Wuppertal Institute
for Climate, Environment
and Energy

Energy Efficiency and Beyond:
Reducing energy intensity as a low carbon strategy

LCS Rnet 3rd. Annual Meeting

Transition towards low carbon societies in a changing world

Paris, 13-14 October 2011

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Overview

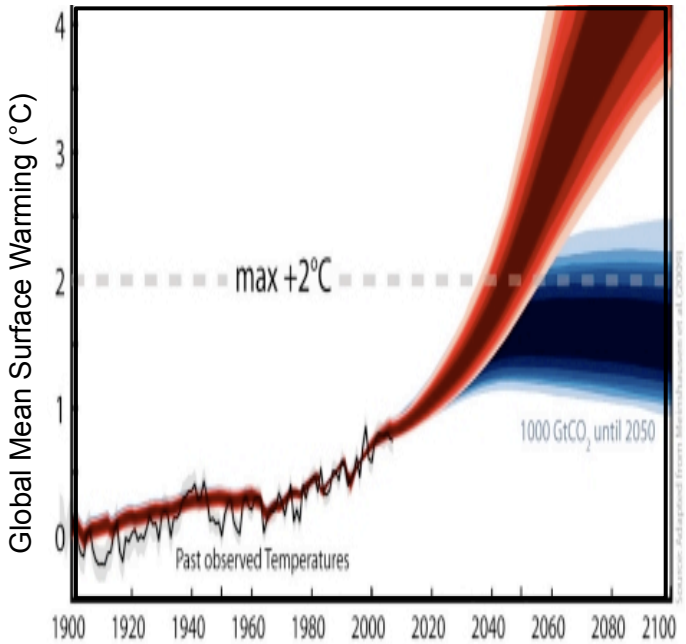
- Energy efficiency is a must for LCS
  - Global scenarios
- Would it be feasible?
  - Industrialised countries: Example Germany
  - But also in developing/emerging economies?
- Energy efficiency for green growth

The Transition towards a Low Carbon Society requires a rethinking of our infrastructures and develoment

- Climate change requires deep cuts in global GHG emissions (-60% or more by 2050 over 1990 levels)
  - For industrialised countries that means a reduction of 85 to 95% from current levels
  - Or a virtually complete decarbonisation of their economies
  - But also for emerging economies the emission budget is limited

- What are the strategies to achieve this?
- What would be the role of energy efficiency and underlying trends?

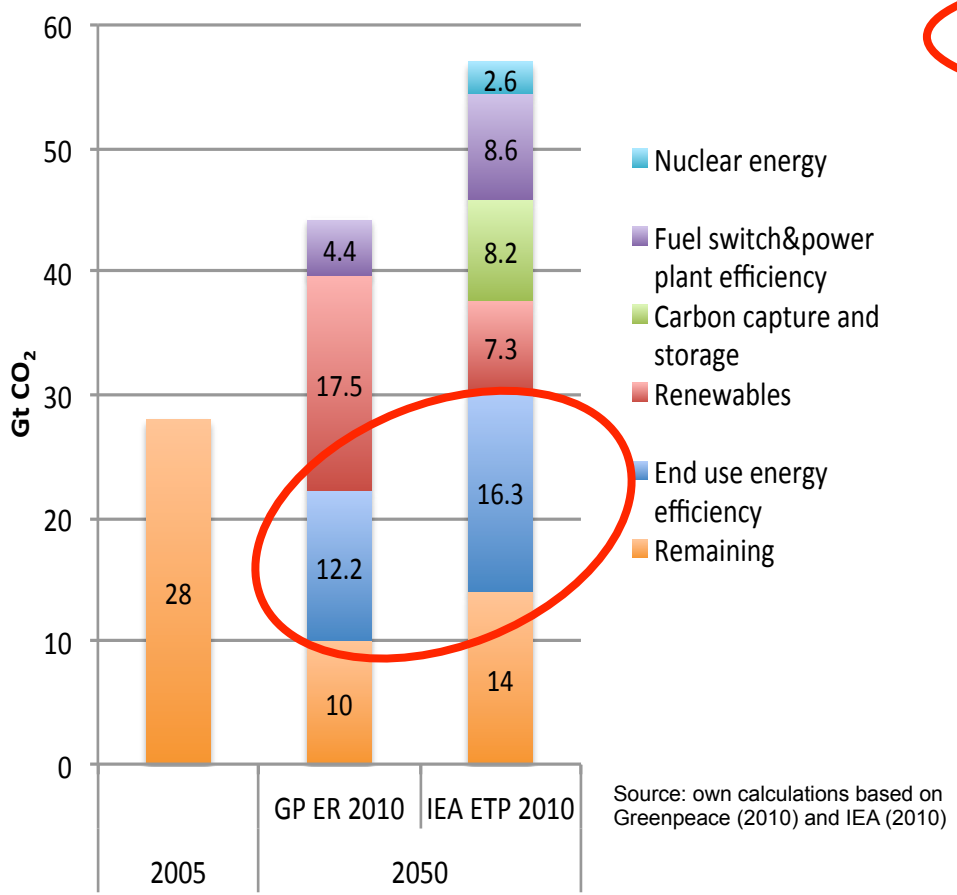
- *Some insights from energy system scenarios.*



Source: Meinshausen 2009 *Nature* 458, 1158-1162, modified

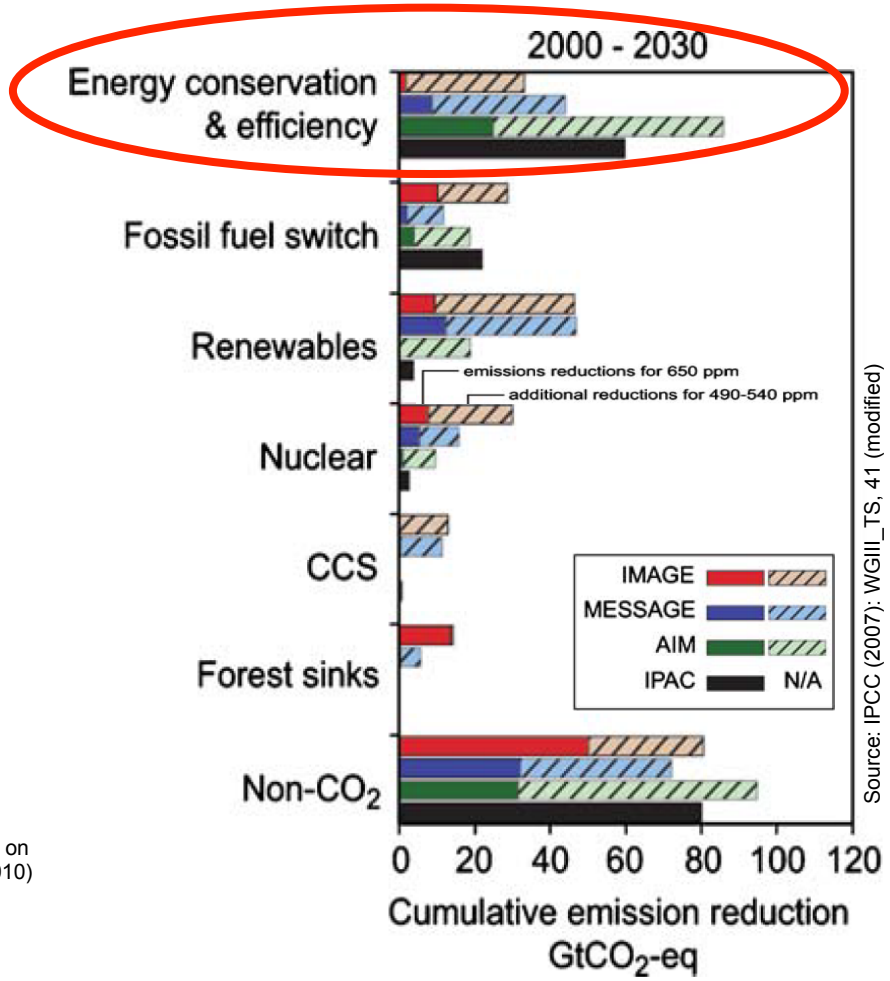
Both, technical bottom-up models as well as IAM-models see Energy conservation and efficiency as major strategy

Bottom-up energy scenarios for 2050 by Greenpeace and IEA



Source: own calculations based on Greenpeace (2010) and IEA (2010)

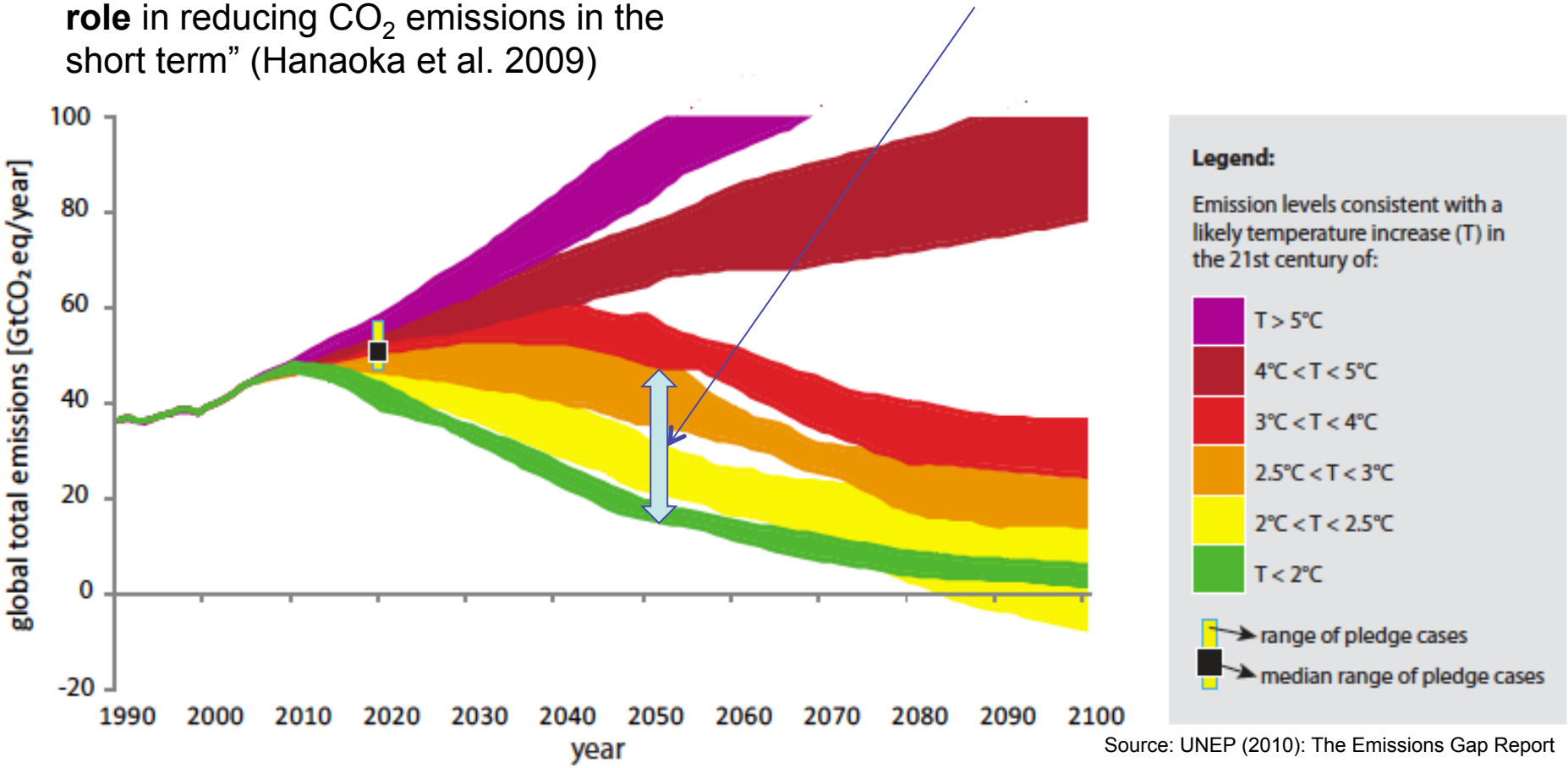
IAM results for 2000 to 2030



Global Scenarios Agree:
(Final) Energy Efficiency is a Core Low Carbon Strategy

- Global Emissions Scenario Database: **"energy intensity improvements play the most important role** in reducing CO_2 emissions in the short term" (Hanaoka et al. 2009)

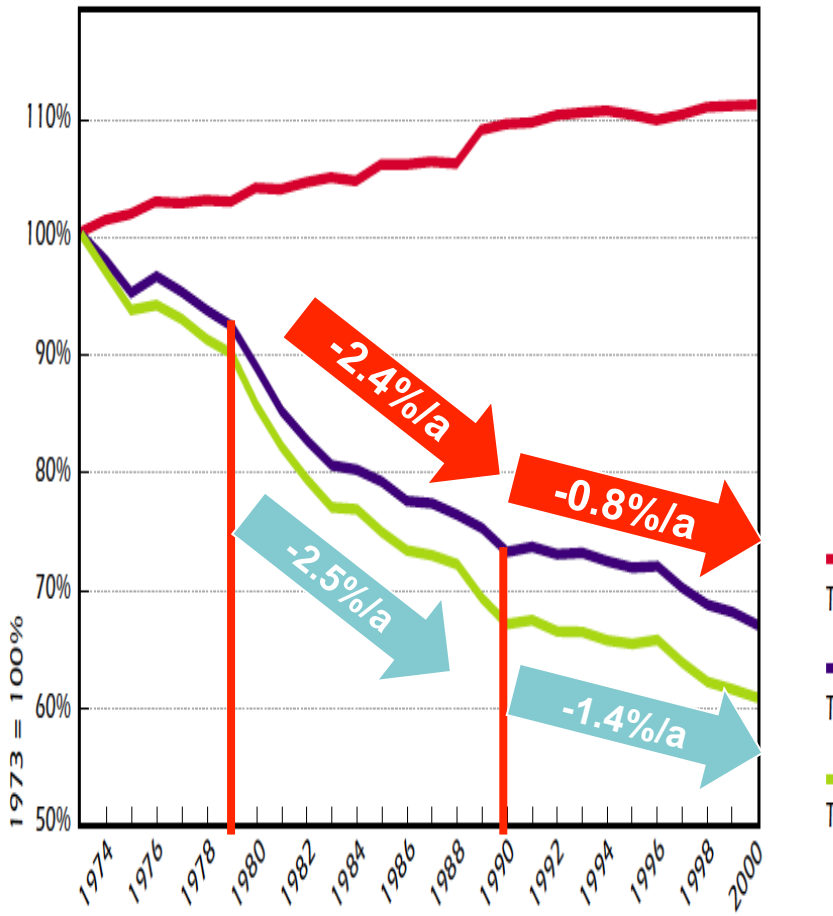
- IPCC-categories I to III: Scenarios assume an **average annual energy intensity reduction of 2%**



Source: UNEP (2010): The Emissions Gap Report

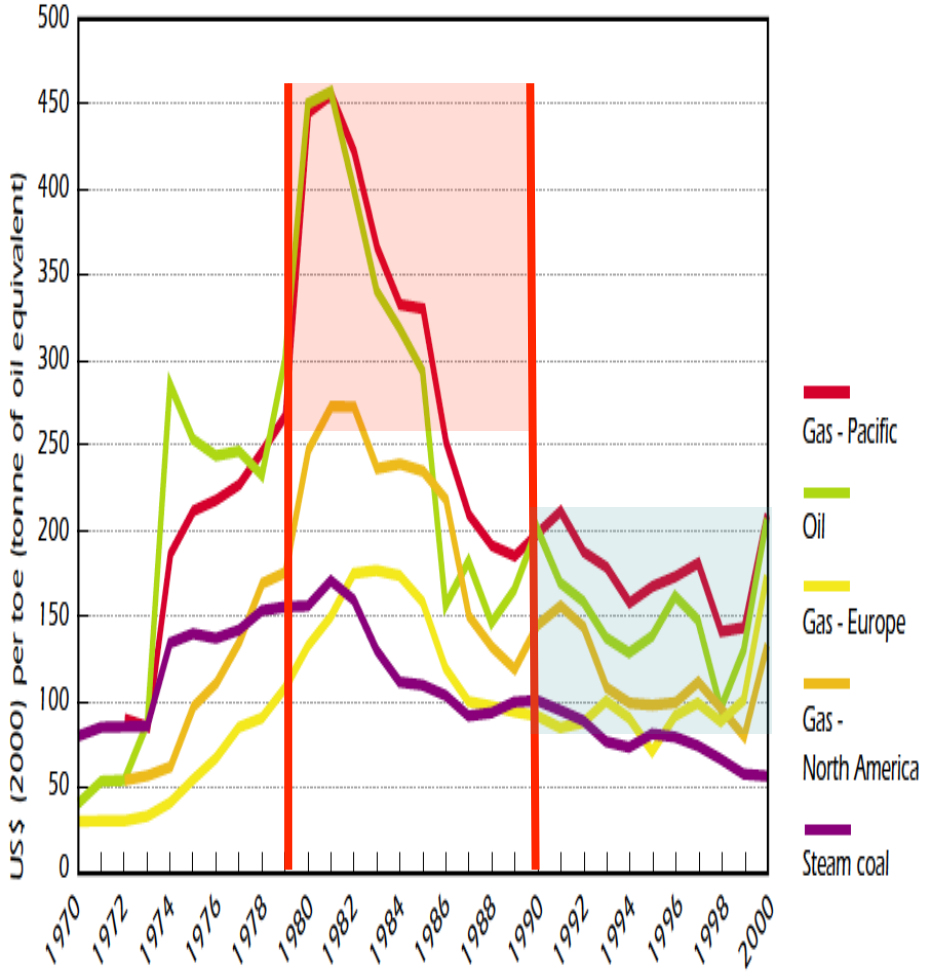
Final Energy Efficiency Mitigated Emission Growth in IEA-Countries (1973 to 2000)

TPES per GDP, TFC per GDP and TPES per TFC, IEA Countries

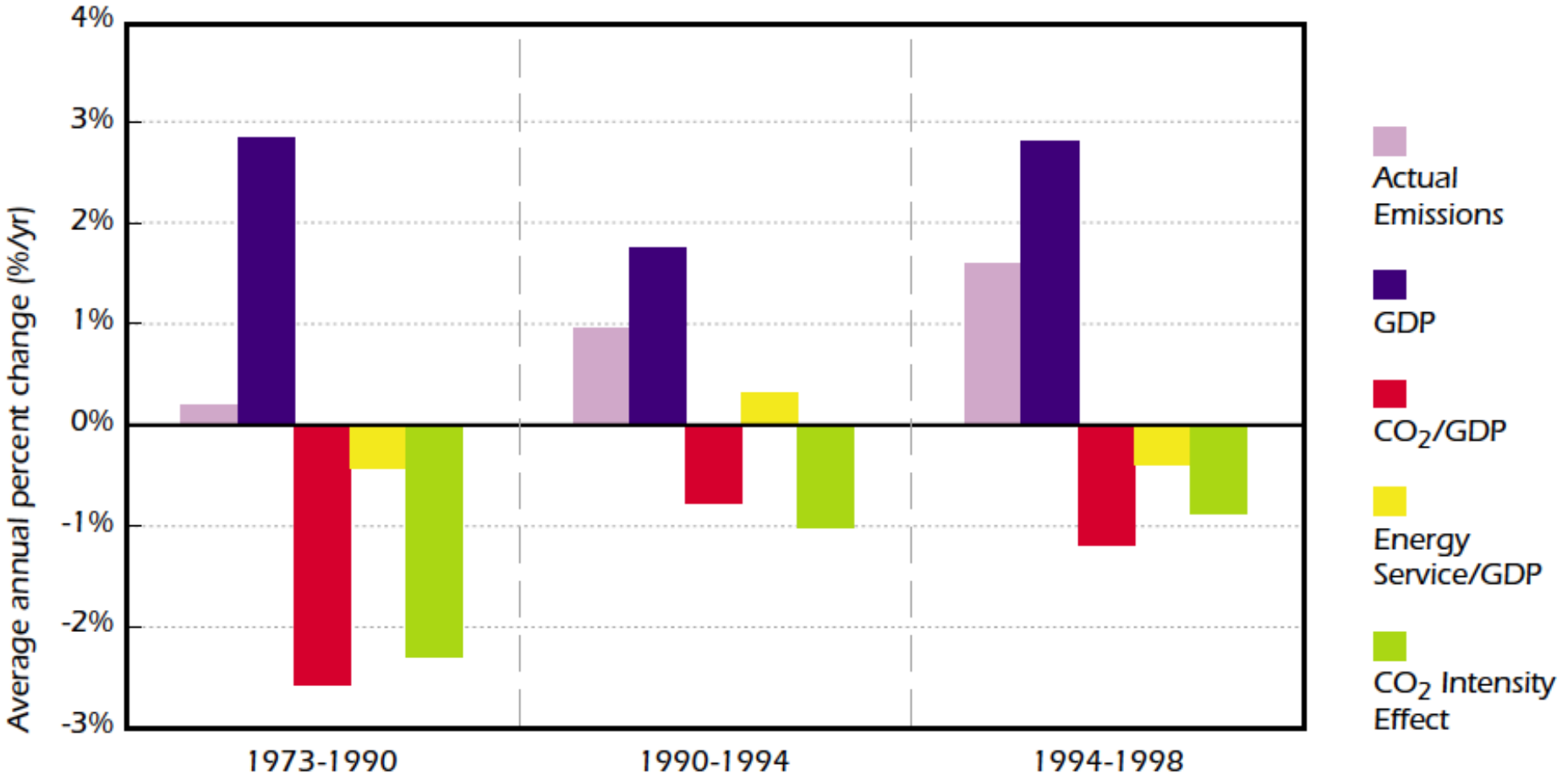


Source: IEA (2004): 30 Years of Efficiency in IEA Countries (modified)

Fossil Fuel Prices in Real Terms

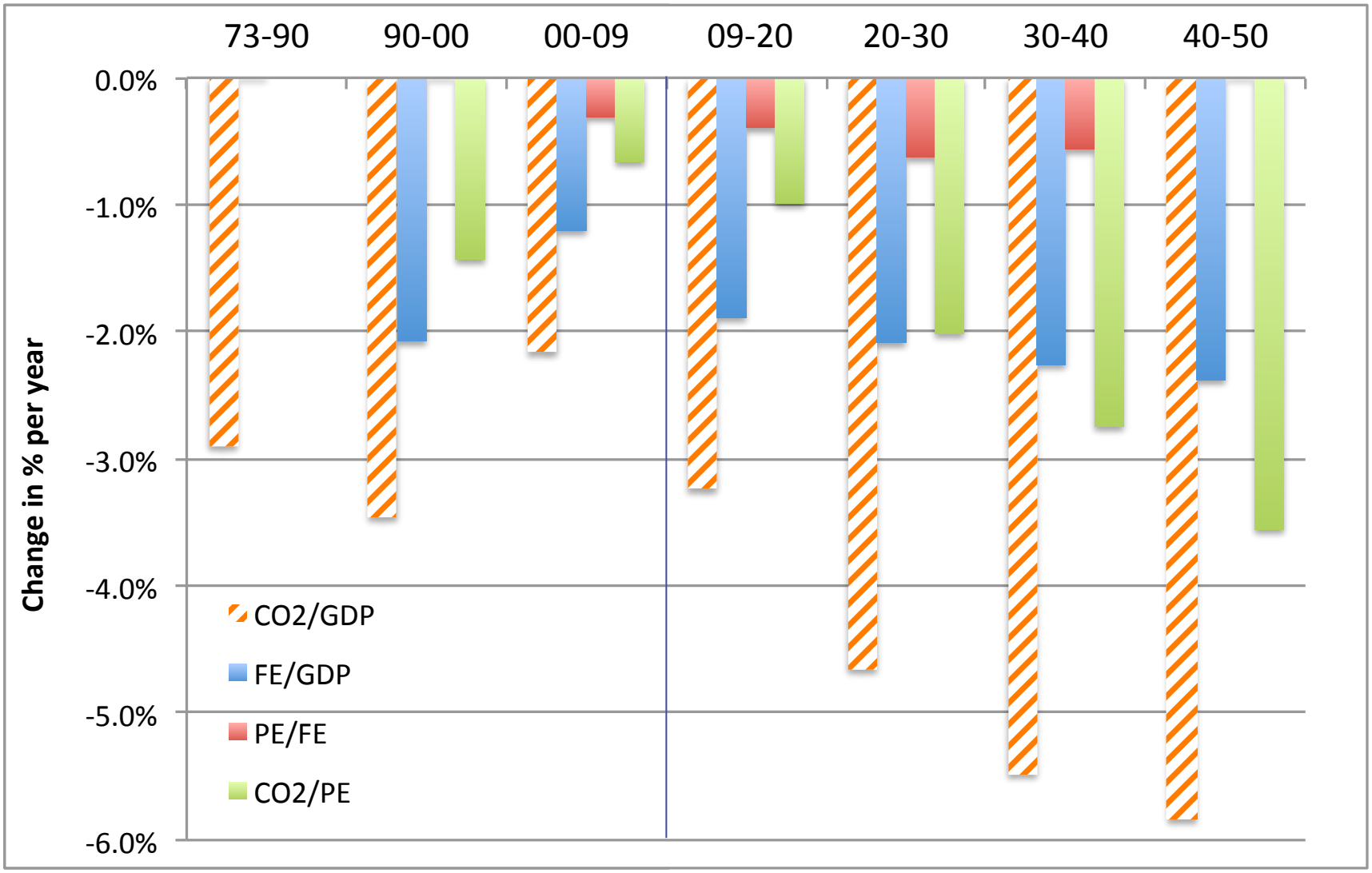


IEA-Countries:
CO_2-Emissions stronger increased as CO_2 intensity decreased



Source: IEA (2004): 30 Years of Efficiency in IEA Countries (modified)

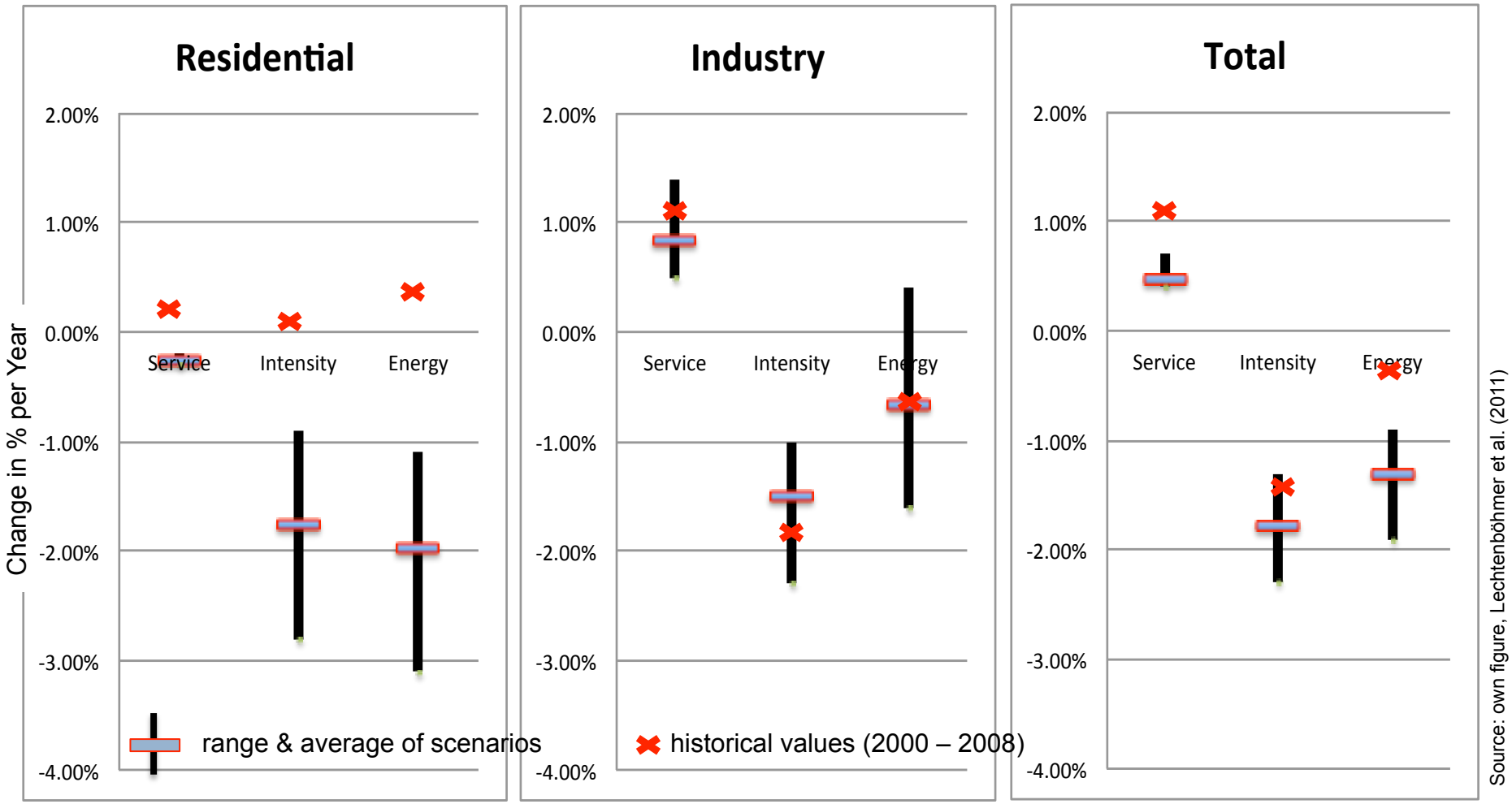
Case Study Germany:
Energy Efficiency Drives Decoupling of GDP and CO_2



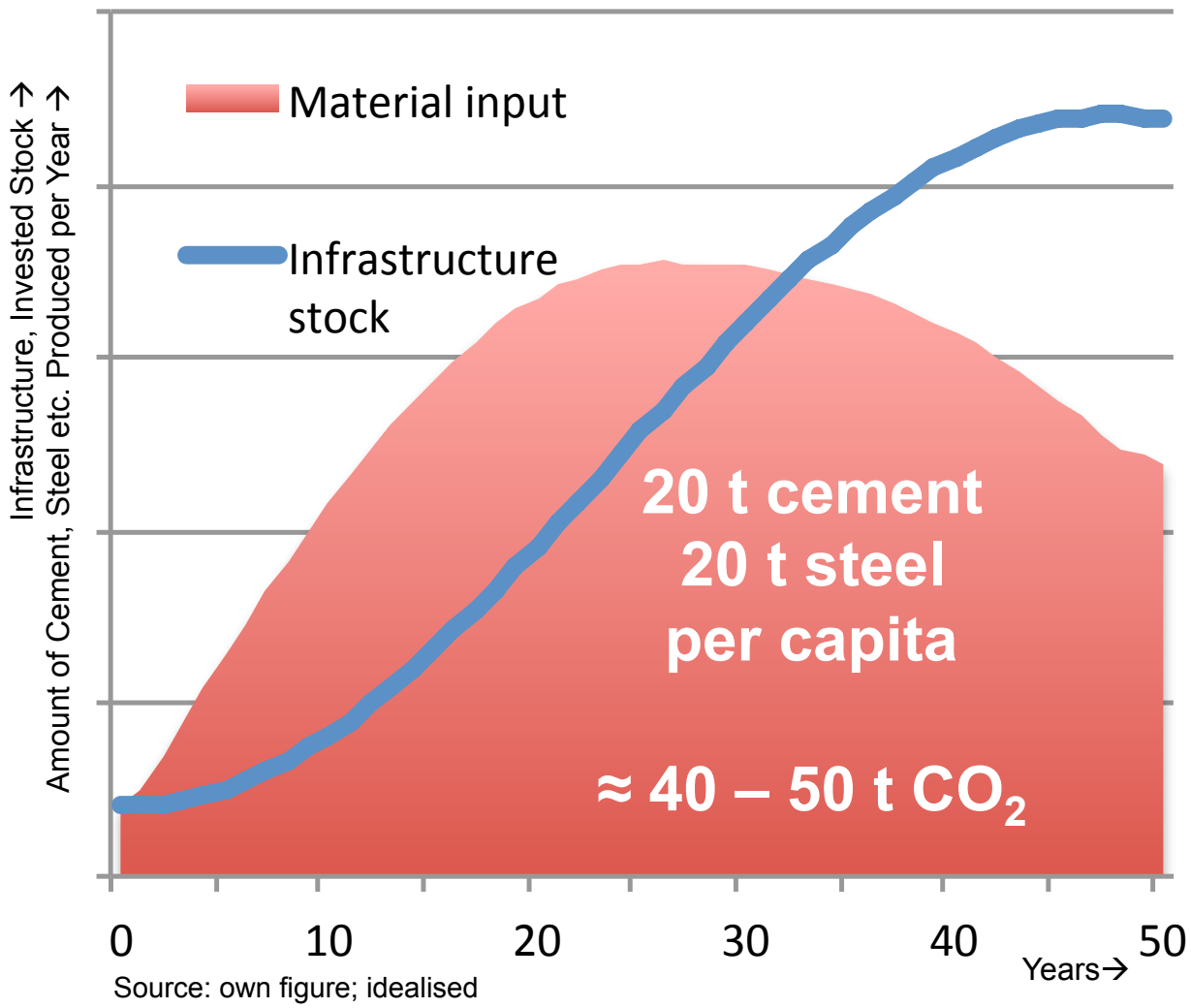
Source: own figure, Lechtenböhmer et al. (2011)

Energy efficiency as a combination of reduced energy service demand growth & increased efficiency

Germany, comparison of 4 recent scenario studies



How about developing & emerging economies?
Current development paradigm could become a problem



Source: own figure; idealised

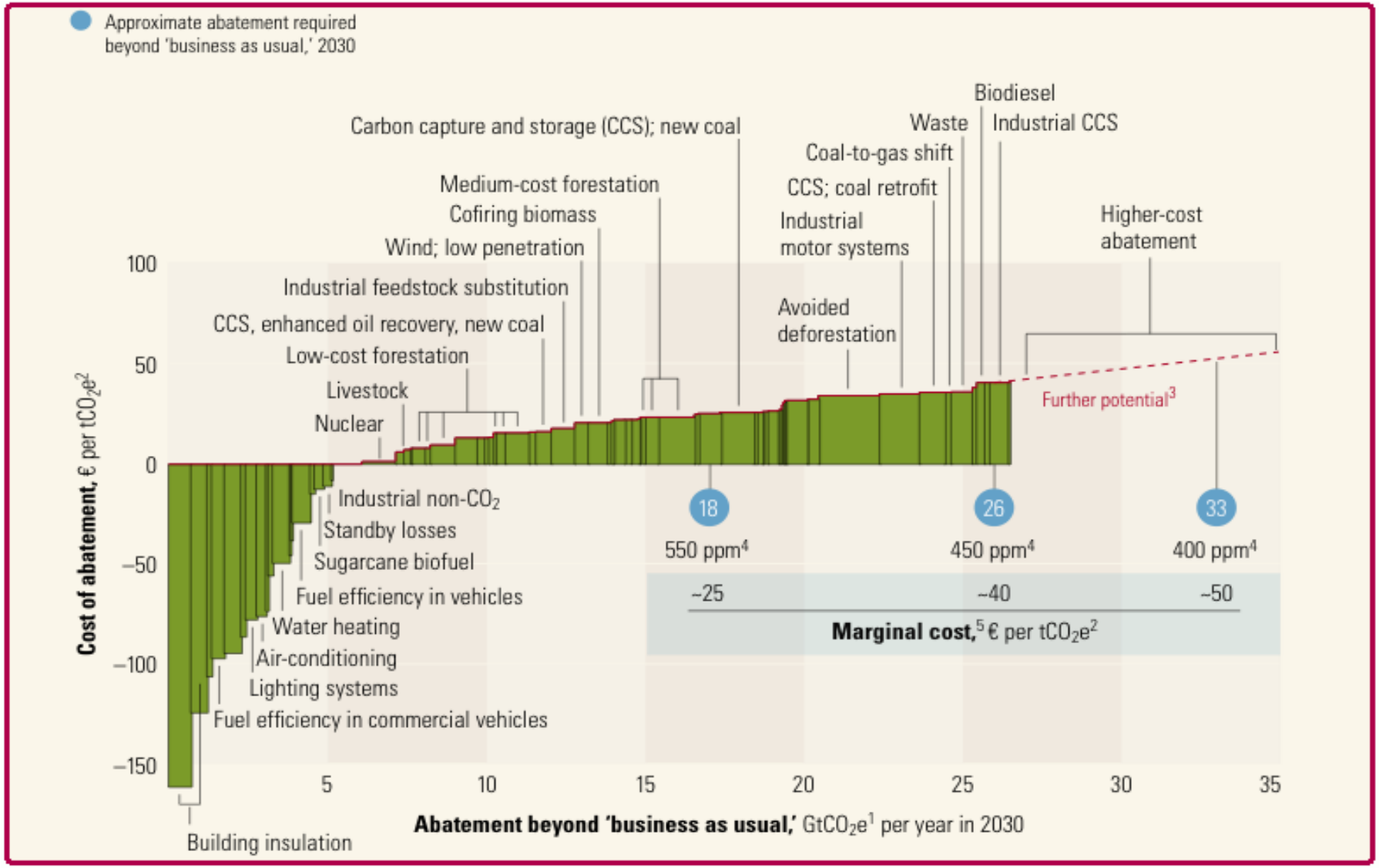
The current development paradigm means:

Build the economy out of concrete and steel.

But emissions alone show:

Only a significantly ***dematerialised development*** *can be sustainable on a global scale.*

Efficiency makes up for most of the negative cost abatement potentials



Source: „The McKinsey Quarterly" 2007-1

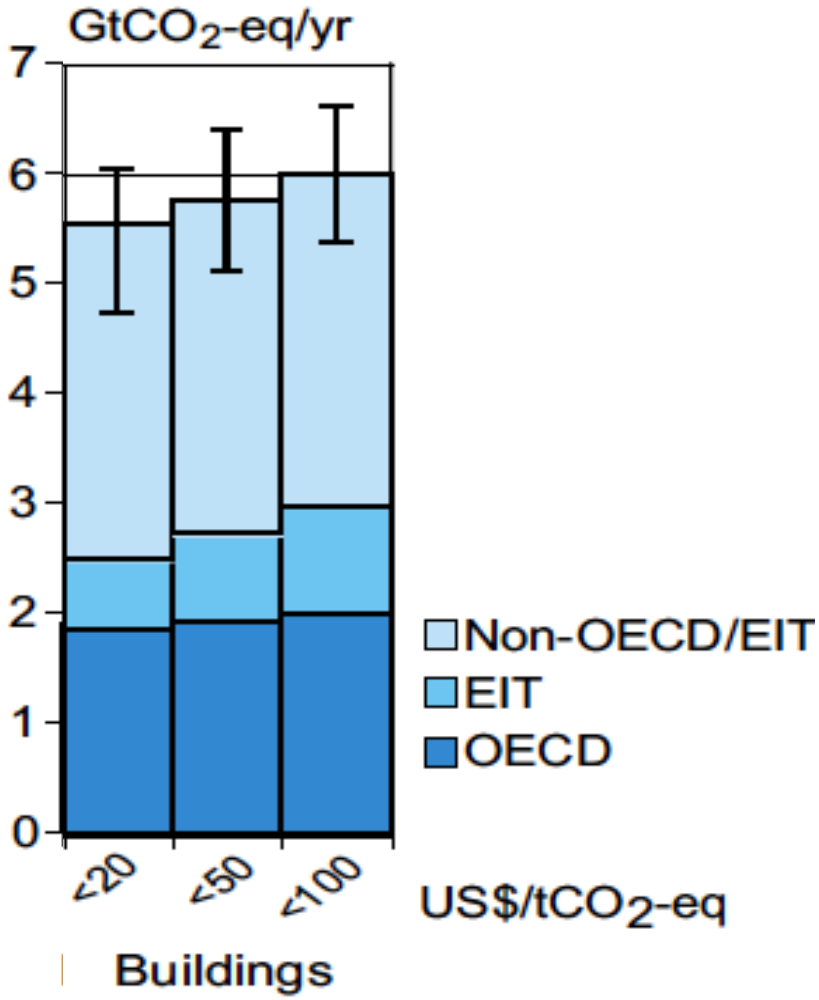
Building sector as a core

Buildings

- largest and cheapest potential
- Strong lock-in danger
- High job creation

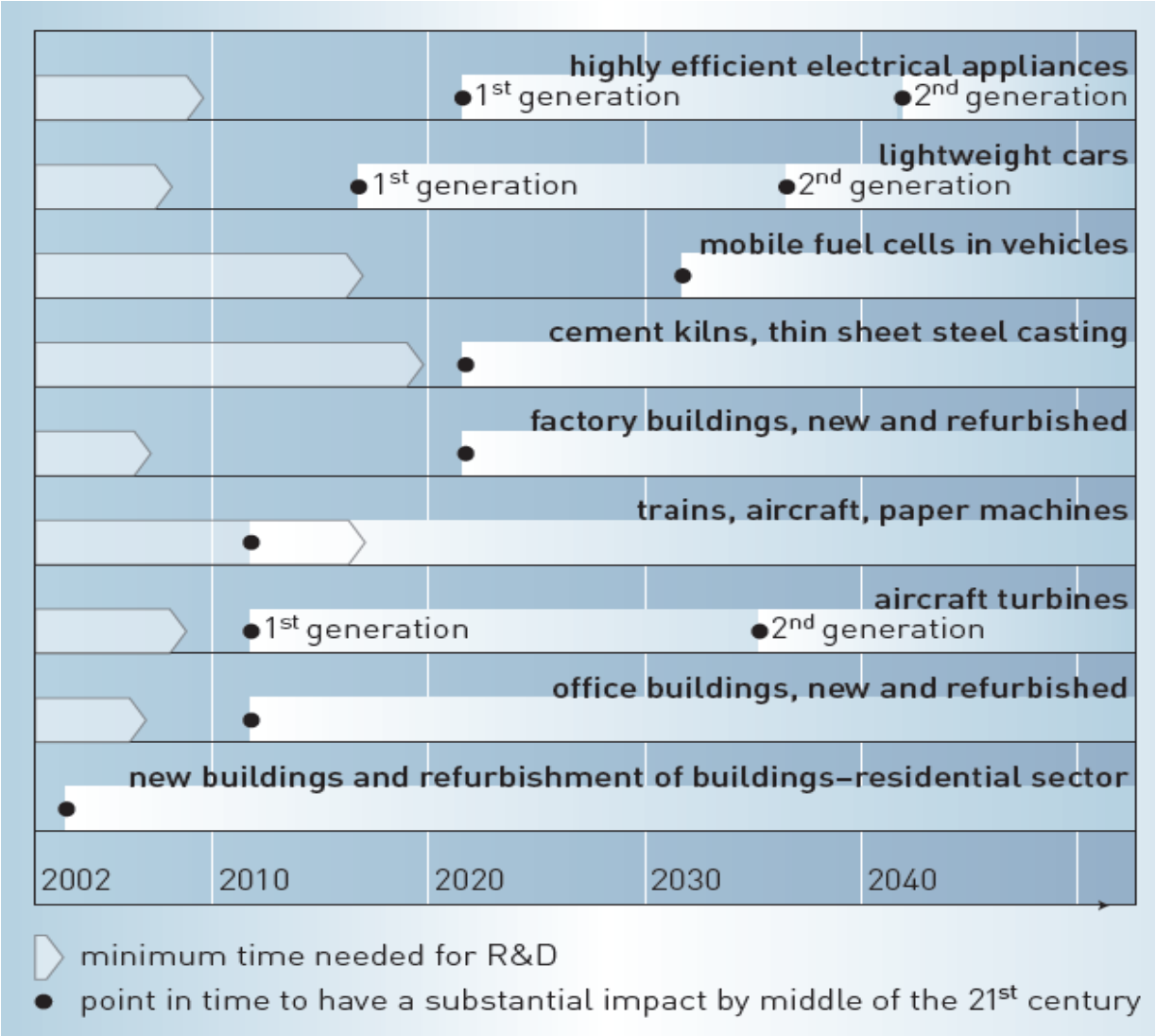
Residential sector

- Low price elasticity
- Various market failiures (not onlyexternal effects)
- Strong policy need (comprehensive tailored policy packages)



Source: IPCC (2007): WGIII_TS (modified)

Efficiency technology development is urgent



Source: Jochem, E. (Ed.) (2004): A WhiteBook for R&D on energy efficient technologies, Novatlantis, ETH Zürich

- Market penetration of low carbon investment goods often takes decades
- → we need low carbon technologies soon
- Technology development has long lead times

Conclusion
Energy efficiency…

- Is necessary
  - Most global and national scenario studies “assume“ **energy efficiency** to be the **core strategy** towards decarbonised economies
- It can be achieved in ICs
  - For Germany
    - By a **slower increase in energy service demand** (1.1%/a to 0.5%/a)
    - By **decreasing final energy intensity faster** than historically (1.4%/a to 1.8%/a)
  - However, the current paradigm of development and growth has to be modified on a global scale towards **dematerialised development**
- **It contributes to economic development (“green growth”)**
  - **Investment into energy efficiency** has **significant** “green” **growth effects** and **hedges economies** against future energy price spikes and scarcity problems
- It **needs significant policy support**
  - Carbon pricing alone is not sufficient
  - Comprehensive policy packages are needed

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Thank you!

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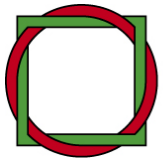

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