

An Enlightened Industrial Policy for Europe through industrial low-carbon roadmaps and their implementation

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Tomas Wyns, Director
CCAP-Europe



Outline

The EU 2050 low carbon roadmap

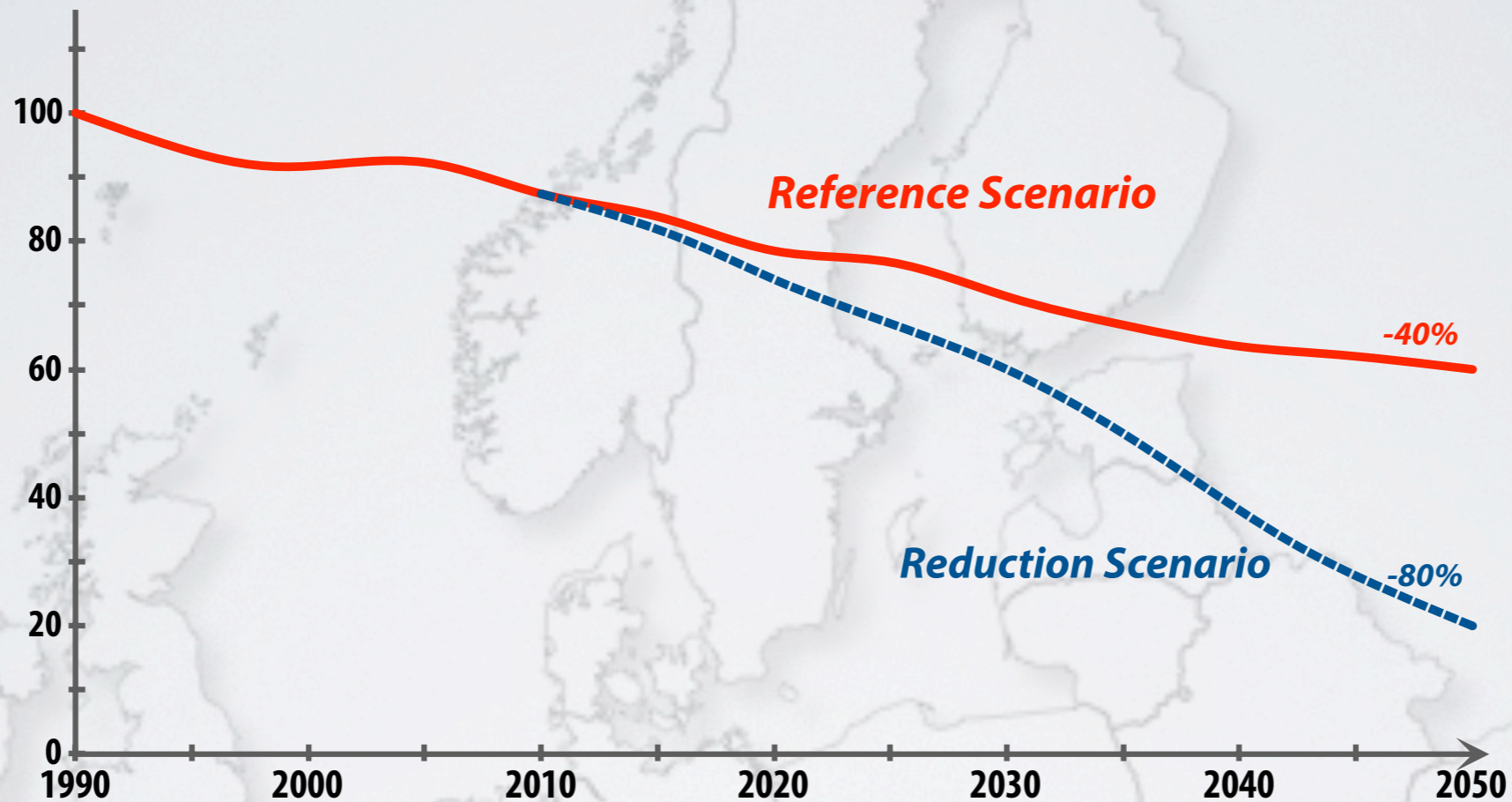
Best practice industrial low carbon roadmap design and implementation

Examples of Industrial sectors developing roadmaps

The economic, industrial & policy challenges ahead

yes we can

European Commission's 2050 low-carbon roadmap



Reductions

-80 to -95% by 2050
-80% = domestic, ref. 1990

Investments

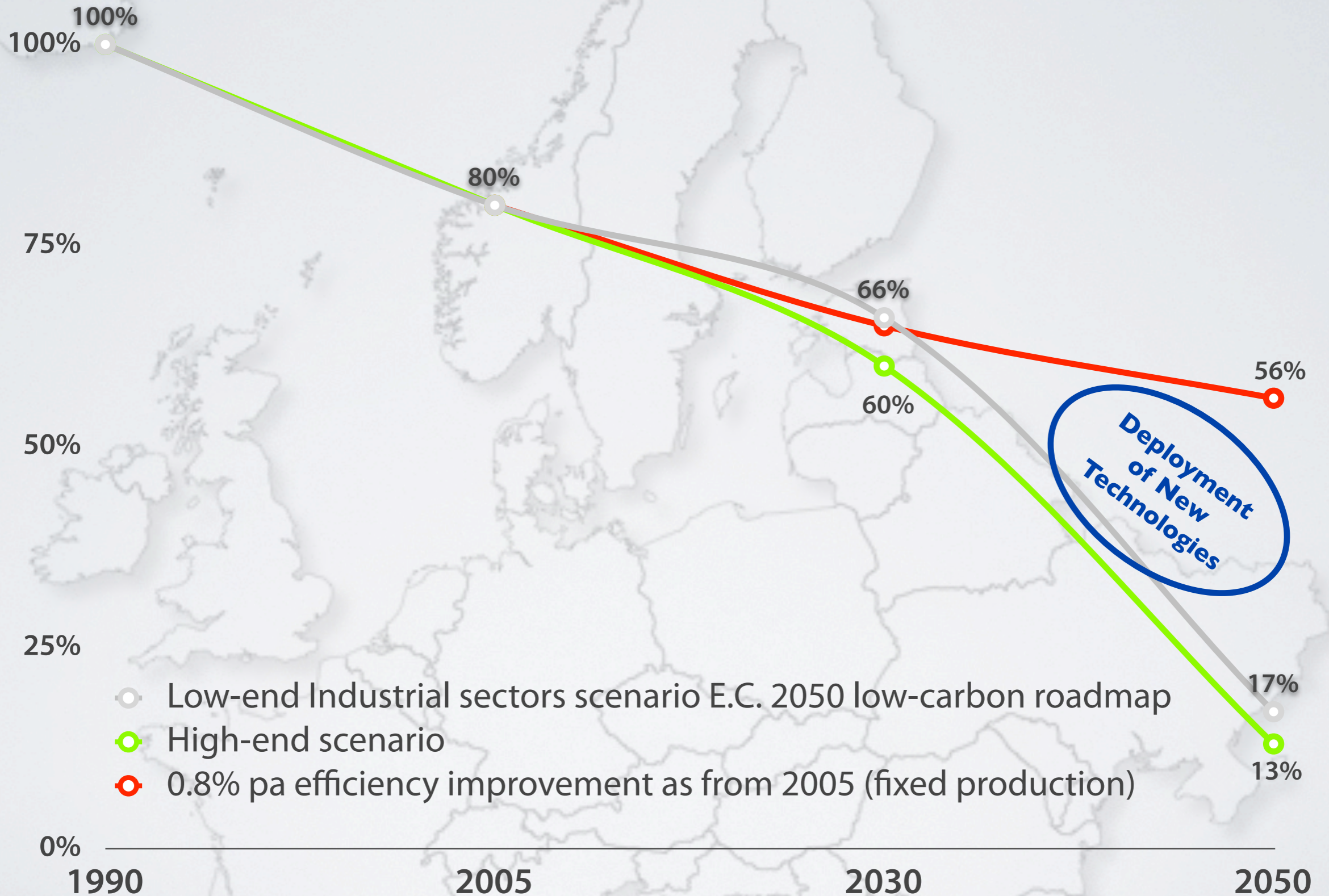
€270 Bn p.a.
in EU economy:
jobs
infrastructure
R&D

Savings

€170-320 Bn p.a.
Fuel cost
€88 Bn in 2050
Air quality and health

EU Member States agree on targets but not on interim milestones

2050 projections for Industry



Best practice industrial roadmaps should include

- *Thorough sectoral analysis (future growth, domestic demand, challenges, opportunities, move to higher value added, ...)*
- *Identification of current options to reduce emissions (BAT)*
- *Identification of future options to reduce emissions (future BAT and breakthrough tech.)*
- *Broader than only end-of-pipe/process solutions (downstream product design/use)*
- *Seek broader benefits beyond GHG reductions (e.g. lower capex, opex, higher value added products)*
- *Identify technical, financial and policy barriers for implementation*
- *Outline of low carbon roadmap implementation plan*
- *Policy recommendations to facilitate implementation*

EU sectoral roadmaps state of play

unfold the future

The Forest Fibre Industry
2050 Roadmap to a low-carbon bio-economy

2050
cepi

Cerame-
unie The European Ceramic
Industry Association



Paving the way to
2050
THE CERAMIC INDUSTRY ROADMAP

EUROFER
The European Steel Association



2050
A STEEL ROADMAP FOR A
LOW CARBON EUROPE 2050

European chemistry for growth
Unlocking a competitive, low carbon and
energy efficient future

cefic Supported by
ECOFYS

The role of CEMENT in the
2050 LOW CARBON ECONOMY



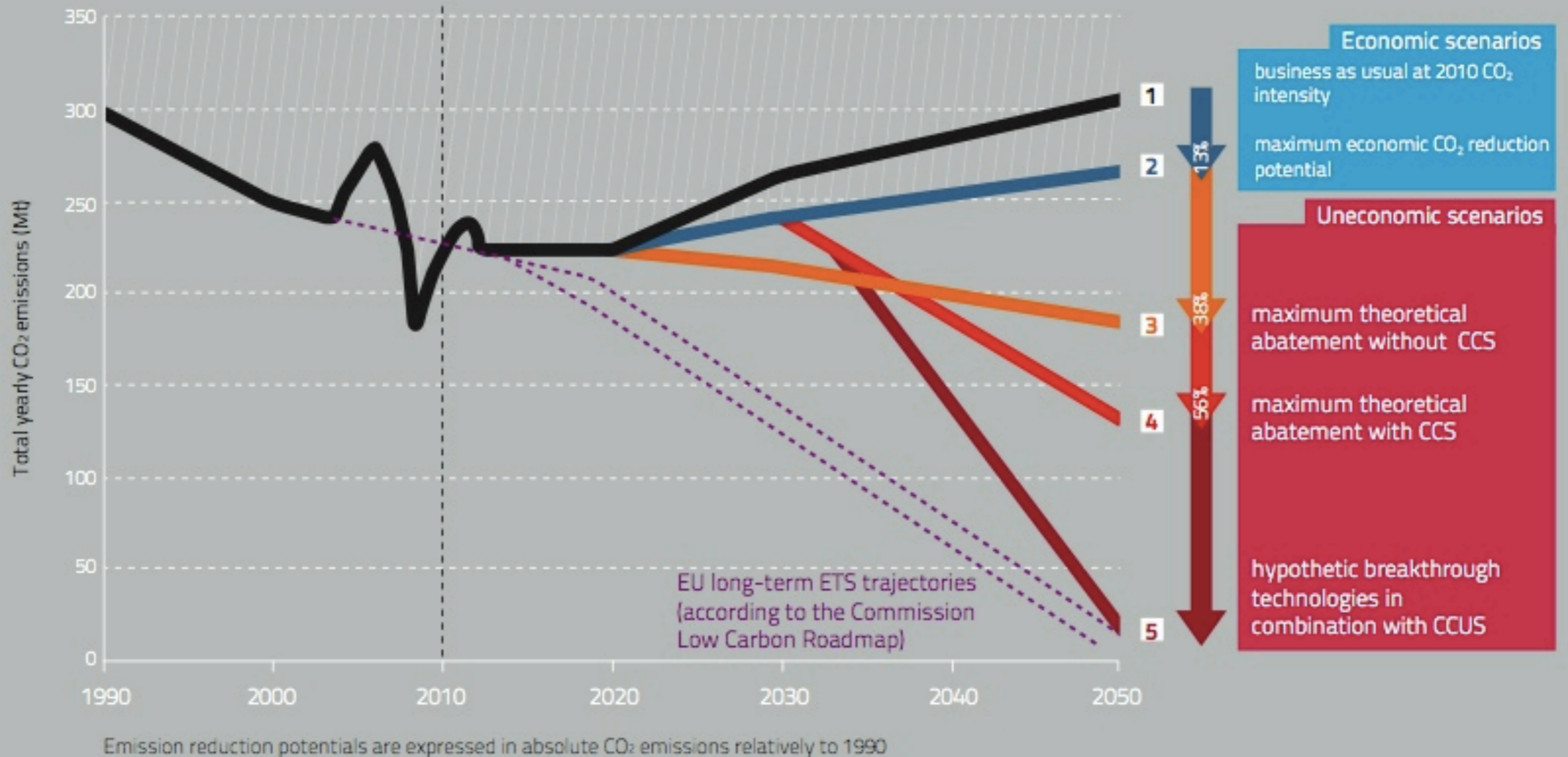
CEMEX THE EUROPEAN
CEMENT ASSOCIATION

EU paper sector was first to develop roadmap (2011)

Followed by EU Ceramics, Steel, Chemicals and
Cement sector roadmaps

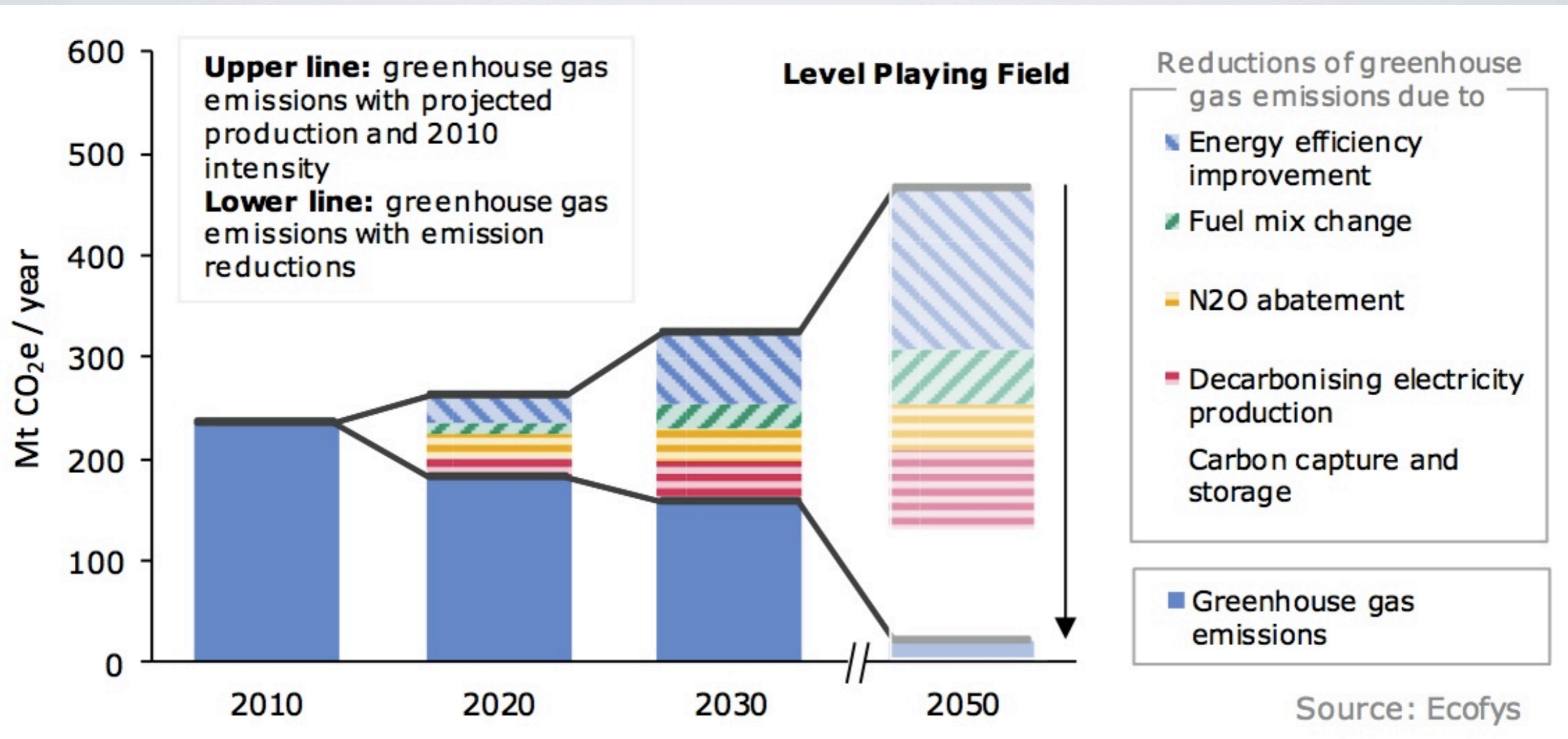
EU sectoral roadmaps state of play

Steel Sector (source EUROFER)



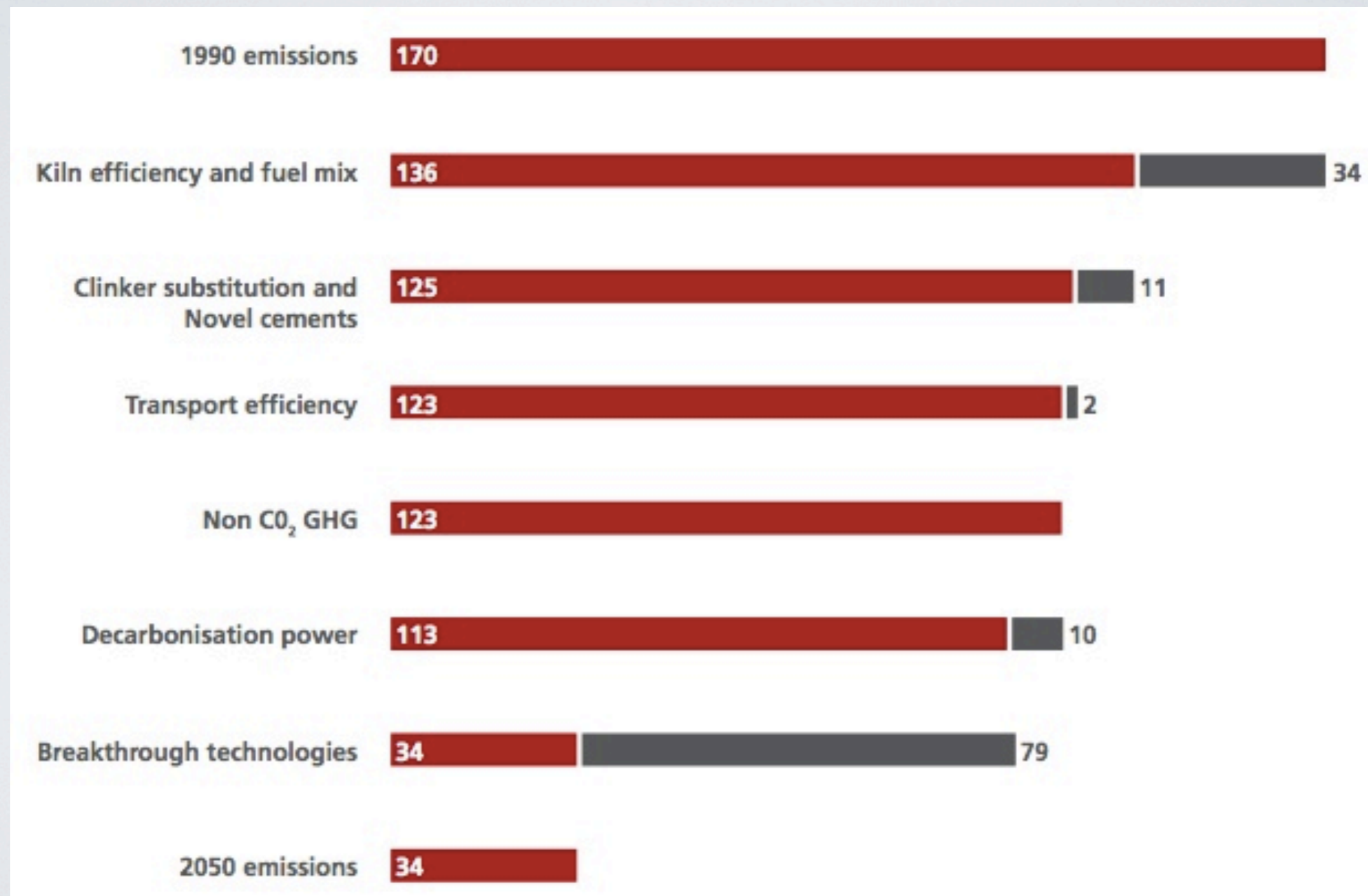
EU sectoral roadmaps state of play

Chemical Sector (source CEFIC/Ecofys)



EU sectoral roadmaps state of play

Cement Sector (source CEMBUREAU)



EU sectoral roadmaps state of play

Ceramic Sector (source CERAMEUNIE)

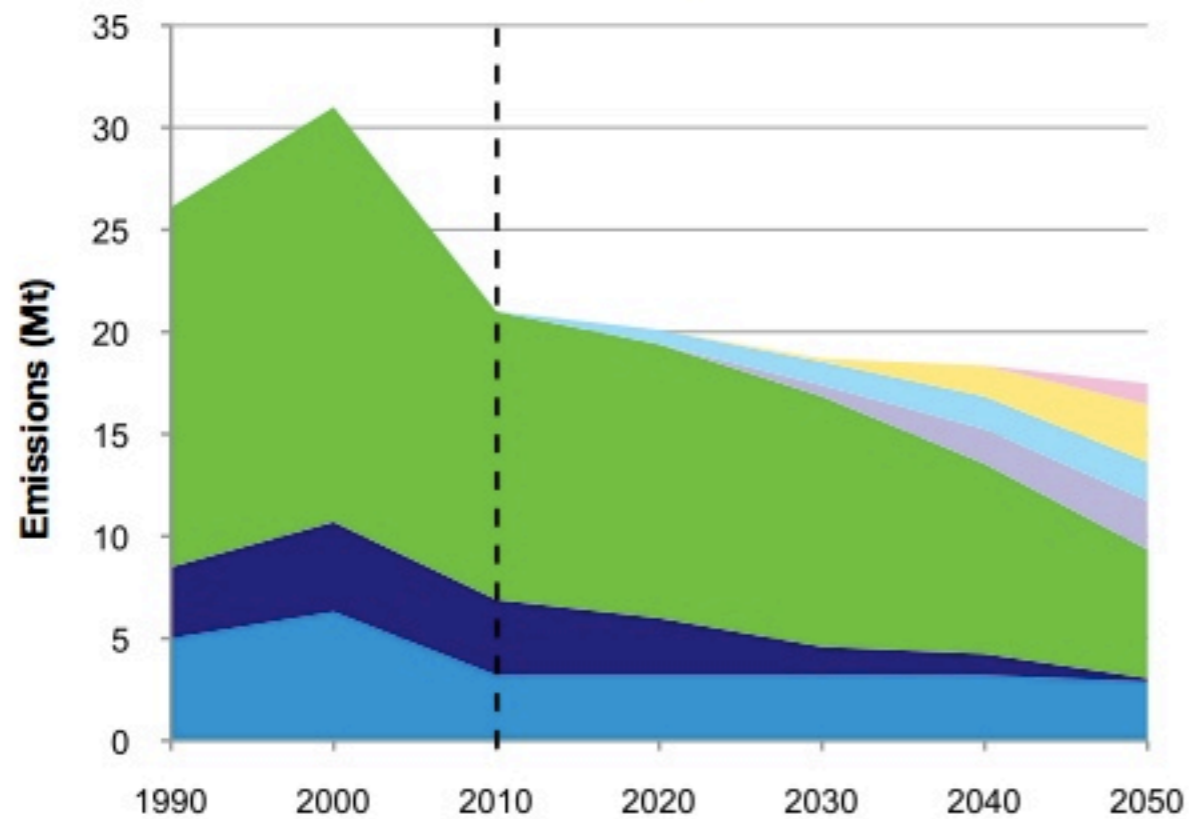
Sources of CO₂ Emissions:

- Fuel
- Extra electricity from kiln electrification
- Electricity
- Process

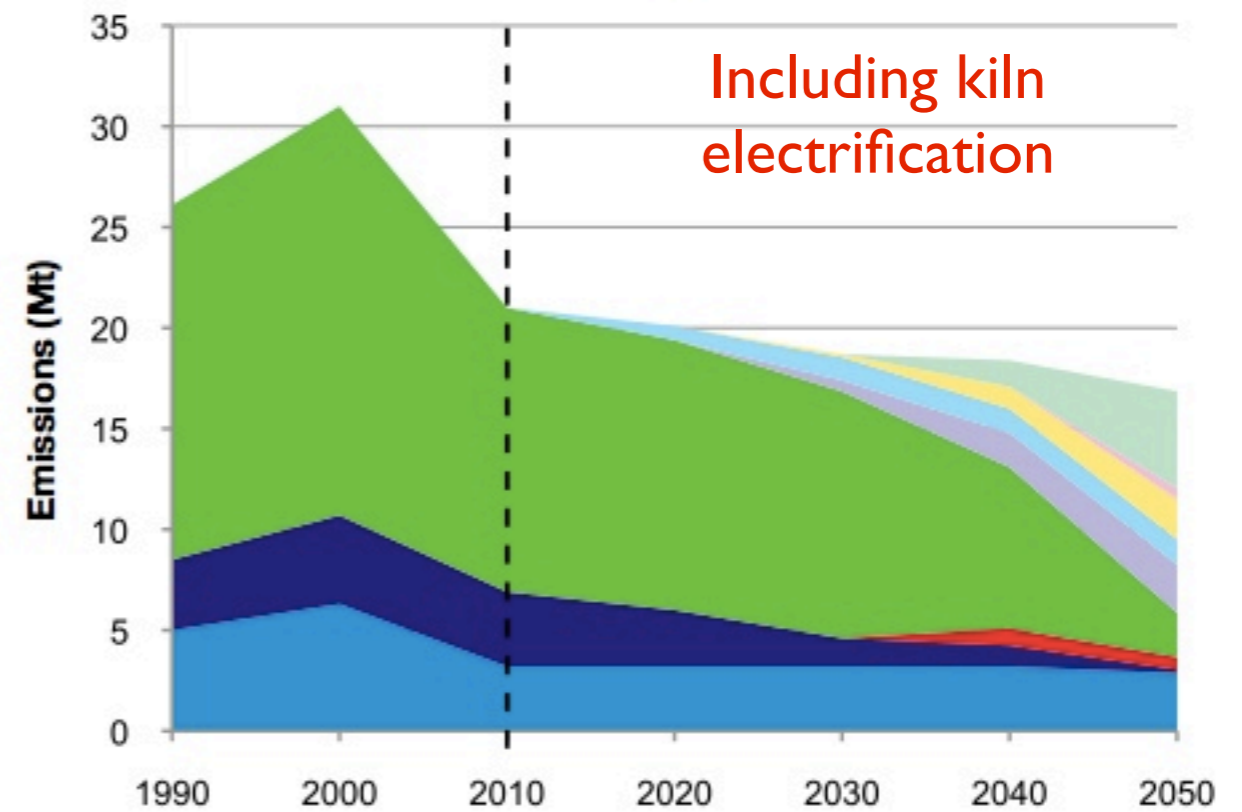
Sources of CO₂ Emissions Reductions:

- Kiln electrification
- CCS
- Other identified breakthrough technologies
- Available technologies
- Breakthrough technology syngas/biogas

A

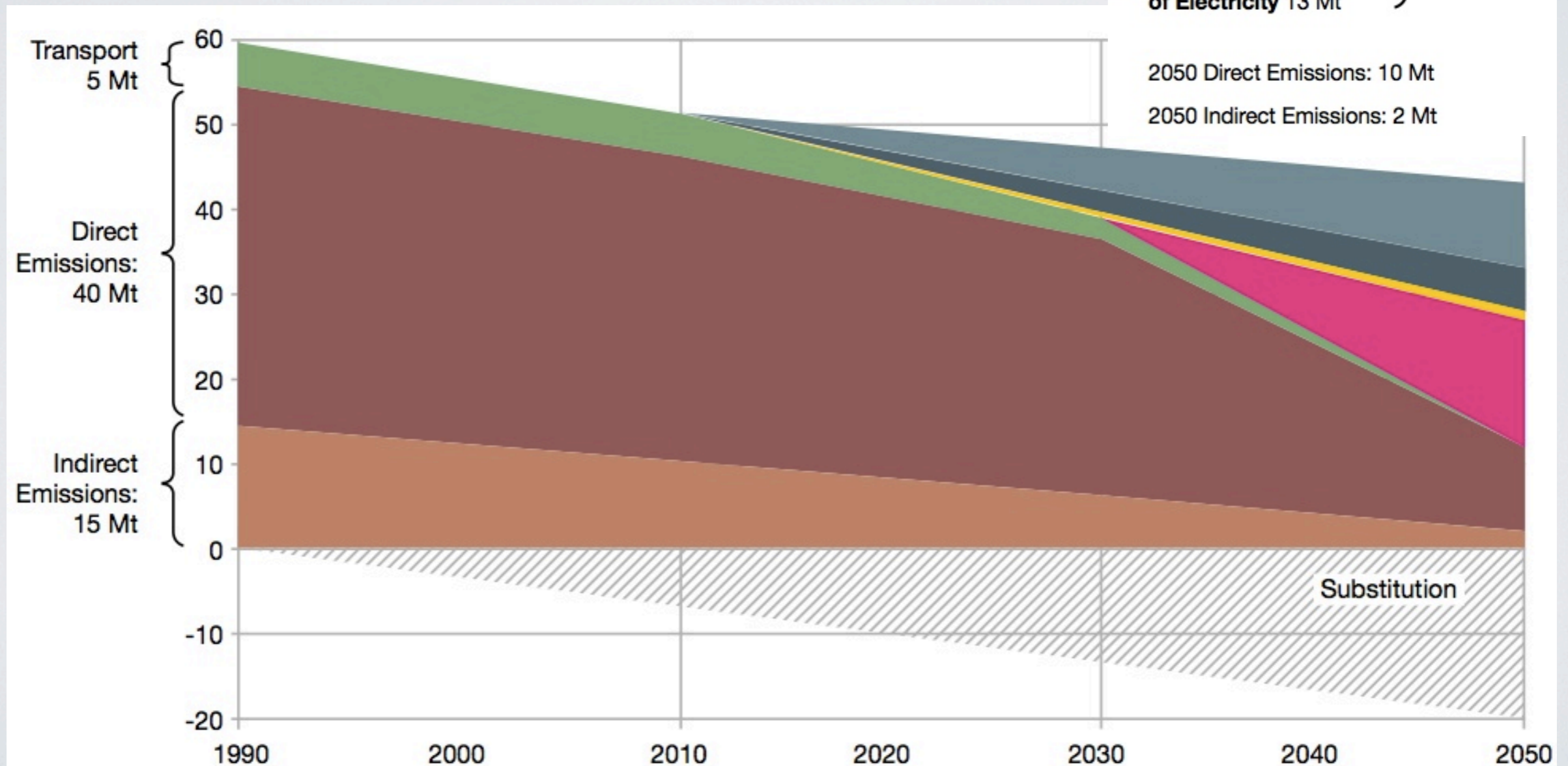
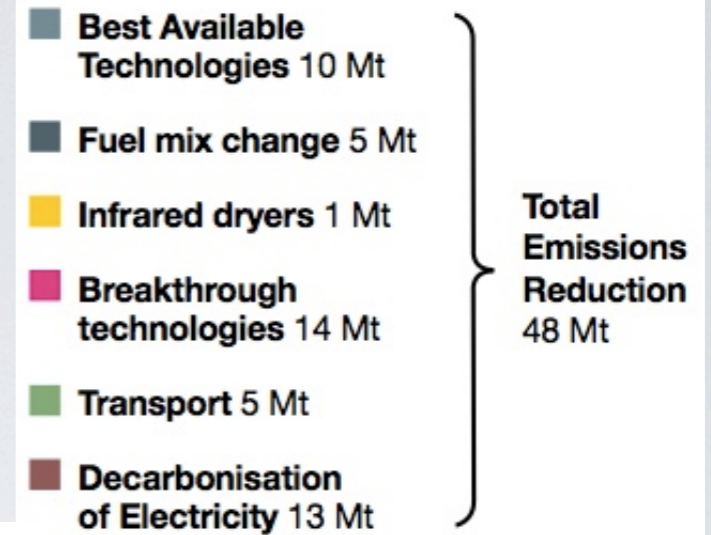


B



EU sectoral roadmaps state of play

Paper Sector (source CEPI)



EU industrial roadmaps: conclusions so far

- *Roadmaps offer interesting insights into possible future sectoral developments, though in most cases quite narrow (e.g. GHG only)*
- *Conservative estimates (low mitigation / high cost)*
- *Need for breakthrough technologies*
- *Need for policy support (but not very specific)*
- *Implementation plan missing except for EU paper sector (CEPI two team project)*

The CEPI **TWO TEAM** PROJECT 1000s OF IDEAS, 2 TEAMS, 1 GOAL

51 **19** **1** **57** **REMAINING**
Days Hours Minute Seconds



Coming soon ... (!!)

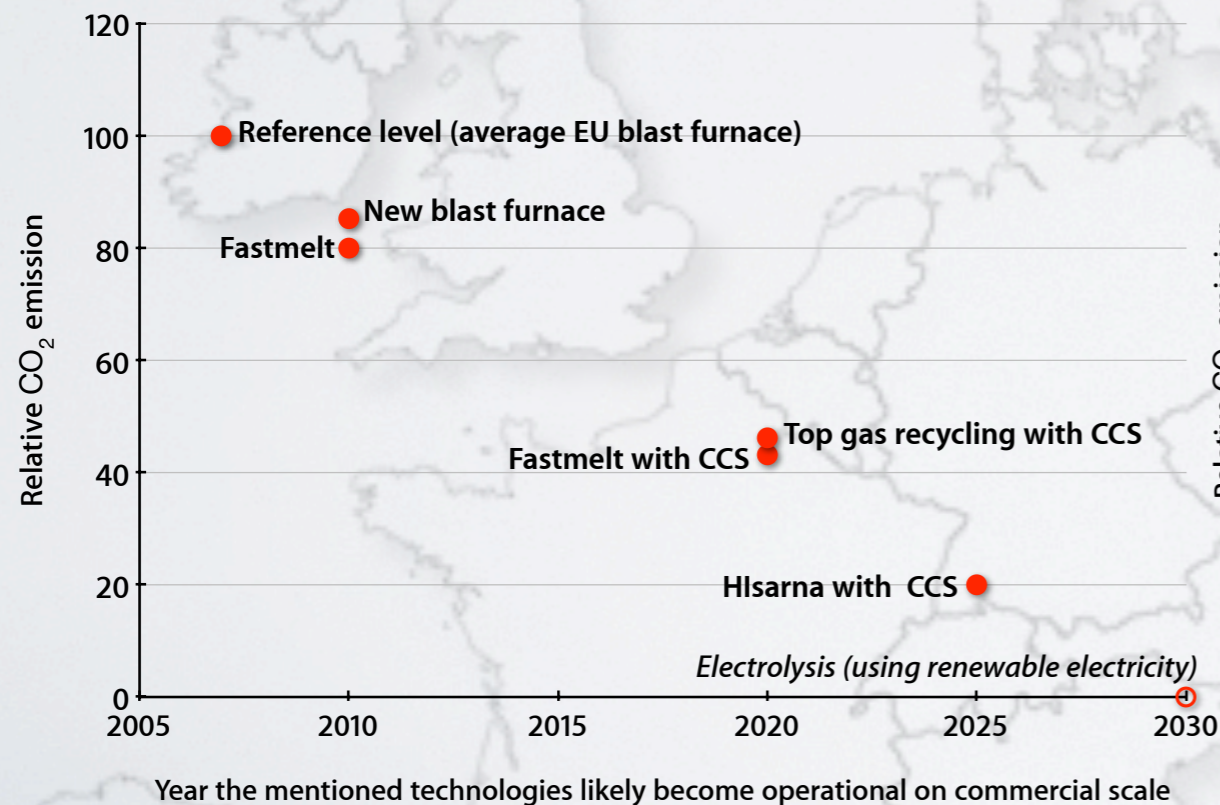
Example of possible breakthroughs in some industrial sectors



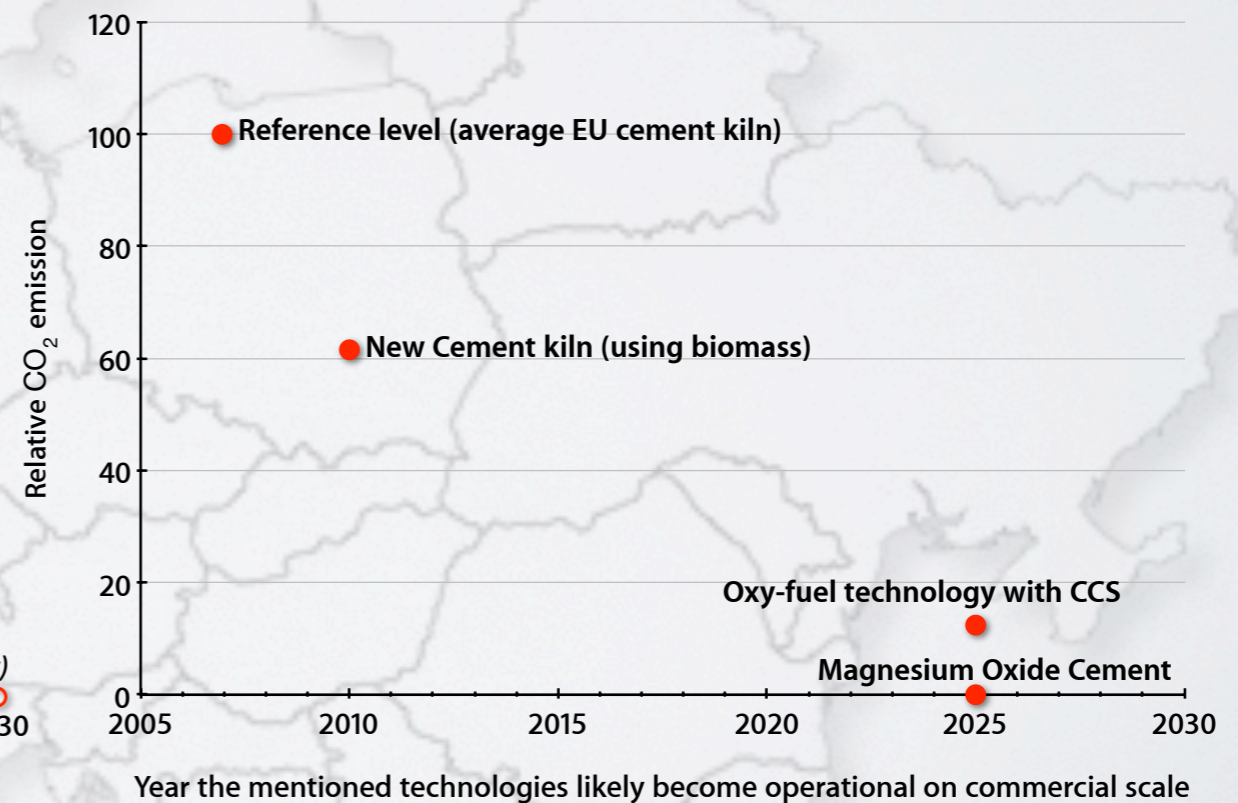
Deep reductions are possible in cement, steel, paper and chemical sectors (over time)

source CE Delft/CAN-Europe

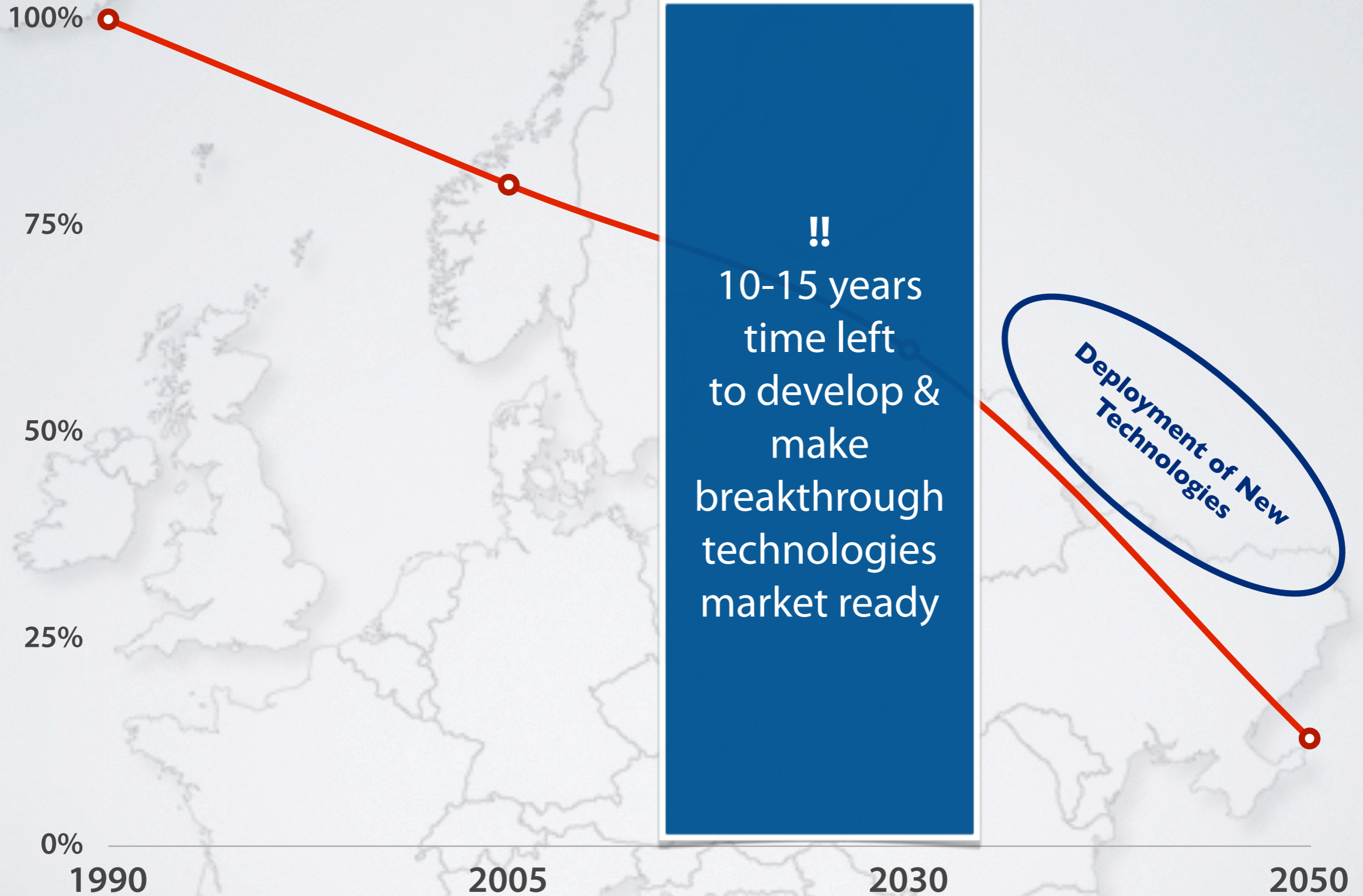
Steel



Cement



2050 = 2030



!!
10-15 years
time left
to develop &
make
breakthrough
technologies
market ready

Deployment of New
Technologies

General challenges for the EU industry

Essential factors which determine the competitive strength and hence influence the location of the energy-intensive sectors:

Access to raw materials

Proximity to demand

Transport costs and infrastructure Cost

availability of (competitive priced) energy

Skilled labour-force (STEM)

Guidance for the EU industry

In particular, EU innovation and industrial policy programme should be guided by some of the major challenges faced by the EU economy:

The ability to achieve an economically-acceptable profit margin in a mature market

The fact that the EU will have to compete with major economies which have a structural competitive advantage when it comes to energy costs and/or access to natural resources

Related to the above, the need to maximise resource efficiency and reach almost full decarbonisation within the next 3-4 decades

The need for new and advanced skills and skilled workers

Key elements of Industrial Low Carbon Transition

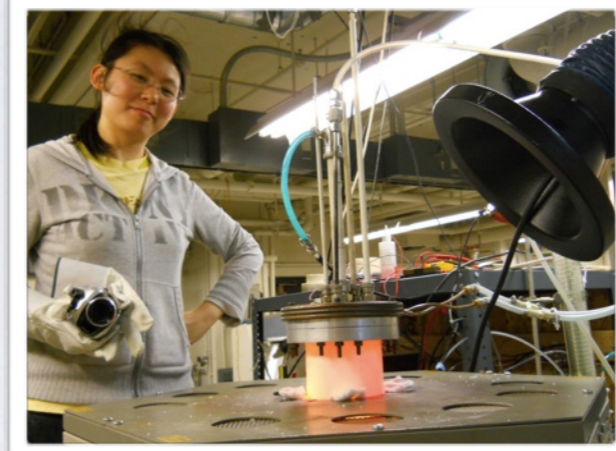
- **Process innovation** with the goal of bringing low-carbon breakthrough processes to the market within the next 15 years
- **Product innovation** with the goal of increasing value-added in products essential to a low-carbon and resource-efficient society
- **Value chain and business model transformation** with the goal of further reducing emissions, enhancing resource efficiency and finding new and smart opportunities for energy-intensive industries in a mature market
- **De-risking (venture) capital and debt** as a tool to facilitate access to finance, promote entrepreneurship and accelerate the market readiness of low-carbon products and processes
- **Social innovation** is needed to train and re-train the skills needed for the transition to a low-carbon economy

Examples

Process Innovation



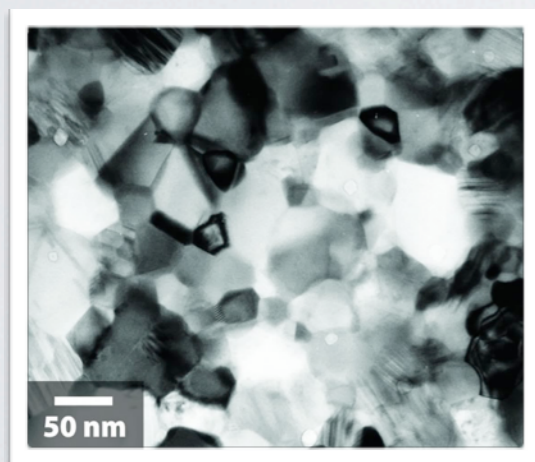
HiSarna Blast Furnace (Tata Steel)



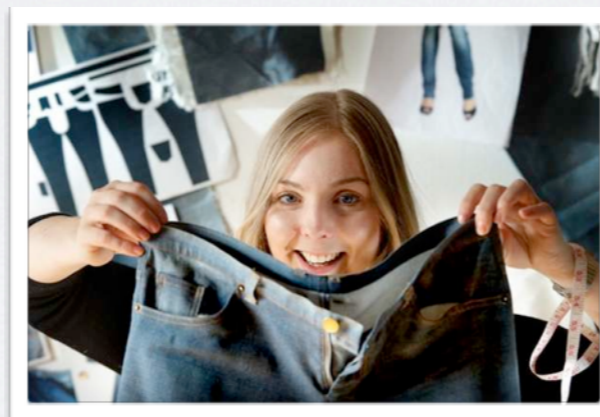
Molten oxide electrolysis (MIT AMBRI)



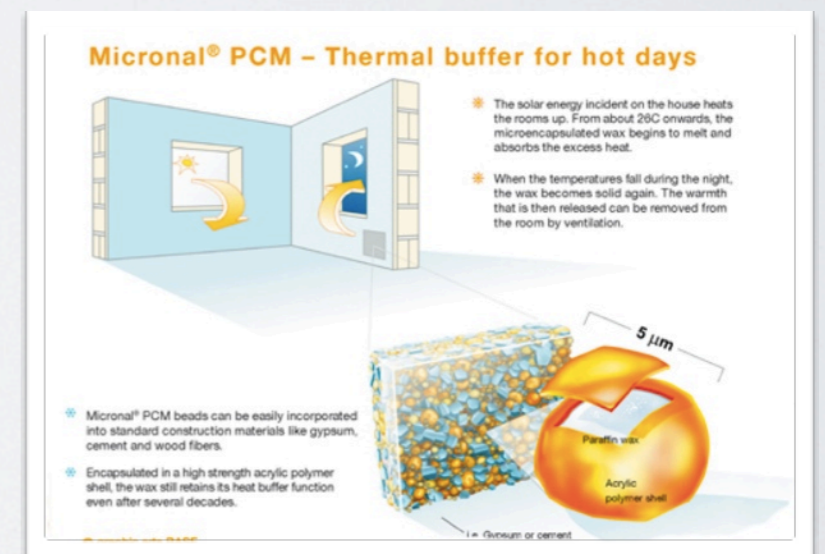
Product Innovation



US Nano-steel



Jeans from wood-fibre



phase-change insulation materials (BASF)

Examples

Business model innovation



TRIMET Aluminium Germany
modulated power use (linked to RE)

Social Innovation



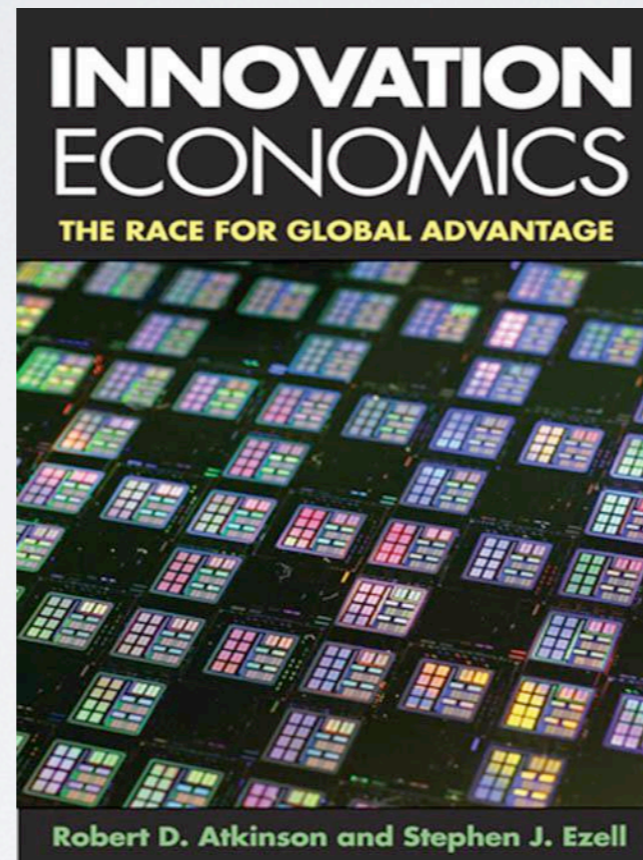
Innovation economics in Finland

3 important recent reports

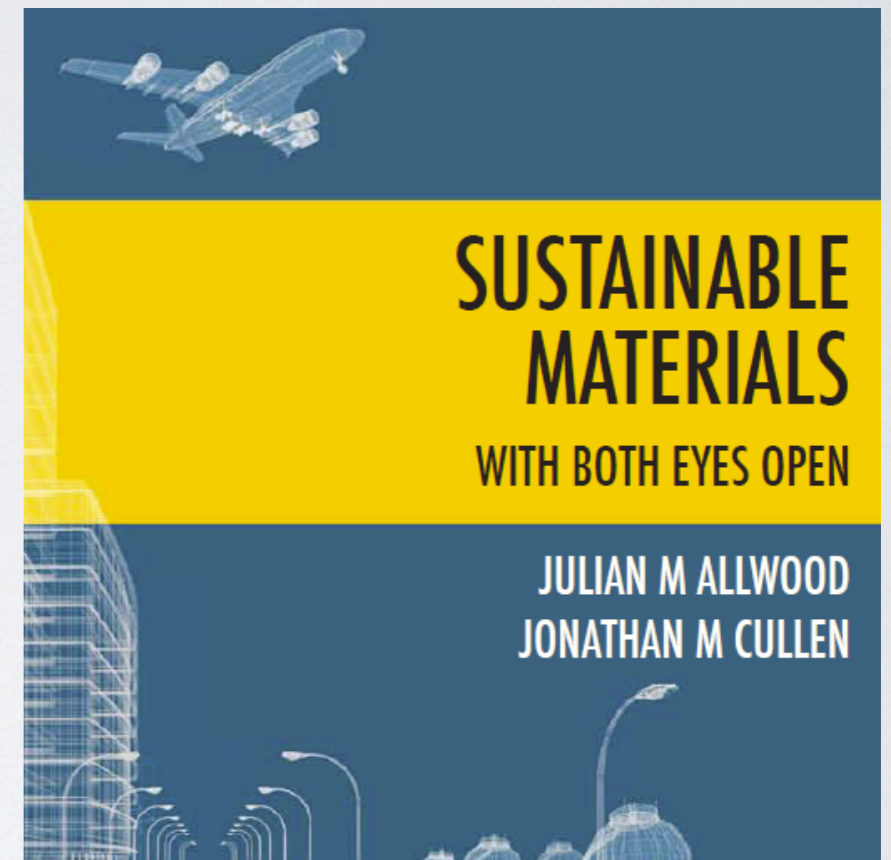
Manufacturing the future
McKinsey Global Institute



Innovation Economics
Robert D. Atkinson

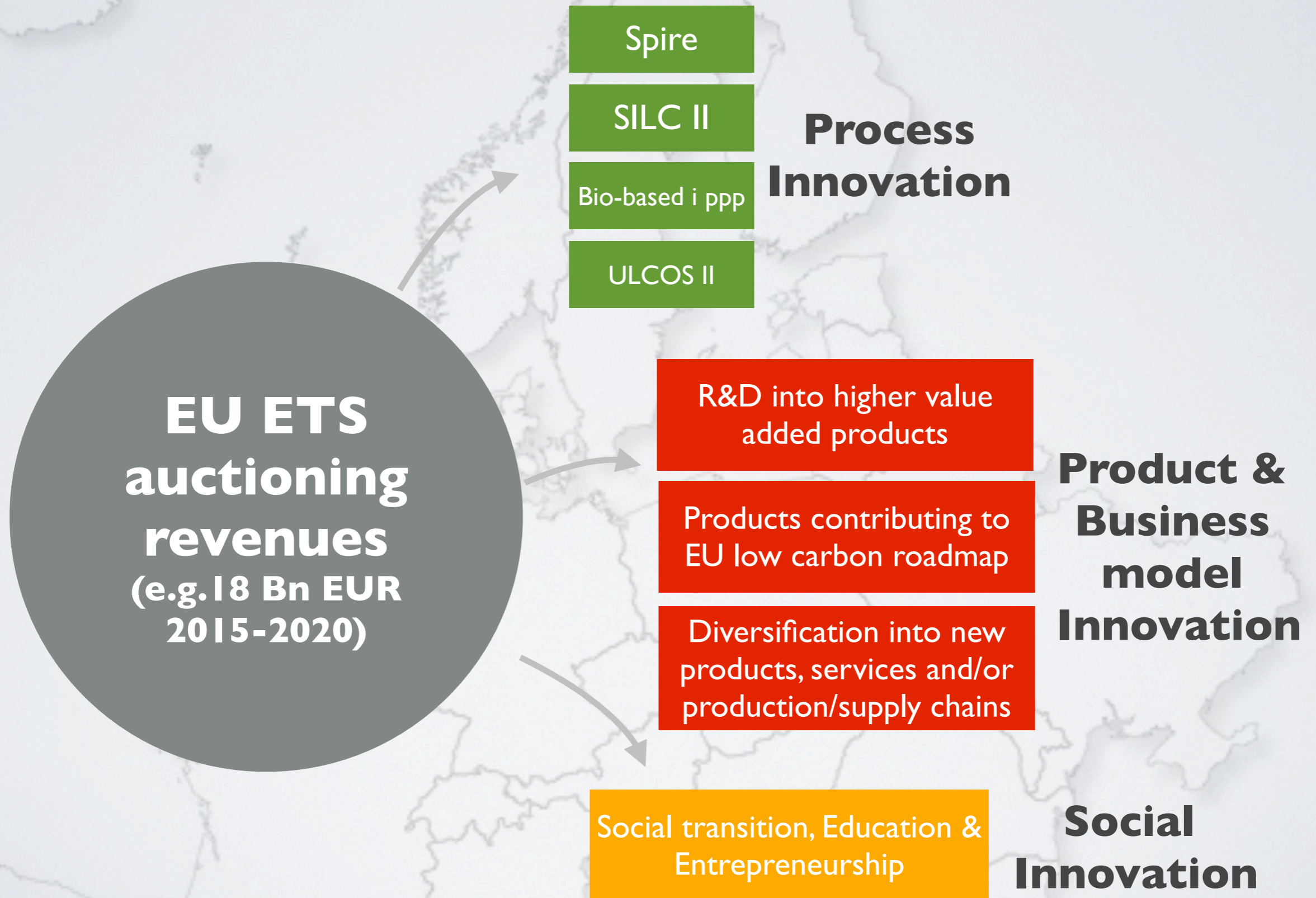


Sustainable Materials
Julian M. Allwood



Recommended reading

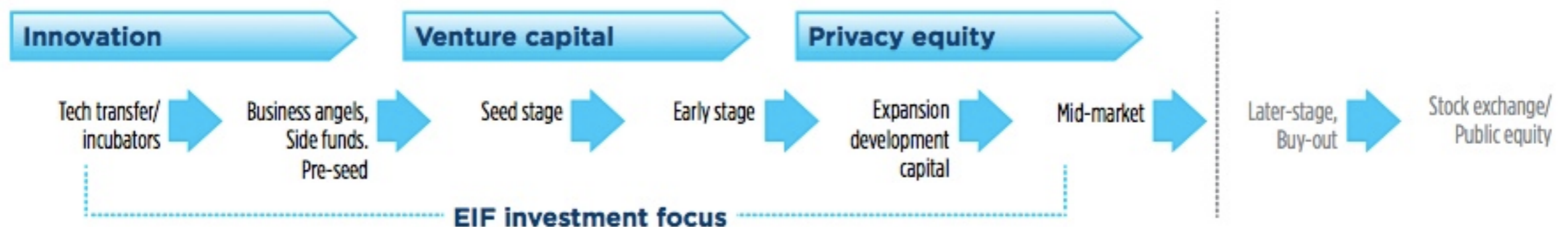
Suggestions for industrial innovation policy/funding



The Industrial Low Carbon Transition Fund

Industrial Low-Carbon Transition Fund Budget Lines (2015-2023)	Billion Euro
Enhanced support for process innovation under SPIRE, SILC II and BRIDGE	5
Advanced (Fundamental) Research Projects Agency for Industrial Low-Carbon Transformation	2
Support for industrial CCS feed-in tariff to enable and demonstrate full cycle CCS over 10 years	2
National and regional initiatives to promote and support SME entrepreneurship aimed at enhancing the low-carbon and resource-efficient value chain	2
Support for education, training and re-training to cope with industrial transformation and skills shortage	2
EIF capitalisation to de-risk and leverage finance for industrial low-carbon transition	5
Total	18

EIF's market coverage



“Innovation distinguishes between a leader and a follower”

Steve Jobs

The
NEW DEAL

An Enlightened Industrial Policy for the EU through Structural EU ETS Reform



PUBLICATION BY THE CENTER FOR CLEAN AIR POLICY-EUROPE

[Download report here](#)

Thank You

Tomas Wyns

twyns@ccap.org



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Dialogue. Insight. Solutions.