

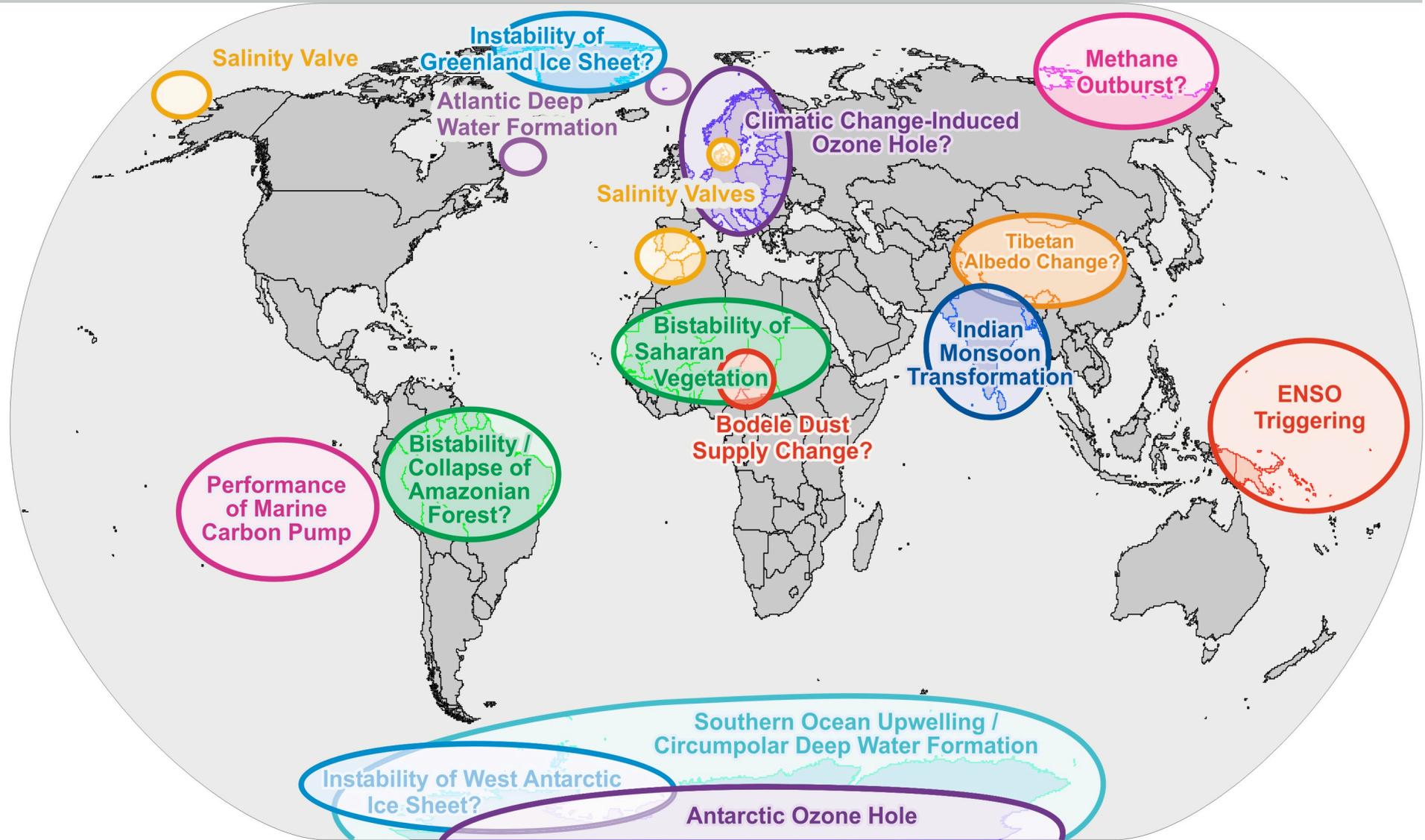
Wuppertal Institute
for Climate, Environment
and Energy

**Climate mitigation, resource protection
and the economic crisis**

Prof. Dr. Peter Hennicke
Wuppertal Institute

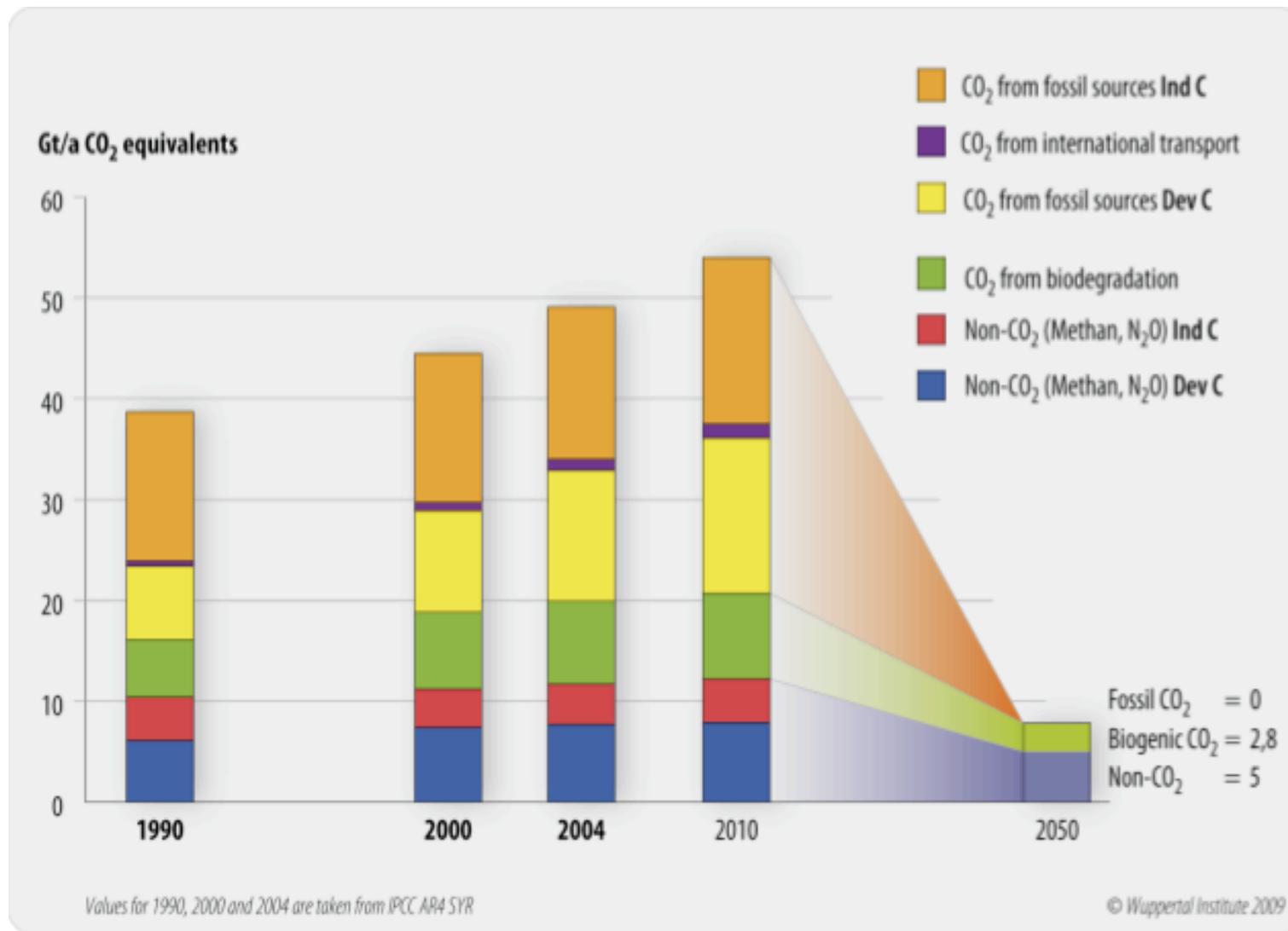
**Presentation at the Multinational Environment Policy Conference,
Seoul, June 11-13**

Tipping Points of the Earth System: An imperative for joint and urgent action!



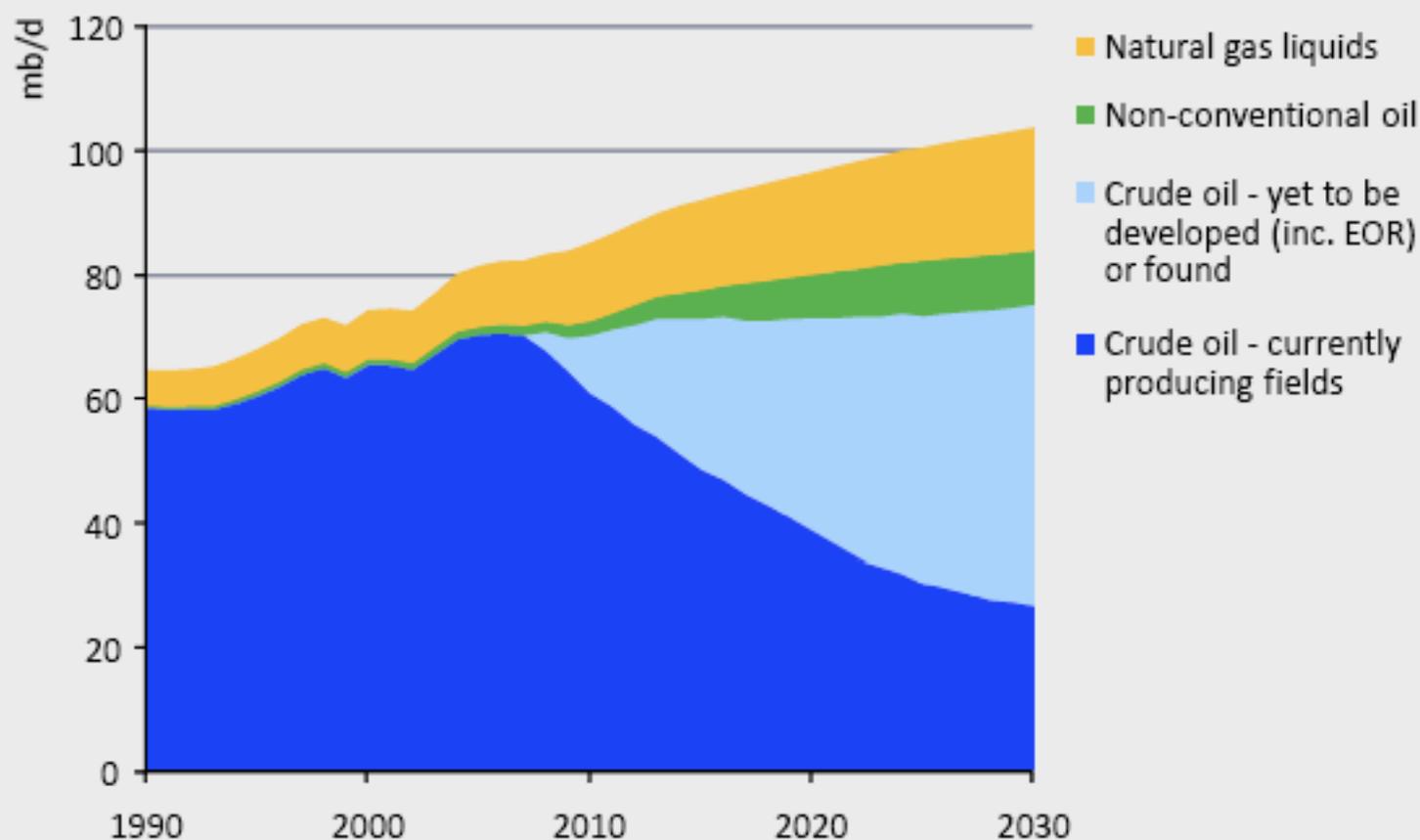
Alarming trends of GHG-emissions: Ambitious reduction targets are needed to keep the temperature increase below 2° C!

Source: Wuppertal Institute 2009



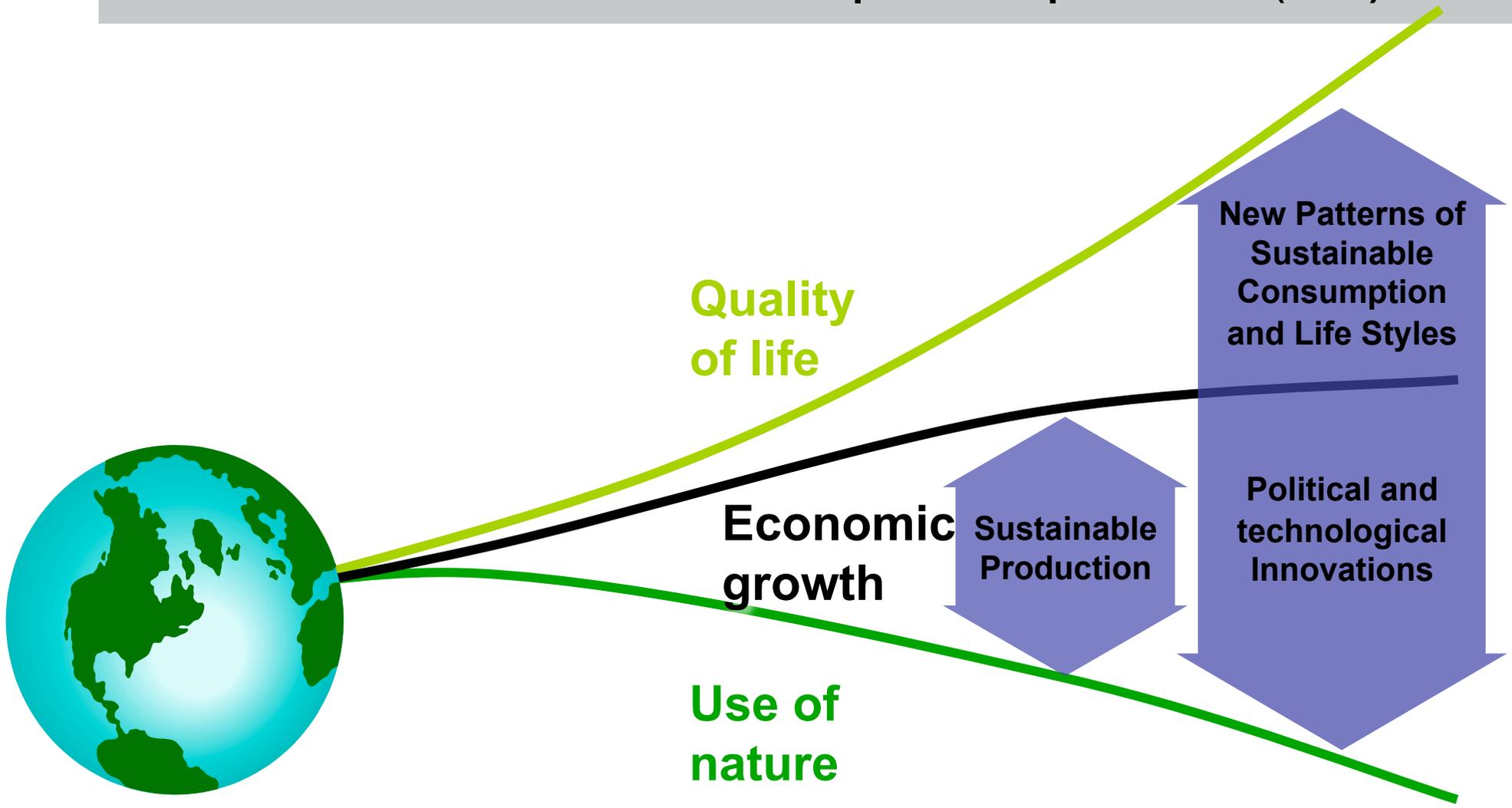
World oil production by source in the Reference Scenario

World
Energy
Outlook
2008



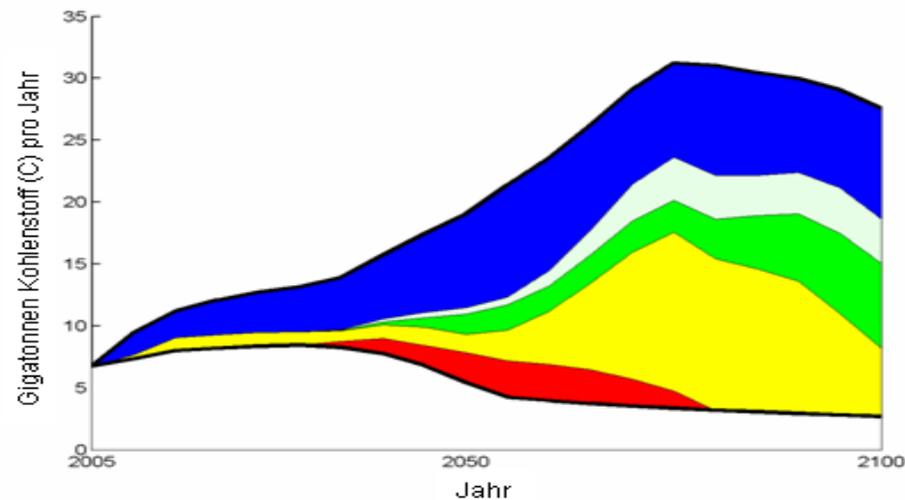
64 mb/d of gross capacity needs to be installed between 2007 & 2030 – six times the current capacity of Saudi Arabia – to meet demand growth & offset decline

The Challenge:
*Absolute decoupling of quality of life from the use of nature -
innovations and sustainable consumption and production (SCP) are key!*

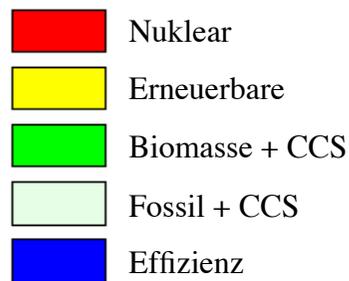


„Humanity can solve the carbon and climate problem in the first half of the century **simply by scaling up what we already know to do**“.

(Pacala/ Socolow 2004, Princeton University, USA)



Energiebedingte Emissionen

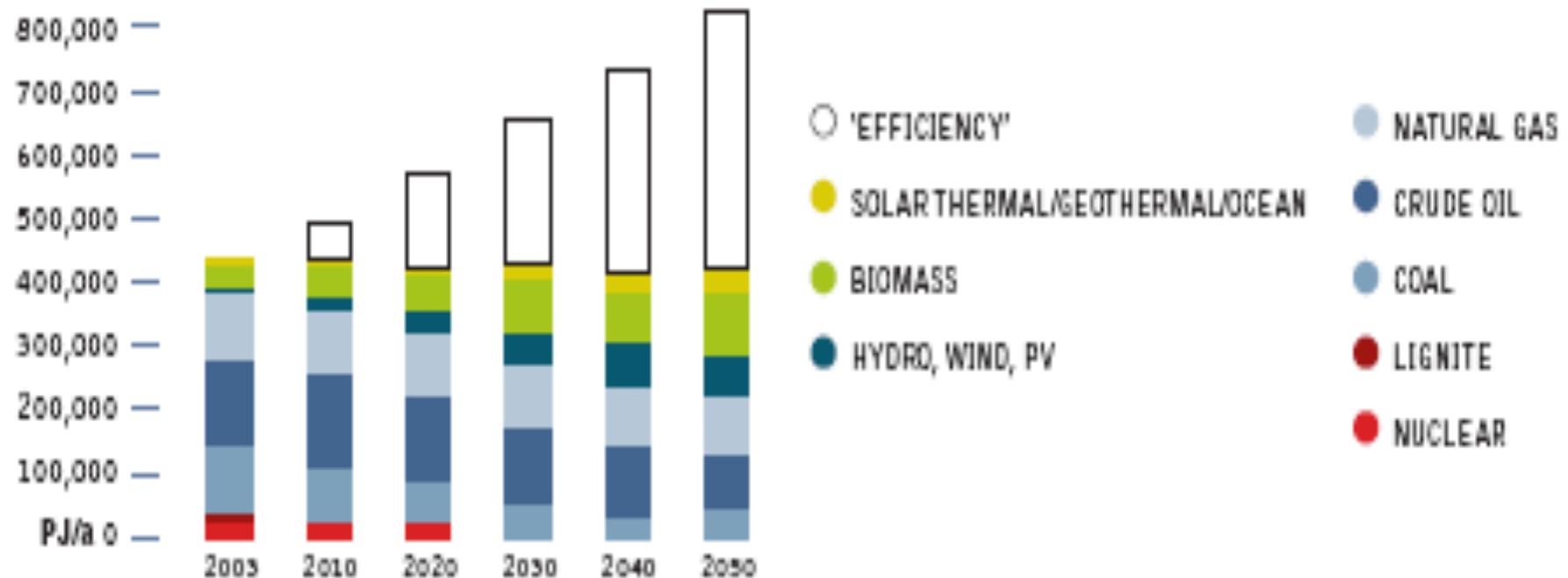


(Source: Edenhofer, PIK, 2007)

Decoupling world primary energy from GDP-growth under the “energy (r) evolution scenario”

(Source: DLR (Ger); Ecofys (NL) on behalf of Greenpeace and Europ.Renewable Energy Council, 2007)

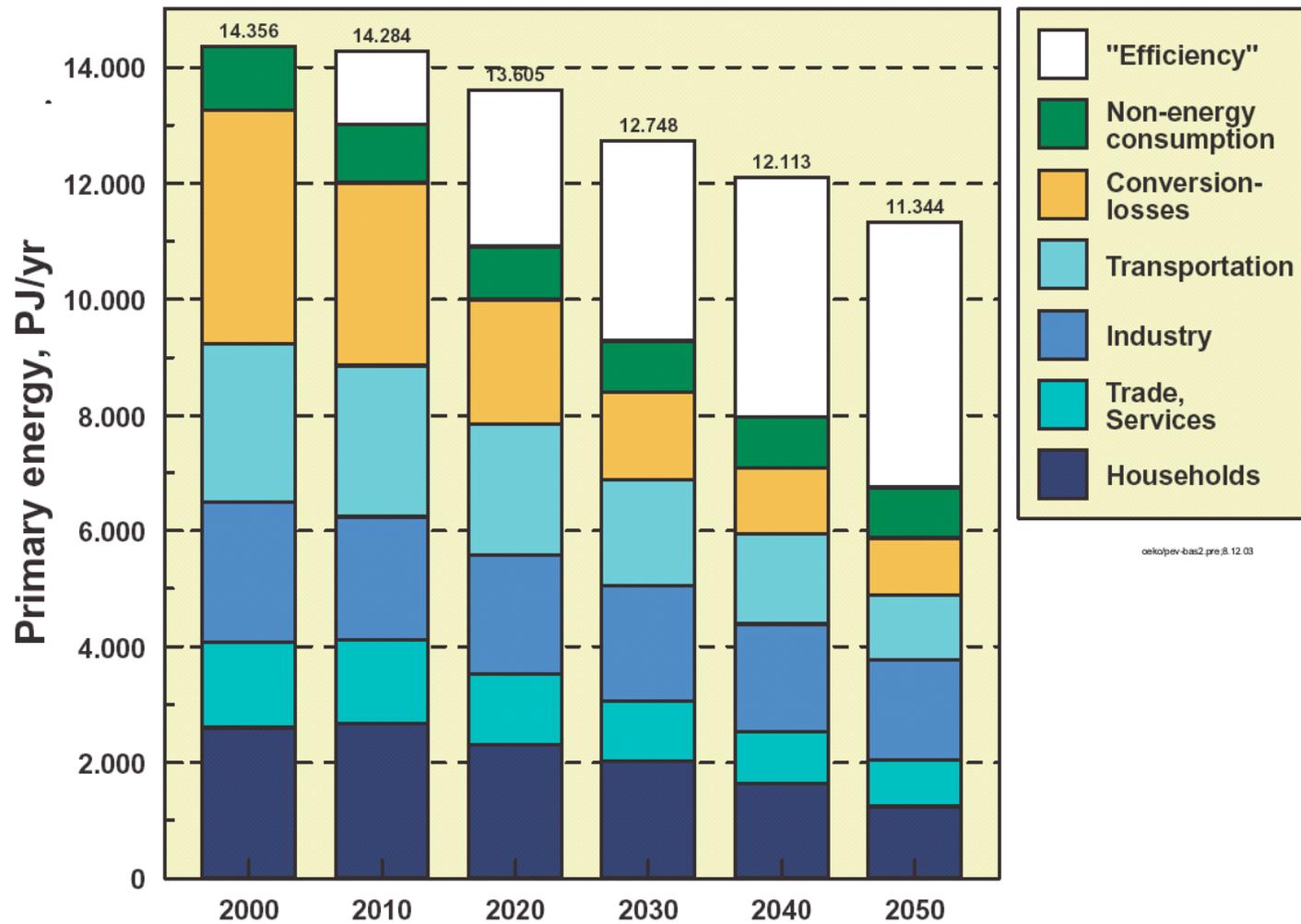
(“EFFICIENCY” = REDUCTION COMPARED TO THE REFERENCE SCENARIO)



Results in 2050 - The „Three Green Pillars“:

- **Fostering efficiency - halving primary energy:** 422 EJ instead of 810 EJ (BAU)
- **Raise share of renewables:** 70% (electricity) and 65% (heat); phasing out nuclear
- **Expansion of CHP** (gas; biomass); biomass mainly used for stationary use
- 50% CO₂-reduction from 23 bn t/a (2003) to 11,5 bn t/a
- Reducing total electricity costs from \$ 4,300bn by on third

Decoupling GDP-growth (1.5% p.a.) from energy: The role of sectoral energy efficiency in a German sustainable energy system



oekojev-bas2.ppt, 8.12.03

Status and targets of the „Integrated German Energy and Climate Policy“ (Source: IECP 2007/2008)

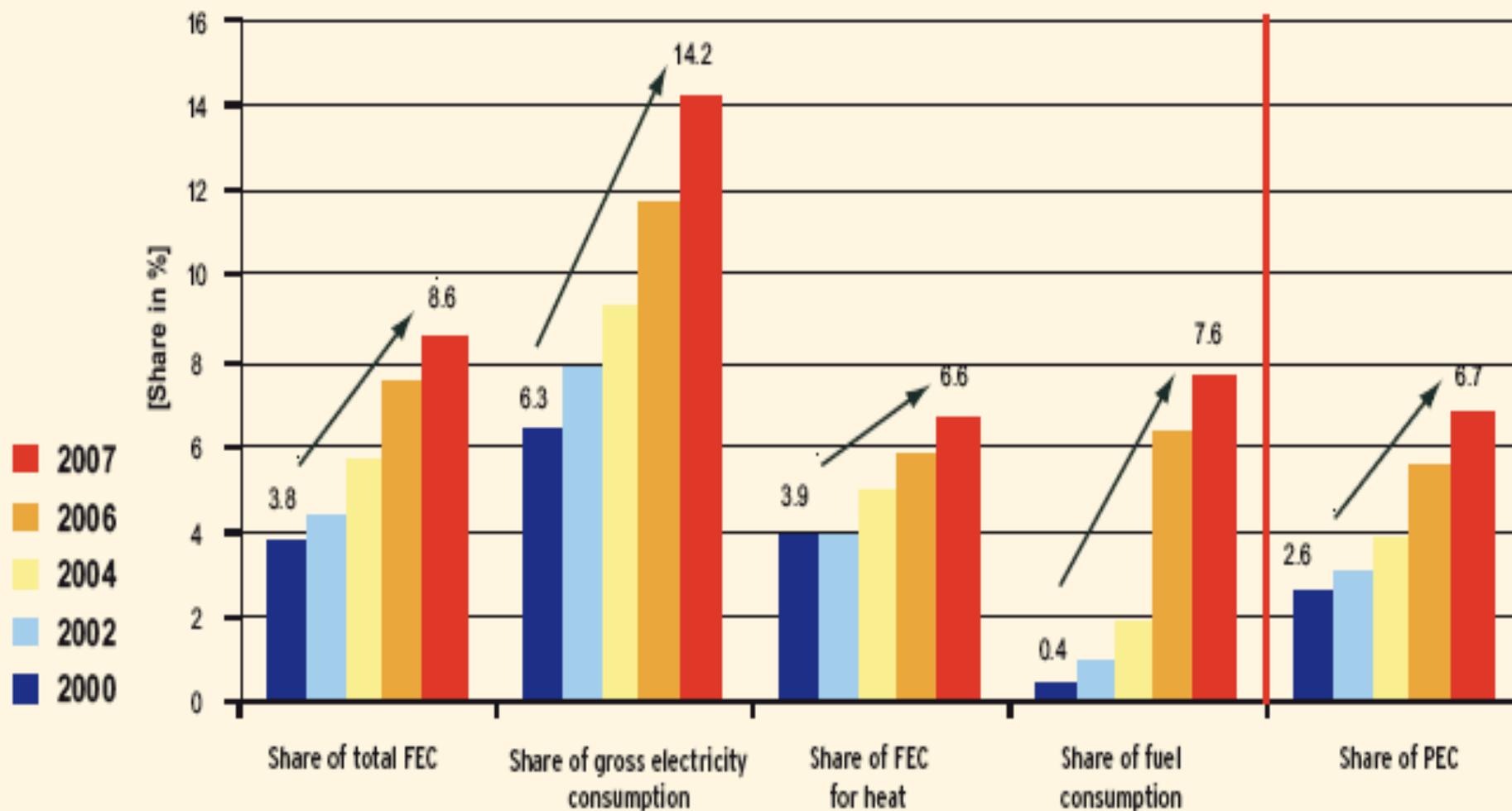
Status

- **Status 2008:** 20,4 % CO₂ reduction compared to 2000
- **Kyoto target:** 21% CO₂ reduction up to 2008-12 will be reached

New targets up to 2020

- Share of **electricity** from renewables: from **14 % up to at least 27%** (2020)
- Share of **heat** from renewables: from **6 % up to 14%** (2020)
- Share of **CHP** from **10% up to 25%** (2020)
- **Doubling energy and resource productivity up to 2020** (compared to 2000)
- **40% CO₂ reduction** up to 2020, if EU decides on a 30% target
- **80% CO₂ reduction** up to 2050; maximum: 2° C global temperature increase

Renewable energy sources as a share of energy supply in Germany

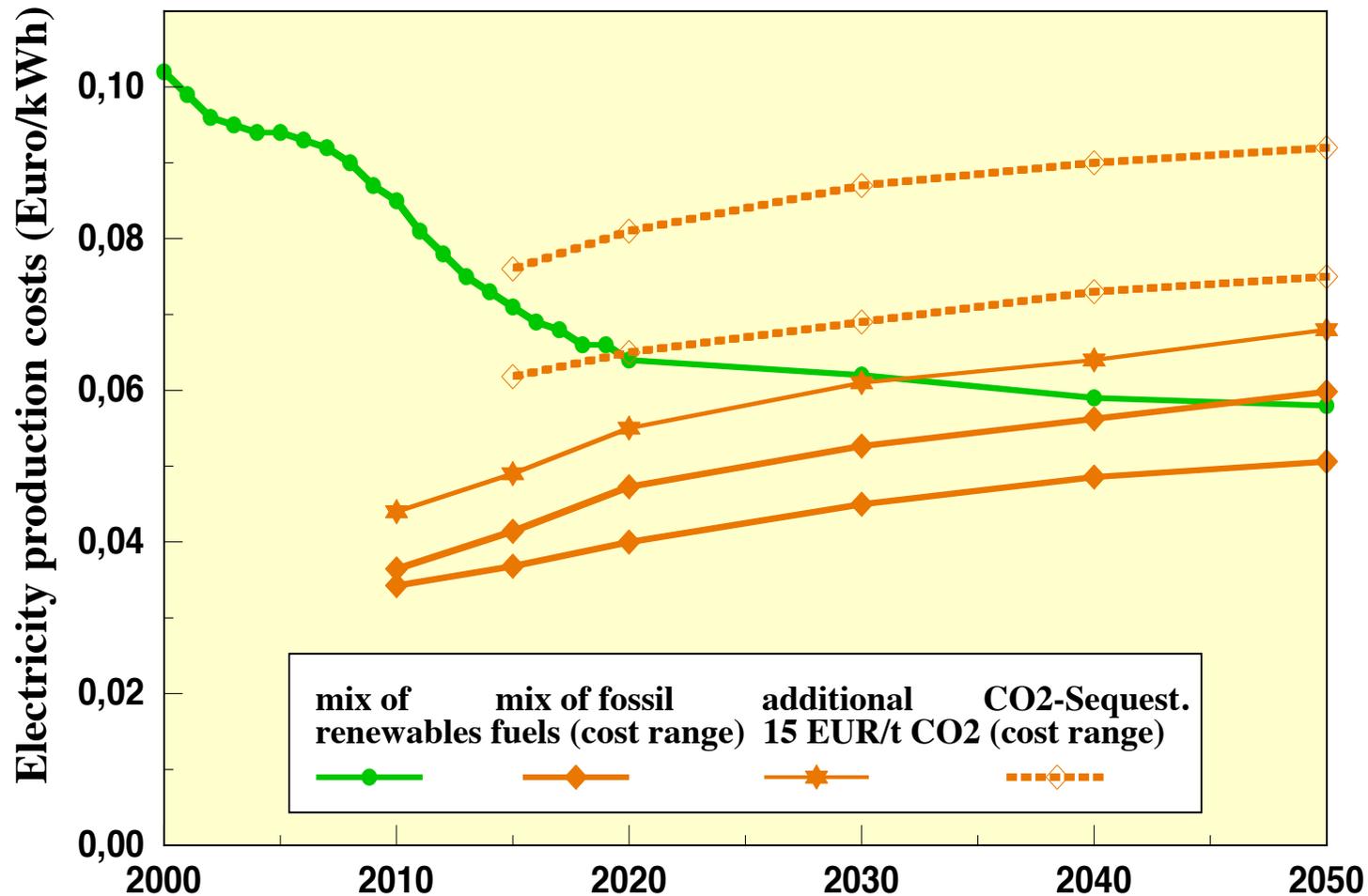


FEC Final energy consumption

PEC Primary energy consumption, calculated acc. to physical energy content method

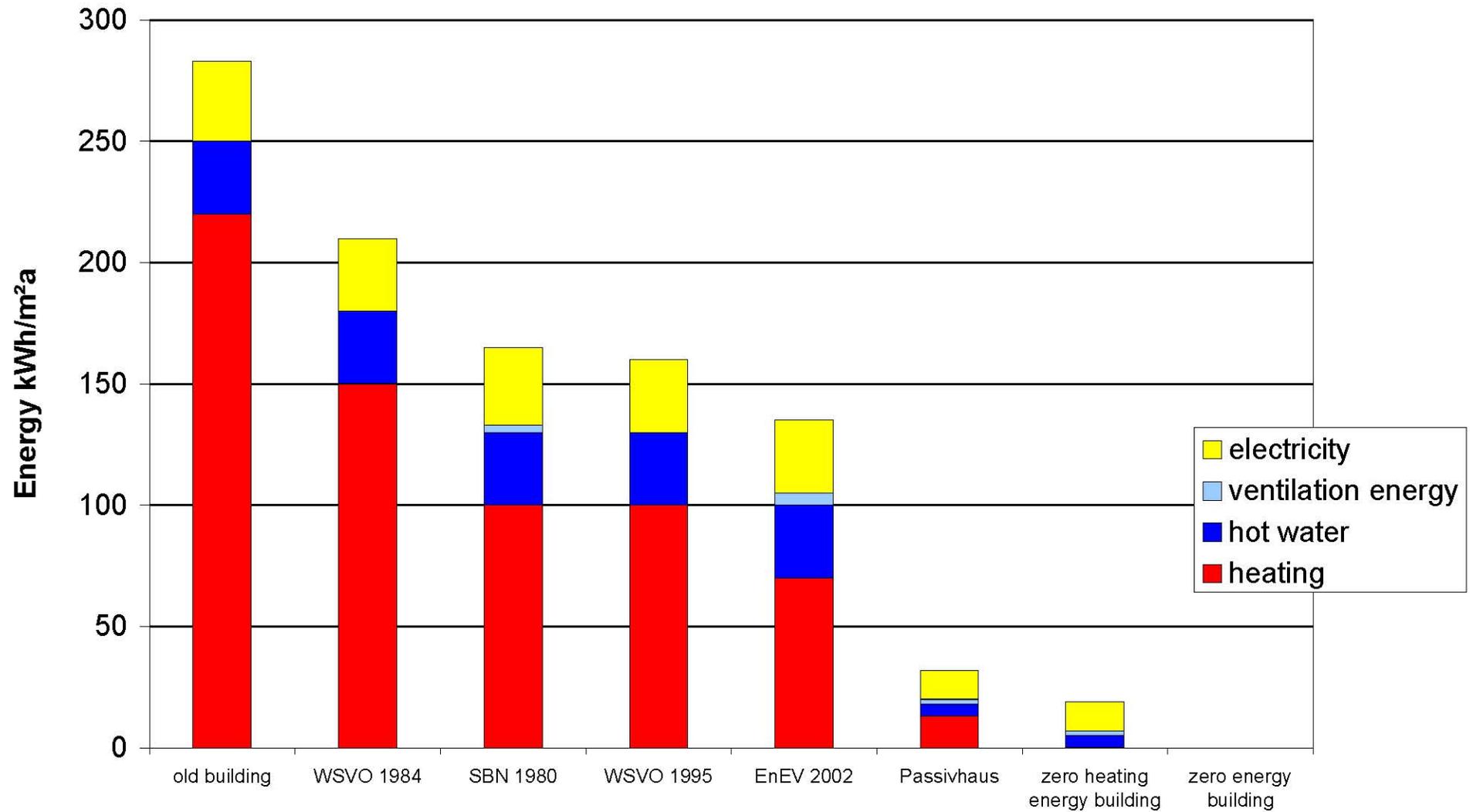
Source: BMU publication „Renewable energy sources in figures - national and international development“, Status: June 2008

Comparison of electricity costs of new power plants: Decreasing from renewables - increasing from fossil/nuclear



oeko/kost-kw.pre; 15.09.03

Building Standards in Germany

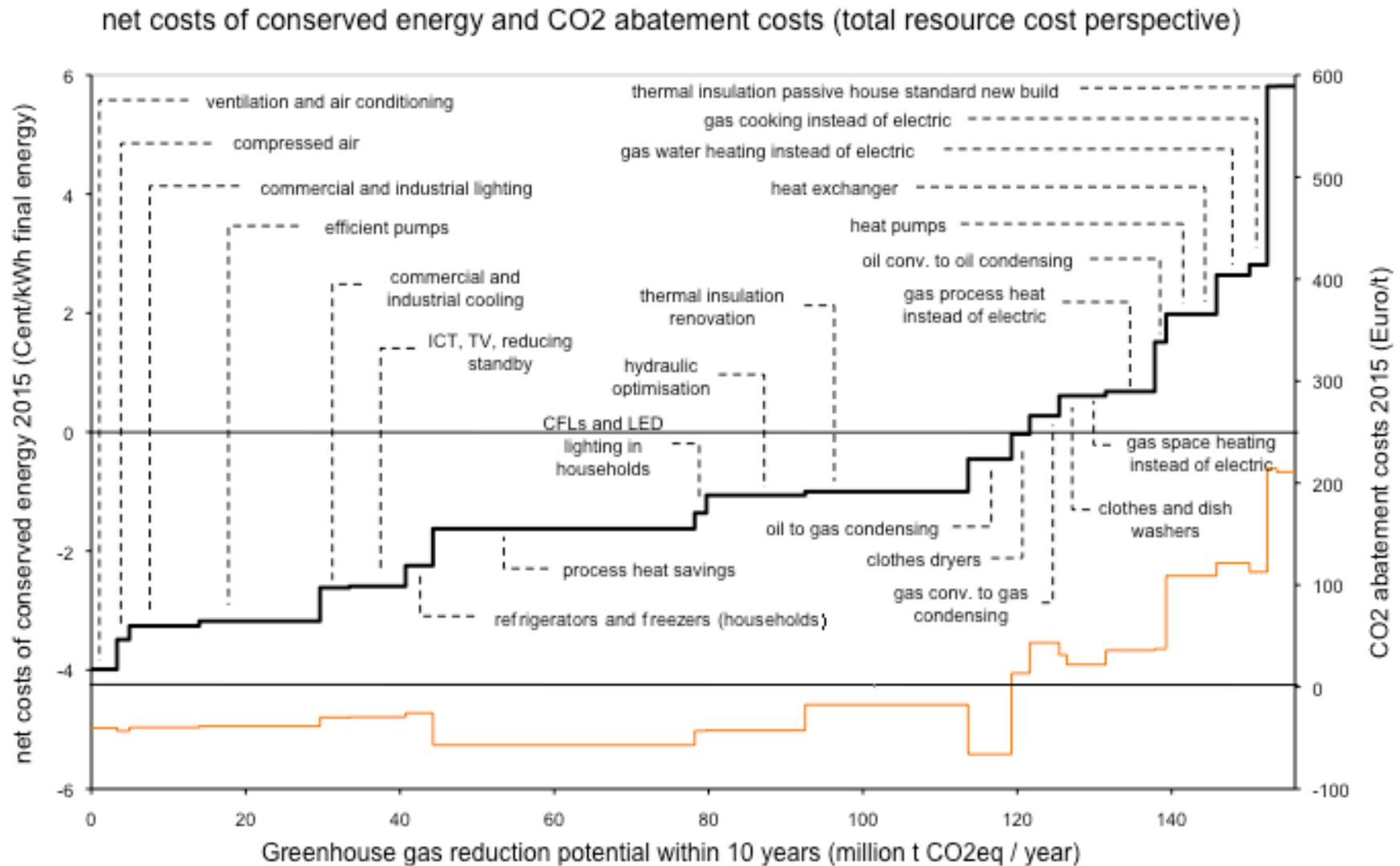


**„The Sun Ship“ in Freiburg/Germany:
Worldwide first „Plus Energy“ Office Building („Plusenergiehaus®“; Disch 2007)**



Energy efficiency potentials in Germany: 120 TWh of electricity can be avoided with a profit - reduction of 12 % of CO₂ emissions in 10 years

(Source: W/E.On 2007)



A Paradigm Shift and a Policy Mix is needed to overcome barriers to foster the deployment of efficiency technologies and to create markets for energy services

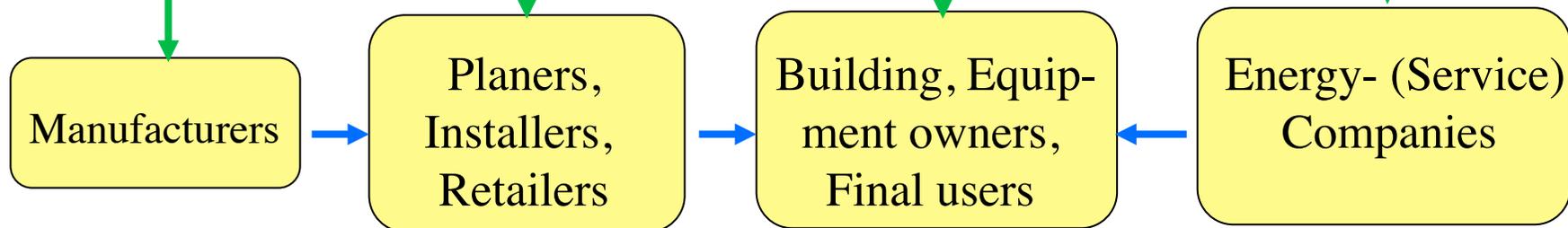
Energy tax,
subsidy reform

Price structure,
costs oriented prices

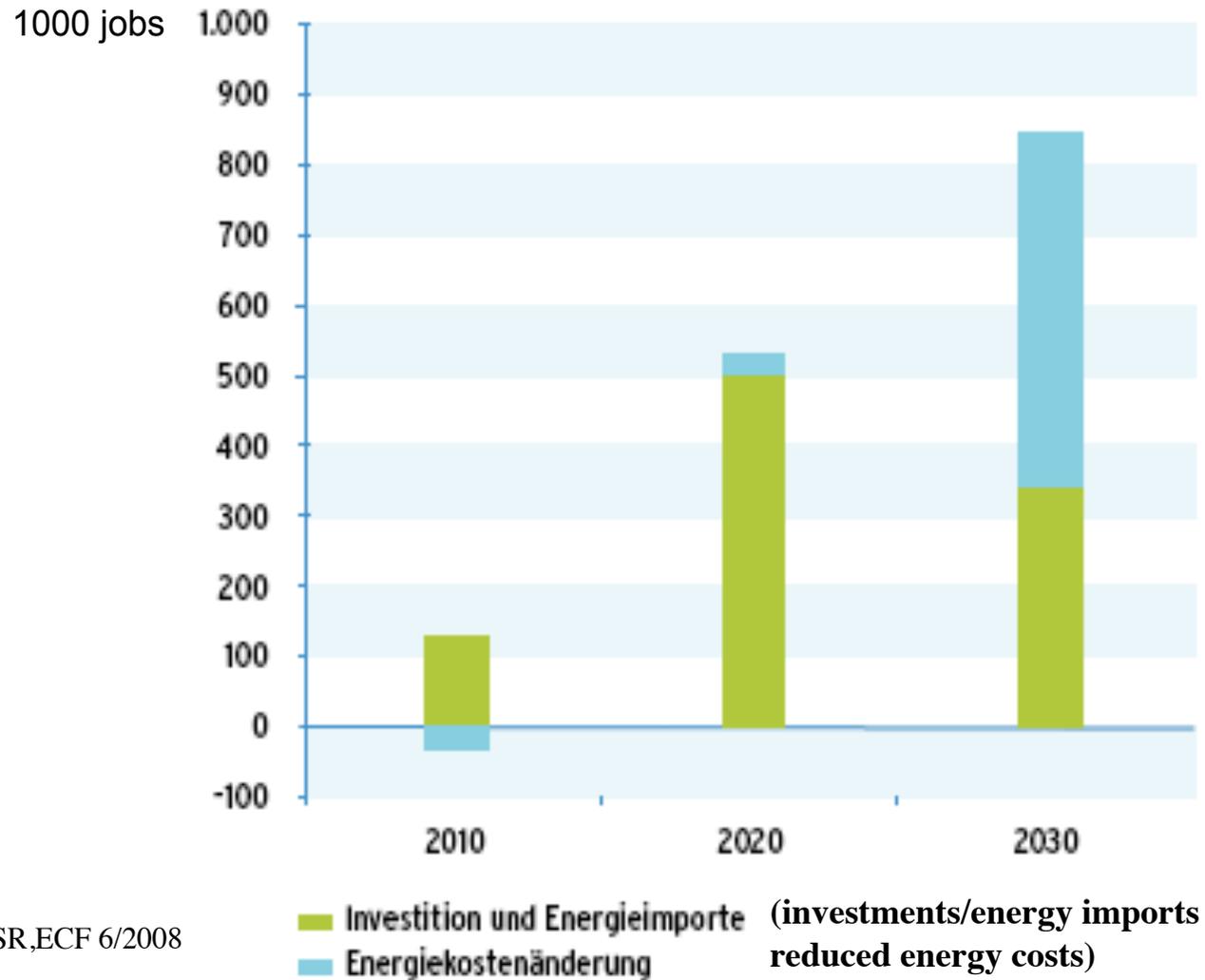
Emission trading, JI, CDM

- **Incentives and support** (financial, organisational) :for investments, R&D, demonstration, pilots
- **Campaigning**: Motivation, information, energy audits, training
- **Efficiency standards/labelling**: for products and production (mandatory/ voluntary; “Top Runner “)
- **Foster public procurement**, bundling of demands etc.
- **Stimulate ESCOs , Contracting/ Third Party Financing** (about 600 in Germany)
- **Establish Energy Efficiency Funds**: on the national, regional and local level (e.g.ProKlima/Hanover)
- **EU-directive on energy efficiency** (target: 1 % **additional** increase of energy efficiency p.a.)

Integrated market transformation programme

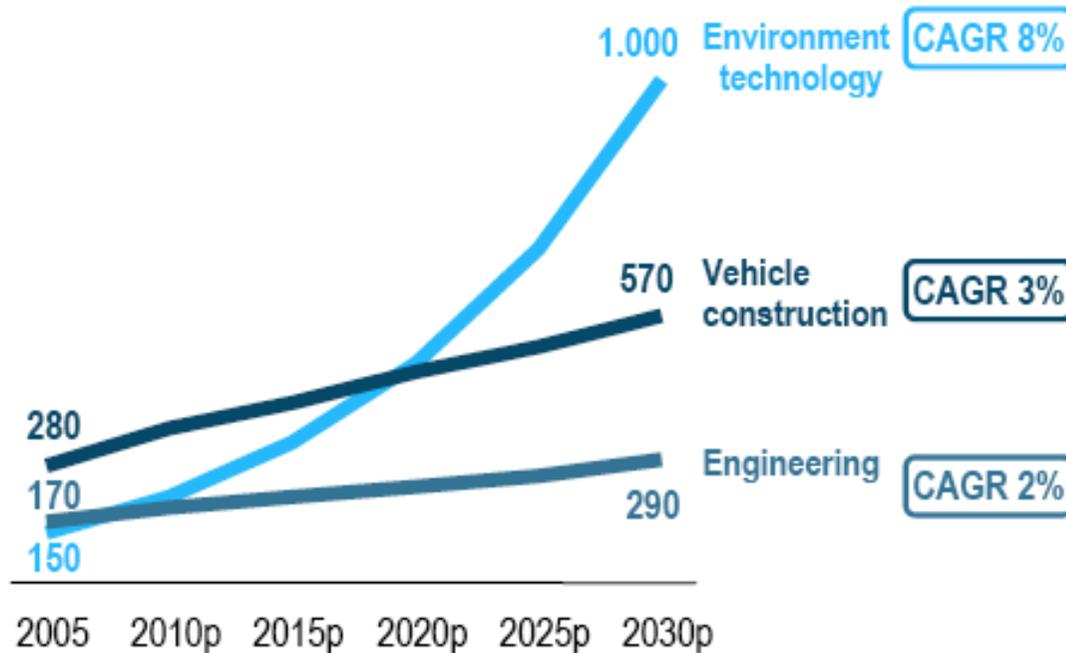


Macroeconomic benefits and employment effects of reducing CO₂-emissions by 40% up to 2020 in Germany: Driving forces are higher investments/reduced imports and energy costs



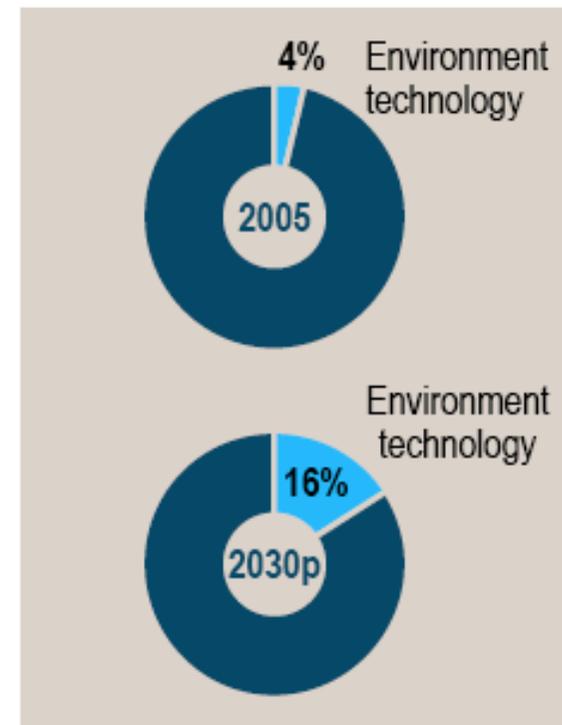
The German example: The turnover in the environment sector multiplies - displacing the car market as leading industry

Salesforecast for Germany [bn. EUR]



Quelle: Prognos 2006, Expertenbefragung, Roland Berger 2006

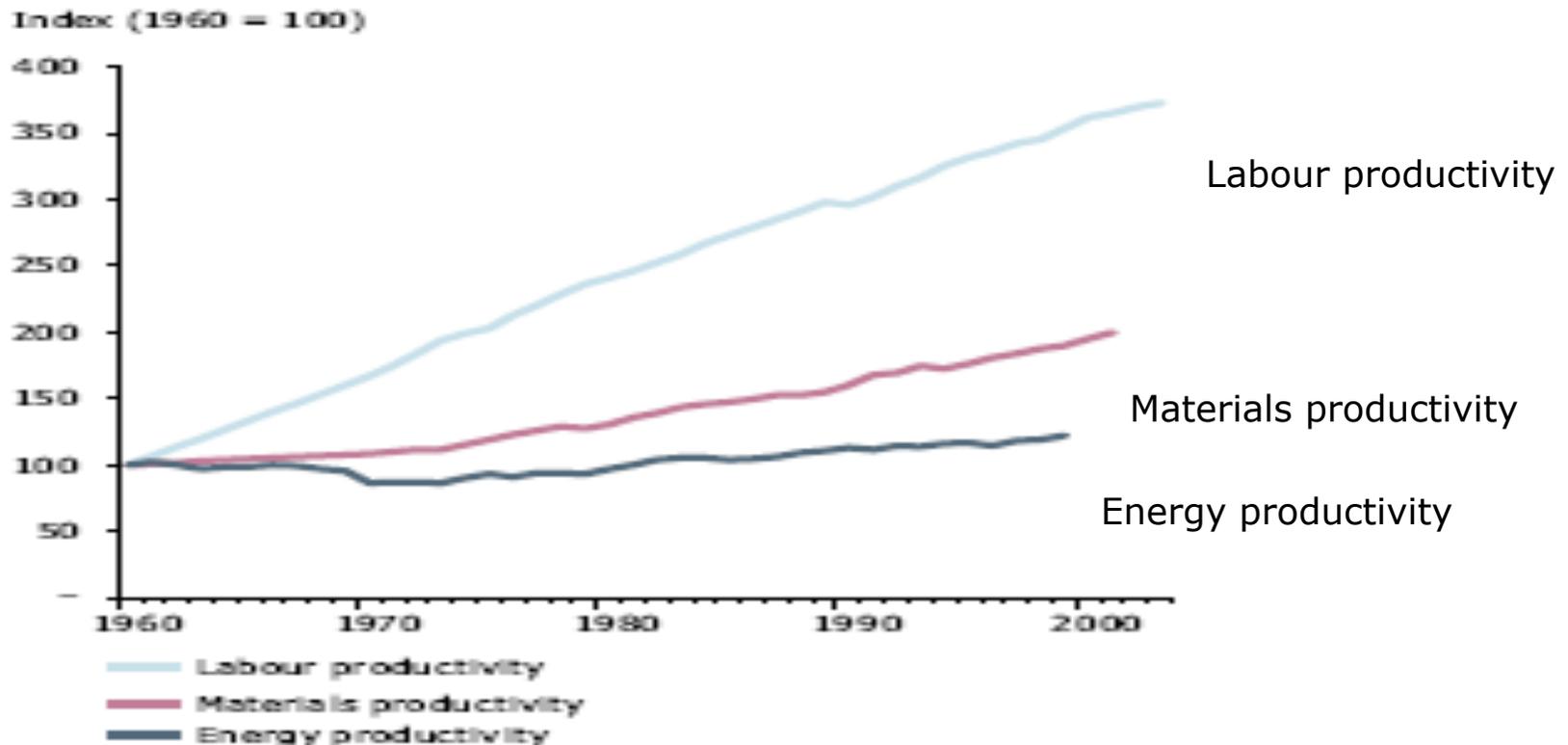
Share of the total economic system volume [%]



Roland Berger
Strategy Consultants

A new direction of technical progress - raise resource and energy productivity: "Make tons and kilowatthours redundant not people"

(EU 15; 1960 to 2002)

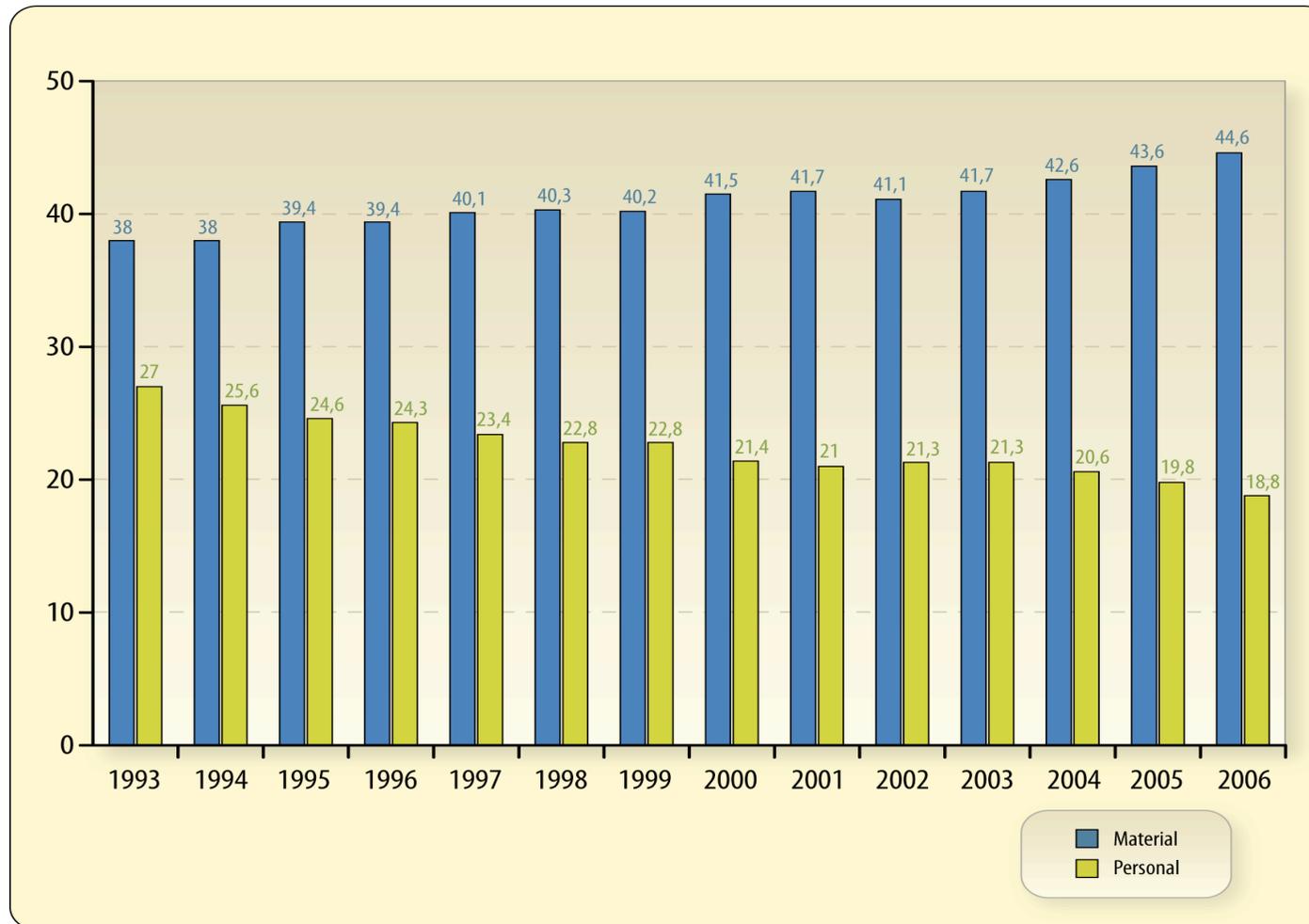


Note: Labour productivity: GDP per annual working hours (1999 USD (converted at EKS PPPs) per hour); material productivity: GDP per domestic material consumption (DMC) (EUR per kg); energy productivity: GDP per total primary energy supply (TPES) (thousand 1995 USD per toe).

Sources: Groningen Growth and Development Centre and The Conference Board, Total Economy Database, 2004; EUROSTAT/IFF, 2004; IEA, 2001; Federal Statistical Office, 2003.

High shares of material (blue) costs compared to wages (yellow) in relation to total costs in German industry

(Source: Dörner/Hennicke 2009)



Materialkosten = Rohstoffe und sonstige fremdbezogene Vorprodukte, Hilfs- und Betriebsstoffe incl. Fremdbauteile, Energie und Wasser, Brenn- und Treibstoffe, Büro- und Werbematerial sowie nichtaktivierte geringwertige Wirtschaftsgüter
(DESTATIS, FS 4, Reihe 4.3. Kostenstruktur im Produzierenden Gewerbe)

Analytical and practical economic benefits of reducing material costs in German Industry and SMEs

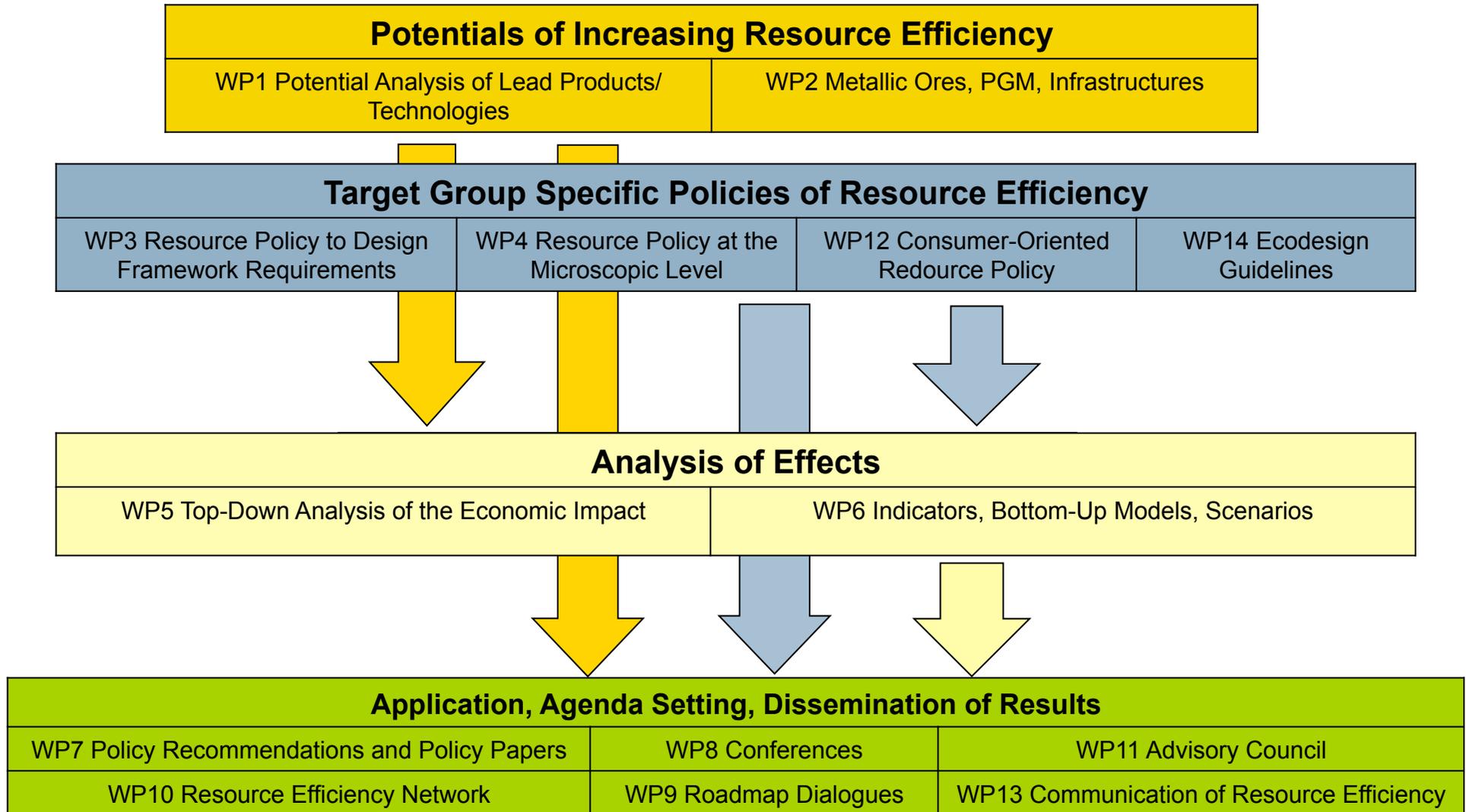
“Aachener Modell” simulation: reducing material costs for German industry by 10%) Results in 2020:

- Additional employment: + 1,000,000 jobs
- Additional business revenues: +120 bn Euro
- Additional increase of economic growth: + 1% per annum
- Harvesting first mover advantages of competitiveness
- Reducing import dependency of strategic resources
- Contributing to geostrategic risk minimisation
- Approaching the official German goal („doubling resource productivity in 2020“)

Empirical evidence:

1. **German “Material Efficiency Agency”** : audits for 220 projects; payback time less than 6 months. 40 networks between SME established.
2. **Efficiency Agency (EFA/NRW)**: 140 realized projects; investments: 27.8 million €/a; cost reduction: 8.7 million €/a (average payback: 3 a)

„Material Efficiency and Resource Protection“: A project to support German „Ecological Industrial Policy“: Wuppertal Institute and 30 partners; on behalf of the German Ministry of Environment (2007-2010)

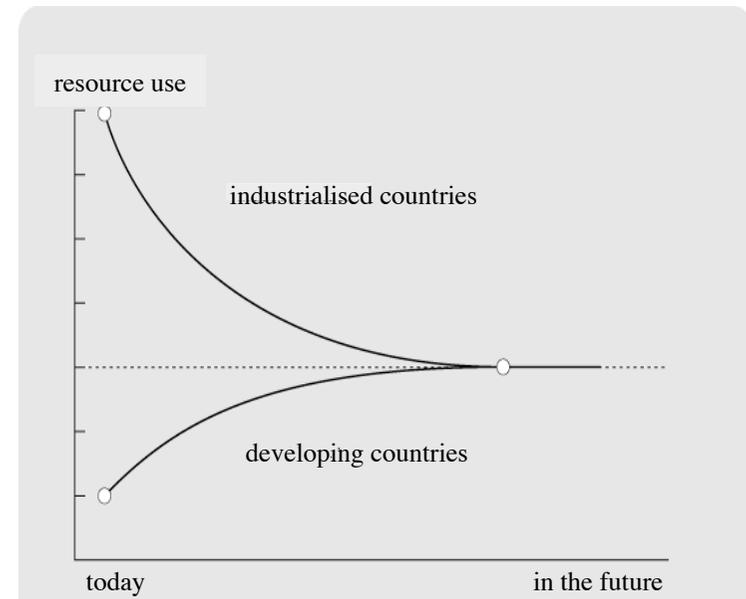


The vision: „2000 W per Capita Society“ – R&D initiative of Swiss Research Institutes

(Swiss „White Book for R&D of energy-efficient technologies“, March 2004)

- A „2000W per Capita Society“ in OECD-countries is feasible; 2000W/cap (= 65 GJ/cap) corresponds to **1/3 of today`s European per capita energy use**;
- **World average** in the last two decades (=70 GJ/cap):
The future convergence value?
- Enabling a GDP/cap growth of 2/3 up to 2050, the „2000W per Capita Society“ **implies a factor 4 to 5 increase of energy and material efficiency**
- Needed: **change of innovation systems**, exploitation of **long re-investment cycles**, **sustainable patterns** of consumption and production

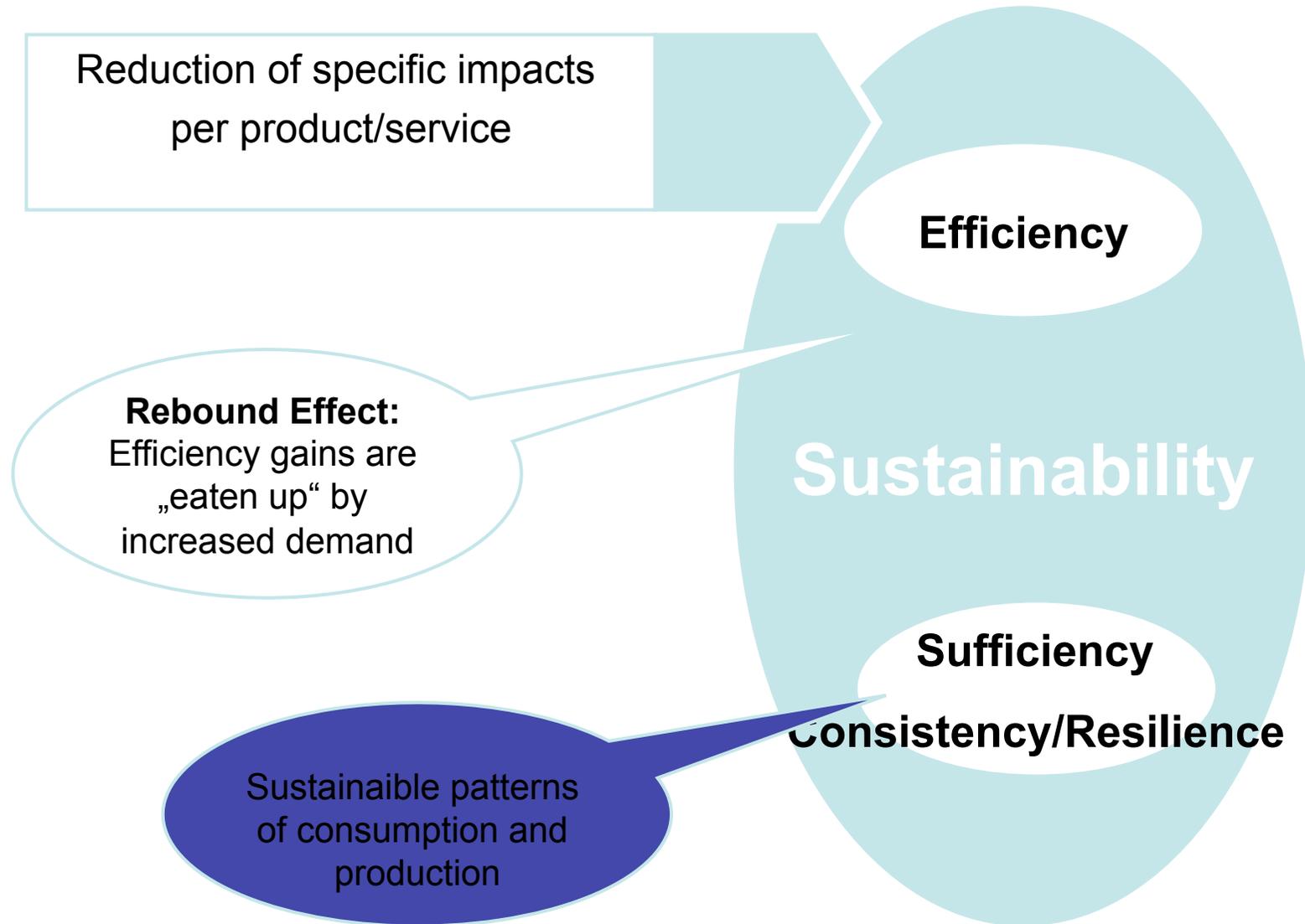
„Reduction and Convergence“



Industrialized countries reduce their resource use more than it increases in developing countries.

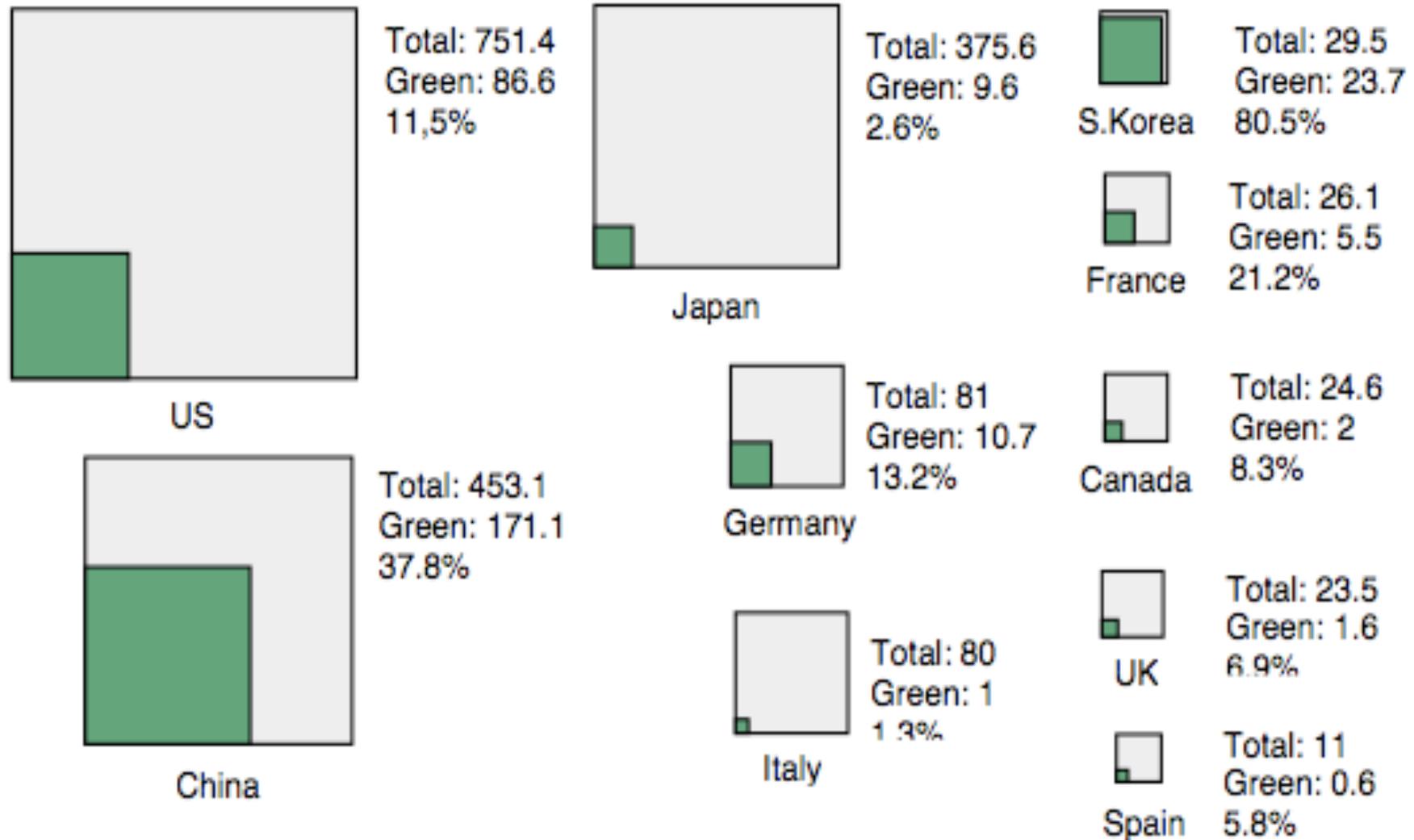
Convergence value should be compatible with the carrying capacity of the biosphere.

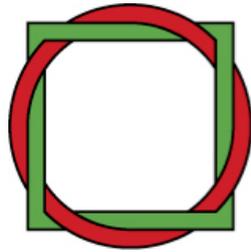
An integrated approach to establish sustainable consumption and production (SCP) patterns: Efficiency + sufficiency + consistency



„Green Share“ of „Recovery Programmes“ 2008/2009

Source: Bernard et al 2009; Schepelmann et al 2009





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<http://www.wupperinst.org>

