Energy and Environment in the EU – How much does the regulation cost?

Prof. Dr. Jiřina Jílková

Summer School The Future of Energy Systems

Content

- Aim of the lesson:
  - present and discuss economic aspects of energy regulation in the context of economy and environment – EU example

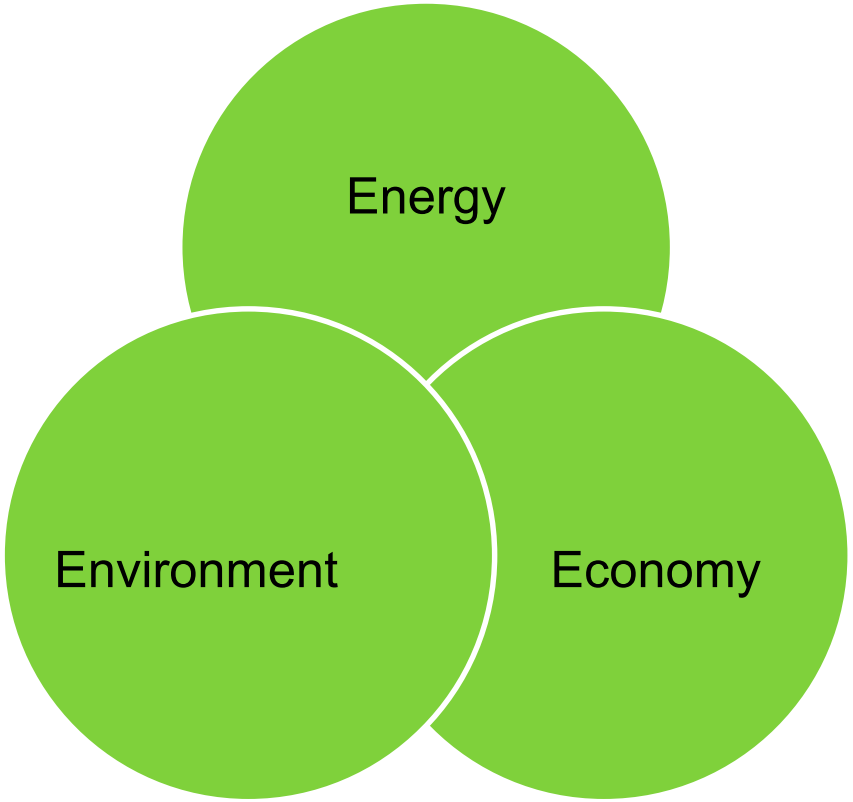
1. Energy – economy – environment
2. EU energy and climate package
   - EU 2020 strategy
   - EU Energy and climate goals for 2030
   - EU Roadmap 2050
3. Why and how to do the economic assessment of impacts?
4. RIA as independent check?

Acknowledgement

In the section EU climate policy several slides from presentations of Mr. Artur Runge-Metzger are included.

Mr. Metzger is Head of Unit Climate strategy, international negotiation and monitoring of EU action, European Commission

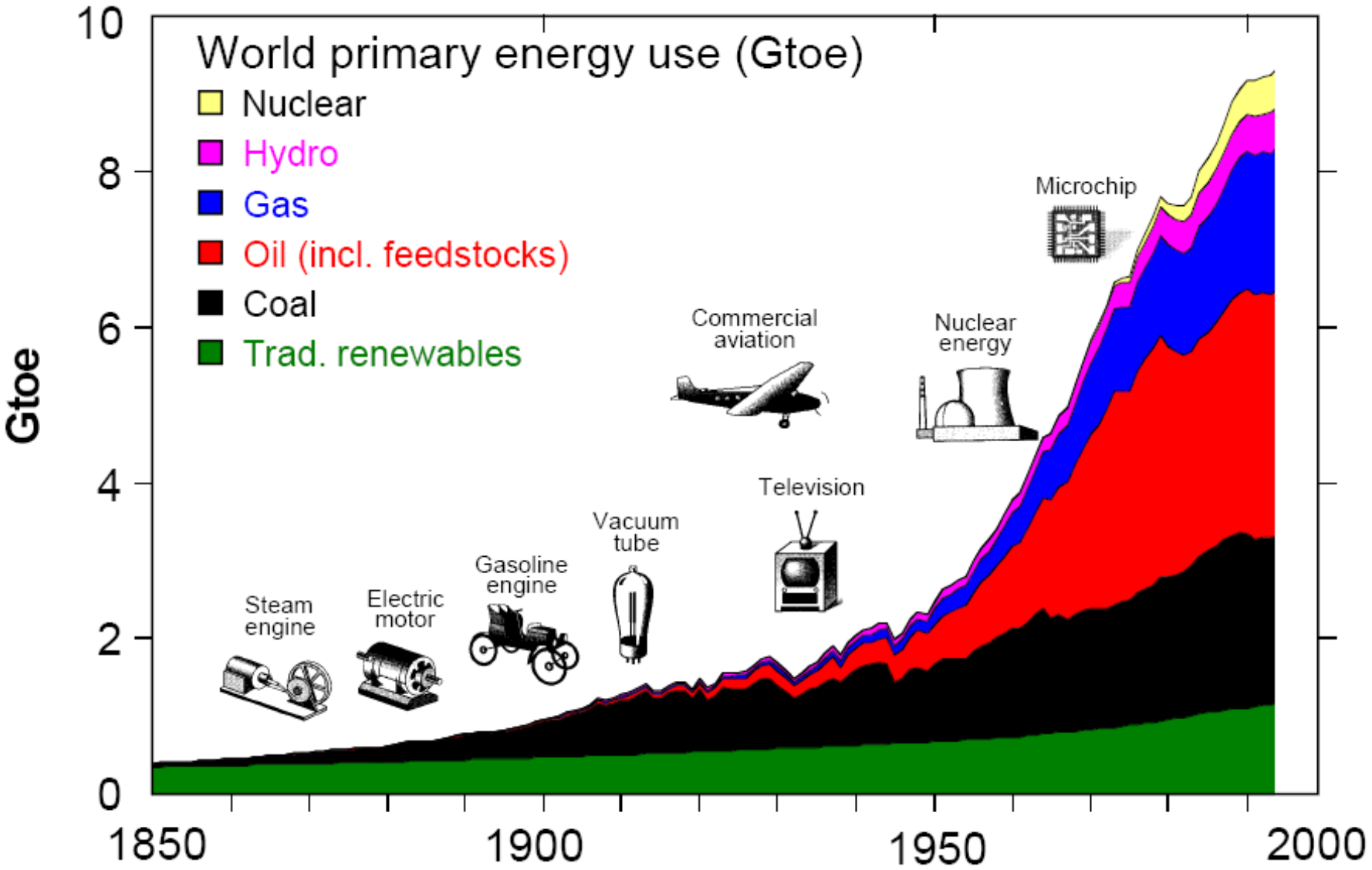
Energy – Environment - Economy



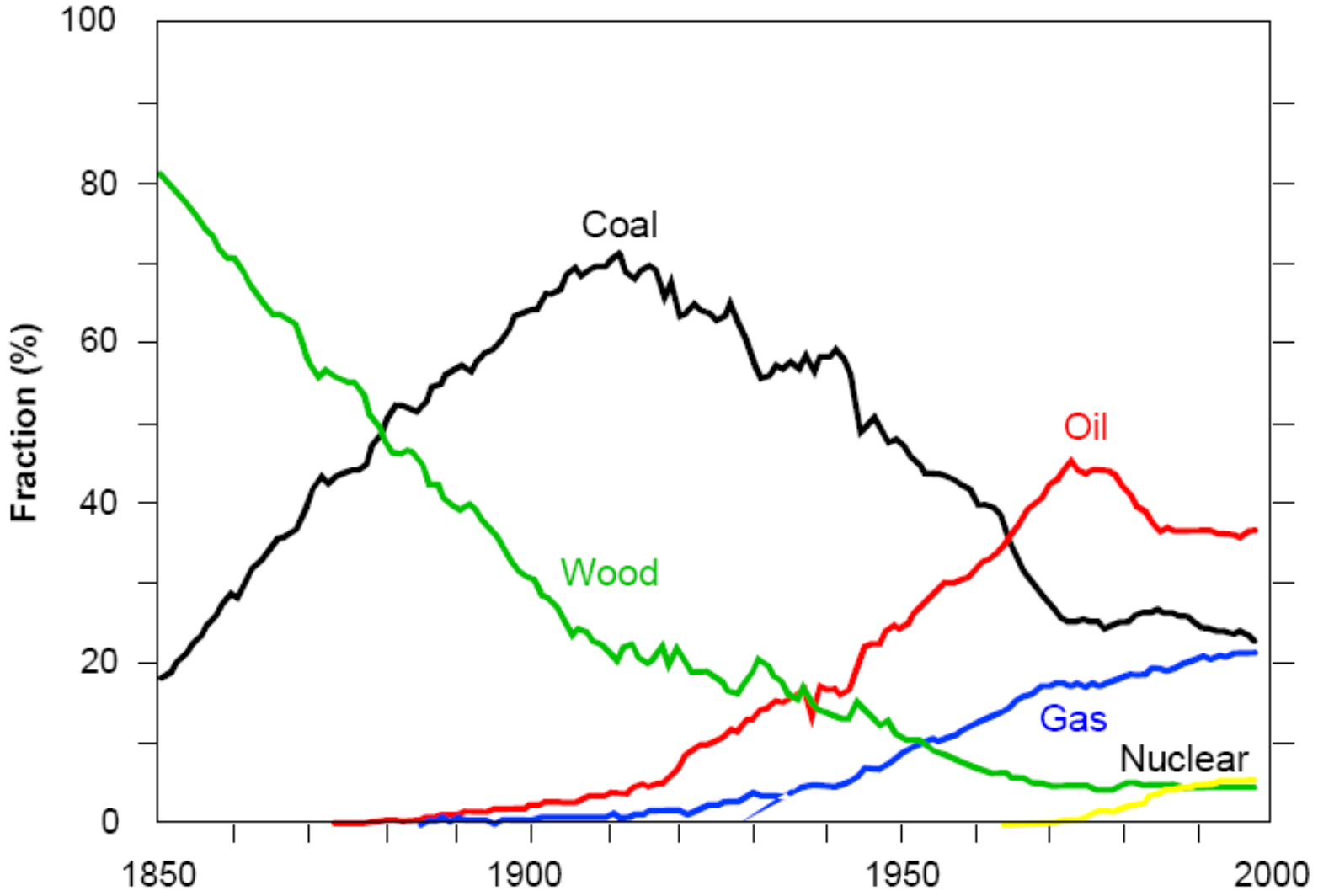
Energy is the “oxygen” of the *economy* and the life-blood of *growth*, particularly in the mass industrialization phase.

Peter Voser, CEO, Royal Dutch Shell, 2011

World Primary Energy Use



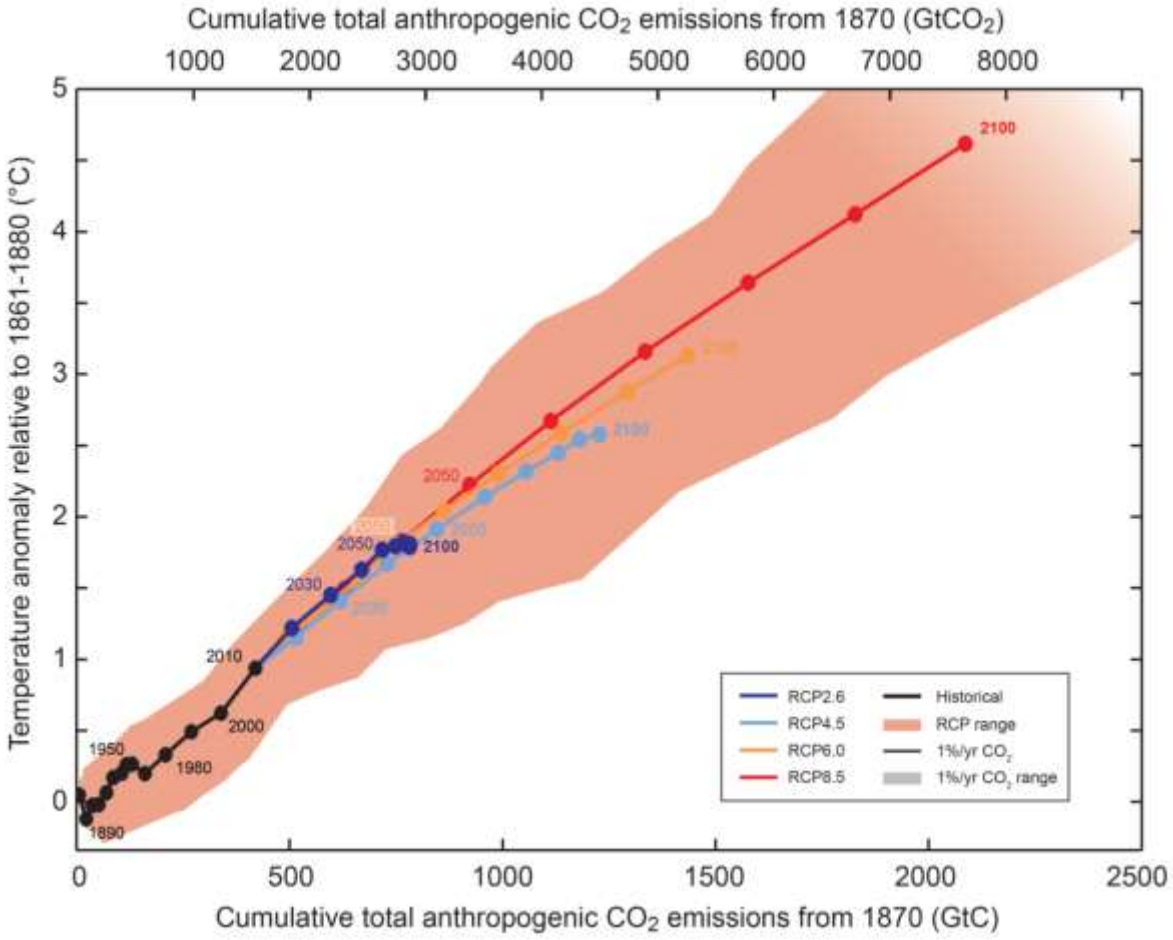
Primary Energy Substitution



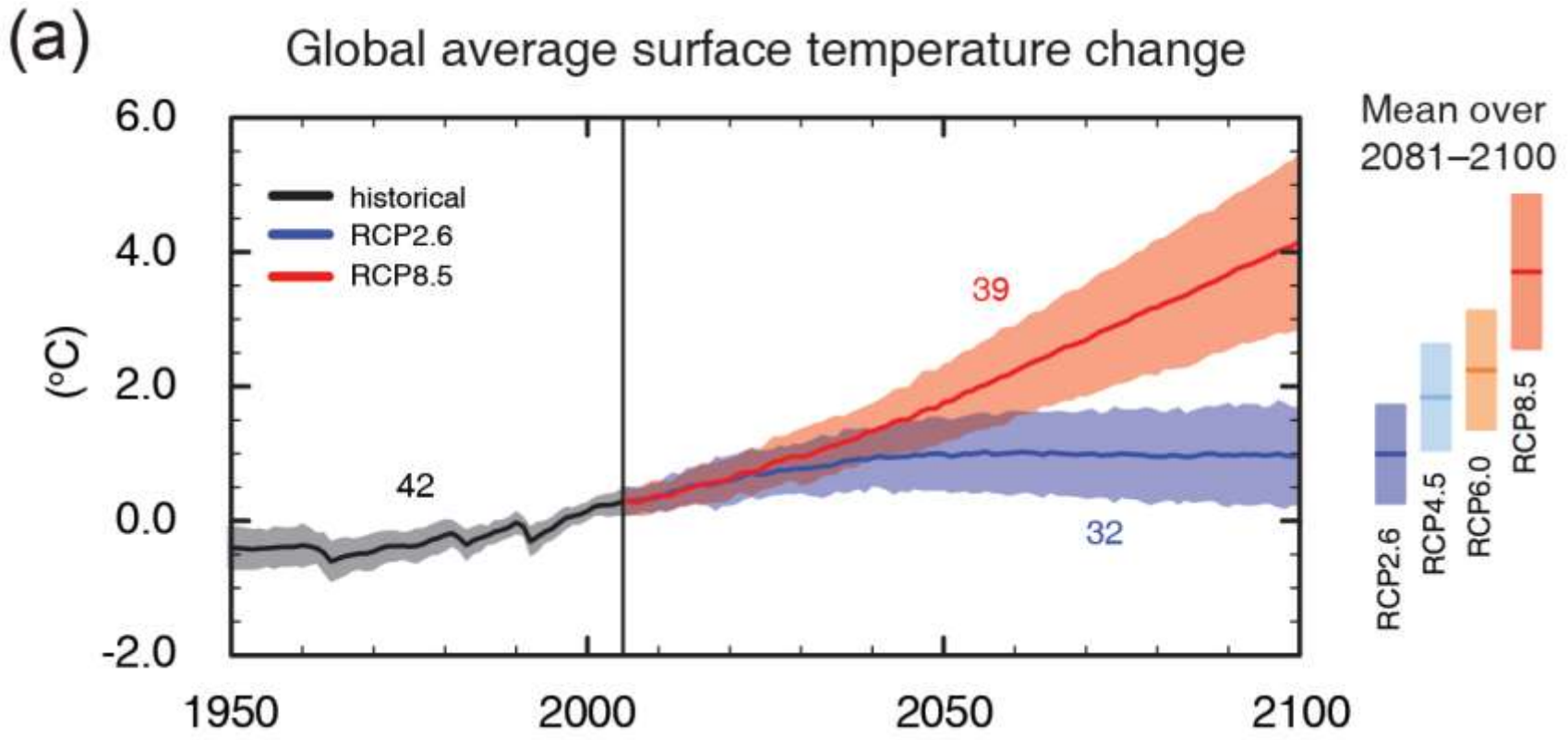
RCP – Representative Concentration Pathways

- Greenhouse gas concentration (not emissions) trajectories adopted by the IPPC for its 5th Assessment Report (AR5)
- The pathways are used for climate modeling and research. They describe **four possible climate futures**, all of which are considered possible depending on how much greenhouse gases are emitted in the years to come. The four RCPs, RCP2.6, RCP4.5, RCP6, and RCP8.5, are named after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values (+2.6, +4.5, +6.0, and +8.5 W/m^2, respectively

Anthropogenic CO2 emissions



Climate Change

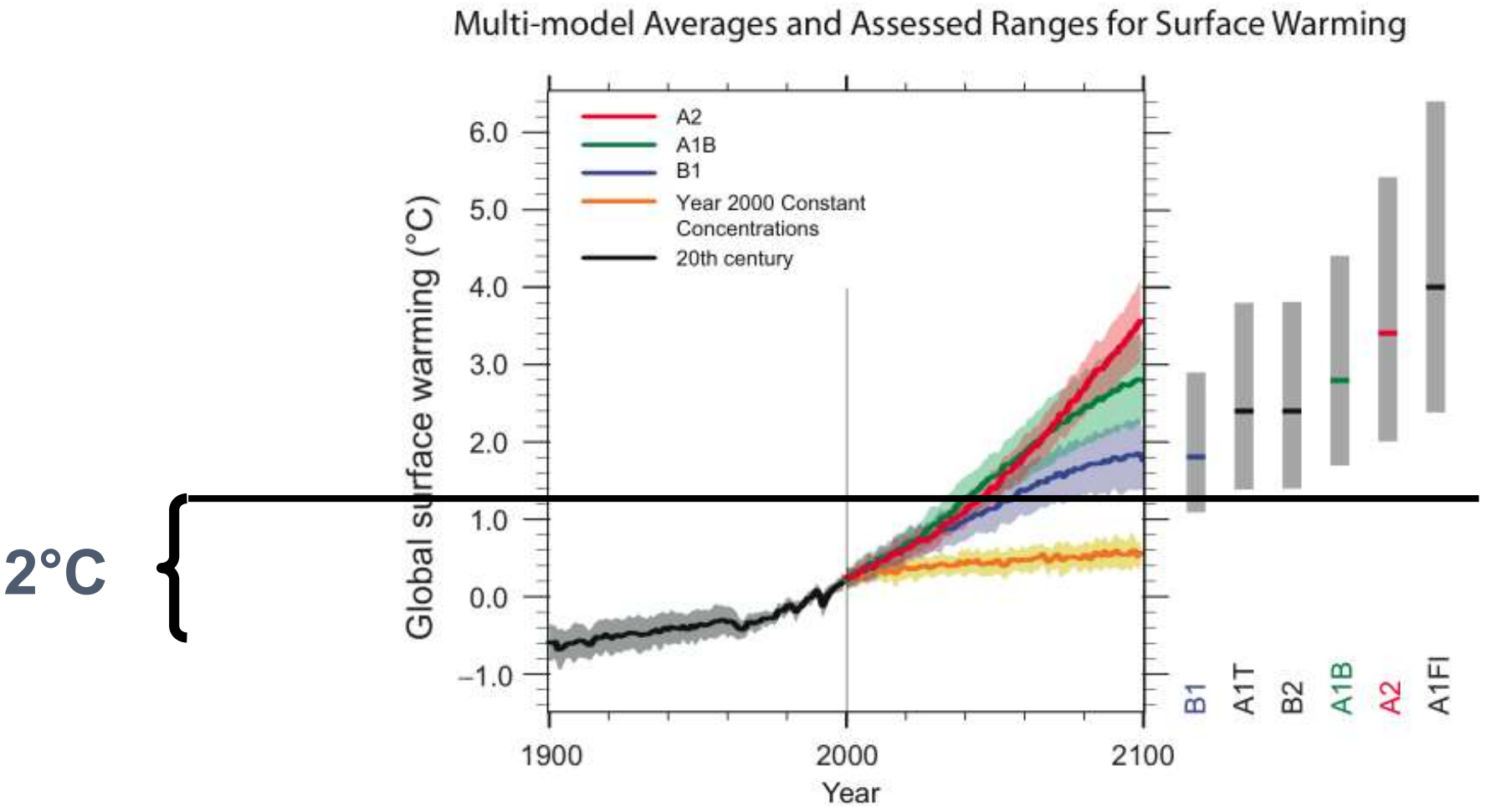


EU vision

The EU's international ambition:

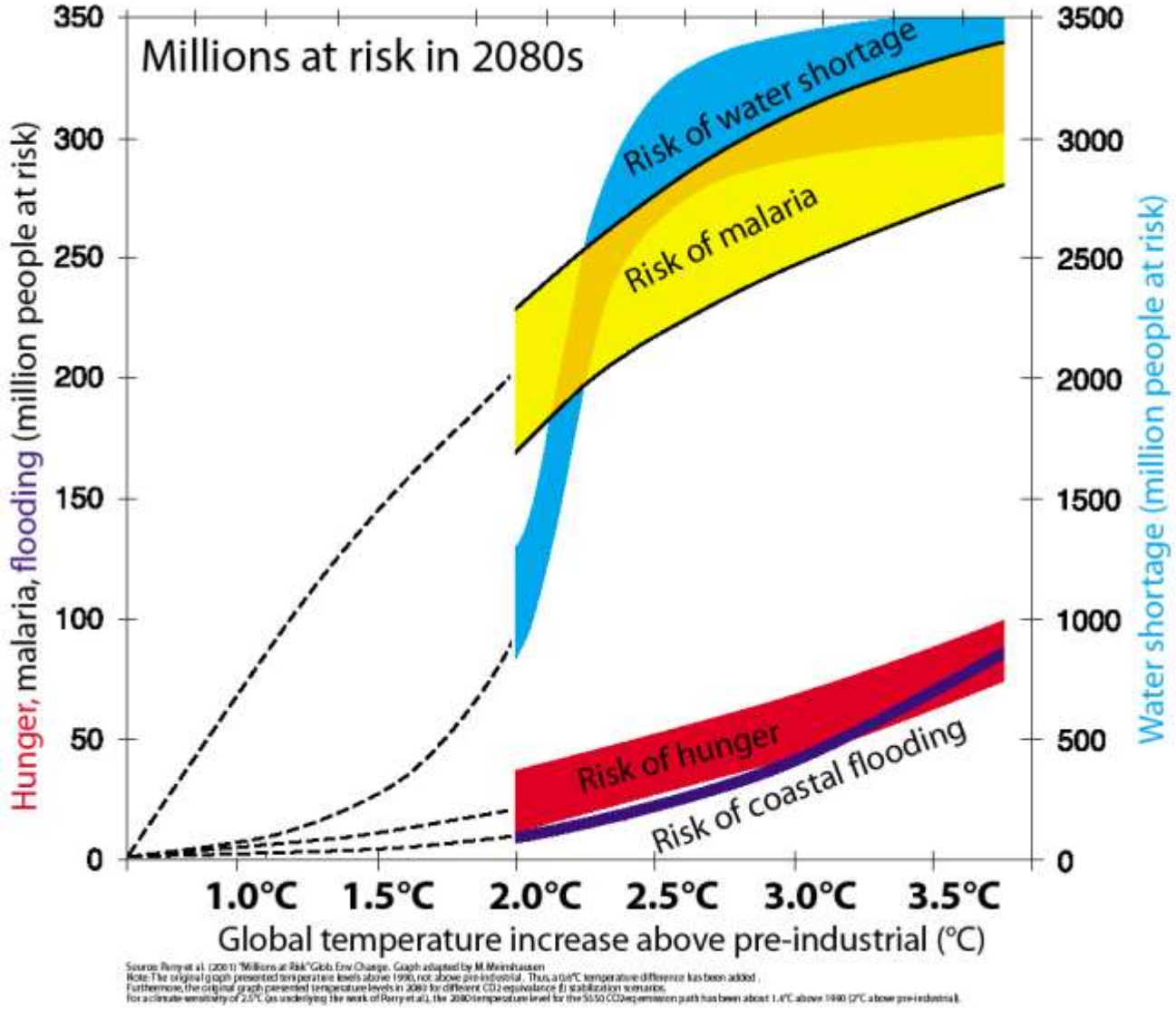
Limiting global average temperature increase to 2 degrees Celsius compared to pre-industrial levels

The EU's 2 degrees Celsius objective

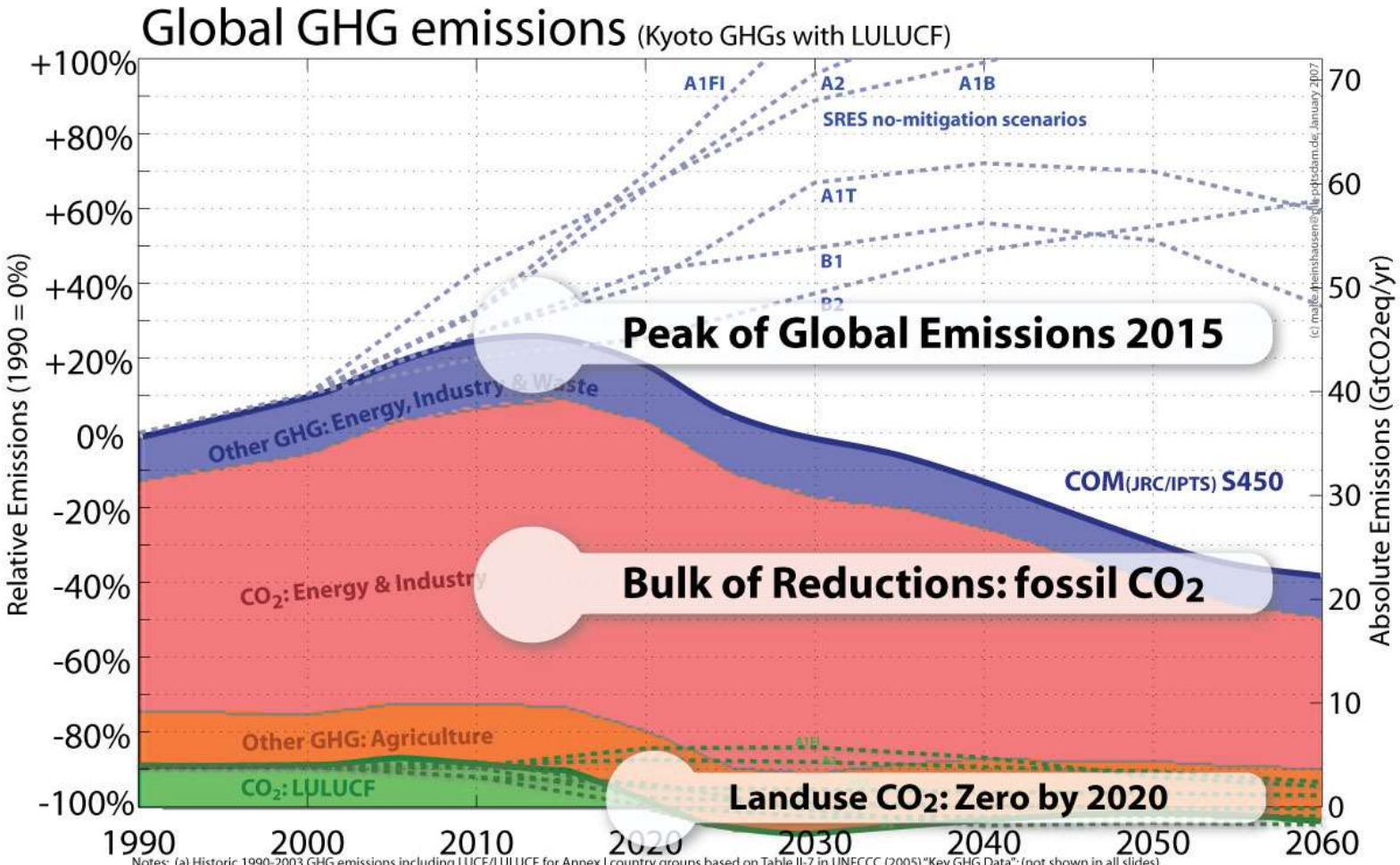


Source: IPCC 2007

Why 2 degrees Celsius? - “Millions at risk”



The EU's vision: Global emission development

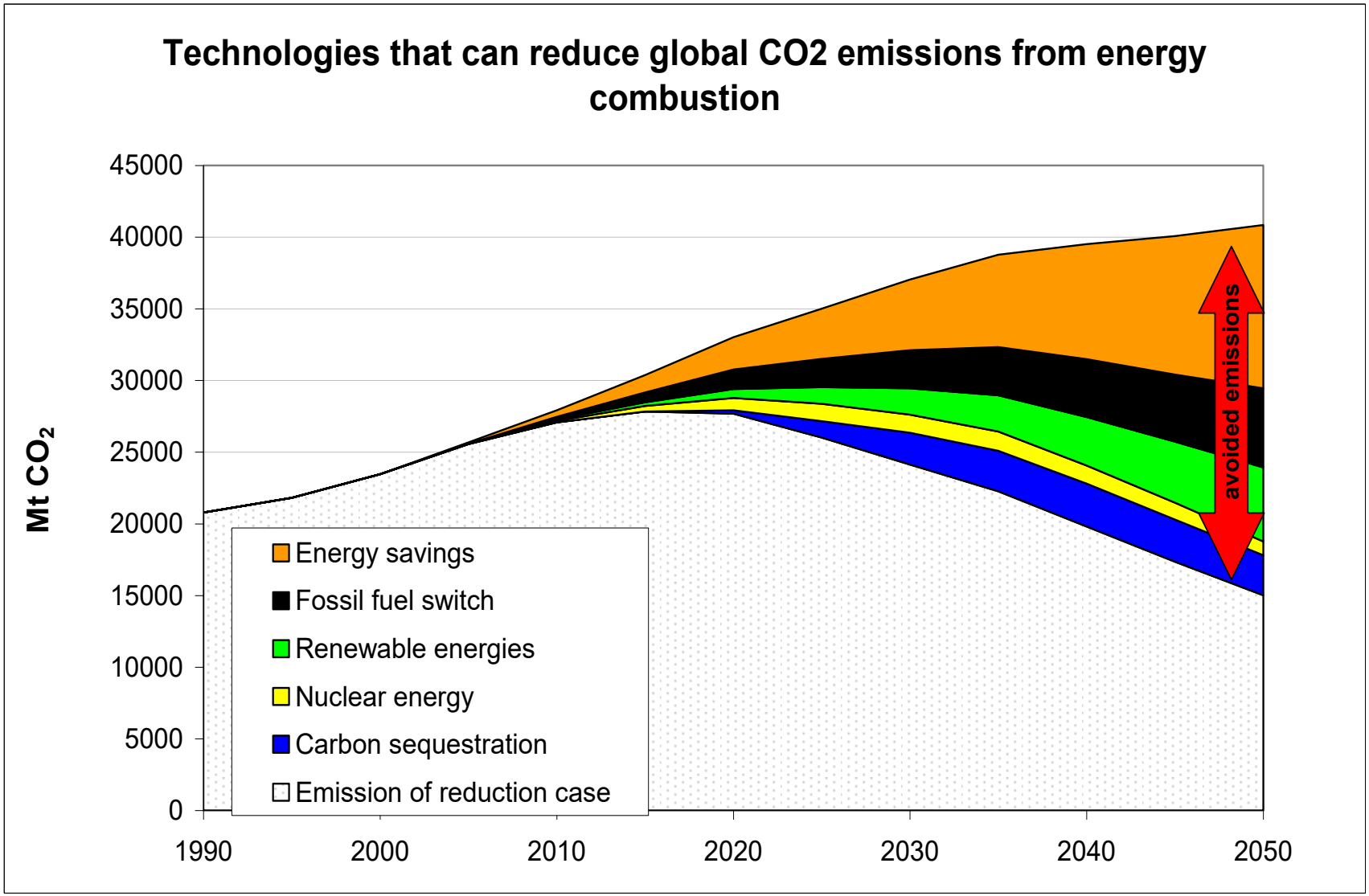


Notes: (a) Historic 1990-2003 GHG emissions including LUCF/LULUCF for Annex I country groups based on Table II-7 in UNFCCC (2005) "Key GHG Data"; (not shown in all slides)
(b) Shown are various multi-gas FAIR-SiMCaP (den Elzen & Meinshausen, 2006) and EQW pathways (Meinshausen et al. 2006) relative to 1990 for peaking at approximately 500 ppm and stabilizing at 450ppm CO2eq (grey pathways) and peaking at 475 with subsequent stabilization at 400ppm CO2eq (green pathways).
(b2) Shown are as well SRES scenarios (Nakicenovic and Swart, 2000), emission pathways used in the STERN review (2006), and the scenario presented by EU Commission COM(2007)2, Fig11, 10th January
(c) The here shown pathways comprise the SRES country groups OECD90 and REF (Economies in Transition). Note that the absolute GHG emission data is (~15%) higher compared to absolute Annex I emissions reported to the UNFCCC, partially due to non-reported sources, as landuse related emissions, and slight differences in countries (Turkey, some REF).
(d) The probabilities are given to stay below 2°C global-mean warming relative to preindustrial levels, assuming an IPCC consistent climate sensitivity pdf with a 90% confidence that climate sensitivity lies between 1.5°C and 4.5°C (for details see Chapter 28 in Schellnhuber et al."Avoiding Dangerous Climate Change", 2006)
(e) The light and dark patches show the mean plus / minus one and two standard deviations, respectively, for the set of analysed FAIR-SiMCaP and EQW pathways.
(f) The calculations imply default MAGICC carbon cylce feedbacks, comparable to approximately the mean across the C4MIP studies (Friedlingstein et al. 2005).

The EU's vision: Further elements

- International research and technology cooperation
  - Large-scale technology demonstration
  - Quantification of regional and local impacts and adaptation and mitigation strategies
- Action to halt deforestation within 2-3 decades and reverse afterwards
  - Large-scale pilot schemes
- Adaptation measures
  - Integrate in public and private investment decisions
  - Enhanced alliance building with developing countries building on EU action plan on climate change and development
- International agreement on energy efficiency standards

The EU vision is technically feasible: e.g. the energy sector



Benefits and Costs of the EU vision

- “Winning the Battle” & Stern Review: benefits of limiting Climate Change outweigh costs of action
- Costs of inaction: 5-20% of global GDP (Stern Review)

- Costs of global action (2030):
  - Investment costs: 0.5% of global GDP / year
  - Reduce global GDP growth by 0.19% / year
    (Expected global GDP growth of 2.8% / year)

- Co-benefits:
  - Increased energy security
  - Improved competitiveness through innovation
  - Health benefits from reduced air pollution

EU 2020

EU climate action up to 2020: mitigating climate change

- **EU independent commitment: Reduce EU GHG emissions by at least 20% in 2020 compared to 1990**
- Energy Package:
  - **Energy efficiency: 20% improvement by 2020**
  - **Renewable energy: 20% mandatory objective by 2020**
    - differentiation of targets between countries
    - flexibility in target setting within a country between sectors
  - Biofuels target of 10% by 2020
  - Sustainable power generation from fossil fuels: 12 large scale CCS demonstration plants by 2015; aiming at near-zero emissions by 2020
  - Strategic energy technology plan
  - Internal market-options unbundling & regulatory powers:
    - Important for functioning EU ETS
    - Overcome hurdles for renewables
  - Nuclear: member states' choice
- Climate Strategy:
  - EU ETS (Review, aviation)
  - Other policies (e.g. fuel quality)
  - Global carbon market (incl. CDM)

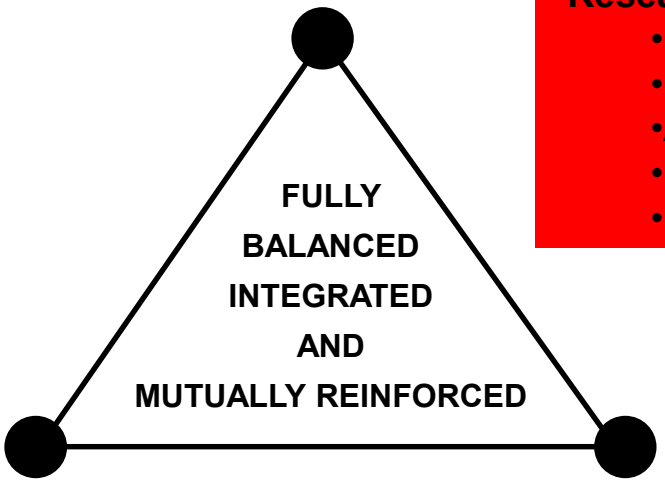
At least -20 % CO_2

Up to - 5% of GHG emissions

The EU's three domestic challenges

Competitiveness "LISBON"

- **Internal Market**
- **Interconnections** (Trans-European networks)
- **European electricity and gas network**
- **Research and innovation**
  - Clean coal
  - Carbon sequestration
  - Alternative fuels
  - Energy efficiency
  - Nuclear



Climate security "POST-2012"

- Emissions trading
- European Climate Change Program
- Renewable energy
- Energy efficiency
- CCS
- Research and innovation
- Nuclear

Security of supply

- International Dialogue
- European stock management (oil/gas)
- Refining capacity and energy storage
- Diversification

Improve competitiveness through innovation

- Climate change policies are an opportunity, e.g. wind sector employs already more than 100,000 people in Germany, Denmark and Spain. EU companies have 60% of the global market.
- Companies ask for a long term investment horizon to develop and deploy new technologies, e.g. demand for a harmonized regulatory framework for CCS.
- Additional investment costs for new technology are recycled inside our economy, higher expenses for imports are not.
- Preliminary results of a study of the European Trade Union Confederation show that climate change policies in total can increase employment.

Health benefits from reduced air pollution (1)

Costs of air pollution policies in the EU would decrease significantly due to climate policies.

Co-benefits from Climate Change Policies		
	Reduction compared to 2020 baseline emissions	
CO2	-9.31%	-22.75%
SO2	-5.90%	-12.11%
NOx	-2.30%	-6.08%
PM2.5	-3.15%	-5.94%

EU energy and climate goals by 2030

- On **22 January 2014** the Commission proposed energy and climate objectives to be met by 2030.
- The targets must be met if the EU is to keep its promise to cut its greenhouse gas emissions **by 80-95% by 2050**.
- EU leaders agreed on 23 October 2014 the domestic 2030 greenhouse gas reduction target of at least 40% compared to 1990
  - **40% cut in greenhouse gas emissions** (compared to 1990 levels)
  - To achieve **at least a 27% share of renewable energy** consumption
  - Increasing energy efficiency by at least 27 %

EU 2020 (and 2030) Climate and Energy framework

- The 2020 climate and energy package is a set of binding legislation which aims to ensure the European Union meets its ambitious climate and energy targets for 2020
- The 2030 framework builds on the experience of, and lessons learnt from the 2020 climate and energy framework.
- The framework also takes into account the long-term perspectives set out by the Commission in 2011 in the Roadmap for moving to a competitive low carbon economy in 2050, the **Energy Roadmap 2050 and the Transport White Paper.**

EU 2050

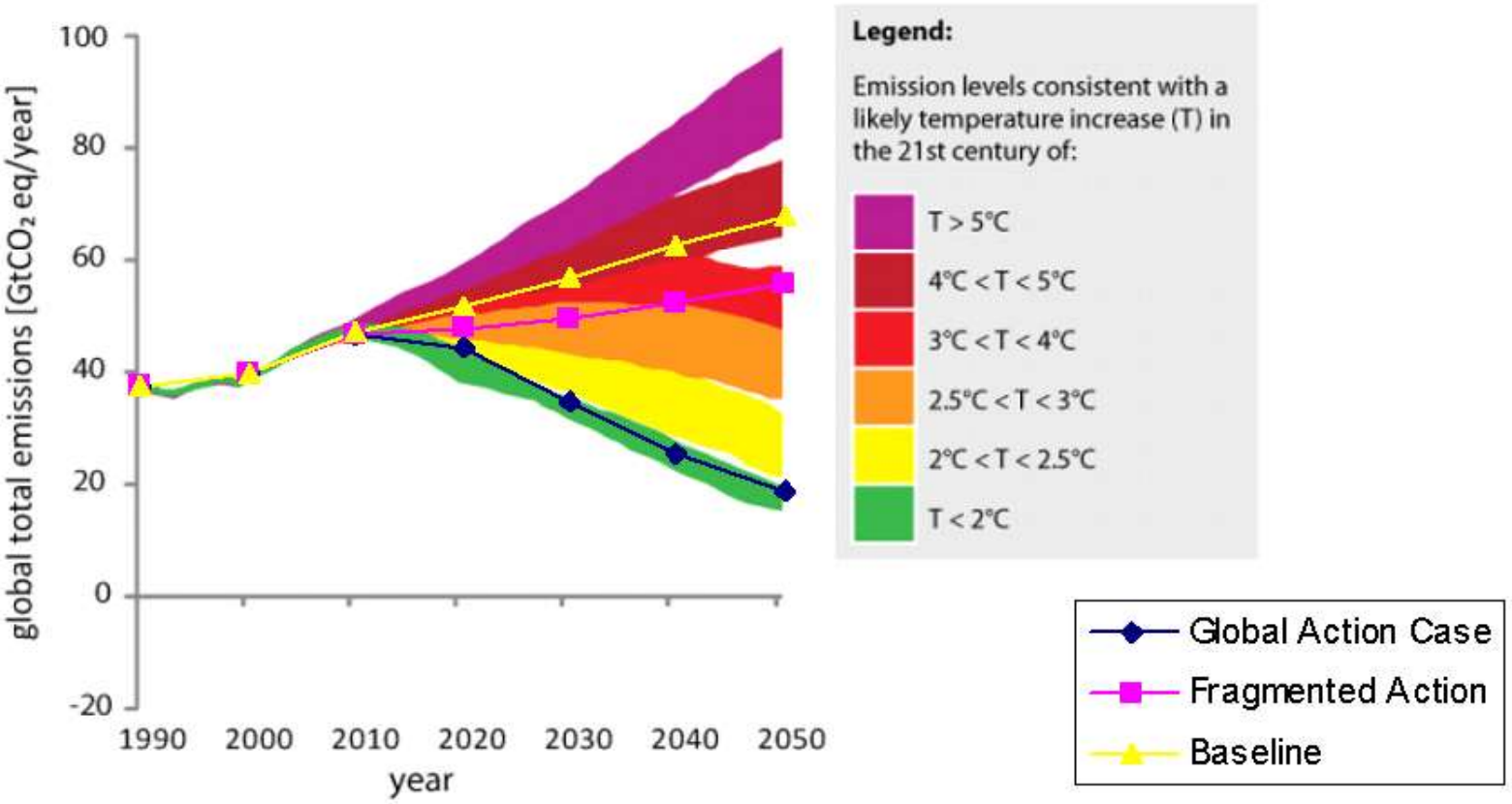
Limiting climate change – a global challenge

- Science requires that global emissions are cut by 50% by 2050 compared to 1990
- **EU objective of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990**, in the context of necessary reductions by developed countries
  http://ec.europa.eu/clima/policies/roadmap/index_en.htm

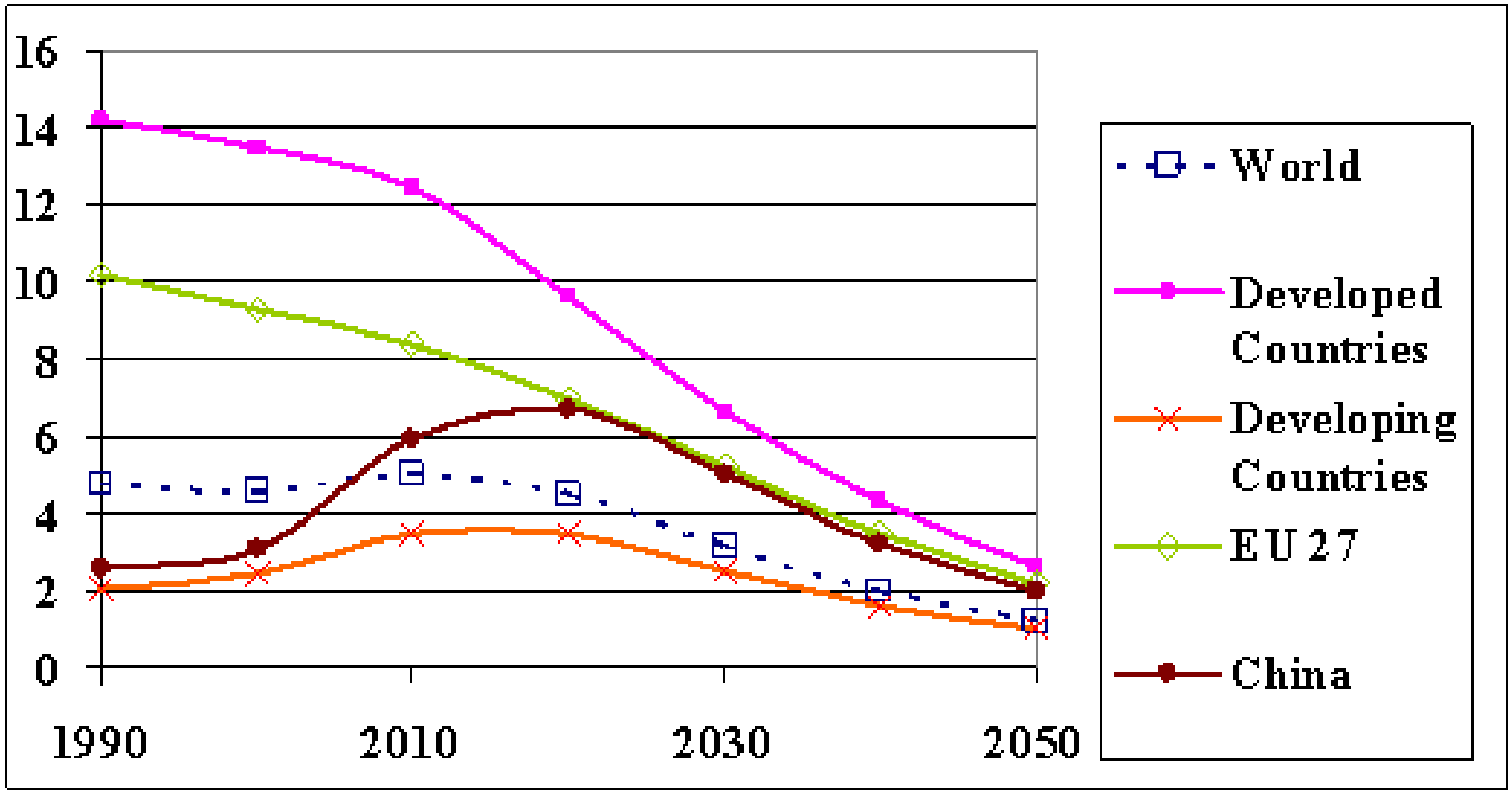
- Low carbon society
- Innovation, green growth and jobs
- Saving energy and resources
- Cleaner air

The impact of climate action on the global temperature increase by 2100

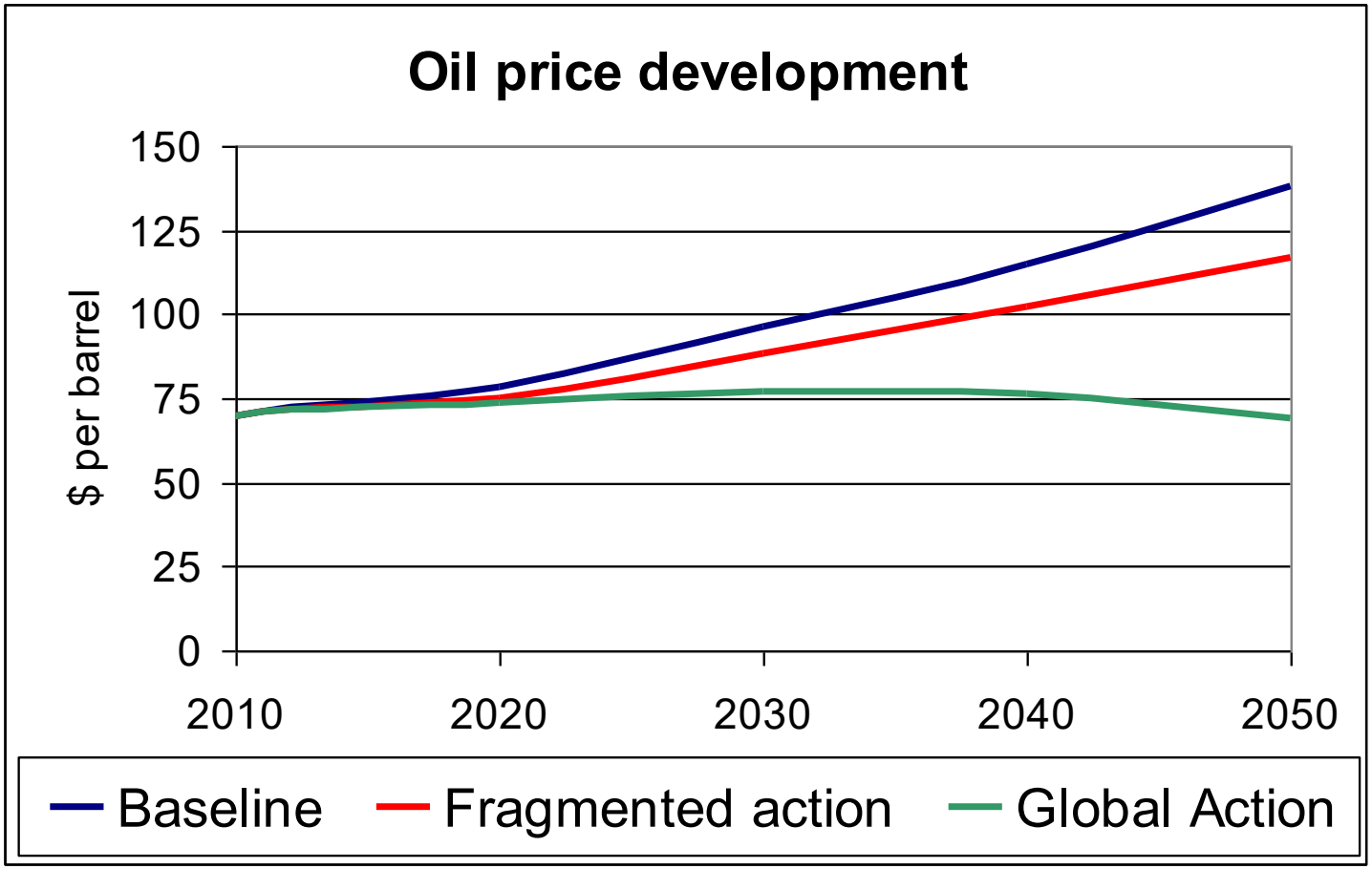
Global emissions pathway in the next 40 years will determine likely warming by the end of the century



Global climate action leads to converging emissions per capita



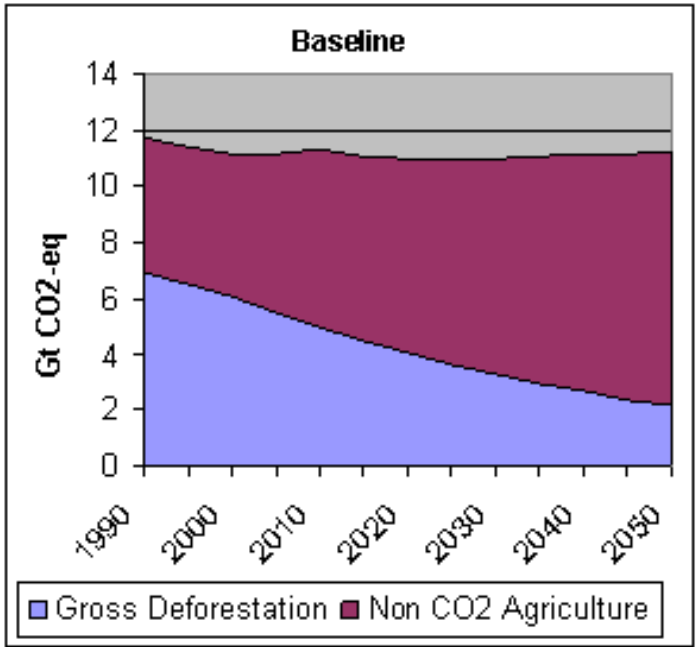
Global climate action reduces fossil fuel prices

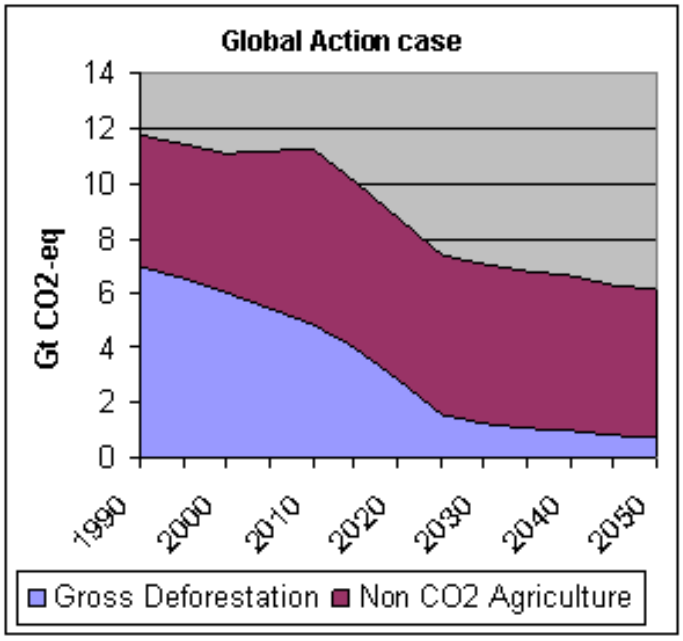


Climate Action

Global forestry and agriculture must be part of the solution

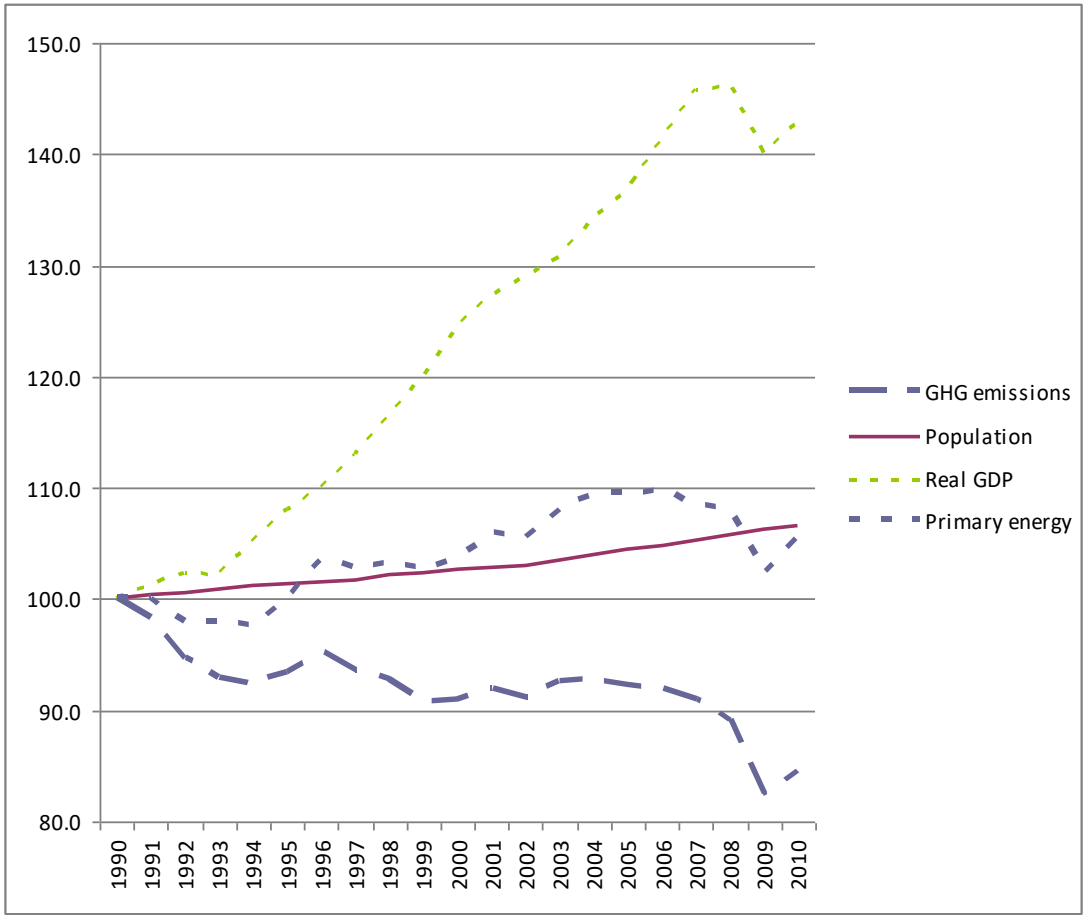
- Need to ensure food security to feed 9 billion people
- EU objective of eliminating net deforestation around 2030
- Efforts to reduce agricultural emissions, or rather limit their increase
- Increased biomass use for energy as a result of global action on climate change





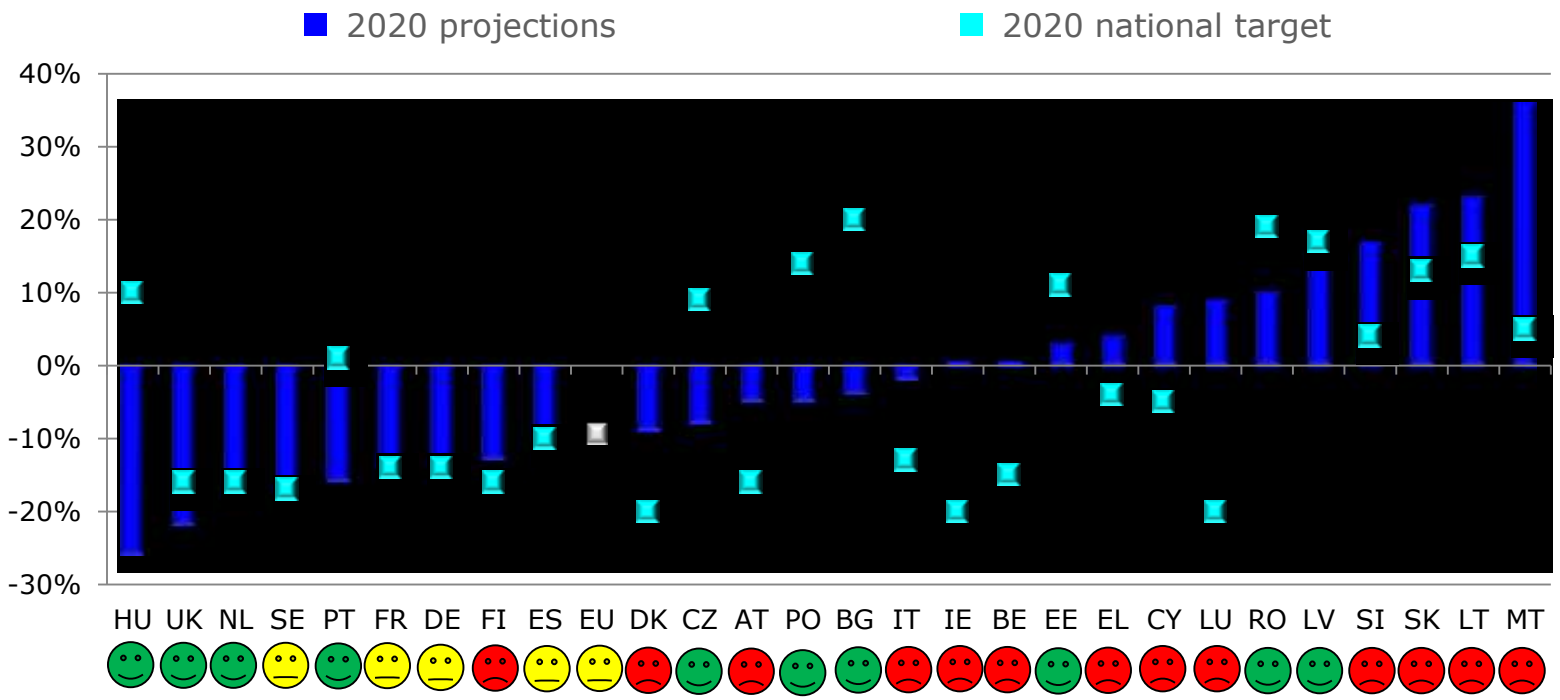
Climate Action

Where does the EU stand now?



- EU emissions reduced by 15.5% 1990 -2010
- EU GDP grew 40%
- EU on track towards 20% emission reduction by 2020

However, majority of Member States will not meet national non-ETS target in 2020



Current projections show the EU would meet its 2020 target. However, for 13 Member States, the existing policies would not be sufficient to reach their national target.

Roadmap 2050:
EU analysis –

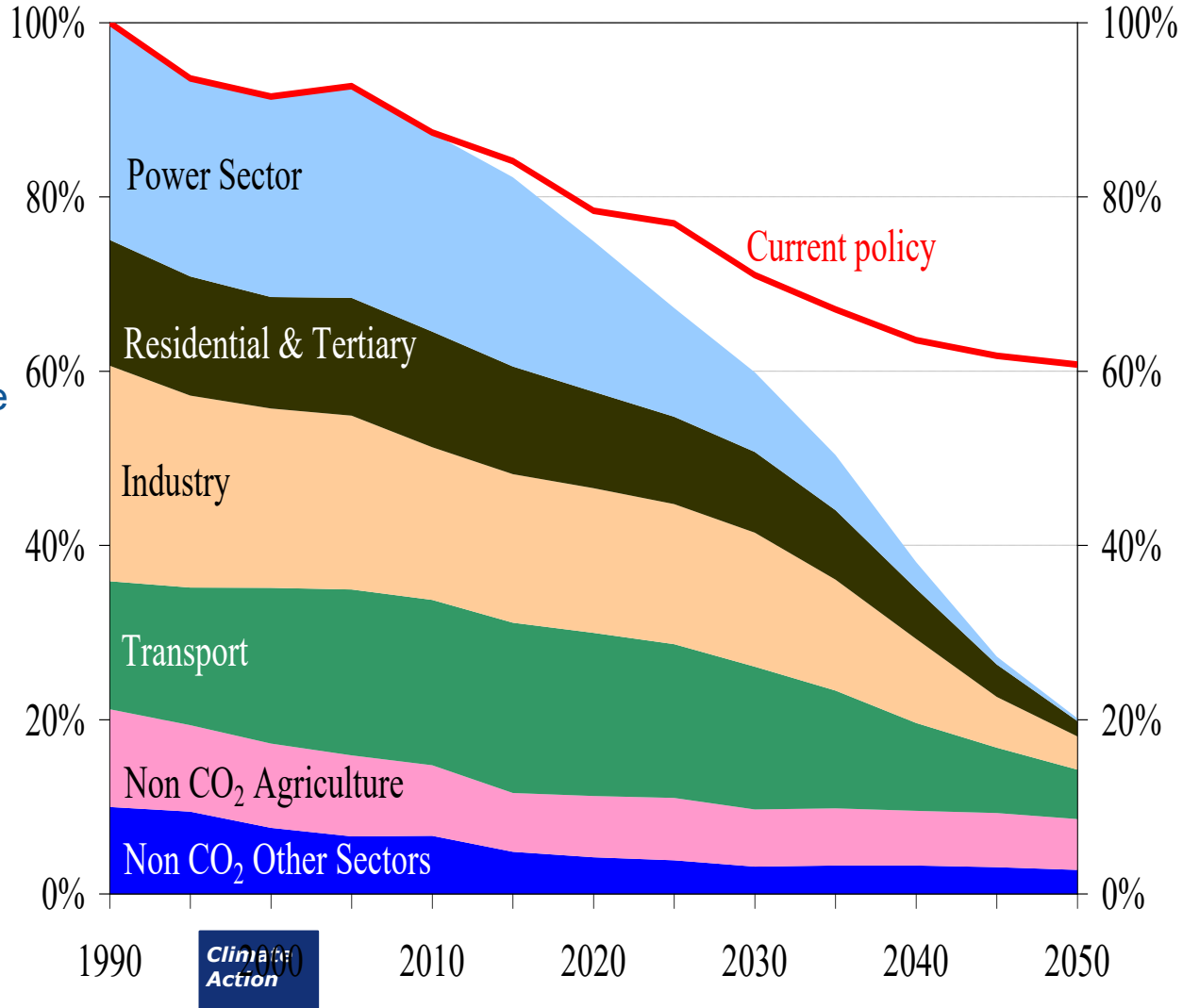
Climate Action

A cost-efficient pathway towards 2050

80% domestic reduction in 2050 is feasible

- with currently available technologies,
- with behavioural change only induced through prices
- If all economic sectors contribute to a varying degree & pace.

Efficient pathway:
-25% in 2020
-40% in 2030
-60% in 2040



Roadmap 2050

- Energy efficiency is the single most important contribution by 2050
- Low carbony economy

- Secure energy supply
- Long-term regulatory framework

Roadmap 2050:
Making the EU fit for the global low-carbon race

- All competitors develop their own low carbon strategies, e.g.

- **US**:
  - 1 million electric cars on road by 2015
  - 80% clean energy by 2035
- **China**:
  - Two-year investment plan: +0.8% GDP on innovation, restructuring, energy conservation, emissions reductions and ecological improvement
  - 12th 5-year plan (2011-2015): reducing emissions per unit of GDP by 17%, accelerating R&D and use of low-carbon technologies, low-carbon pilot projects

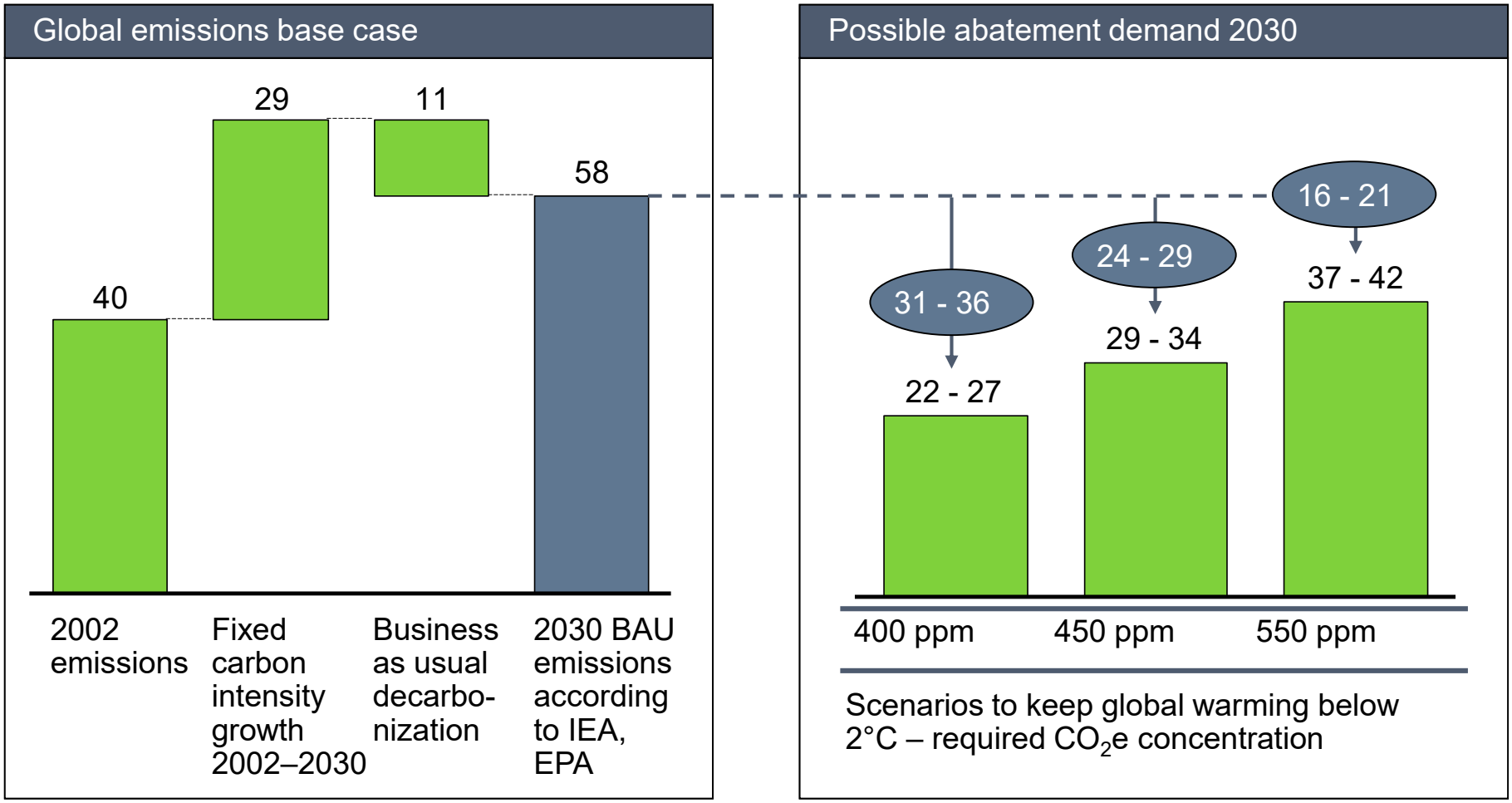
Mc Kinsey study on global abatement cost curves

- Published in 2008, further updates
- Economic impacts of GHG reduction scenarios based on abatement cost curves

The magnitude of the global challenge by 2030 is huge …

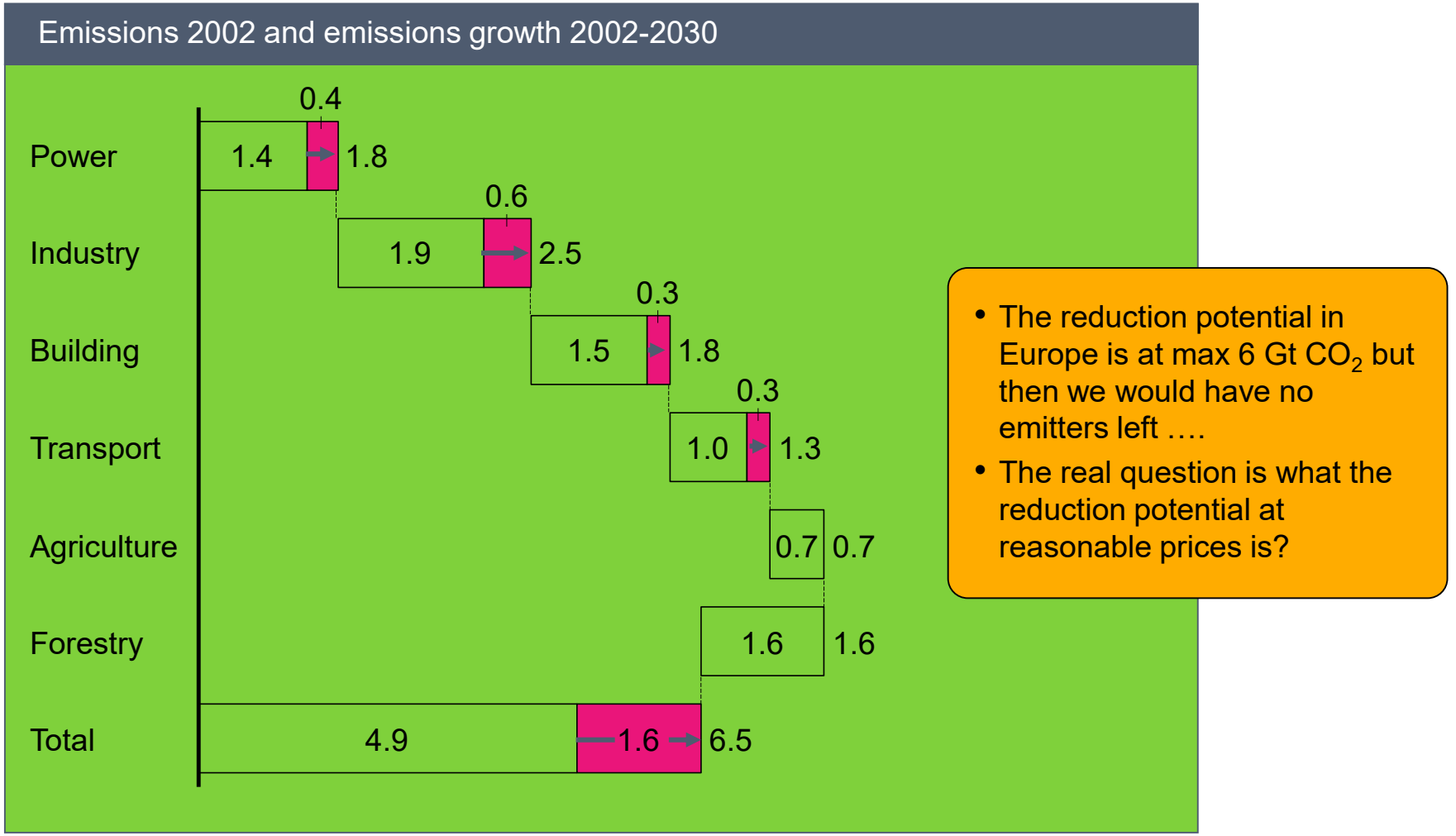
CO_2e emissions per year, Gton

Abatement required by 2030 compared to the BAU



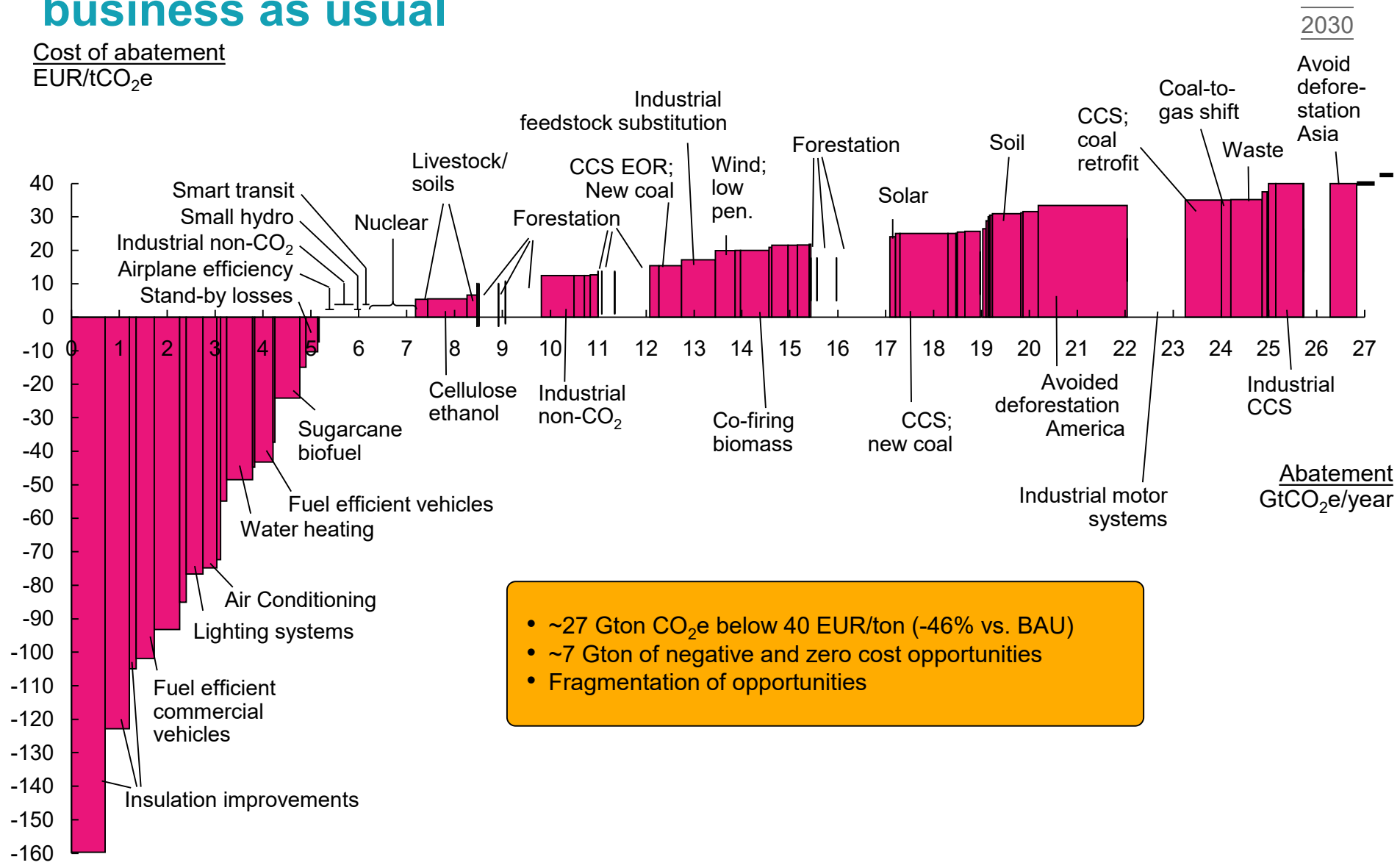
… and Europe can only be a part of the solution

CO_2e emissions per year, Gton



- The reduction potential in Europe is at max 6 Gt CO_2 but then we would have no emitters left ….
- The real question is what the reduction potential at reasonable prices is?

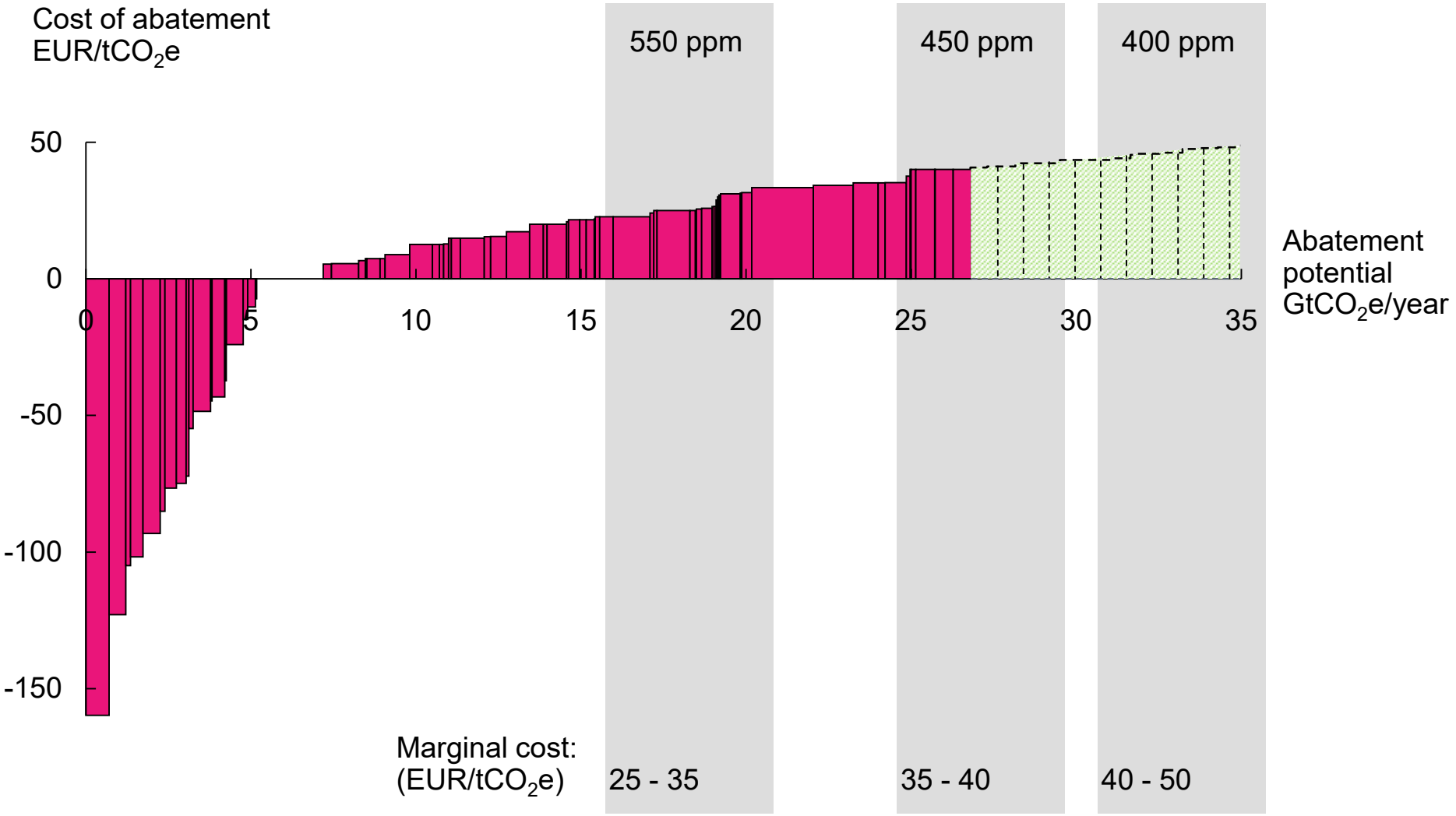
Global cost curve of GHG abatement opportunities beyond business as usual



- ~27 Gton CO_2e below 40 EUR/ton (-46% vs. BAU)
- ~7 Gton of negative and zero cost opportunities
- Fragmentation of opportunities

Marginal abatement cost in the different demand scenarios are always beyond 30 EUR/t in the best case

2030



Myths and realities about GHG abatement

Myths	Realities
• Abatement opportunities are concentrated in the industry and power sectors	• Industry and power represent <45% of the total 2030 abatement potential*
• Limited amount of low-cost opportunities in industrialized countries	• Negative cost abatement potential represents 35–45% of the total in industrialized countries
• Abatement opportunities are concentrated in industrialized countries and China	• Developing world excluding China represents >40% of the total 2030 abatement potential*
• We can only achieve the required abatement through new technology	• 70% of the total 2030 abatement potential* not dependent on new technology
• Addressing GHG emissions will severely strain the global economy	• Reaching 450 ppm could cost as little as 0.6% of GDP if all low-cost opportunities are addressed but will require wealth redistribution

Economic assessment of regulation

- **How much does the regulation really cost?**

  – Strategic documents – Roadmaps are transformed to regulatory interventions - laws

Regulatory Impact Assessment (RIA)

- Process and document created **before** a new government regulation is introduced
- Regulation commonly has numerous impacts and that these are often difficult to foresee without detailed study and consultation with affected parties
  - Impacts on competitiveness
  - Administrative cost and compliance cost
- Objective: detailed and systematic appraisal of a new regulation
- Cost-Benefit-Analysis (CBA) as core concept

Implementation of RIA

- 1986 – USA: Business Impact Assessment
- All OECD countries have implemented RIA
  - BRD: Normenkontrollrat

- EU: member states are encouraged, but not obliged to implement RIA system

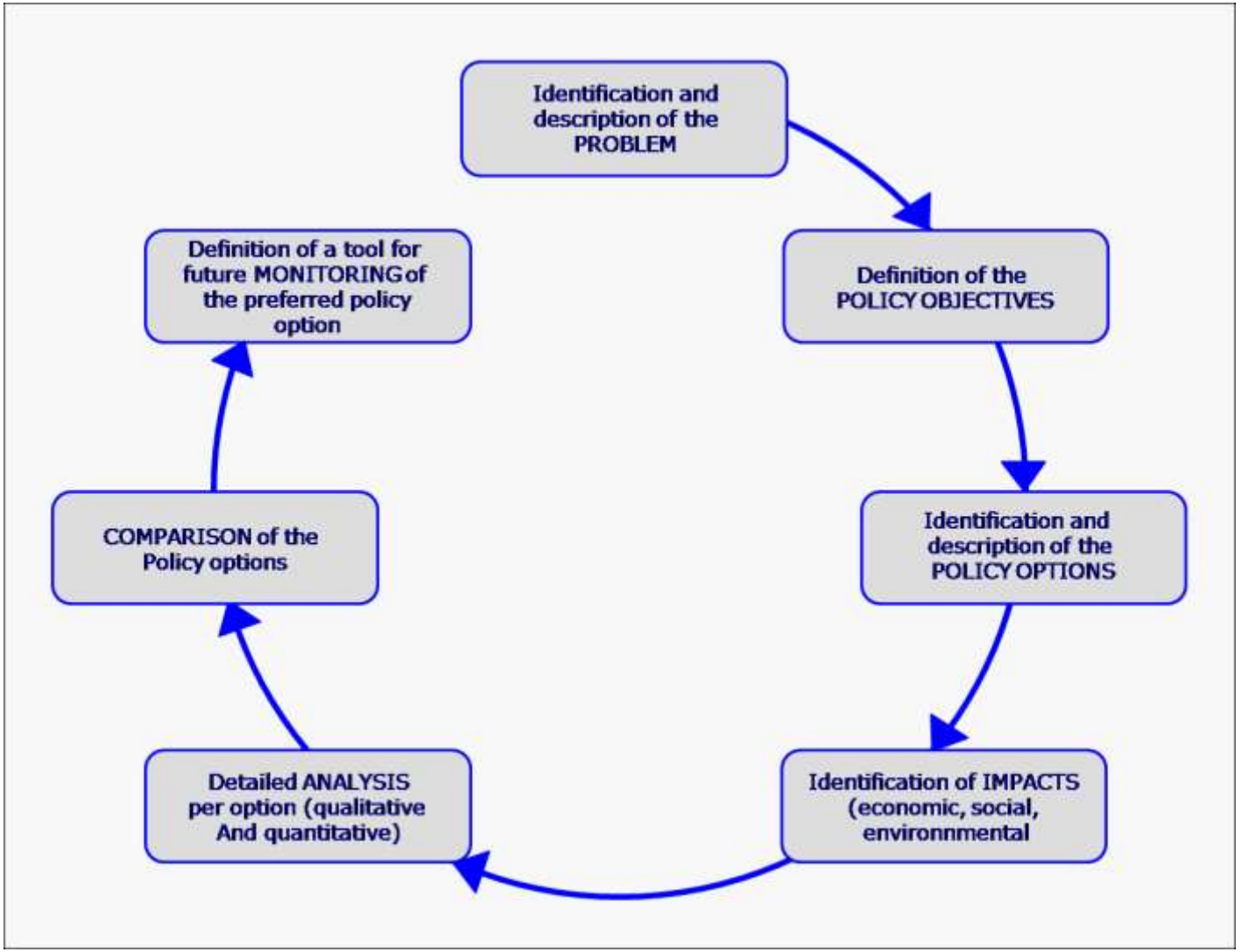
- Better Regulation Efforts x competiteveness concerns

EU

- 2001 – Mandelkern Report
- 2002 – Action Plan and guidelines – integrated method of impact assessment
- 2005 and 2006 – new guidelines with EU Standard Cost Model
- 2006 – Impact Assessment Board

- 2009 – Impact Assessment Guidelines
- 2015 – Better Regulation Package

Regulatory impact assessment - RIA



2030 framework for climate and energy policies

- Greenpaper 28. 3. 2013 - COM(2013) 169 final – 16 pages
- **Impact Assessment** published 22. 1. 2014 - {COM(2014) 15 final}
  - 235 pages
  - PRIMES model – Technical University of Athens

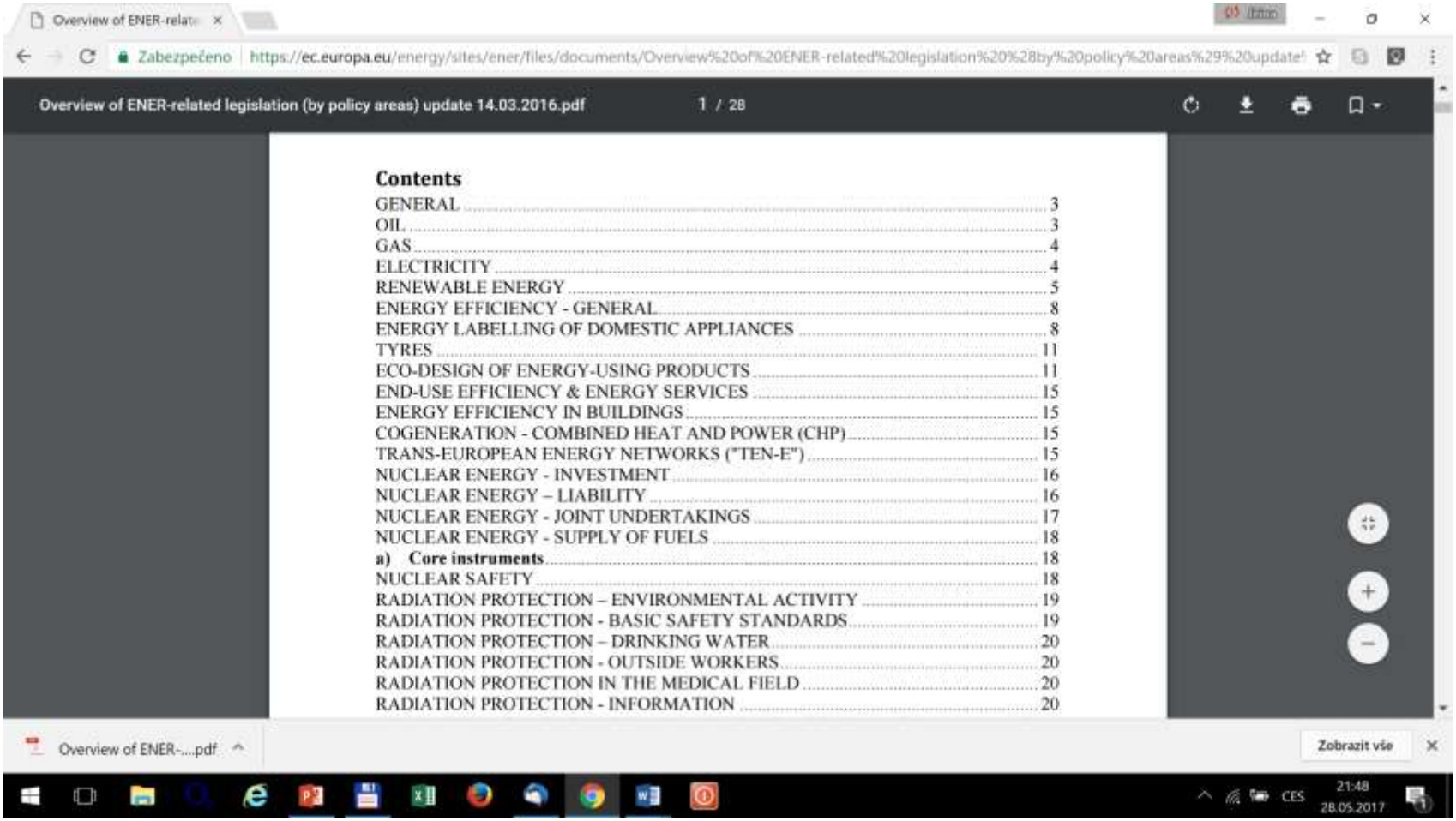
- Roadmap
- Final decision of the European Council – October 2014
  - http://ec.europa.eu/clima/policies/2030/index_en.htm
- CWP – Commission Working Plan
  - specific regulations and directives

EU 2015 Energy Roadmap

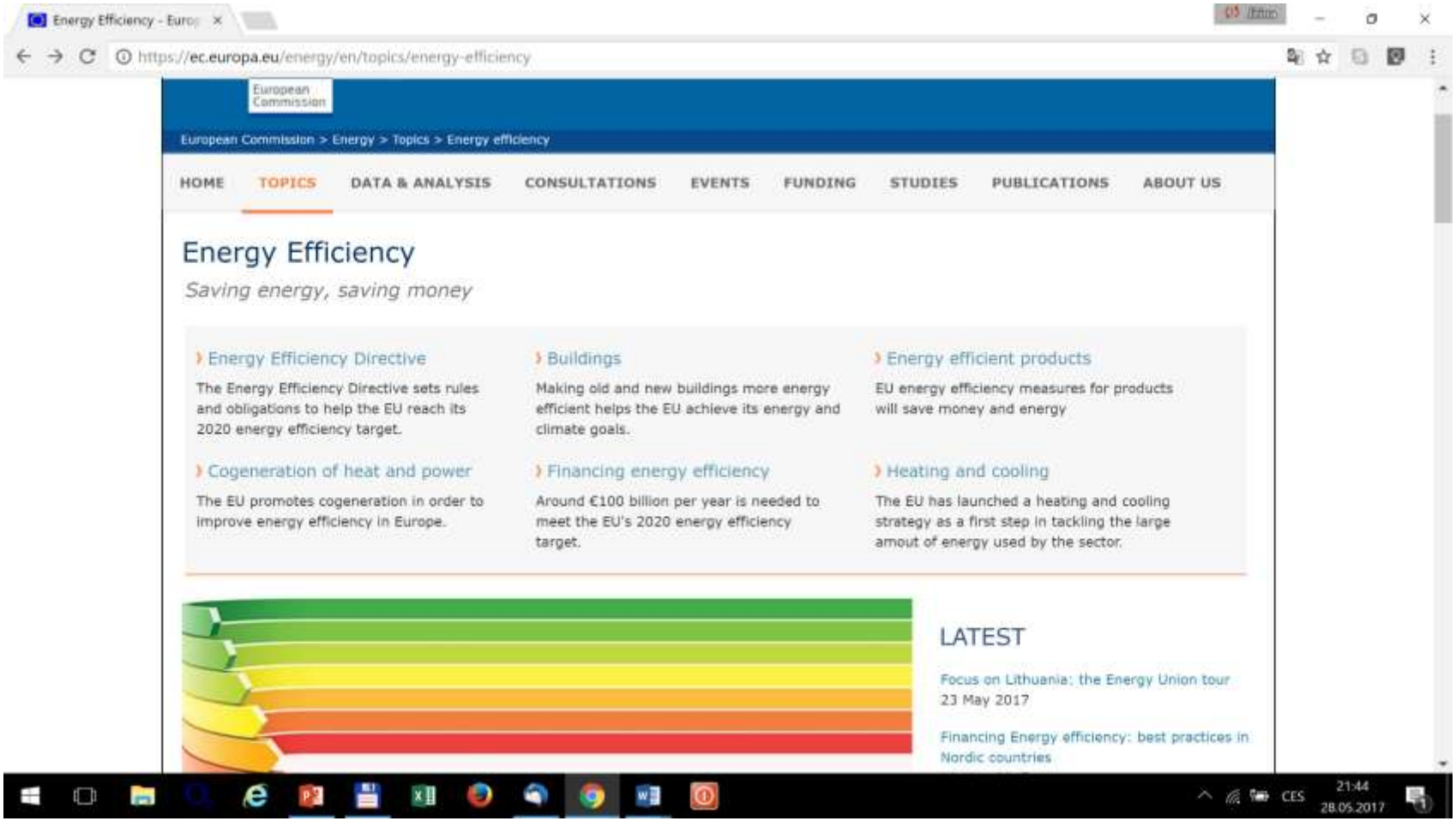
- Published 2011
    - 20 pages
- Impact assessment
    - 192 pages

- The Commission is preparing sectoral roadmaps with sectoral objectives

EU Energy Legislation



Regulations



ASSIGNMENT
for the Summer School Vienna

Aim: critically reflect the

EU Energy Roadmap 2050 and its Impact assessment

COMMISSION STAFF WORKING PAPER

Impact Assessment Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Energy Roadmap 2050

{COM(2011) 885} {SEC(2011) 1566} {SEC(2011) 1569}

IA structure

1. What is the problem Aminata - Jakub
2. Modelling approach and assumptions / who is affected
    1. Farshid - Jakub
3. Objectives of the regulation + independent positions

    Lukas and Petr

1. **Policy options**

    Javad and Assylbek and Carol

1. Analysis of impacts - Thomas and Mahdi
2. Comparing the options
    1. Miroslav and Ali and David

3. Monitoring and evaluation Nikola and Vukola

What is missing in the IA?

- Assumptions – reality check
- Impacts on national states
- Impacts on business

- Evaluation of ongoing policies
- Debate in the Czech Republic and Austria

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