On the Economics of Climate Change

Political and Social Implications

Visit by a High-Level Delegation from Ireland

Potsdam, 08 May 2013

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P I K

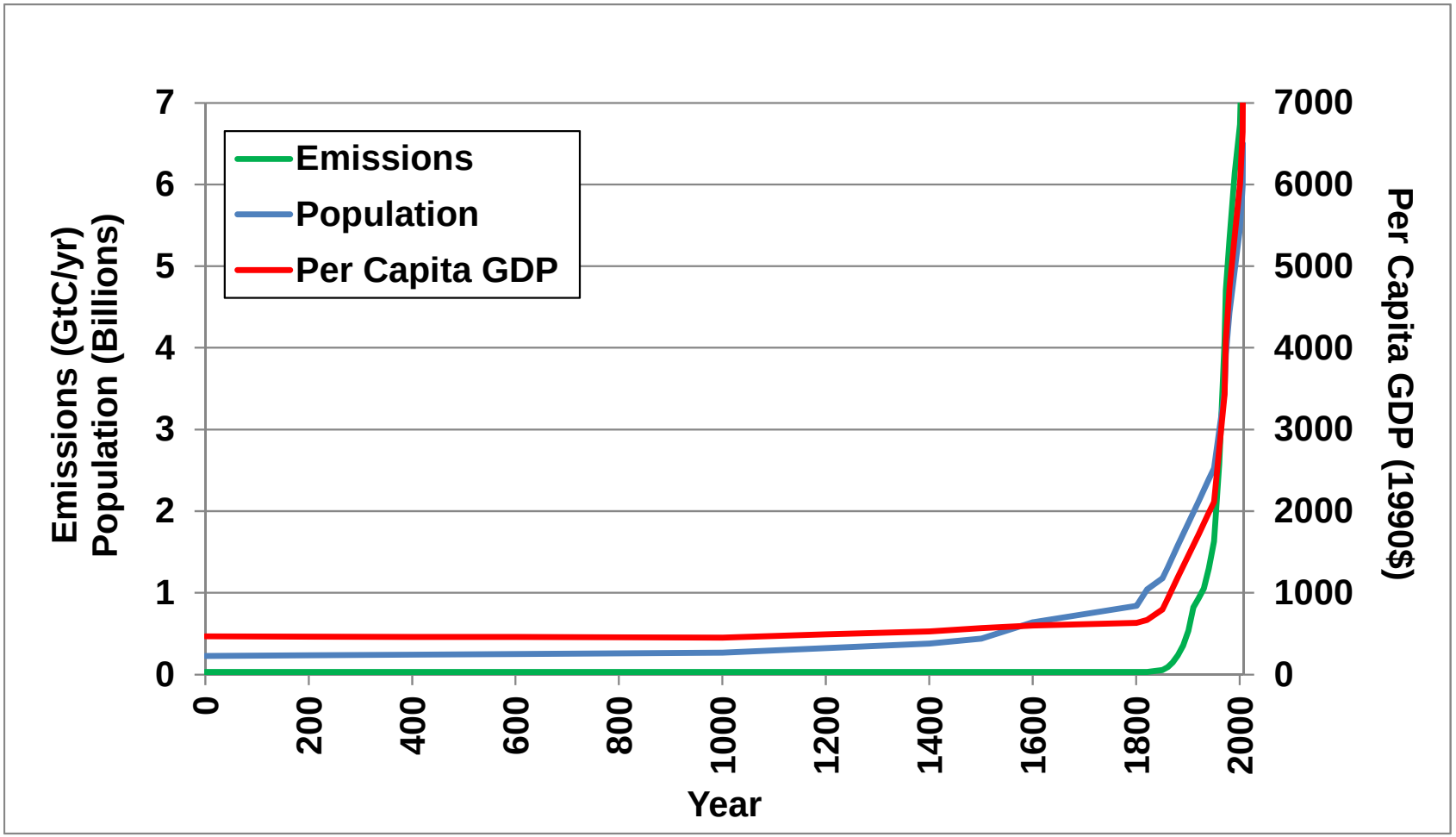
MCC
Mercator Research Institute on
Global Commons and Climate Change

berlin

ipcc
INTERGOVERNMENTAL PANEL ON climate change
Working Group III (WG III) – Mitigation of Climate Change

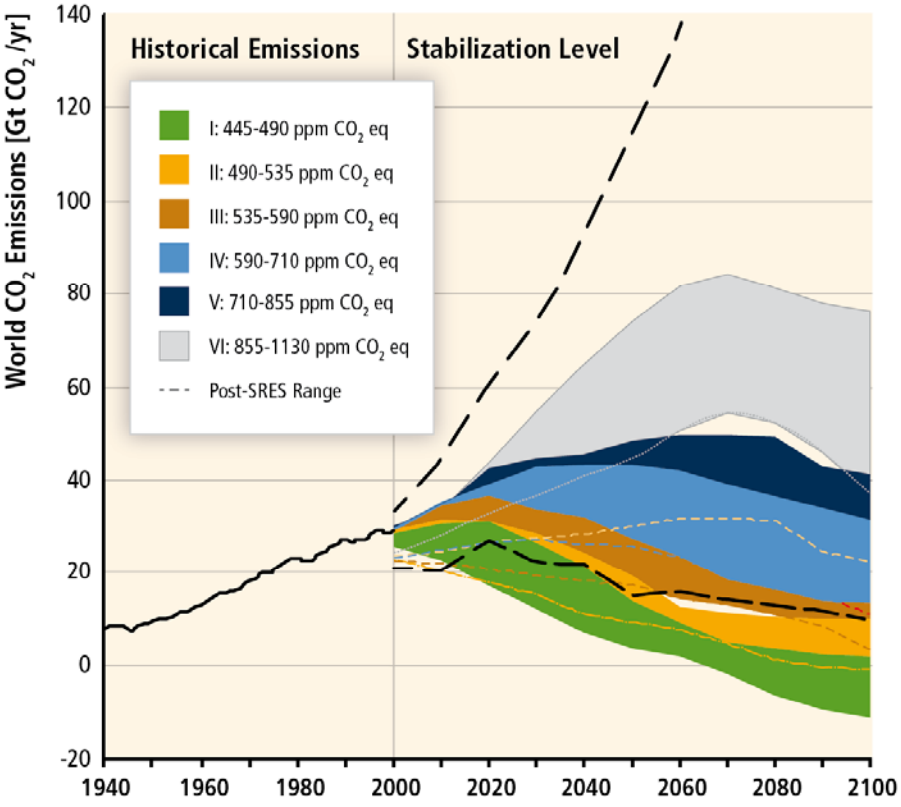
WMO UNEP

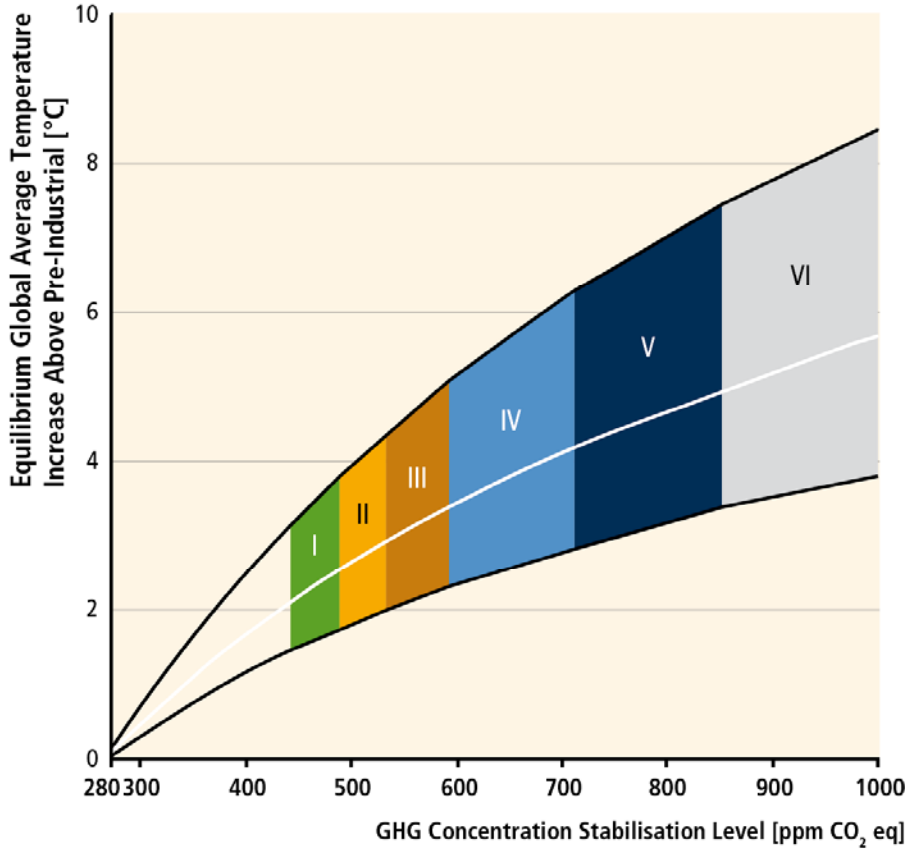
Economic growth in perspective



Edenhofer et al. 2012

Climate policy as an insurance

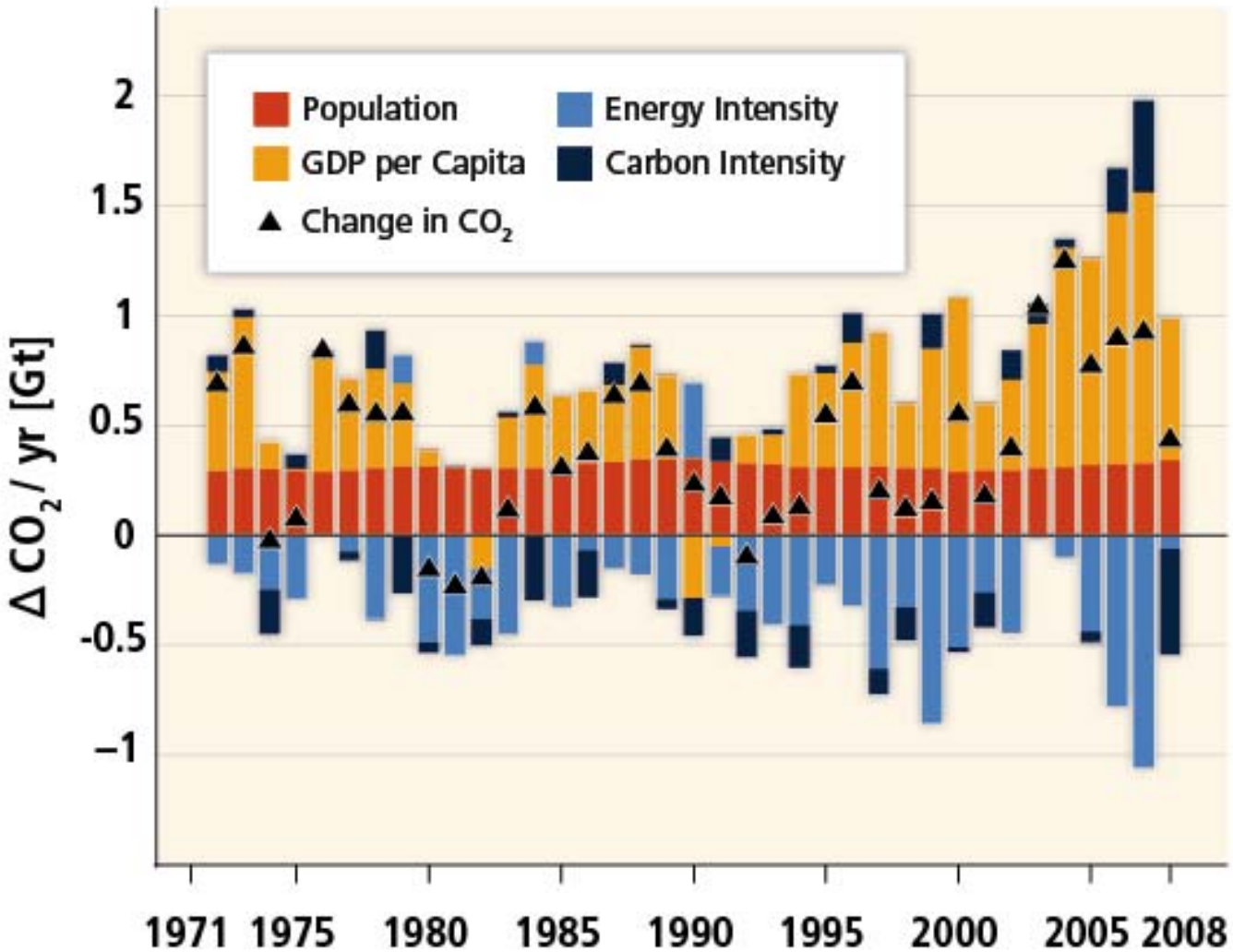




GHG emissions resulting from the provision of energy services contribute significantly to the increase in atmospheric GHG concentrations.

SRREN (IPCC, 2011)

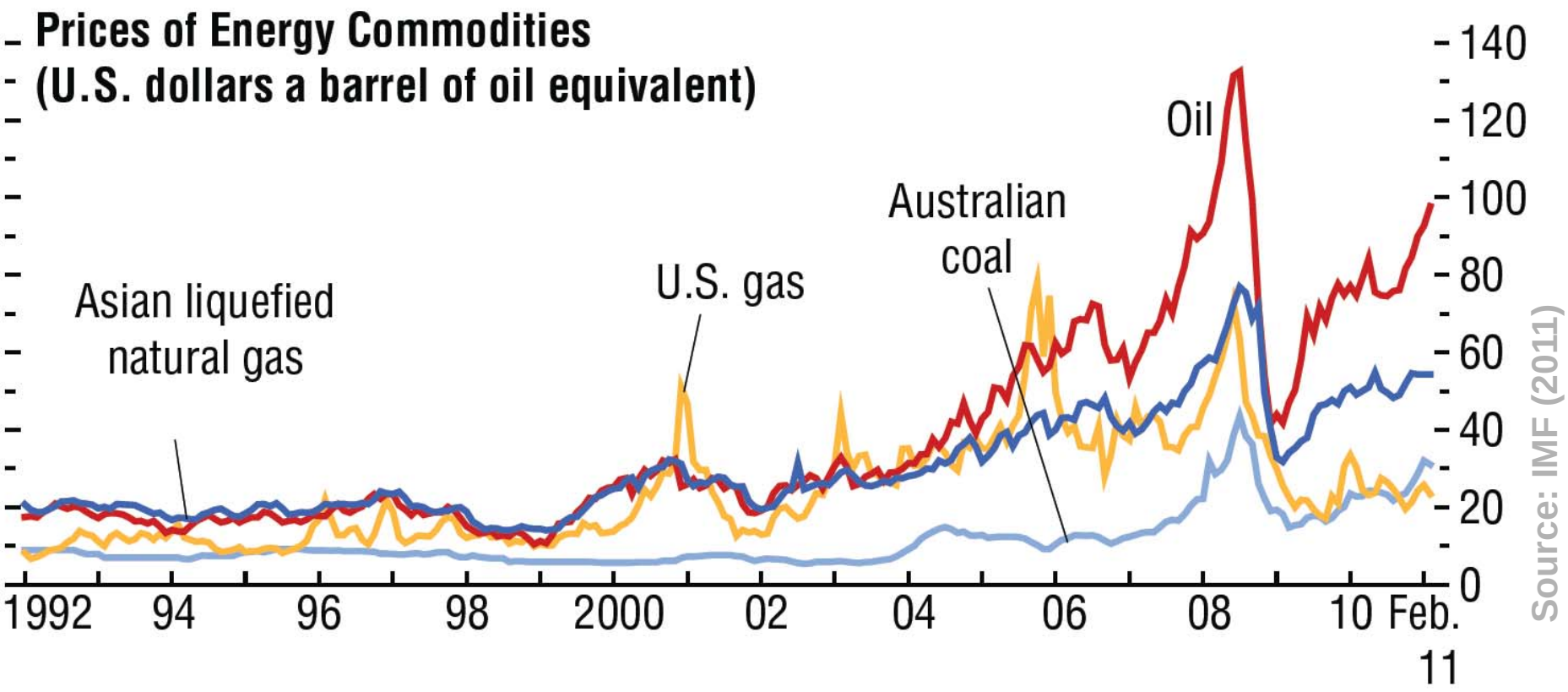
We are not on track – renaissance of coal!



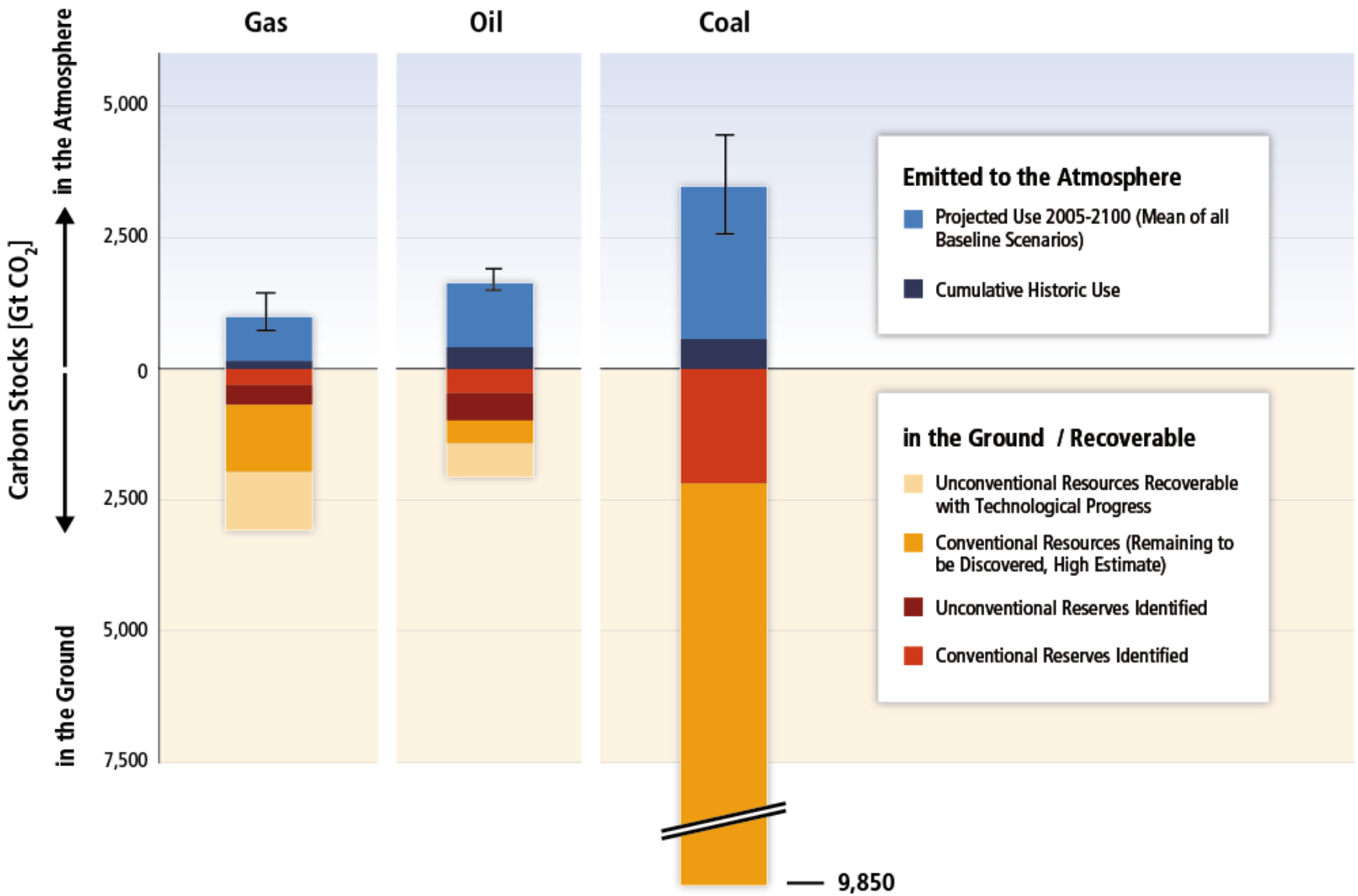
Kaya decomposition of global CO2 emissions.

SRREN (IPCC, 2011)

Renaissance of coal?

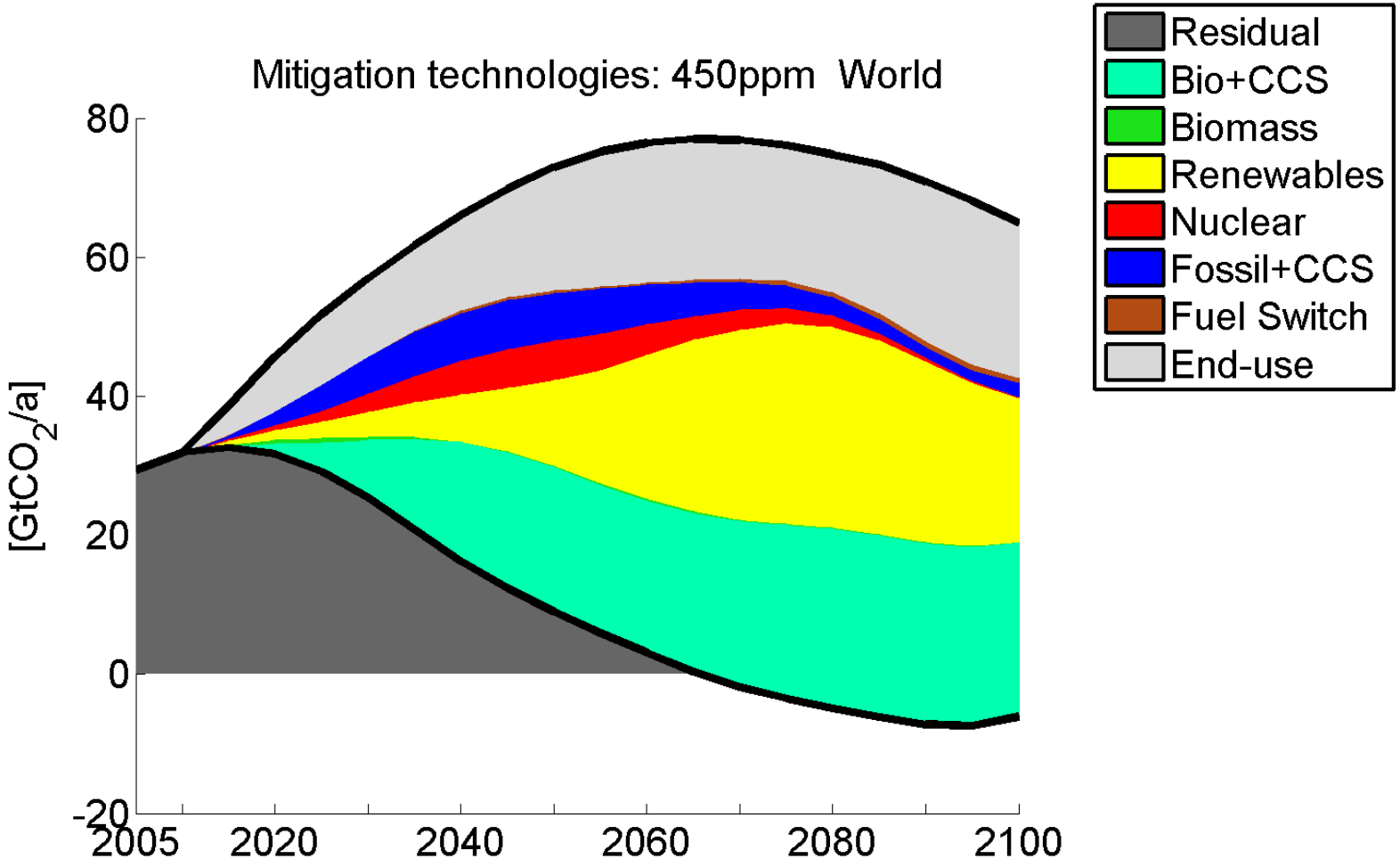


The BAU Scenarios could exceed the level of Greenhouse Gas Concentration of 600ppm (~4° C temperature increase)



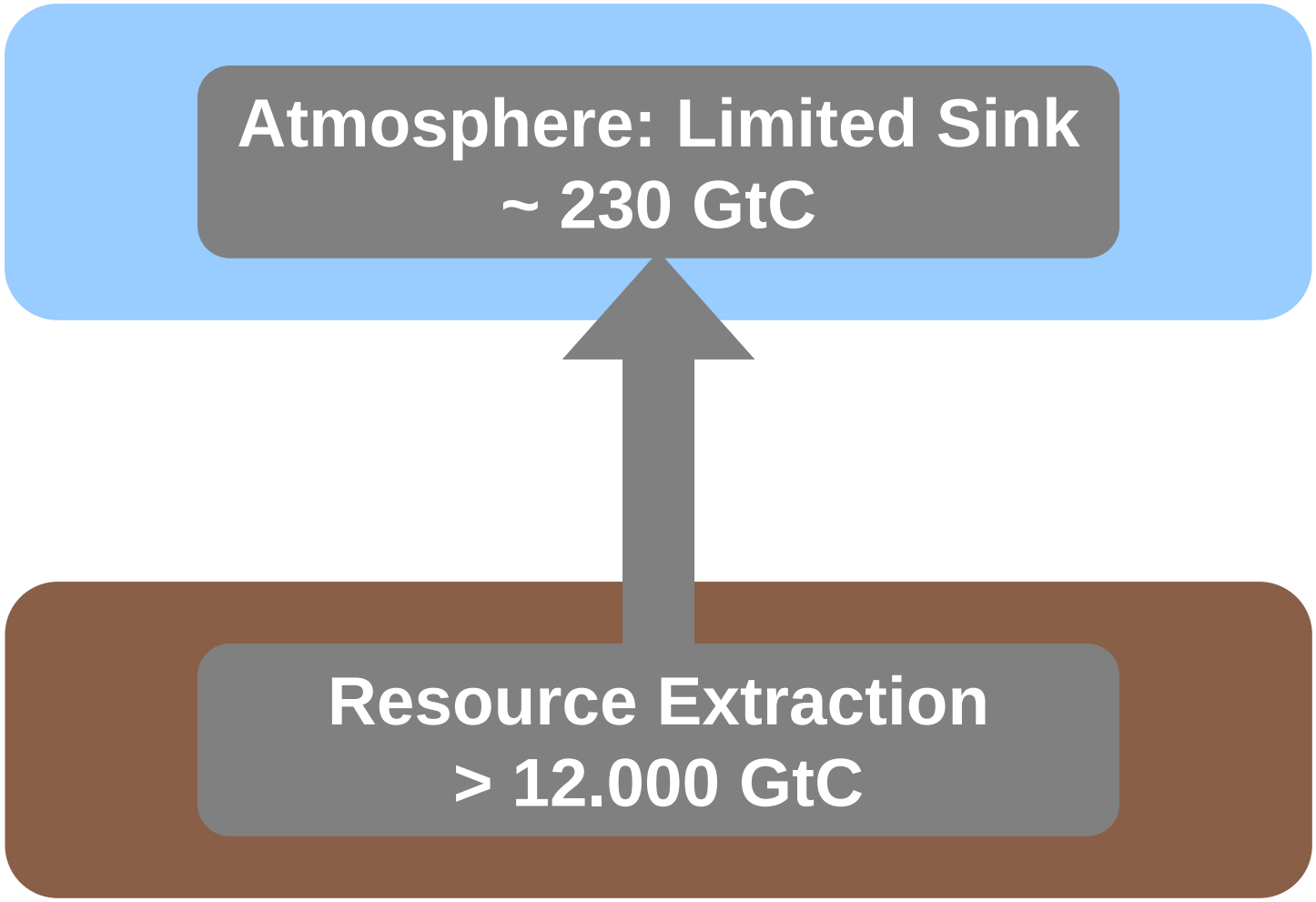
SRREN (IPCC, 2011)

… and what about energy efficiency?



Luderer et al. 2011

The Atmosphere as a Global Common



New perspectives for international negotiations

Emissions trading

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Promoting Renewables

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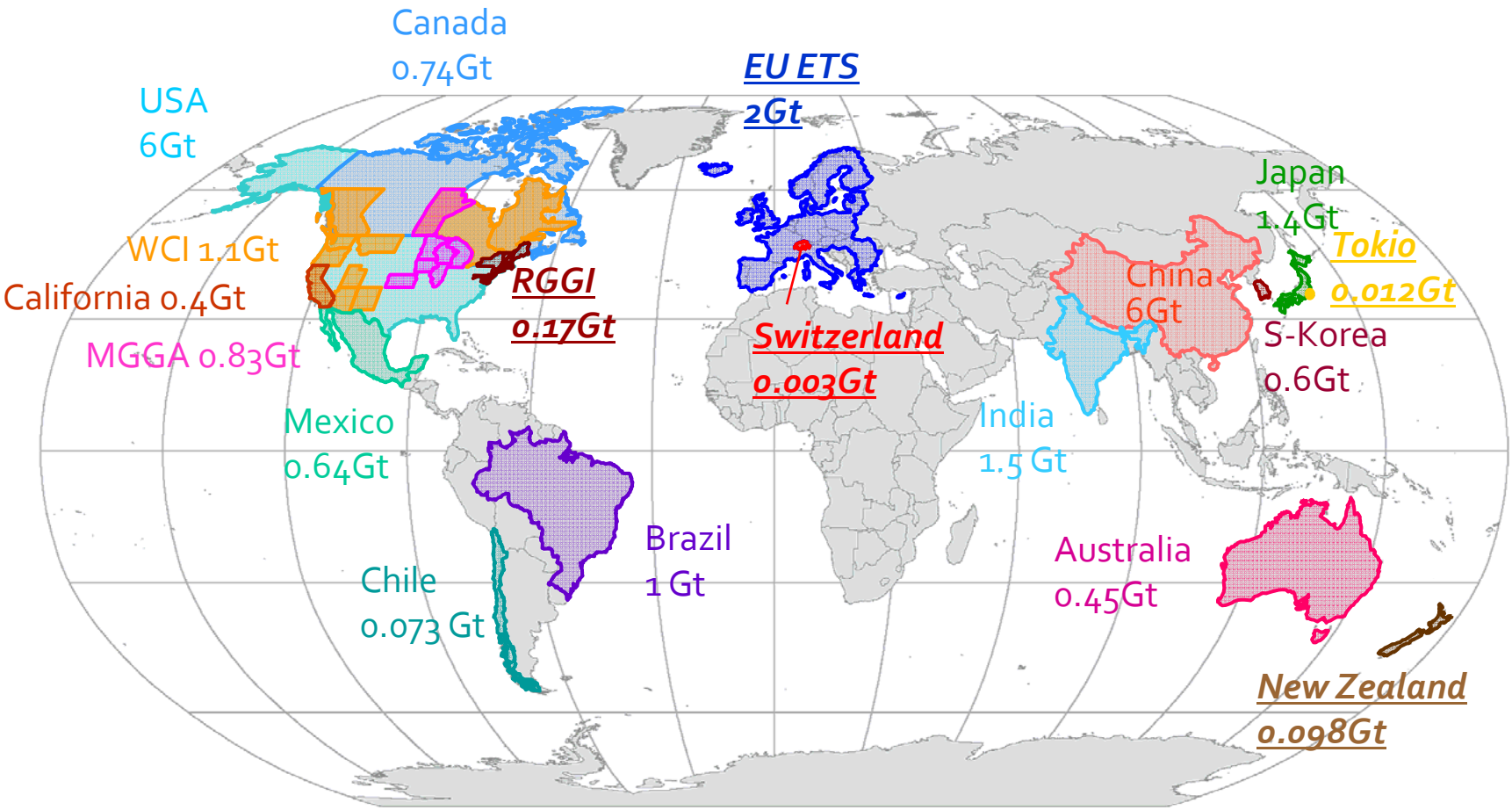
Integration of Renewables

New perspectives for international negotiations

Emissions trading

Creation and ‚linking' of emissons trading systems



Flachsland (2011)

⇒ Reduction of mitigation costs by establishing access to low-cost abatement options

⇒ Potential for strategic incentives

New perspectives for international negotiations

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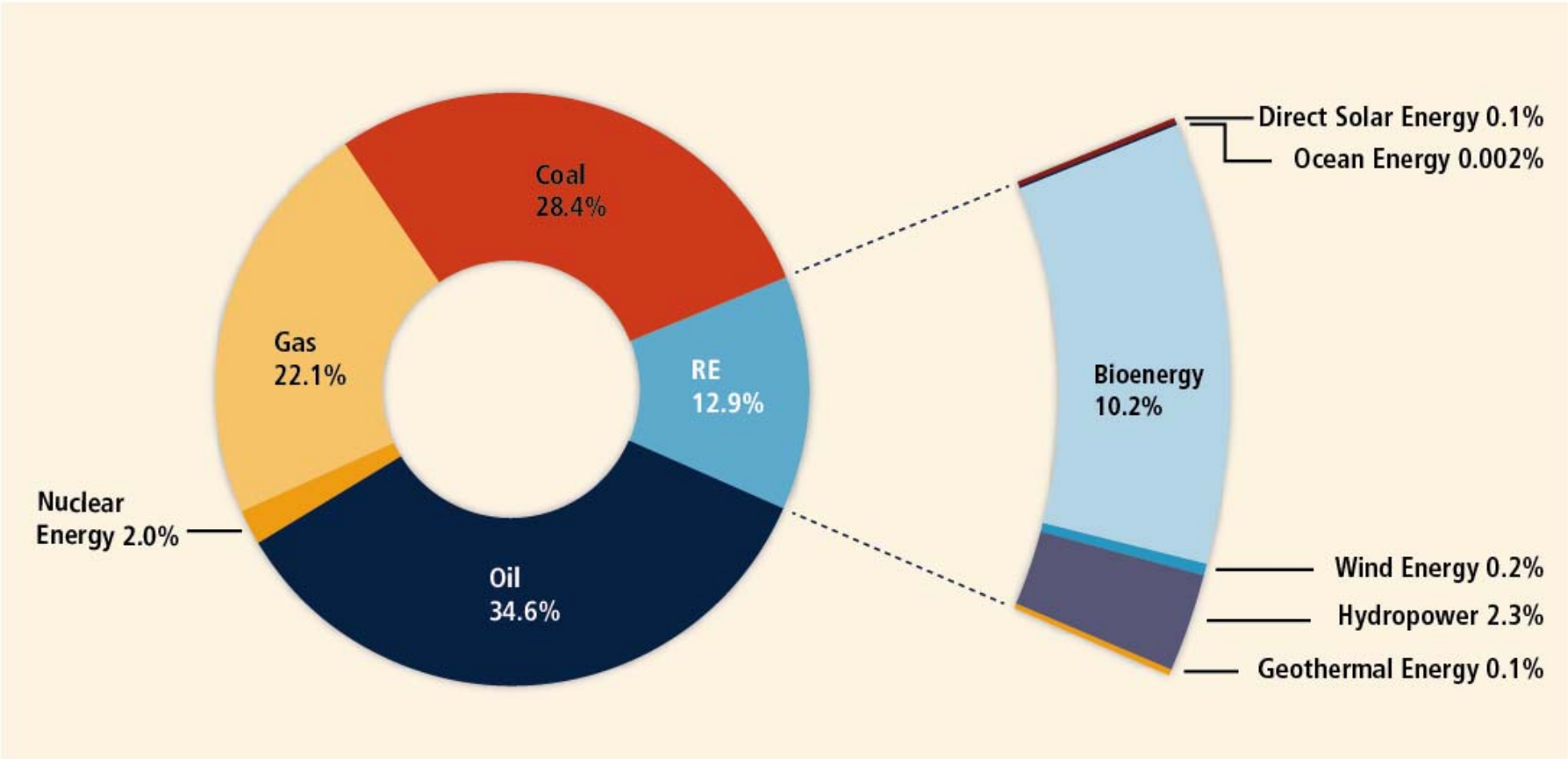
Promoting Renewables

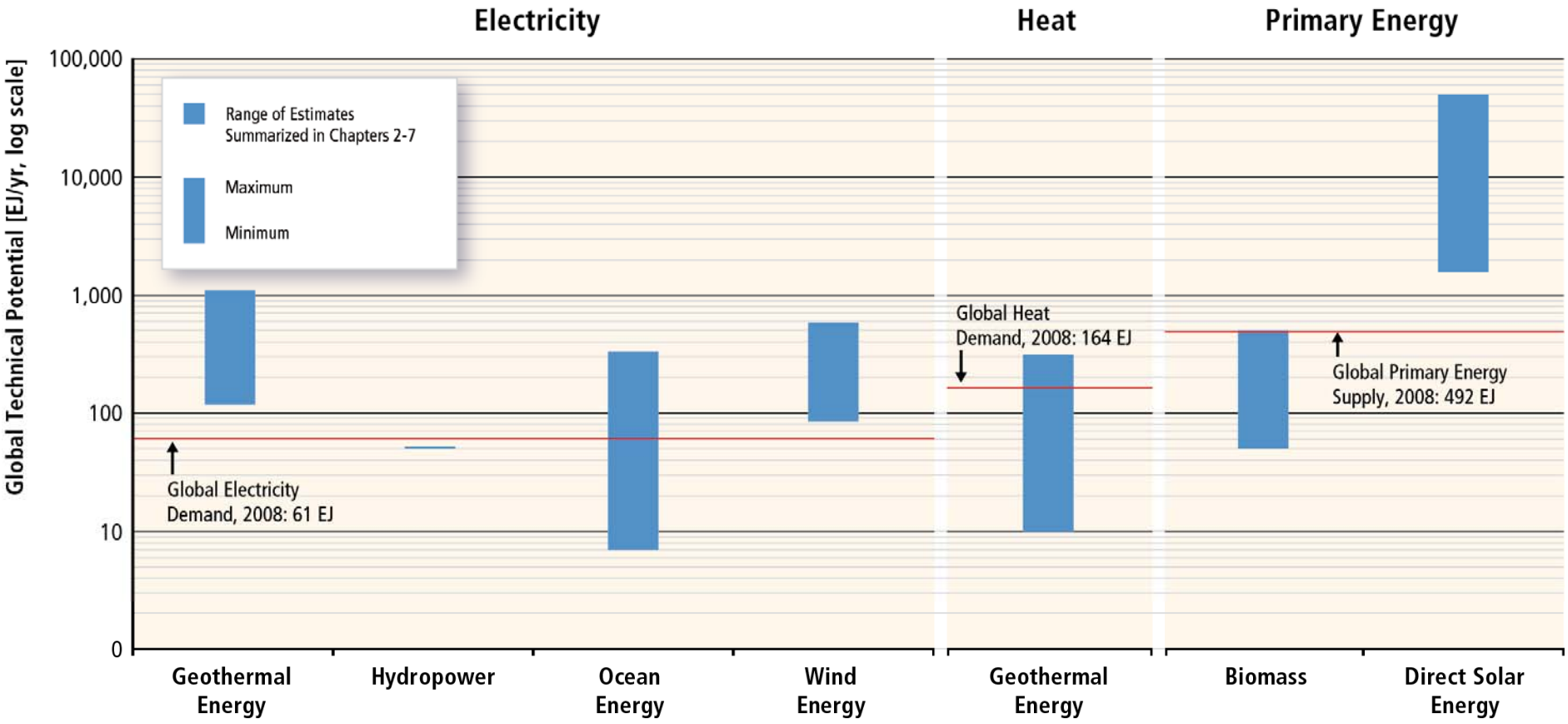
The current global energy system is dominated by fossil fuels



Shares of energy sources in total global primary energy supply in 2008

IPCC SRREN 2011

The technical potential of Renewable Energies

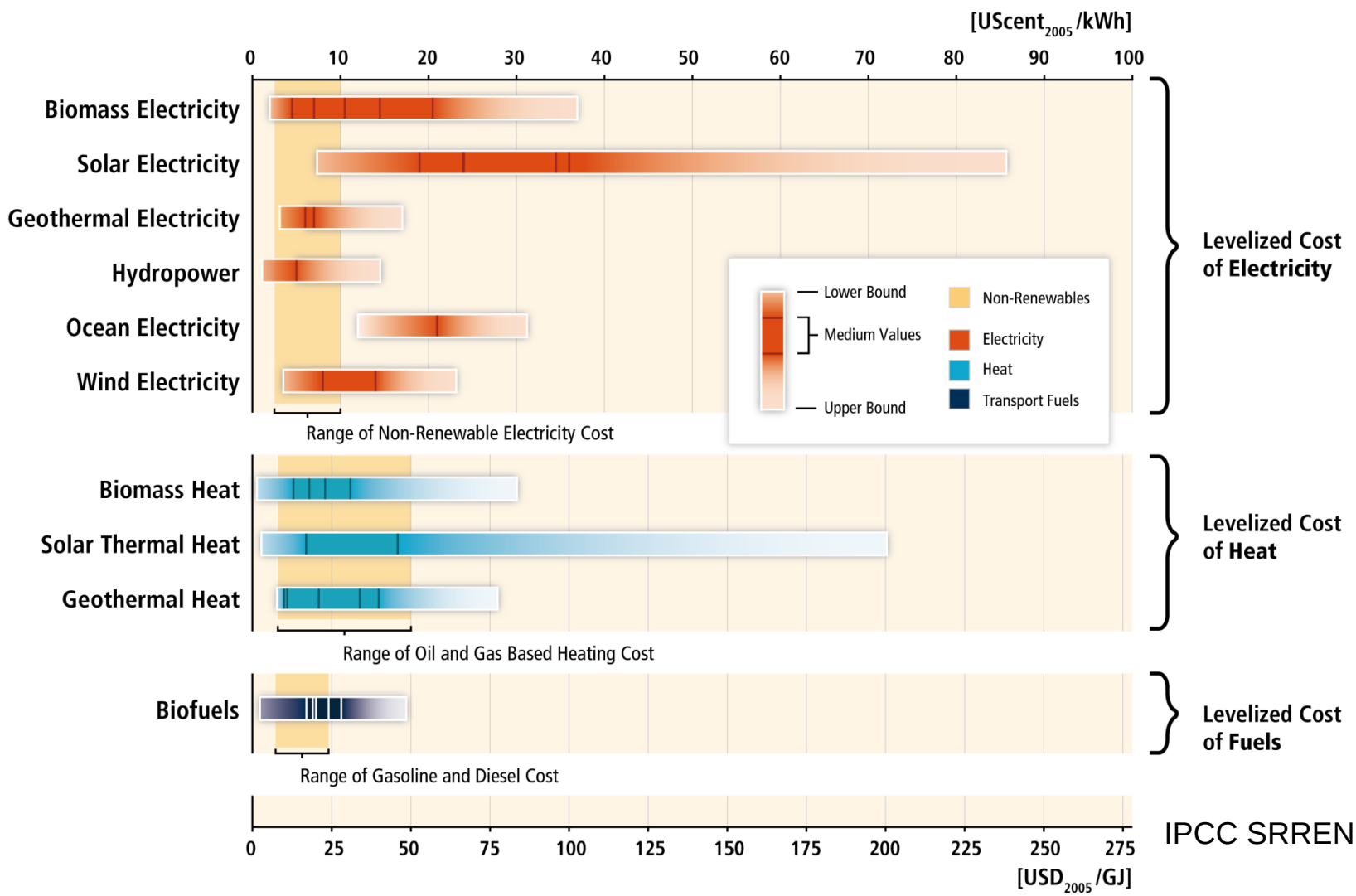


Range of Estimates of Global Technical Potentials

	Geothermal Energy	Hydropower	Ocean Energy	Wind Energy	Geothermal Energy	Biomass	Direct Solar Energy
Max (in EJ/yr)	1109	52	331	580	312	500	49837
Min (in EJ/yr)	118	50	7	85	10	50	1575

SRREN (IPCC, 2011)

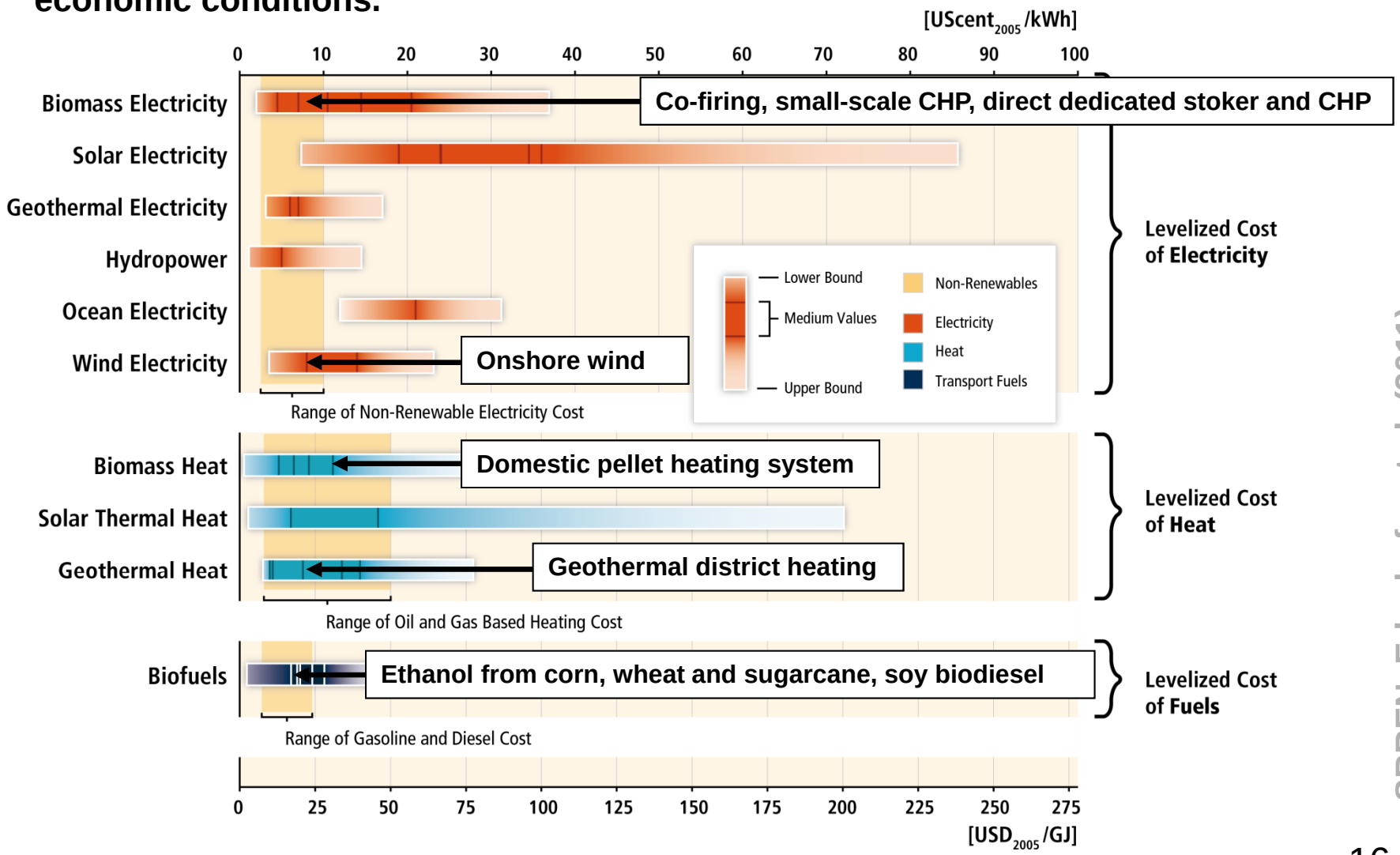
The costs of renewables are often still higher than those of non-renewables but…



IPCC SRREN (2011)

Some technologies can already be competitive today

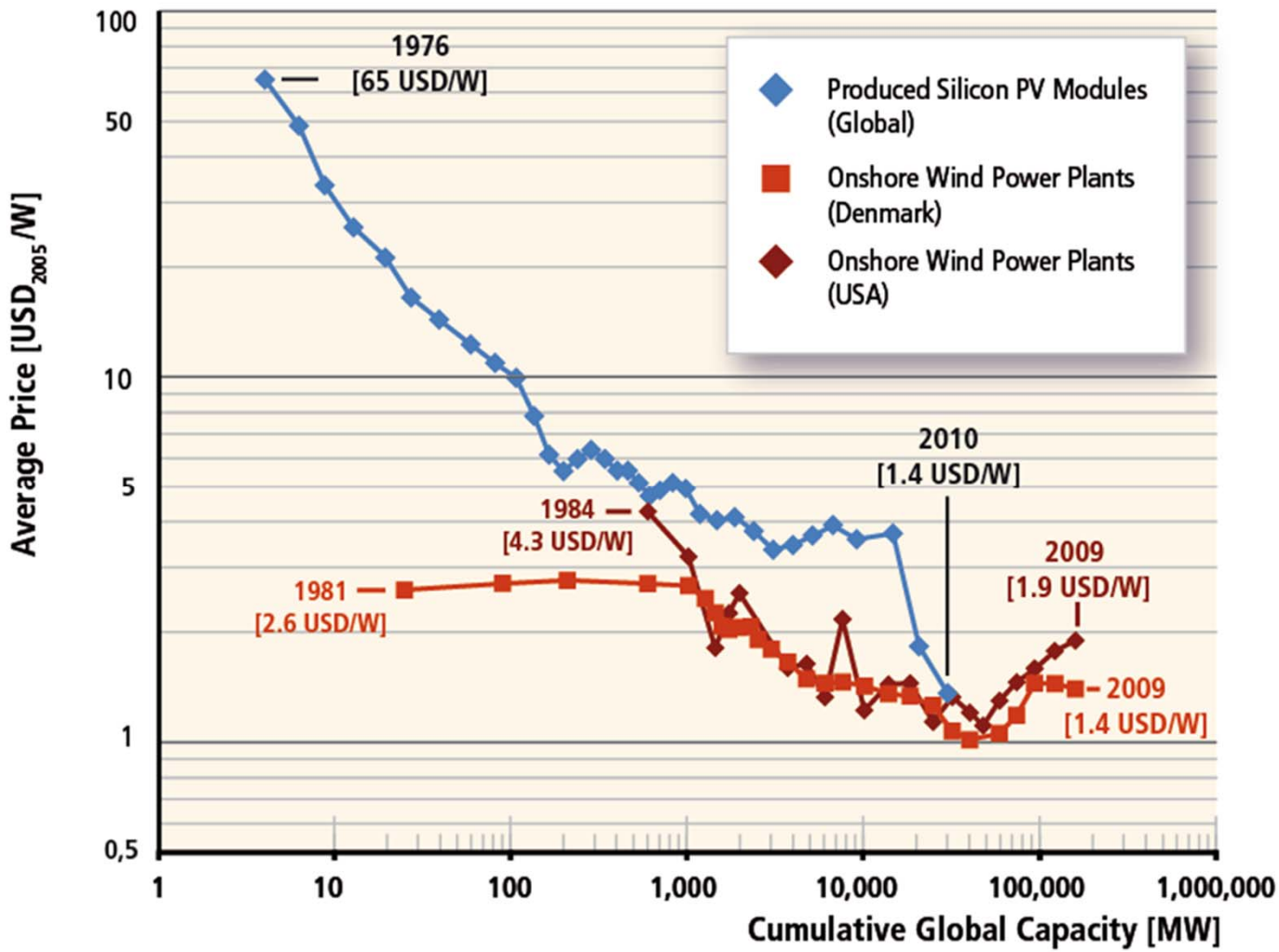
The lower end of the cost ranges represents favourable geographic and economic conditions.



SRREN, Edenhofer et al. (2011)

Examples should not be misinterpreted to suggest a generally valid ordering of specific technologies from least to highest cost.

Learning-by-doing



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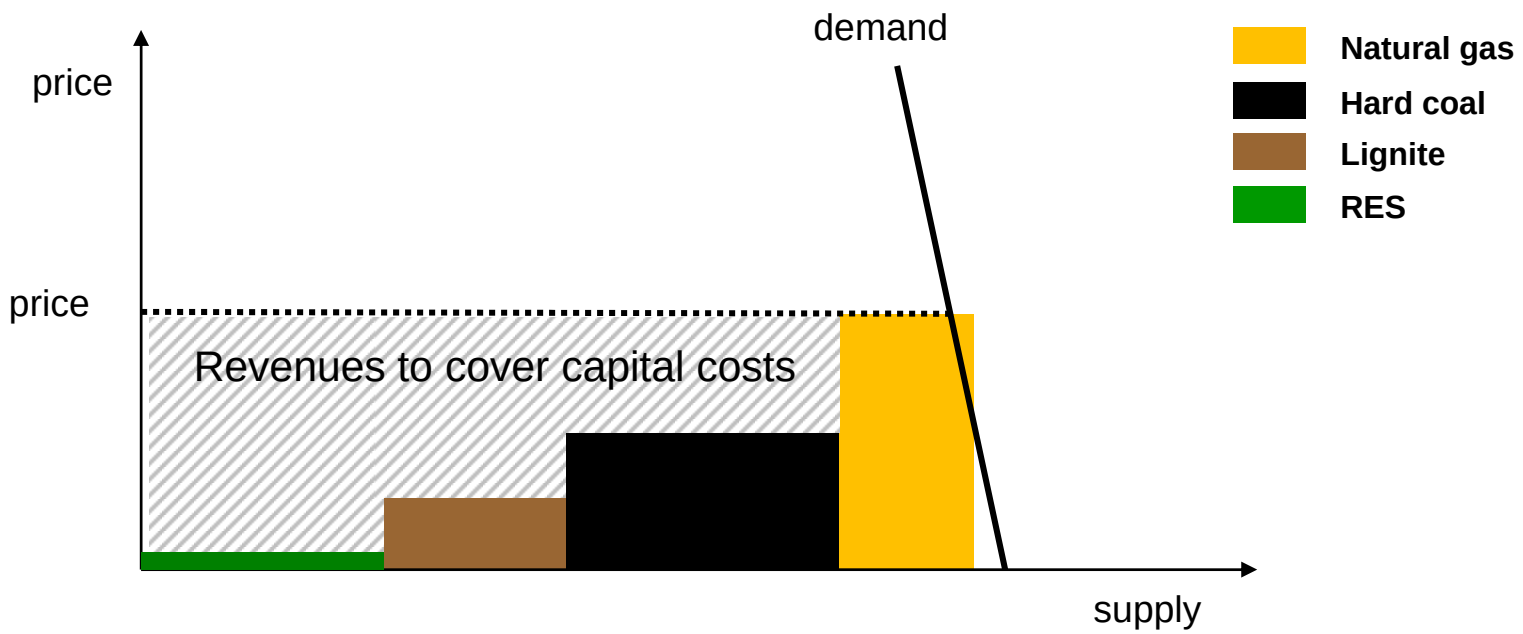
Integration of Renewables

Entering the phase of implementation: The *Energiewende* in Germany

- **Regulatory challenge:** Which renewable subsidy scheme(s) for inducing transition?
- **Market design challenge:** Renewables have marginal costs of (nearly) zero - can they be integrated into the existing energy only market?



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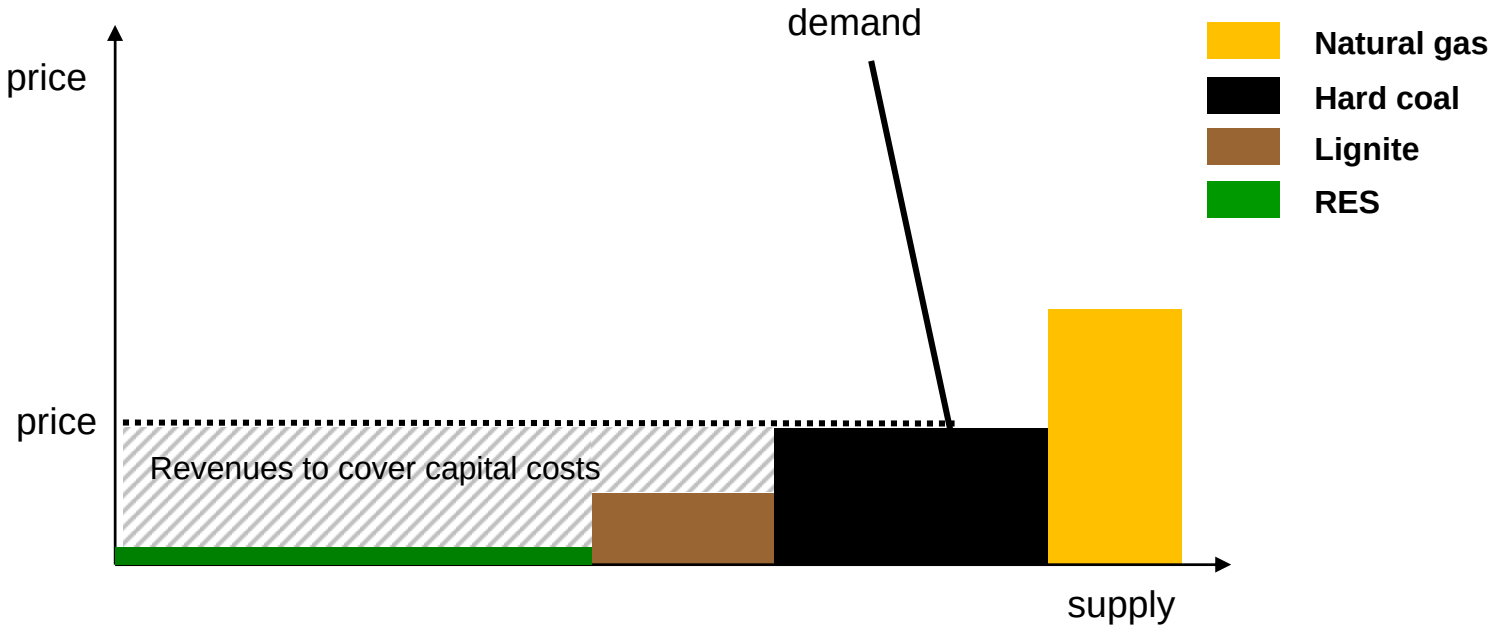

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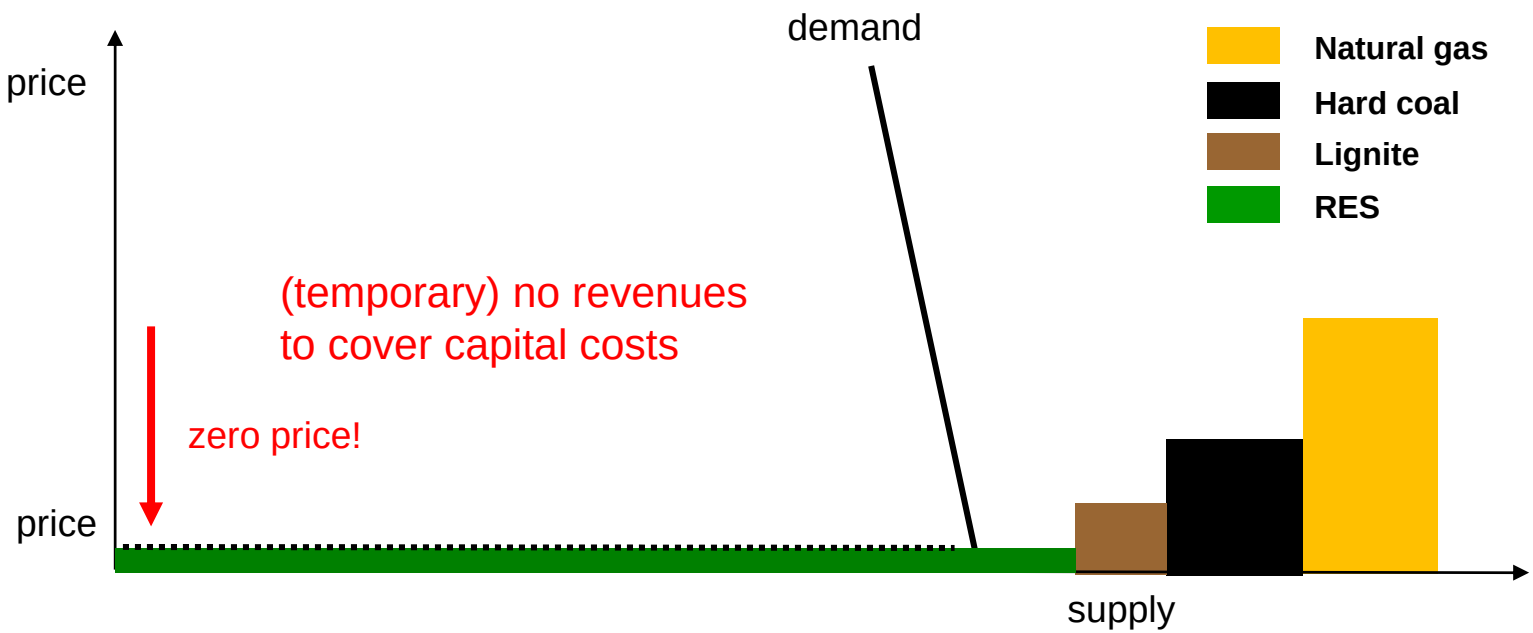
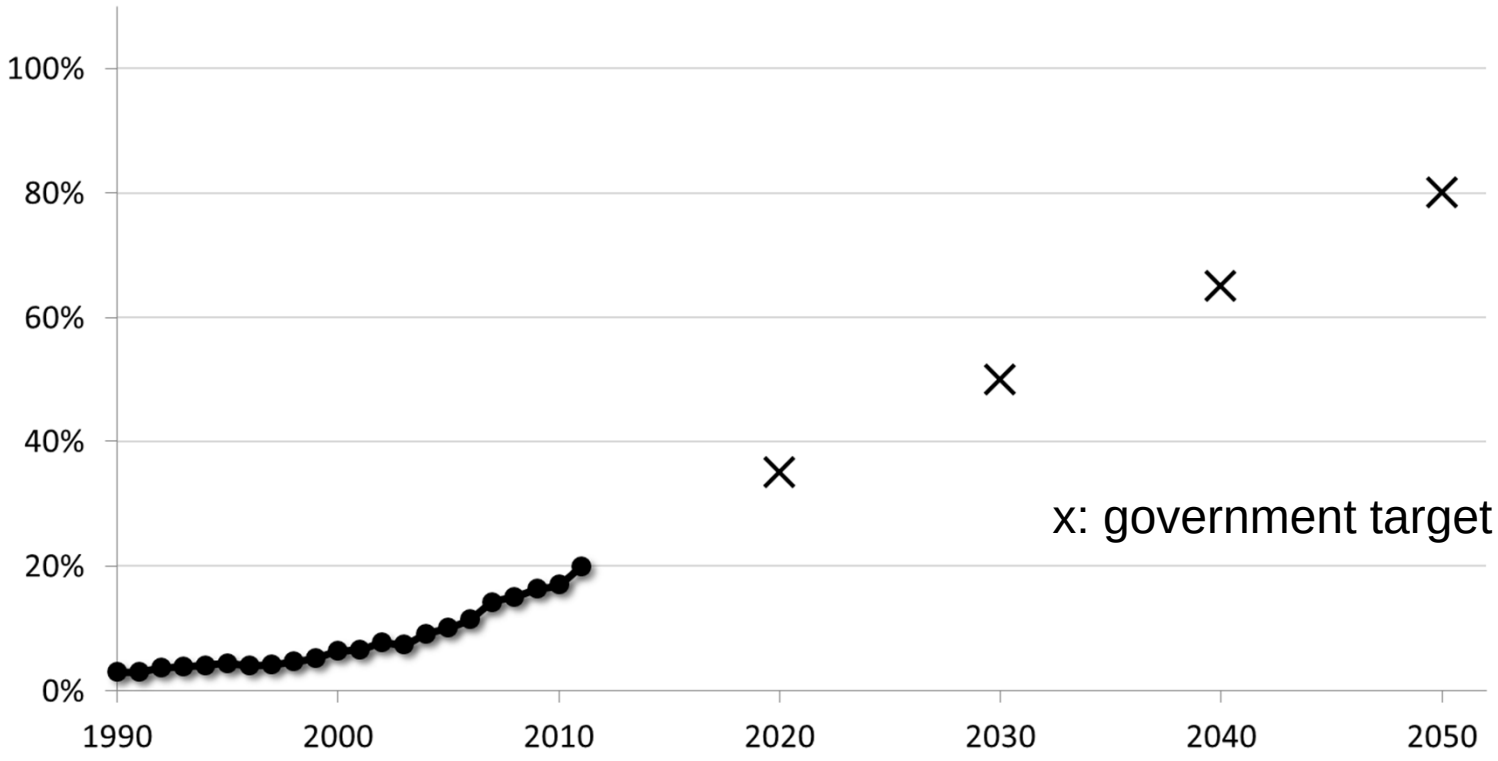
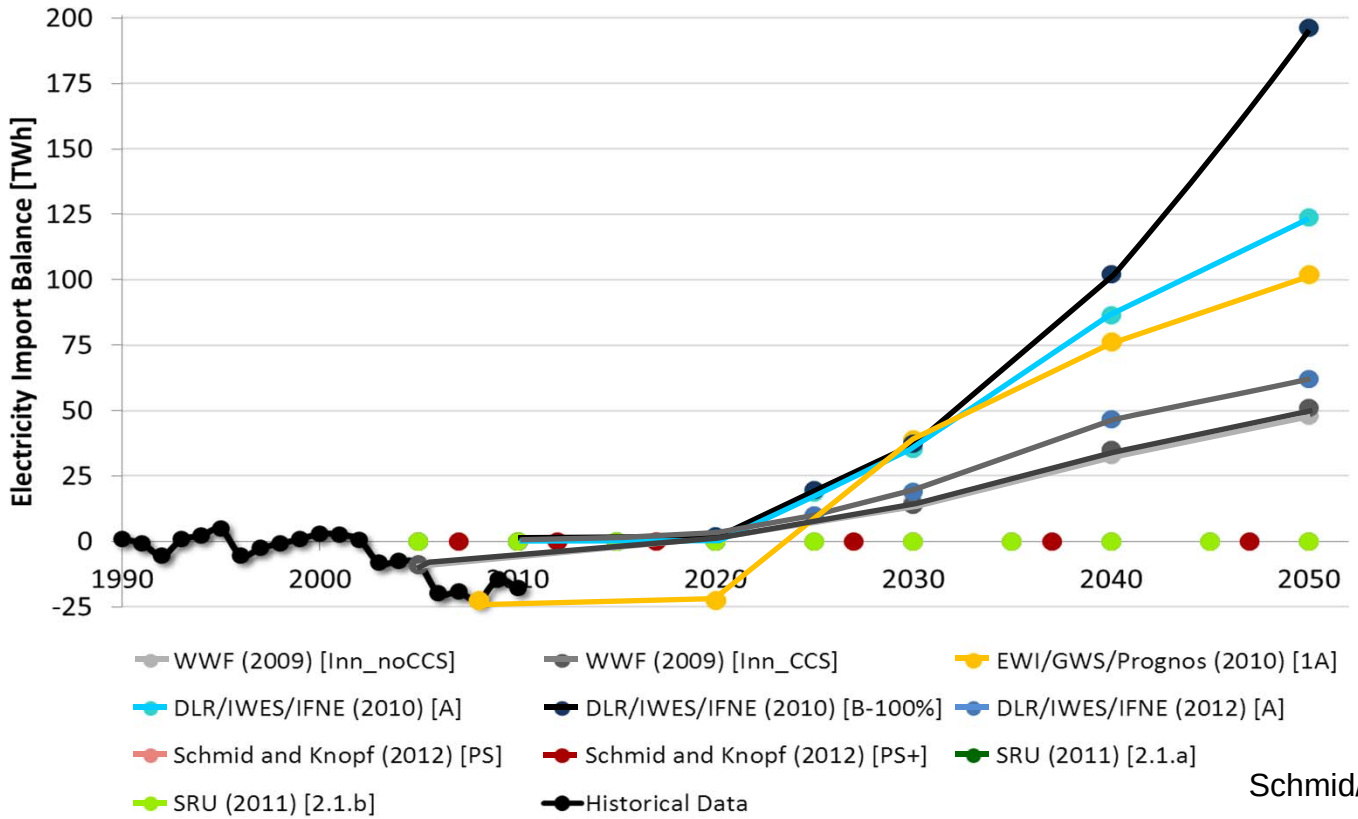


The Energy Transformation in Germany: increasing share of Renewable Energy in electricity generation



Electricity imports



Schmid/Pahle/Knopf (2012)

- Increase of EU imports requires expansion of interconnectors and probably joint market integration schemes for RES
- Imports need to be coordinated with neighbouring countries

Current problems and possible solutions for a new supporting scheme for renewables

Current problems:

•No coupling to market signals of the supporting scheme

•Probably not cost-efficient

Possible solution:

•Separation of the generation from renewables in the two products „electricity“ and „green“

•Two different sources of revenues:

- Electricity: to be sold at the energy exchange market
- „Green“: to be sold either as a tradable quota or a premium

Solutions for solving the problem of the adequacy of power generation capacities

- **Demand Side Management**
  → demand should be more price elastic, e.g. with Smart Grids

- **Integration to European Internal Energy Market is important**
  → Energy autarky is no reasonable concept

- **Capacity Mechanisms**
  - **Determination of the demand**
  → depends crucially on deployment path of RE, bottlenecks are expected between 2018 and 2020 in Germany
- **Option A: Strategic reserve**
  → provision of power plants as „backup“ in times of peak load
  → operation of power plants at a fixed price cap

  - **Option B: Contracts for security of supply / capacity market**
  → capacity bonus by means of auctioning for all plants
  → linked to an obligation to „cap“ premium prices with financial compensation (Call-Option)

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Integration of Renewables

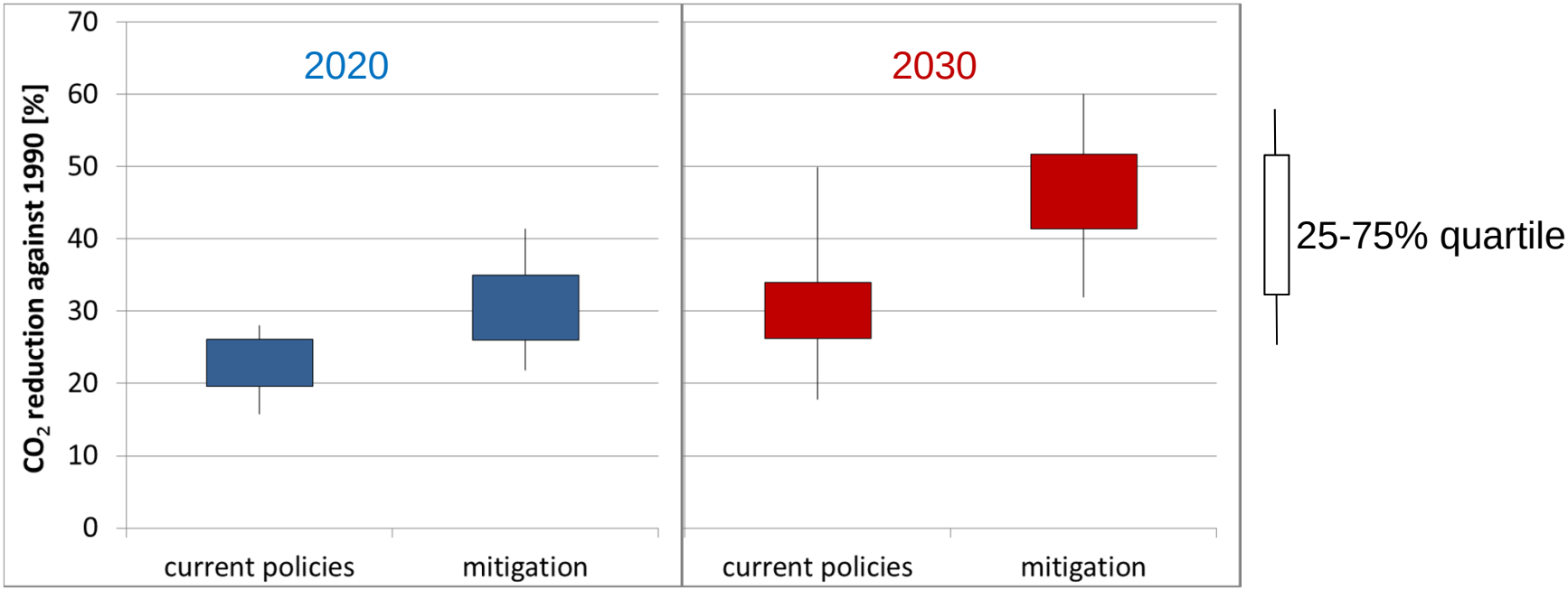
EU Green paper: A 2030 framework for climate and energy policies

- By 2030 GHG emissions would need to be reduced by 40% in the EU to be on track to reach a GHG reduction of between 80-95% by 2050, consistent with the internationally agreed target to limit atmospheric warming to below 2°C.
- Higher shares of renewable energy, energy efficiency improvements and better and smarter energy infrastructure are "no regrets" options for transforming the EU's energy system.
- For renewables, the policy scenarios in the Energy Roadmap 2050 indicate a share of around 30% in 2030.
- Significant investments are needed to modernise the energy system, with or without decarbonisation, which will impact the energy prices in the period up to 2030.

Model comparison on the EU Energy Roadmap: potential targets for 2030

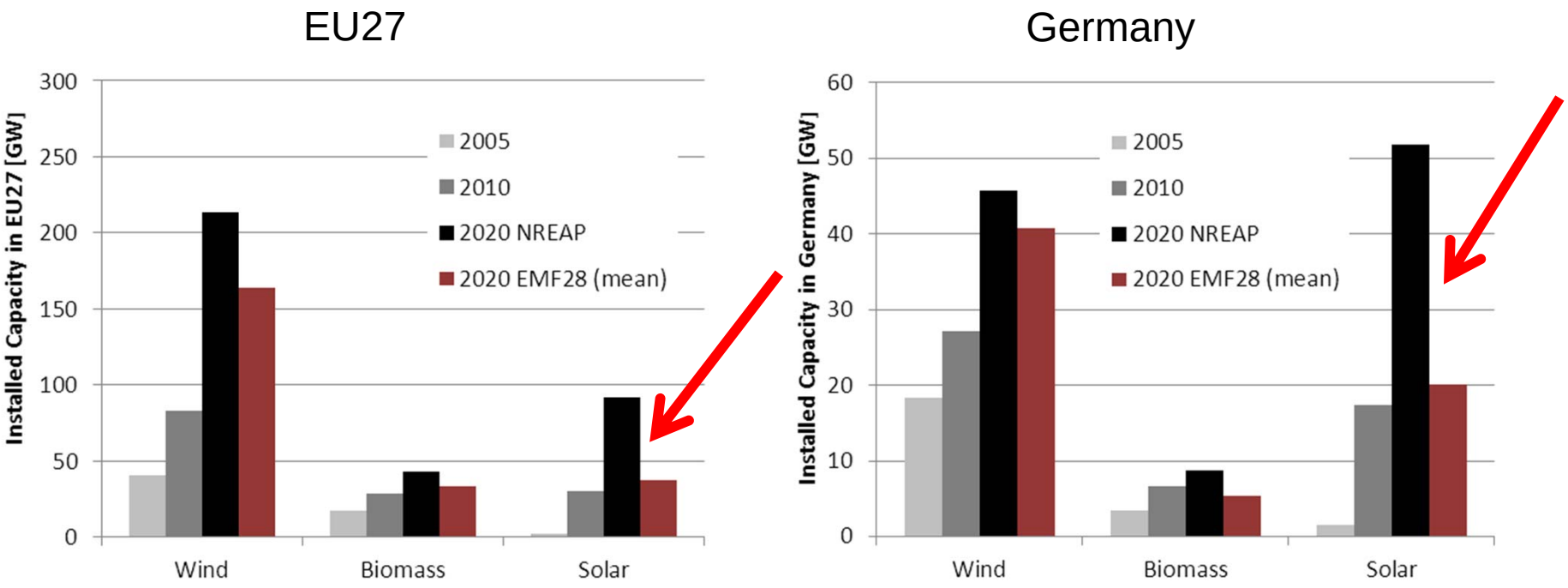
- Model comparison with 13 models on the EU Energy Roadmap
- Are the current policies of 20% GHG reduction by 2020 sufficient to meet the long-term target of 80% GHG reduction by 2050? No!
- Exploration of potential targets for 2030

12 different models included



(Knopf et al., 2013)

Living in a world of multi-objectives



- Solar PV is considerably underestimated in the models
- Existence of multi-objectives (and potential co-benefits) are not considered in the models

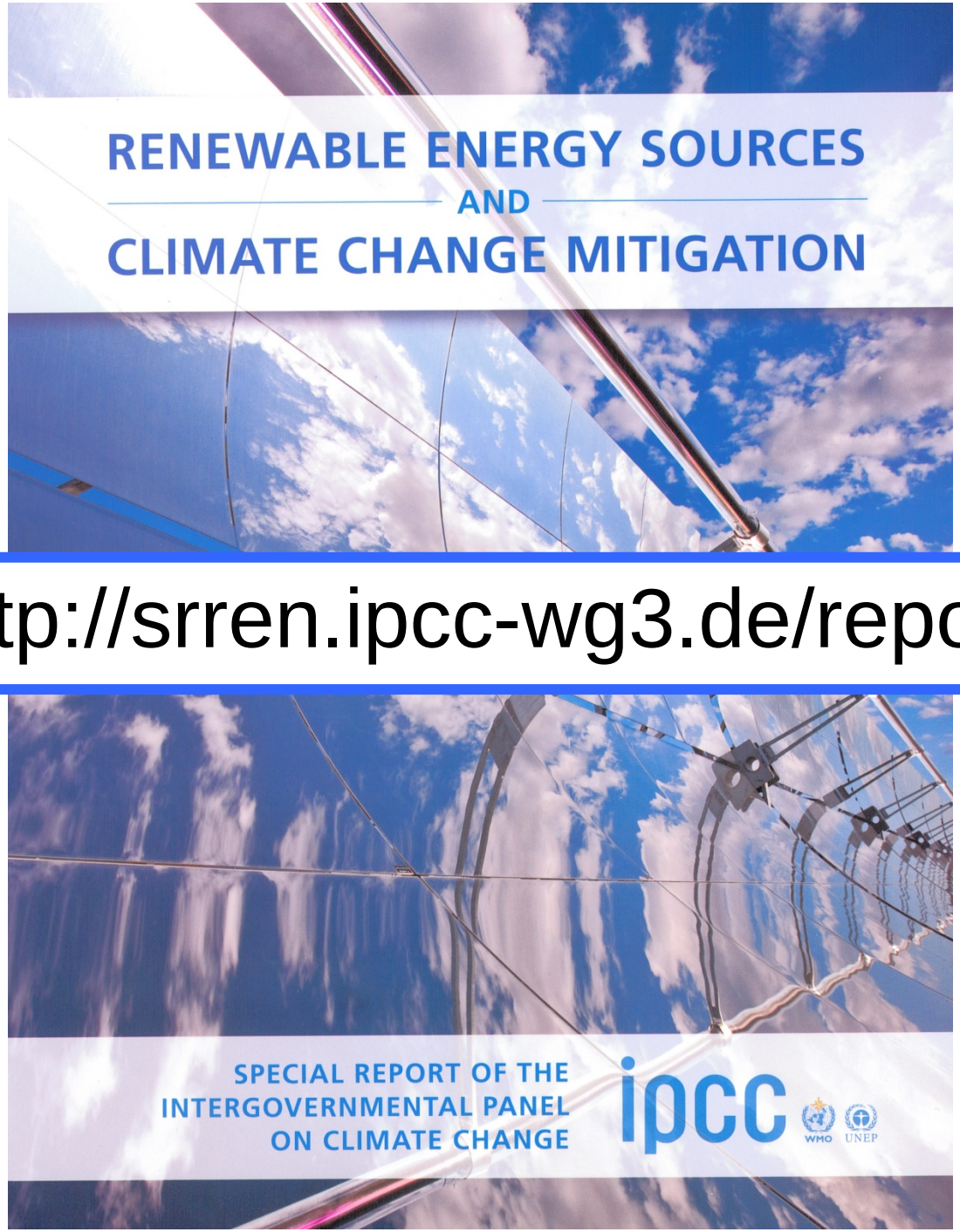
Knopf et al. (2013)

Scientific assessment can be broadly defined as:

Using scientific methods to
explore the relevant solution space

with a view toward making
underlying value judgments for evaluation explicit

in a form intended to be
relevant for decision making



http://srren.ipcc-wg3.de/report