroeconomic development of the Czech Republic in the required time frame, that is in particular for the states in transition to a market economy, at present very problematic. Nevertheless, the Czech Republic should not have major problems until 2012 with the fulfilment of the Protocol's reduction objective.

A significant share of the achieved reduction can be accounted for the general economic decline in the initial period of the transformation process in 1990-1993 and the partial restructuring of industry. Although the Czech Republic´s emission growth trend after 1995 is not alarming, a gradual stabilisation and reduction measures must be implemented now. The main reasons for this are:

With the assumed development of the Framework Convention process, determination of a higher reduction objective can be expected for the second commitment period (probably 2013-2017). If the Czech Republic is able to fulfil the reduction objective for the period 2008-2012 with a reserve the acquired difference in the balance may be transferred to the next period, and possibly, in the case of rules being adopted for emission trading, sold at a market price to those states that will not be able to fulfil the objective. The costs for emission reduction will grow over time, therefore, it makes sense to use the economic transformation process and the ongoing modernisation of industry for the implementation of corresponding measures as soon as possible, thus, with lower costs.

The European Union considers the protection of the global climate system to be extremely important. Since 1997, the Czech Republic and the EU had intensive consultations on climate issues and it is expected that this question will be a very significant issue in the EU accession of the Czech Republic. Thus, it is necessary that already in the pre-accession period this area of environmental protection should be included among the national priority development objectives. Therefore, the protection of the global climatic system is reflected in the current Czech *Environmental Policy* and subsequently additional fundamental strategic documents must be approved by the government. The UNFCCC implies that strategic decisions must be taken jointly by the ministries of industry and trade, transport, agriculture and finance according to government Resolution No. 669/98.

Due to the significant potential of greenhouse gas emission reductions, advantageous initial conditions and favourable development projections in the Czech Republic until 2010, it is possible to fulfil point III/1b of government Resolution No. 669 of 12.10.1998 and start the ratification process of the Kyoto Protocol already in 1999 what appears to be and it would demonstrate on the international scene the determination of the Czech Republic to significantly contribute to resolving the most crucial problem of global environmental protection.

Key Elements of the Greenhouse Gas Emission Reduction Strategy

The main strategic directions of emission reduction and climate change alleviation must be balanced and mutually interconnected. It is necessary that they *respect both the economic needs and possibilities of the state and the population.* They can be seen especially in a wide spectrum of measures connected with energy saving and in an increased use of what is in accordance with the official environmental policy, the energy efficiency and the renewable energy programme, the contents of the *energy policy*, and with the programmes of the State Environmental Fund and the Czech Energy Agency. It is necessary that the implementation of these programmes will significantly influence future emission reductions in the Czech Republic.

Energy saving must presently be considered as the single most important emission reduction potential. Support for such saving programmes must lean on market stimulation that should open up entrepreneurial prospects in energy services when the purchase sale of energy-saving equipment will be more profitable for companies than selling energy. The reform of energy prices must be completed, production subsidies abolished, external costs (costs for ameliorating environmental damage) included in prices and gradually domestic energy prices must reach the level in neighbouring countries. The development of energy-efficient technologies may be considerably supported by a focused information campaign, certification and standardisation of energy products and equipment, energy audits, the extension of advisory services, and the promotion of development programmes etc.

The objective of the programme on an extended use of *renewable energy sources* is to support the development and implementation of facilities for energy production from economically acceptable renewable sources. Under the conditions of the Czech Republic, the recovery and construction of small hydro sources is considered, as well as the use of biomass and geothermal energy and, to a limited extent, also of solar and wind energy. Other requirements for using these sources should not exceed the framework of the state programme of energy saving and wider use of renewables. As in the case of energy saving, research, development and the role of demonstration projects should be emphasised.

Measures in the Energy Production and Consumption Sector

The total share of the *energy sector* in the Czech Republic (including the sectors of *industry, transport, commerce, housing and civic amenities*) in the total aggregate balance of greenhouse gas emissions is at present approximately 85%: energy production accounts for 39%, industrial power engineering for 30%, transport for 8%, the commercial sphere and housing and civic amenities also for 8%. Close attention must be given to measures that force or otherwise motivate producers, distributors and consumers to save and to use energy more efficiently. They can be divided into those that:

- inform producers and consumers about methods of achieving savings;
- limit the selection of energy appliances and equipment and affect the behaviour of consumers;
- require changes in the structure of energy prices.

There are a number of other possibilities (restructuring of industry, environmental measures not directly related to climate change, measures in the transport sector etc.) that may be reflected in energy savings and positively affect the overall technological development of the energy sector, especially the behaviour of final users. The basic source for savings is to reduce the level of *demand for energy* and its final consumption, what can be achieved through:

- *Rectification of the distorted price and tariff structure* of energy commodities and services. Current problems include the continuation of the so-called cross subsidies for energy and

gas prices for households, the effect of subsidised prices and prices for other consumers and energy companies, the non-existence of tariff structures for natural gas and central heat supplies. For the rational functioning of the electricity and gas market it is inevitable to gradually remove price subsidies for households and combine the process of price rectification with the reconstruction of tariff systems and, at the same time, establish an effective regulatory body.

- *Information and national technical education*, increasing the population's consciousness on the possibilities to use more efficient and energy-saving equipment.
- *Changes in credit policy* for small and medium-sized entrepreneurs concerning the implementation of more energy-efficient production technologies.
- *Obligatory carrying out of energy audits,* particularly for every legal and natural person applying for state subsidies in the area of state support for fuel- and energy-saving programmes, for specified facilities in state ownership or with its majority participation, for entrepreneurial subjects with high energy consumption and for important producers of heat and electricity from heat processes preparing the construction of new and reconstruction of existing sources and the lacking implementation of combined heat and power generation.
- *Introduction of obligatory labelling* for energy appliances, mostly determined for households, shops and services, the aim of which is to inform consumers on the energy consumption of products and to convince them to buy products with lower energy requirements; this measure will also motivate producers to innovate in the desired direction.
- Extension of special *advisory services* in connection with introduction of energy standards.

In the area of *energy production*, reduction of greenhouse gas emissions may be achieved by:

- Full *abolition of energy production subsidies* (especially for fossil fuels) and parallel creation of a new energy tariff regime that would reflect production and distribution costs and also ensure an adequate profit for producers, allowing them to install new technologies.
- Support of *combined heat and power generation* during construction of new and reconstruction of old sources.
- Promotion of the use of *gas in towns* and villages especially for cogeneration and for the parallel use of local secondary energy sources for heat supply.
- Support for the *use of carbon-free fuels and charges for energy use and CO_2 emissions*.
- Elaboration of *energy audits* for energy producers and important consumers.
- *Voluntary agreements* with energy producers on increasing energy efficiency of sources.

According to OECD and EU studies a strong tool for emission reduction is the introduction of an *energy and carbon tax*. Its application can decrease negative impacts on the environment and subsequent external costs. The resulting goal is to support the use of fuels with low carbon content and renewables. Since the introduction of such a tax will also be reflected in prices of final products, this tool can be considered sufficiently effective only if applied by a higher number of states. Otherwise, there may be a deformation of the international market relations. Thus, it is necessary to respect harmonisation of the current legislation with that of the EU. Another efficient mechanism is the elaboration of energy master plans as in the Czech Energy Economy Act that specifies the conditions for an economic production, distribution, and consumption of energy. Several proposed measures are included in the *Proposal of Real Intentions of the Energy Economy Act* that was jointly prepared by the Czech ministries of industry and trade and the environment.

Measures in the Transport Sector

During the last years, CO_2 emissions from transport have fluctuated. From 1992-1994, the annual growth was roughly 8%, in the late 1990s was is stable, with slight fluctuations. Forecasts on the future development assume that if the adopted reduction measures are taken, total CO_2 emission will reach an annual growth with a decreasing trend ranging between 4 and 1%. Several effective measures were already formulated in the *adopted transport policy* that support:

- development and introduction of road, railway, water and air transport means complying with the standards of relevant international bodies on their effect on the environment and safety;
- gradual introduction of economic tools (including internalisation of external costs) aimed at a strengthened application of economically acceptable transport systems and means and thus decreasing the environmental burden;
- gradual transfer of parts of the passenger traffic and truck loads from road and air transport to railway combined with transport on water;
- development of other types of transport through the building of adequate infrastructure.
- preference for public transport, introduction of integrated transport systems and development of their infrastructure;
- improvement of the organisation and regulation of road transport (more effective systems of traffic control, building of separate car parks etc).
- Development of alternative types of vehicle engines.

Measures for Waste Management

Greenhouse gas emissions from waste (methane release from landfills, refuse incineration) may be influenced by the methods of *waste disposal.* A significant contribution may be *waste sorting* at the level of producers that may also affect energy consumption during recycled waste material processing and extend entrepreneurial opportunities

Agriculture and Forestry Measures

Measures that were adopted in both sectors affect both CH_4 and N_2O emission reduction (agriculture) and decrease of CO_2 emission through its absorption (forestry). However, in the Czech Republic, these sectors have relatively minor importance compared with the energy, industry, housing and transport sectors. In agriculture and forestry it is rather necessary to focus on the preparation of suitable adaptation measures and thus increase their ability to adapt to the risk of possible climate change in the future.

Science, Research, Education and Public Information

In November 1998, the 4th conference of state parties (COP 4) to the UNFCCC in Buenos Aires approved a resolution calling for an intensification of support for science and research on climate change, adaptation measures, the establishment of systems improving the quality of greenhouse gas emission monitoring, including its absorption, and offering more precise long-term projections of emissions and greenhouse gas drops. This work is carried out in co-operation with the activities of the IPCC. But it also requires increased support on national levels. According to resolution (14/CP.4) it is necessary that within the framework of the *"Science and Research - Atmosphere Programme"* projects are launched on:

- more precise scenarios for climate change projection on the Czech Republic with regard to regional changes in Central Europe;

- impacts of territorial scenarios of climate change projection and air pollution (including effects of CO_2 concentrations) on physiological processes and hydrological regimes of individual sectors: and
- detection of the vulnerability of the Czech Republic due to possible climate change to select suitable adaptation measures.

The Ministry of the Environment should finance studies that monitor annual Czech greenhouse gas emissions (emission inventories) on a regular basis and make them more precise, based on internationally adopted methodologies. This refers to the fundamental obligation of the Czech Republic under the UNFCCC and in fulfilment of EU Directive No. 93/389/EEC. In 2000, an update of existing greenhouse gas emission projections must be carried out for the time frames of 2005 and 2010, possibly even up to 2020. Emission inventories and projections of emission developments will be a fundamental basis for the preparation of the third national communication that must be submitted by 30.11.2001.

This work could be linked to the already drafted basic scenarios on the climate change impact projection for the Czech Republic and estimates of its possible vulnerability, as well as to the time series of greenhouse gas emissions for 1990-1997. Support is also needed for departmental research tasks that are closely linked to the measures in individual sectors, and educational, and public information programmes. Especially in these two areas, the Czech Republic owes a considerable debt to the international community, as was stated at an international audit of the second national communication of the Czech Republic on its compliance with the obligations elaborated by a UN international expert team in Prague on 1 to 5 February 1999.

Strategy of International Cooperation

Joint implementation measures for the reduction of greenhouse gas emissions on an international level that are defined in Articles 6, 12 and 17 of the Kyoto Protocol may offer in the future effective supplementary instruments for emission reduction. The basic Czech strategy in complying with Article 13 of the Kyoto Protocol prefers practical measures from the national reductions to these "flexible mechanisms". If joint measures are implemented in the future, priority will be given to emissions trade among Annex I states especially with EU states. Then the Clean Development Mechanism with non-Annex I countries will be considered in developing countries. The substance of these joint projects is the implementation of reduction activities in countries where the costs for emission reductions are lower. The relevant project must be verified in advance and the participating countries must also mutually agree on sharing the investment costs and subsequent profits from the reduced emissions. Such agreements between Amendment I states (*joint implementation*: JI) must be signed in accordance with general rules that are under preparation for oversight and verification of projects on an international level and that may not be adopted before the end of 2000.

Until 2000, a pilot phase of the *activities implemented jointly* (AIJ) among Annex I states is being carried out. These measures are based on analogous principles as in the case of JI and are not connected with emission credits among partner states. Experience from the evaluation of this pilot phase will be used for the preparation of the rules for JI projects.

In the Czech Republic, the responsible body for the adoption and control of these contracts or agreements in the pilot phase of AIJ projects and also for JI projects will be the Ministry of the Environment that updates the existing obligatory criteria for their future implementation on the Czech territory in accordance with international rules. In order to realise the objectives of the UNFCCC and of the compliance of the Czech Republic with its obligations, the volume of aggregate emissions the Czech Republic would transfer to other states will be limited. Such measures implemented in compliance with international rules should guarantee the national

potential for emission reductions and, at the same time, the fulfilment of the obligation of the Czech Republic. Such projects will only be adopted as JI projects that are primarily focused on greenhouse gas emission reductions and that will simultaneously fulfil the conditions of energy efficiency and air pollution control in the Czech Republic. This must be demonstrated in an expert opinion that must be submitted by the proponent at his own expense. Those efforts will be excluded as JI projects that are motivated only by the need to fulfil emission limits and other conditions for operation of stationary air pollution sources in the policy of Act No. 211/ 1994 and Regulation No. 117/1997. With respect to *emission trading* the attitude of the Czech Republic is to constantly observe this issue and to coordinate relevant procedures with EU states. However, with respect to international negotiations, this "environmentally risky" mechanism so far may not be considered as too promising and no account can be started before internationally valid rules for emission trading have been adopted.

Estimate of Possible Emission Potential of the Czech Republic for the Flexible Mechanisms of the Kyoto Protocol

The following estimates are based on the adjusted projections of greenhouse gas emissions until 2010 (table F-1)

Table F.1: Resulting CO_2 Emissions Equivalents in Mt

1990	2008-2012	1997	2010	2010	2010
	Objective of the Czech Republic according to the Kyoto Protocol		"high growth" scenario	"low growth" scenario	estimated potential for Kyoto flexible mechanisms
187.5	**172.5**	**151.4**	**169.0**	**157.0**	**3.5 – 15.5**

Source: Ministry of the Environment of the Czech Republic: *Strategie ochrany klima-tického systému Zeme v Ceské republice* [Strategy of the Earth Climate Protection in the Czech Republic] (Prague, Ministry of the Environment of the Czech Republic, 1999).

According to these estimates, the possible *annual* emission potential for flexible mechanisms on the level of approximately *350 - 1550 kt of* CO_2 can be expected (the value from the table is equally distributed for the 10-year period). Since the projections strongly depend on the assumed growth rate, it is very difficult to offer qualified estimates for the time frame of the end of the 1st commitment period (average of 2008-2012) of the Kyoto Protocol. This is a general problem for all transformation states. But in any case, it is desirable to start measures for greenhouse gas emission reduction as soon as possible. It would allow a suitable potential for negotiations with the EU or possible emission trading (based on international rules) at the end of the first commitment period of the Kyoto Protocol. Several countries will have problems fulfilling their obligations and the price for emission rights will significantly increase.

Due to the uncertainties on the size of the emission potential of the Czech Republic and due to the lacking international rules for JI projects and emission trading, the preparation of new JI projects should be carried out very cautiously. All general principles stated here must be observed. A part of them also refers to the administrative assurance of their qualified negotiation and approval, including control mechanisms. Until internationally valid rules and a regime for compliance with the Kyoto Protocol has been adopted, no negotiations on future emission credits should start. This also applies to approaches on *emission trading* and possible negotiations on *CDM projects* (with states Non-annex I states).

Conclusion

To realise this *Strategy for Global Climate Protection in the Czech Republic*, the Czech government will fully support international cooperation under the obligations of the UNFCCC and the Kyoto Protocol. The three flexible mechanisms for the fulfilment of the Kyoto Protocol have not yet been completely worked out. In the near future they will be the subject of further complex negotiations, both among states with differing levels of economic and social development and within EU countries and states with transforming economies. Therefore, this document should be considered as an open material oriented at this parallel activity and not as a subject of a single campaign. In agreement with Resolution No. 669 of the Czech government of 12.10.1998, its basic propositions must be reflected in the detailed materials of individual departments that can contribute to a reduction of the risk of negative impacts on the global climate system. This material also takes the resolution No. 472 of the Czech government 12.5.1999 into account.

Appendix G: On the Project

G.1: English Version: On the Project

G.1.1: Project description and project partners

Since the early 1990s, the Czech Republic has been a candidate for membership in the European Union. In 1998, as one of the five Central and Eastern European Countries, the Czech Republic was selected for the fast track to EU membership. At the European Council meeting in Helsinki in December 1999, the European Union decided to launch membership negotiations with the other five CEECs in the slow track and to offer Turkey the status of a candidate.

Based on the Copenhagen criteria of 1993, the European Commission is negotiating with all 12 countries on 31 different dossiers, including energy and environment. The European Union has entered membership partnerships with all 12 candidate countries to assist them in adapting to the *acquis communautaire*. Already during the negotiation process, considerable efforts are required from the Czech Republic to comply with the legal standards of the European Union.

The project: „Energy and Environment in the Czech Republic" aims at an assessment of the present situation in the energy and environment sectors in the Czech Republic. Therefore, both the developments since the turn of 1989 and the requirements with respect to EU membership will be analysed. Furthermore, with this project, a positive contribution is to be made for a closer co-operation in the technical and administrative area between German and Czech partners. For these reasons, a mutual discussion process and transfer of knowledge and technology are to be initiated in the energy and environment sectors. In March and in May 2000, in two workshops the project results were discussed between the German and Czech partners.

The following regions have been in the centre of this project:

- *Northern Bohemia* has most important raw material resources of the Czech Republic, including lignite. Thus, this region also has the largest energy production facilities in the country.
- The *Ostrava region* has been a traditional energy intensive industrial site in Northern Moravia and the centre of Czech hard coal mining. Furthermore, Ostrava is a major transport centre linking Austria, Poland and the industrial city Brno.
- As the capital of the Czech Republic, *Prague* is the centre of industrial production with a highly sophisticated infrastructure. 12% of the Czech population live in the central Prague region.

Given the good bilateral relations between the Czech Republic and Germany, EU membership of the Czech Republic has been a major German political interest. For this very reason, this project on „Energy and Environment in the Czech Republic" was launched by German Federal Environmental Agency (UBA) with the support of the Czech Environment Ministry.

The following partners collaborated in this project: a) Federal Environmental Agency (*UBA*), Berlin, b) *GERTEC Engineering Company*, Ltd., Essen, c) *SEVEn* - The Energy Efficiency Centre, Prague; d) *ITUT e.V.*, Leipzig, e) *Czech Energy Agency*, Prague, f) *German-Czech Chamber of Commerce in Prague*, g) *AFES-PRESS e.V.*, Mosbach, h) *Stredisko pro úspory energie, s.r.o.*, Litvinov, i) *Euro Region (Euroregion) Nisa*, Liberec.

G.1.2: Subcontractor: SEVEn, Stredisko pro efektivní vyuzívání energie, o.p.s.

The Energy Efficiency Center

SEVEn, The Energy Efficiency Center, is a non-profit, non-governmental organisation founded in Prague in 1990. SEVEn's mission is to protect the environment and to support economic development by finding more efficient ways to use energy. SEVEn focuses on developing business activities related to energy efficiency and on finding cost-effective ways to save energy.

It strives to realise the combined goal of developing the economy while protecting the environment. SEVEn works to overcome barriers to realising the cost-effective potential for energy savings in households and in the industrial and commercial sectors. In its consulting-related activities, SEVEn combines its technical knowledge of the possibilities for energy efficiency with economic analyses, comprehensive evaluations including environmental effects, proposals for optimal methods of financing, and the preparation of business plans for actual projects.

SEVEn cooperates with domestic and foreign governmental bodies and organisations, financial institutions, private companies, towns and municipal administrative bodies, schools and hospitals, energy suppliers and other interested groups, NGOs, and individuals. Among SEVEn's clients are organisations such as the United Nations, the World Bank, US AID, PHARE, OECD, the City of Prague, Pilsen and other municipalities in the Czech Republic, including small villages with less than 1000 inhabitants, the Ministry of Environment, the Ministry of Industry and Trade, national power and gas utilities CEZ a.s., Transgas s.p., regional power and gas distribution utilities, coal mining company MUS a.s., Business Chamber of the Czech Republic, and other organisations.

SEVEn is an independent organisation. It is not affiliated through ownership nor in any other way to any additional domestic or foreign companies. SEVEn covers the costs of its activities through contracts, proceeds from consulting, and, in exceptional cases and to a limited degree, grants. SEVEn's non-profit status is dependent upon the fact that it does not have owners who could eventually use SEVEn's proceeds or assets for purposes other than to meet the organisation's goals. Revenue may only be used in accordance with SEVEn's mission. A Board of Directors ensures SEVEn's compliance with its non-profit status and oversees its financial management. The Board's members are internationally recognised individuals in the energy and environmental sectors from the Czech Republic. They have experience working in state administration, universities, and/or the commercial sector.

SEVEn's activities include:

- cooperation in drafting legislative measures concerning energy use, energy policies, and regulation of energy companies;
- drafting and preparing government policies to reduce CO_2 emissions and to increase energy efficiency;
- proposing and evaluating specific ways to use state subsidies and funds to support the efficient use of energy;
- developing private business activity in the field of energy efficiency and spreading information related to business experiences, energy-saving technologies, methods of financing energy-saving projects, and non-traditional business methods (Energy Performance Contracting);
- performing strategic environmental assessment for energy strategies;
- preparing energy plans for towns and regions with active approaches to reducing energy losses;

- performing energy audits on buildings and industrial facilities and preparing economic evaluations and proposals for measures to reduce energy consumption, including ways to finance these measures;
- completing feasibility studies and business plans for private investors and towns in regard to supplying and utilising energy in a cost-effective manner;
- publishing overviews of traditional and non-traditional methods of financing;
- engaging energy suppliers in energy-saving projects and demand-side management activities in the Czech context;
- organising seminars and training sessions and completing publications for energy consumers, companies, and representatives of town and state administration on preparing energy projects, feasibility studies, and business plans; on obtaining project financing; and on new forms of business activities in the energy efficiency field;
- publishing the quarterly newsletter "News at SEVEn" for domestic and foreign readers on energy efficiency activities in the Czech Republic;
- hosting the largest international conference in Central and Eastern Europe specifically focused on the energy efficiency business (Energy Efficiency Business Week);
- providing free basic consulting on energy savings in households.

SEVEn's Management:

- Exekutiv Director: Jaroslav Maroušek (Deputy: Jiří Zeman)
- Board of Directors: Jan Jícha, Jan Kára, Bedřich Moldan
- Advisory Board: William U. Chandler, Hans Nilsson, Slawomir Pasierb, Hans-Eike von Scholz
- Supervisory Board: Jiří Dudorkin, Marie Košťálová, Vladimír Novotný

Contact for this Project:

Mr. Jiří Zeman
SEVEn, Slezská 7, 120 56 Praha 2 , Czech Republic
Phone: 420-2-2425 2115
FAX: 420-2-2424 7597
E-Mail: Jiri.Zeman@svn.cz
Internet: http://www.svn.cz

Mrs. Marie Havlíčková
SEVEn, Slezská 7, 120 56 Praha 2 , Czech Republic
Phone: 420-2-2424-7552
FAX: 420-2-2424 7597
E-Mail: Marie.Havlickova@svn.cz

G.1.3: On the authors

Jiři Zeman received his degree in energy economics and Management in 1987 from the Czech Technical University in Prague. Afterwards he worked at the West-Bohemian Power Distribution Company and at the energy research institute VÚPEK in Prague. Since 1991, Mr. Zeman has been with SEVEn where he leads projects focused primarily on the liberalisation in the area of power engineering, the development of municipal energy plans, energy policy, regulation of energy companies and DSM. In 1992, with the support of the organisation NRDC he studied integrated resource planning and demand-side management during a three-month fellowship in the USA. Mr. Zeman is author or co-author of dozens of articles for SEVEn, including the study *Providing for Pilsen's Energy Needs Efficiently*, a similar one for Český Krumlov, he conducted projects, for example, on DSM in the sector of the gas industry, draft and implementation of the model of deregulation of the power industry in the Czech Republic and he gave many presentations at international conferences. Among his main professional interests are cost-effective energy conservation as part of how an energy company does business. Mr. Zeman serves as SEVEn's Deputy Director and is the head of the section of environmental strategies and power-engineering policy.

Marie Havlíčková graduated in 1965 from the Electrical Faculty of the *Czech Technical University in Prague*. She specialised in control systems and on measuring and controlling technology. After completing her studies she worked at the Electrical Testing Institute, testing and preparing evaluation of electrical components. From 1977 to 1990, she worked for a company specialised on industrial energy efficiency and energy savings; last as head of department. She participated in the elaboration of proposals on specific energy efficiency projects for industrial firms. After 1990, she worked at the Research Institute for Construction and Architecture as head of the department for policies and programmes, and in the Prague branch of the Japanese Chiyoda Corporation that carried out the project of desulphurisation of the Tušimice II power plant. Since 1995, she has been an employee of SEVEn where she prepares analyses and assessments of energy efficiency projects. She focuses on technical and economic aspects, energy efficiency and environmental issues.

Jana Szomolanyiova graduated from the Faculty of Social Sciences at *Charles University in Prague* in economics in 1997. In 1996 she attended the MBA course at the University of Wales in Aberystwyth. In addition, she participated in economic courses in Sweden and Germany. She has been working with SEVEn since 1997 on the following issues: strategies to promote energy efficiency and renewable energy and lowering of the emissions; economic tools of environmental protection especially on energy taxes and emission levies; energy policy and liberalisation of the energy markets; criteria for the evaluation of energy efficiency projects and on projects for the utilisation of renewable energy resources

Stanislav Travniček graduated at the Department of Energy Economics and Management of the Electrical Faculty at the *Czech Technical University in Prague* in 1998. Simultaneously he worked at the IBM - CR Company, Department of PGS (Personal System Group), focusing on marketing support, PC installation and competitive marketing. Since 1998, he has been working with SEVEn. He prepares financial analyses and economical assessments of energy efficiency projects. At present he studies for a PhD (doctoral study) at the Department of Economics, Management and Humanities of the Czech Technical University in Prague where he is also lecturing on financial aspect of projects.

G.1.4: Abstract of this Study

Energy and Environment in the Czech Republic

Based on a broad analysis of energy supply and of energy consumption in the following sectors of industry, construction, transport, commerce and services, agriculture and households in the first part the report by SEVEn evaluates the total supply of coal, natural gas, district heat and electricity in the Czech Republic also with respect to energy efficiency and environmental protection. This includes especially energy saving in housing, application of co-generation of power and heat; use of renewable energy sources.

For these sectors, the report covered both existing constraints and measures for overcoming them. It also analysed what is of special importance for the Czech Republic with respect to the planned EU accession of the Czech Republic. The analysis for the whole country, is followed by regional studies on Northern Bohemia, the region around Ostrava and Prague that are of high importance for the Czech Republic due to their high economic potential and their severe environmental problems. The analyses on these three regions focus on the following structure: economic importance and development of the region as well as significant industrial centres, energy and environmental situation as well as priorities for environmental protection, foreseeable trends of regional development, analysis of the special strengths and weaknesses of each region.

Then the framework for energy and environment policy in the Czech Republic is analysed with respect to:

- energy and environment policy,
- energy and environment legislation,
- international linkages.

This is followed by an outlook on future developments of the energy economy and their implications for the environment. Based on this assessment the existing deficits are identified that must be minimised with regard to EU membership. The report concludes with a compilation of the national, bilateral, and international financial and grant programmes to improve energy efficiency as well as the environment and climate policies of the Czech Republic.

Contact person for this study

Mr. Jiří Zeman
SEVEn, Slezská 7, 120 56 Praha 2 , Czech Republic
Phone: 420-2-2425 2115
FAX: 420-2-2424 7597
E-Mail: Jiri.Zeman@svn.cz
Internet: http://www.svn.c

Mrs. Marie Havlíčková
SEVEn, Slezská 7, 120 56 Praha 2 , Czech Republic
Phone: 420-2-2424-7552
FAX: 420-2-2424 7597
E-Mail: Marie.Havlickova@svn.cz

G.2: Deutsche Fassung: Zum Projekt

G.2.1: Projektbeschreibung und Projektpartner

Die Tschechische Republik bereitet sich auf ihre EU-Mitgliedschaft vor. Neben Estland, Polen, Slowenien und Ungarn zählt die Tschechische Republik zu den fünf mittel- und osteuropäischen Staaten, mit denen seit März 1998 konkrete EU-Beitrittsverhandlungen geführt wurden. Von der EU-Kommission werden in den Beitrittsländern die Themen Umweltschutz, Entwicklung von Strukturen und Kapazitäten zum Monitoring und die Umsetzungskontrolle für die Luftreinhaltung und den Klimaschutz als eine mittel- und langfristige Aufgabe angesehen. Die angestrebte Mitgliedschaft in der EU erfordert bereits während des Beitrittsprozesses erhebliche Anstrengungen auf der tschechischen Seite, um die erforderliche Angleichung an die Standards der EU zu erreichen. Vor diesem Hintergrund wurde auf Initiative des Umweltbundesamtes mit Unterstützung des Tschechischen Umweltministeriums das Projekt „Energie und Umwelt in Tschechien" durchgeführt.

Ziel des Projektes „Energie und Umwelt in Tschechien" ist zum einen die Bestandsaufnahme der gegenwärtigen Situation der Tschechischen Republik in den Bereichen Energie und Umwelt. Dabei werden die zurückliegenden Entwicklungen seit der politischen Wende 1989 sowie die Anforderungen mit Blick auf den EU-Beitritt betrachtet. Zum anderen wird mit dem Projekt beabsichtigt, eine konstruktive Basis für eine engere Zusammenarbeit im technischen und administrativen Bereich zwischen deutschen und tschechischen Partnern zu schaffen. Dazu soll ein gegenseitiger Diskussionsprozeß und Wissenstransfer in den Bereichen Energie und Umwelt initiiert werden. Der Einstieg in diesen Prozeß erfolgte mit zwei Workshops im März und Mai 2000, bei denen die bis dahin erarbeiteten Projektergebnisse und die daraus resultierenden Perspektiven mit deutschen und tschechischen Partnern erörtert wurden.

Im Mittelpunkt des Projektes standen folgende Regionen:

- In *Nordböhmen* befinden sich die wichtigsten Rohstoffvorkommen der Tschechischen Republik. Daraus resultierend befinden sich in dieser Region die bedeutendsten Energieerzeugungsanlagen des Landes.
- Die *Region Ostrau* ist ein traditioneller energieintensiver Industriestandort in Nordmähren und Zentrum des tschechischen Steinkohlebergbaus. Ostrau ist darüber hinaus der Verkehrsknotenpunkt zwischen Österreich, Polen und der Industriestadt Brünn.
- *Prag* ist als Hauptstadt der Tschechischen Republik eine der bedeutendsten Städte in Europa. Als Zentrum der industriellen Produktion gibt es in Prag eine gut entwickelte Infrastruktur. In der Prager Region leben 12% der tschechischen Bevölkerung.

Aufgrund der guten Beziehungen zwischen der Tschechischen Republik und Deutschland ist der Beitritt der Tschechische Republik in die EU für Deutschland von großem Interesse. Aus diesem Grund initiierte das Umweltbundesamt das Projektes „Energie und Umwelt in Tschechien" mit Unterstützung des Tschechischen Umweltministeriums.

Folgende Unternehmen und Institutionen sind an dem Projekt „Energie und Umwelt in Tschechien" beteiligt: a) *Umweltbundesamt*, Berlin; b) *GERTEC GmbH Ingenieurgesellschaft*, Essen; c) *SEVEn* - Energieeffizienzentrum, Prag; d) *ITUT* e.V., Verein zur Förderung des international Transfers von Umwelttechnologie - Leipzig; e) *Tschechische Energieagentur*, Prag; f) *AFES-PRESS e.V.*, Mosbach; g) *Stredisko pro úspory energie, s.r.o.*, Litvinov; h) *Euroregion Nisa*, Liberec; und i) *Deutsch-Tschechische Industrie- und Handelskammer*, Prag.

G.2.2: Unterauftragnehmer: SEVEn,

Stredisko pro efektivní vyuzívání energie, o.p.s. The Energy Efficiency Center

SEVEn - das Energieeffizienzzentrum ist eine gemeinnützige, unabhängige Nichtregierungsorganisation, die 1990 in Prag gegründet wurde. SEVEn verfolgt das Ziel, einen kosteneffizienten und wirksamen Energieeinsatz als Mittel zum Umweltschutz und zur Wirtschaftsentwicklung zu fördern. SEVEn arbeitet mit tschechischen und ausländischen Regierungsstellen und zentralen Organisationen, mit Finanzinstitutionen, mit Privatunternehmen, Städten, Schulen und Krankenhäusern, mit Energieanbietern, anderen gemeinnützigen Organisationen und mit individuellen Partnern zusammen. Zu den Auftraggebern von SEVEn gehören u.a. US AID, PHARE, OECD, die Weltbank, die Vereinten Nationen, Städte in der Tschechischen Republik.

Seit der Gründung hat SEVEn in vielen Projekten mit internationalen Teams zusammengearbeitet. Zu den Auftraggebern gehörten sowohl solche aus dem Ausland als auch tschechische Regierungsstellen und Unternehmen. SEVEn führte die Methode des Energie Contracting (EPC) in Mittel- und Osteuropa ein und begründete damit in der Tschechischen Republik einen neuen Geschäftszweig. Neben der Organisation von internationalen Konferenzen und vielen Regierungsaktivitäten, hat SEVEn das erste ESCo zum Einsatz von Maßnahmen des Energie Contracting in der Tschechischen Republik durchgeführt.

SEVEn hat viele Investitionsprojekte zu Maßnahmen der Energieeffizienz und der Energieproduktion, vor allem Blockheizkraftwerke bewertet. Die wirtschaftliche Analyse wurde zu einem integralen Teil der Strategie von SEVEn, um Technologien zur Energieeffizienz und zur nachhaltigen Entwicklung zu unterstützen. SEVEn unterstützt Evaluierungen von Energieprojekten für die Weltbank, die Globale Umweltfazilität (GEF), um die CO_2-Emissionen zu reduzieren.

SEVEn gibt viermal jährlich das Bulletin: "Nachrichten von SEVEn" (auch im Internet) mit Informationen zur Energiepolitik und zu gegenwärtigen Entwicklungen und Aktivitäten im Zusammenhang mit der Energiepolitik der Tschechischen Republik in englischer Sprache heraus.

Geschäftsleitung von SEVEn

- Exekutivdirektor: Jaroslav Maroušek (Stellvertreter: Jiří Zeman)
- Vorstand: Jan Jícha, Jan Kára, Bedřich Moldan
- Beratungsgremium: William U. Chandler, Hans Nilsson, Slawomir Pasierb, Hans-Eike von Scholz
- Aufsichtsrat: Jiří Dudorkin, Marie Košťálová, Vladimír Novotný

Ansprechpartner für dieses Projekt

Dipl.-Ing. Jiří Zeman
SEVEn, Slezská 7, 120 56 Praha 2, Czech Republic
TEL: 420-2-2425 2115 FAX 420-2-2424 7597
E-Mail: Jiri.Zeman@svn.cz
Internet: http://www.svn.cz

Dipl.-Ing. Marie Havlíčková
TEL: 420-2-2424-7552
FAX: 420-2-2424 7597
E-Mail: Marie.Havlickova@svn.cz

G.2.3. Kurzfassung der Studie

Energie und Umwelt in der Tschechischen Republik

In dieser SEVEn-Studie wird ausgehend von einer globalen Analyse der Energiebereitstellung und des Energieeinsatzes in den Sektoren: Industrie, Bauwirtschaft, Verkehr, Handel und Dienstleistungen, Landwirtschaft und Haushalte zunächst der landesweite Energieeinsatz der Energieträger Kohle, Öl, Erdgas, Fernwärme und Strom untersucht und hinsichtlich der Energieeffizienz und der vorhandenen Umweltbelastungen bewertet.

Ausgehend von der Abschätzung der Energiesparpotentiale werden Schwerpunktbereiche für eine Verbesserung der Energieeffizienz und des Umweltschutzes erörtert. Hierzu gehören insbesondere: Energieeinsparung im Gebäudebestand, Anwendung der Kraft-Wärme-Kopplung, Einsatz erneuerbarer Energien.

Für diese Bereiche wurden sowohl vorhandene Hemmnisse als auch Maßnahmen zu ihrer Beseitigung erfaßt und analysiert, was insbesondere vor dem Hintergrund des bevorstehenden EU-Beitritts der Tschechischen Republik von Bedeutung ist.

Vor dem Hintergrund der landesweiten Analyse werden anschließend regionale Untersuchungen in den Landesteilen Nord-Böhmen, Ostrau und Prag durchgeführt, die hinsichtlich ihres wirtschaftlichen Potentials und ihrer Umweltbelastungen von herausragender Bedeutung für das gesamte Land sind. Die Untersuchung dieser Regionen folgt dem Gliederungsschema:

- wirtschaftliche Bedeutung und Entwicklung der Region sowie signifikante industrielle Schwerpunkte,
- Energie- und Umweltsituation sowie Prioritäten für den Umweltschutz,
- absehbare Trends der regionalen Entwicklung,
- Stärken - Schwächen - Analyse der Region.

Im Anschluß hieran wird eine Analyse der Randbedingungen im Energie- und Umweltbereich der Tschechischen Republik im Hinblick auf die Energie- und Umweltpolitik, die Energie- und Umweltgesetzgebung und internationale Verflechtungen gegeben mit einem Ausblick auf die künftigen Entwicklungslinien der Energiewirtschaft sowie deren Auswirkungen auf die Umwelt. Hieraus werden dann die noch vorhandenen und zu minimierenden Defizite im Hinblick auf den EU-Beitritt des Landes abgeleitet.

Die Studie endet mit einer Zusammenstellung der nationalen, bilateralen und internationalen Finanzierungs- und Förderprogramme zur Verbesserung von Energieeffizienz sowie Umwelt- und Klimaschutz in der Tschechischen Republik.

Ansprechpartner zur Studie

Dipl.-Ing. Jiří Zeman
SEVEn, Slezská 7, 120 56 Praha 2, Czech Republic
TEL: 420-2-2425 2115
FAX: 420-2-2424 7597
E-Mail: Jiri.Zeman@svn.cz
Internet: http://www.svn.cz

Dipl.-Ing. Marie Havlíčková
TEL: 420-2-2424-7552
FAX: 420-2-2424 7597
E-Mail: Marie.Havlickova@svn.cz

G.3: Česká verse: O projektu

G.3.1: Popis projektu

Od počátku devadesátých let je Česká republika kandidátem na členství v Evropské unii. Jako jedna z pěti zemí střední a východní Evropy (ZSVE) byla Česká republika v roce 1998 vybrána pro rychlý posun k členství v Evropské unii kromě Estonska, Madarska, Polska a Slovinska. Při setkání Evropské komise v Helsinkách v prosinci 1999 rozhodla Evropská unie zahájit jednání o členství v pomalému posunu s ostatními pěti zeměmi střední a východní Evropy.

Na základě kritéria z Kodaně z roku 1993 jedná Evropská komise se všemi 12 zeměmi ZSVE v 31 různých oblastech včetně energetiky a ŽP. Evropská unie navrhla členské partnerství všem kandidátským zemím, aby jim pomohla při osvojování acquis communautaire. Již při postupu jednání jsou od České republiky vyžadovány výkony a programy vyhovující právním normám Evropské unie.

Projekt "Energetika a živontni prostředi v České republice" směřuje k vyhodnocení současné situace v sektorech energetiky a ŽP v České republice. Budou proto analyzovány jak požadavky s ohledem na členství v EU, tak vývoj od období zlomu v roce 1989. Dále tento projekt positivně přispěje k užší spolupráci v technické a administrativní oblasti mezi německými a českými partnery. Z těchto důvodů by měl být iniciován vzájemný diskusní vývoj, transfer znalostí a technologie v sektorech energie a životního prostředí. Výsledky tohoto projektu budou diskutovány mezi německými a českými partnery na dvou seminářích v březnu a květnu r. 2000.

Regiony se speciálním zaměřením

Středem tohoto projektu budou tyto následující regiony:

- Severní Čechy – mají nejdůležitější nerostné suroviny v ČR včetně lignitu. Tento region má tudíž největší vybavení na výrobu energie v zemi.
- Region Ostrava – je tradiční průmyslovou energeticky náročnou lokalitou na severní Moravě a střediskem české těžby černého uhlí. Ostrava a je dále hlavní transportní tepnou spojující Rakousko, Polsko a průmyslové město Brno.
- Praha – jakožto hlavní město České republiky je střediskem průmyslové produkce s vysoce dokonalou infrastrukturou. 12 procent české populace žije v centrálním regionu Praha.

Společnost zajišťující financování projektu a partneři projektu

Hlavním německým politickým zájmem je členství ČR v Evropské unii při dohodnutých dobrých bilaterálních vztazích mezi Českou republikou a Německem. Právě tohoto důvodu byl projekt "Energetika a životní prostředí v ČR" zahájen Federální agenturou pro životní prostředí (UBA) s podporou českého Ministerstva životního prostředí. Ostatní partneři, kteří spolupracovali na tomto projektu (s napojením na web site partnerů) jsou uvedeni samostatně.

G.3.2: Subkontraktor: SEVEn, Středisko pro efektivní využívání energie, o.p.s.

The Energy Efficiency Center

SEVEn, Středisko pro efektivní využívání energie, je česká nevládní nezisková organizace, která byla založena v roce 1990 v Praze jako nadace. Posláním SEVEn je ochrana životního prostředí a podpora ekonomického rozvoje cestou účinnějšího využívání energie.

Ve své činnosti se SEVEn zaměřuje na rozvoj podnikání a ekonomicky efektivní hospodárné využívání energie. Touto činností směřuje ke splnění dvojjediného cíle: hospodářskému rozvoji svázanému s ochranou životního prostředí. Svou prací se SEVEn snaží překonávat bariéry, které znemožňují dostatečně zužitkovat ekonomicky efektivní potenciál úspor energie v praktickém životě v domácnostech, v průmyslu i v komerční sféře. Ve své poradenské činnosti SEVEn propojuje technické znalosti možností hospodárného využívání energie s jejich ekonomickou analýzou, celkovým hodnocením rizik včetně dopadů na životní prostředí, návrhy vhodných způsobů financování až po přípravu podnikatelských plánů konkrétních projektů.

SEVEn spolupracuje s domácími a zahraničními vládními úřady a centrálními organizacemi, finančními institucemi, se soukromými podniky, s městy a jimi spravovanými organizacemi, školami a nemocnicemi, dodavateli jednotlivých forem energie a dalšími zainteresovanými subjekty, s nevládními organizacemi i jednotlivci. Mezi klienty SEVEn se řadí takové organizace jako OSN, PHARE, OECD, US AID či Světová banka, statutární města České republiky Praha, Plzeň, ale i malé domácí obce s méně než 1000 obyvateli, Ministerstvo životního prostředí a Ministerstvo průmyslu a obchodu, ČEZ a.s., Transgas s.p., distribuční plynárenské a elektroenergetické podniky, Hospodářská komora ČR a další organizace.SEVEn je nezávislá organizace, není vlastnicky ani jiným způsobem napojena na žádné další domácí nebo zahraniční podnikatelské subjekty. Náklady na svou činnost hradí SEVEn z uzavřených kontraktů a z příjmů za poradenskou činnost, ve výjimečných případech a v omezeném množství z účelově vázaných grantů.

Neziskovost SEVEn spočívá v tom, že ze zákona nemá vlastníky, kteří by mohli eventuálně odčerpávat případný vytvořený a zdaněný zisk nebo majetek nadace pro jiné účely. Veškeré příjmy mohou být použity pouze v souladu s posláním SEVEn. Na dodržování principu neziskovosti a hospodaření SEVEn dohlíží správní rada, jejímiž členy jsou mezinárodně uznávané osobnosti v oblasti energetiky a životního prostředí a se zkušenostmi ze státní správy, univerzit i soukromého sektoru.

Aktivity SEVEn zahrnují:

- spolupráci při návrhu legislativních opatření v oblasti využívání energie, energetické politiky a regulace energetických podniků
- návrhy a přípravu vládních opatření na snižování emisí CO2 a zvyšování energetické účinnosti
- návrh a hodnocení konkrétních způsobů využívání státních dotací a fondů na podporu hospodárného užití energie
- rozvoj soukromého podnikání v oblasti úspor energie a rozšiřování podnikatelských zkušeností, informací o energeticky úsporných technologiích, způsobech financování

projektů na úsporu energie a netradičních podnikatelských metodách (Energy Performance Contracting)

- zpracování územních energetických plánů a koncepcí pro města a regiony se zahrnutím aktivních přístupů ke snižování energetických ztrát
- energetické audity budov a průmyslových technologií, ekonomické vyhodnocení a návrh vhodných opatření ke snížení spotřeby energie a způsob jejich financování
- zpracování studií proveditelnosti a podnikatelských záměrů pro investiční záměry soukromých investorů a měst v oblasti hospodárného zásobování a užití energie
- publikace přehledů o dostupných tradičních a netradičních formách financování
- zapojení dodavatelů energie do projektů úspor energie, programy řízení spotřeby -demand side management v prostředí české energetiky
- semináře, školení a publikace o přípravě energetických projektů, zpracování studií proveditelnosti, podnikatelských plánů, zajištění financování projektů a informace o nových formách podnikání v oblasti úspor energie pro spotřebitele energie, podnikatele, zástupce městských samospráv a státní správy přenos a aplikace zahraničního know-how, inovativních přístupů a nových metod podnikání do domácích podmínek
- publikace čtvrtletníku o aktivitách v České republice v oblasti úspor energie "Zprávy ze SEVEn" pro domácí a zahraniční čtenáře
- pořádání největší mezinárodní konference ve střední a východní Evropě speciálně zaměřené na podnikání v oblasti hospodárného využívání energie - Úspory energie: Energy Efficiency Business Week
- bezplatné základní poradenství o úsporách energie v domácnostech

Management SEVEn:

Výkonný ředitel: Jaroslav Maroušek (Zástupce: Jiří Zeman)
Správní rada: Jan Jícha, Jan Kára, Bedřich Moldan
Poradní výbor: William U. Chandler, Hans Nilsson, Slawomir Pasierb, Hans – Eike von Scholz
Dozorčí rada: Jiří Dudorkin, Marie Košťálová, Vladimír Novotný

Kontakt na tento projekt

Jiří Zeman:
TEL 420-2-2425 2115 FAX 420-2-2424 7597
E-Mail Jiri.Zeman@svn.cz Internet http://www.svn.cz
Marie Havlíčková:
TEL 420-2-2424-7552 FAX 420-2-2424 7597
E-Mail Marie.Havlickova@svn.cz

G.3.3: Abstrakt studie: Energie a životní prostředí České republiky – předpoklady budoucího rozvoje v souvislosti se vstupem do Evropské Unie.

V prvé části studie SEVEn je analyzována energetická náročnost ekonomiky České republiky, primární energetické zdroje a spotřeba paliv a energie v jednotlivých sektorech národního hospodářství. Popsána je rovněž situace v dodávkách uhlí, plynu, olejů, dálkového tepla a výhled jejich spotřeby. Analýza cen paliv a energie je provedena i s ohledem na postup příprav na připojení České republiky k Evropské Unii. Snižující se dopady výroby, spotřeby a přenosu energie na životní prostředí jsou dokumentovány v tabulkách emisí hlavních znečišťujících látek do ovzduší.

Další část studie je věnována energetické politice a jejím hlavním prioritám, kterými jsou úspory energie, liberalizace trhu s elektřinou a plynem a privatizace v sektoru energetiky.Pozornost je věnována vládnímu programu pro úspory energie a využívání obnovitelných zdrojů, který podporuje opatření ke zlepšení energetické efektivnosti a zlepšení životního prostředí zejména

- energeticky úsporné stavební materiály, postupy a technologie v budovách;
- instalace kogeneračních jednotek;
- instalaci a využívání obnovitelných zdrojů energie.

Jsou zde rovněž definovány překážky většímu rozšíření opatření pro úspory energie a popsány i možné finanční zdroje pro projekty energetických úspor.

Dále jsou zahrnuty informace o nové energetické legislativě, která se nyní připravuje, a která bude v souladu s odpovídajícími normami v EU a s mezinárodními závazky České republiky. Umožní postupně liberalizovat trh s energiemi, odstranit deformace v cenách energií, ale také i uvede v platnost nové povinnosti pro výrobce a dodavatele energie. Popsány jsou kroky , vedoucí k liberalizaci a časové postupy k úplné liberalizaci v energetickém sektoru. Pozornost je věnována i platnosti a přizpůsobení standardů a norem standardům EU.

Dále je analyzován rámec, daný politikou životního prostředí a jejími prioritami a rovněž hlavní legislativní normy v oblasti ochrany životního prostředí. Pozornost je zaměřena rovněž na mezinárodní smlouvy a závazky, v rámci kterých přispívá Česká republika pro zmírnění vlivu klimatických změn.

Zvláštní kapitola je věnována prioritám z energetického sektoru a sektoru životního prostředí, které je nutno řešit před vstupem do EU v různých časových horizontech a překážkám, které je nutno odstranit. Studii uzavírá soubor národních, bilaterálních a mezinárodních grantových programů pro zvýšení energetické efektivnosti, ve kterých byla, je a bude Česká republika zapojena. Samostatnou částí studie je analýza tří regionů: Severních Čech, Ostravska a Prahy, které mají jednak podstatný ekonomický význam a jednak nejvíce znečištěné životní prostředí v rámci celé republiky. Analýza se týká.

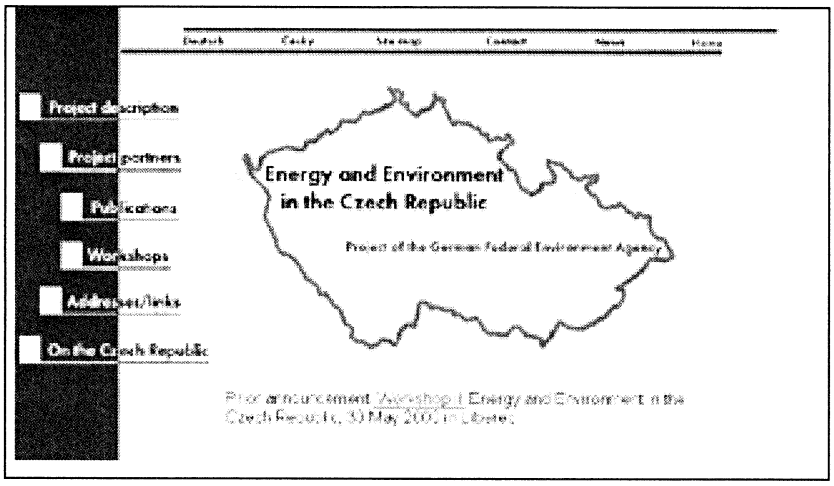
- ekonomického významu regionu;
- energetické situace a situace v životním prostředí a priorit v těchto oblastech;
- silných a slabých stránek každého regionu.

Kontakt pro tuto studii:

Jiří Zeman: TEL: 420-2-2425 2115; FAX: 420-2-2424 7597 E-Mail: Jiri.Zeman@svn.cz
Marie Havlíčková: TEL: 420-2-2424-7552 FAX 420-2-2424 7597;
E-Mail Marie.Havlickova@svn.cz Internet: http://www.svn.cz

G.4: Additional Products: Project Website: <http.//www.uba-eecr.de>

For this project a webpage was developed in Czech, English and German that covers the following issues (see picture 1 of the English homepage):

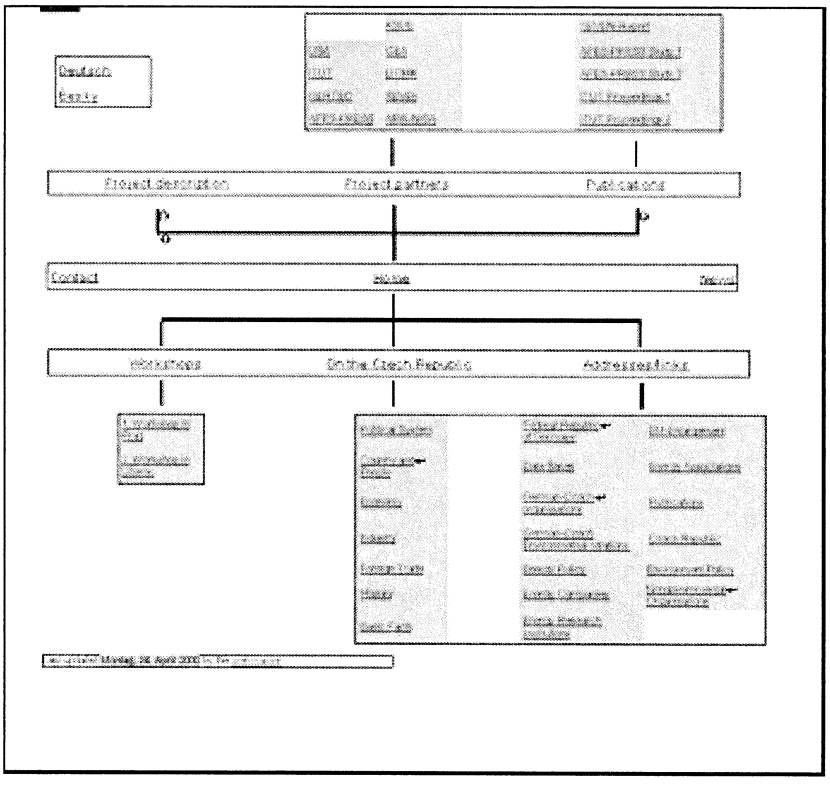


- Description of the project
- Project partners
- Publications
- Two Workshops
- Information on the Czech Republic
- Links and addresses to important institutions in the energy and environment sectors in both countries
- News
- contacts
- sitemap

Based on the studies and the results of the workshops guidelines for future cooperation will be developed in both Czech and German. These guidelines will also be put on the project website. A detailed sitemap assists to find the relevant documents (Picture 2)

On the links the website contains these pages:

- Federal Republic of Germany
- Data bases
- German - Czech Organisations
- German - Czech Enviromental Relations (Press Releases)
- Energy Policy
- Energy Research Institutions
- Energy Associations
- Energy Companies
- EU - Enlargement
- Project Partners
- Publications on Environment and Energy Policy in the Czech Republic
- Czech Republic
- Environment Policy
- Nongovernmental Organisations (Energy and Climate)



This project webpage was produced by AFES-PRESS e.V., Mosbach

Legal responsibility: PD Dr. Hans Günter Brauch, Alte Bergsteige 47, D-74821 Mosbach,
Webmaster: Thomas Bast, Von Leiningen Str. 1, D-74722Buchen 🖳 webmaster@afes-press.de

☎ 49-6261-12912 🖹 49-6261-15695 🖳 brauch @ afes - press.de http://www.afes-press.de