

**Feasibility and Usage of Prospective Studies
Seminar
7th Dec. 2006, Free University of Brussels**

Scenarios, modeling, backcasting... in long-term planning for SD

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SERI Projects

- **ALARM:**
Assessing large scale environmental risks for biodiversity with tested methods
- **MOSUS:**
Modelling opportunities and limits for restructuring Europe towards sustainability
- **ARTEMIS**
- **FORESCENE**
- **many others**



ALARM

- Assessing **l**arge scale environmental **r**isks for biodiversity with tested **m**ethods
- **www.seri.at/alarm, www.alarmproject.net**
- Integrated Project, 6th FP
 - Coordinator: UFZ
 - over 50 partners
- SERI's contribution:
 - Coordination of the socio-economic research in ALARM
 - Collaboration in analysing the relation of economic policies, climate change and biodiversity loss.



ALARM

- **Scenario development:**
 - **Socio-economic storylines** as narrative framework
 - **Deriving socio-economic scenarios**
- **Modelling:**
 - **Simulation of the scenarios with the Integrated Model GINFORS**
- **Participation:**
 - Consultative Forum (in Brussels and Cologne with selected stakeholders)



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- **Socio-economic storylines as narrative framework** for different simulation tools (e.g. climate change model, land use model, economic model)
- **3 different storylines** provide a qualitative description of different future developments for Europe
 - **GRAS:** Growth Applied Strategy Scenario
 - **BAMBU:** Business-As-Might-Be-Usual
 - **SEDG:** Sustainable European Development Goal



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GRAS

- **General ideas:**

- reduced role of the state, privatisation
- international competitiveness
- reduced taxes, state expenditures declining
- renationalisation of European politics instead of integration

- **Policy objectives**

- deregulation
- free trade
- growth
- globalisation
- environmental policy focussing on damage repair; no emphasis on biodiversity



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BAMBU

- **General ideas:**

- already made but not implemented policy decisions in the EU are implemented and enforced

- **Policy objectives**

- deregulation and privatisation except in some areas
- free trade, especially in services
- better policy coordination
- environmental policy as challenge
- promotion of efficiency technologies
- tax cuts



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SEDG

- **General ideas:**

- Enhancing the sustainability of societal development by an integrated social, environmental and economic policy
- Combination of informational, economic and command-and-control policy instruments

- **Policy objectives**

- competitive economy
- social cohesion and security
- healthy environment
- gender equity
- development cooperation
- participation of stakeholders and citizens in decisions



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The modelling challenges

- The storylines **describe drivers of environmental change**, e.g. economic development, technological changes, etc.
- They are **comprehensive stories**, including qualitative aspects.
- These storylines constitutes scenarios (for different sub-themes such as land use, nitrogen deposition, climate change, **socio-economic development**).
- Modelling** provides an **illustration of quantifiable parts** of the narratives (for SE group based on quantitative economic data)



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The modelling challenges

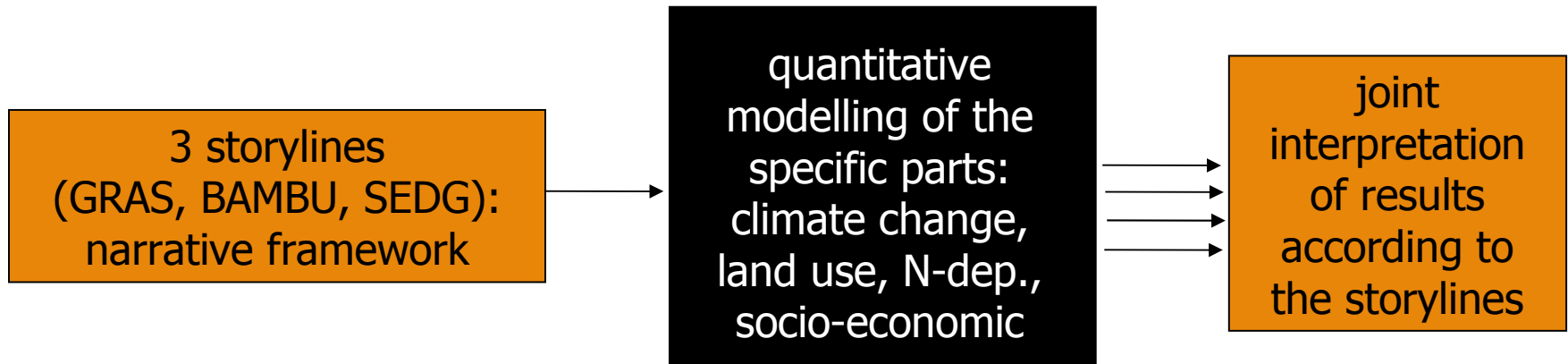
- Narratives must be **multi-disciplinary**
- **Integration** of different disciplines **difficult**, because of own logic, time schedule, parameters, in- and outputs.
- **Challenge:** to find shared framework with climate, land use, biodiversity modellers, ...



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The modelling challenges

Storylines serve as general framework to link the different sub-themes



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Socio-economic modelling

- Providing the basis for **political decision-making**
- **Knowledge about possible effects** (e.g. on economic growth, employment, interest rate, but also on environmental use and degradation) of different policies.
- Each set of policies corresponds to a **specific policy trajectory**
- Trying to derive a **sustainable mix of instruments**
- Showing how a **switch from one policy trajectory to another** can be done.
- Presenting **policy recommendations** for a switch to sustainable biodiversity strategies



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Socio-economic modelling in ALARM: process

1. Development of **storylines**
2. Extracting **policy issues**
3. Identify model **input** parameters and **output** parameters (results)
4. Translate input parameters into **policy measures** for all storylines
5. **Simulate** quantifiable measures to **understand** impacts
6. Model all simulation runs per storyline **simultaneously**
7. Run **sensitivity analyses** where possible
8. **Interpret** the results and re-embed them into the storylines to generate **qualitative** reports



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Linking socio-economic and natural scientific scenario simulations

Exchange of **data input** and **resulting parameters**

Land use ↔ socio-economic

- GINFORS delivers data for land use scenarios (GDP, agricultural demand, prices and costs of agricultural products, biomass)
- Joint qualitative interpretation of the results

Climate change ↔ socio-economic

- Need for climate data input into the THC shock scenario modelling
- Consistency check of CO₂ results

Biodiversity ↔ socio-economic:

- Direct link not possible, but indirectly over pressures (land use, climate change)
- Exception: Link of economic trade model with biological invasions



MOSUS

- **Modelling opportunities and limits for restructuring Europe towards sustainability**
- **www.seri.at/mosus, www.mosus.net**



www.mosus.net

Is Europe sustainable? Modelling opportunities and limits for restructuring Europe towards sustainability

- Funded by the **5th Framework Programme** of the European Union (sub-programme environment and sustainable development)
- Endorsed by the Industrial Transformation Project of the **International Human Dimensions Programme (IHDP-IT)**



Introduction

Growing importance of issues of resource use and resource productivity in national and EU environmental and economic (!) policy

Increasing data availability on past developments, but few empirical studies on outlooks and scenarios on effectiveness of resource use policies

Key research questions

- Can **environmental policy measures** oriented towards higher resource and energy efficiency **support goals of economic policy** such as growth, competitiveness and employment?
- How **effective** are different **policy measures** to reduce environmental pressures in terms of material extraction and can they contribute to dematerialisation in Europe?
- What are the **impacts** of the implementation of environmental policy measures for **other world regions**?

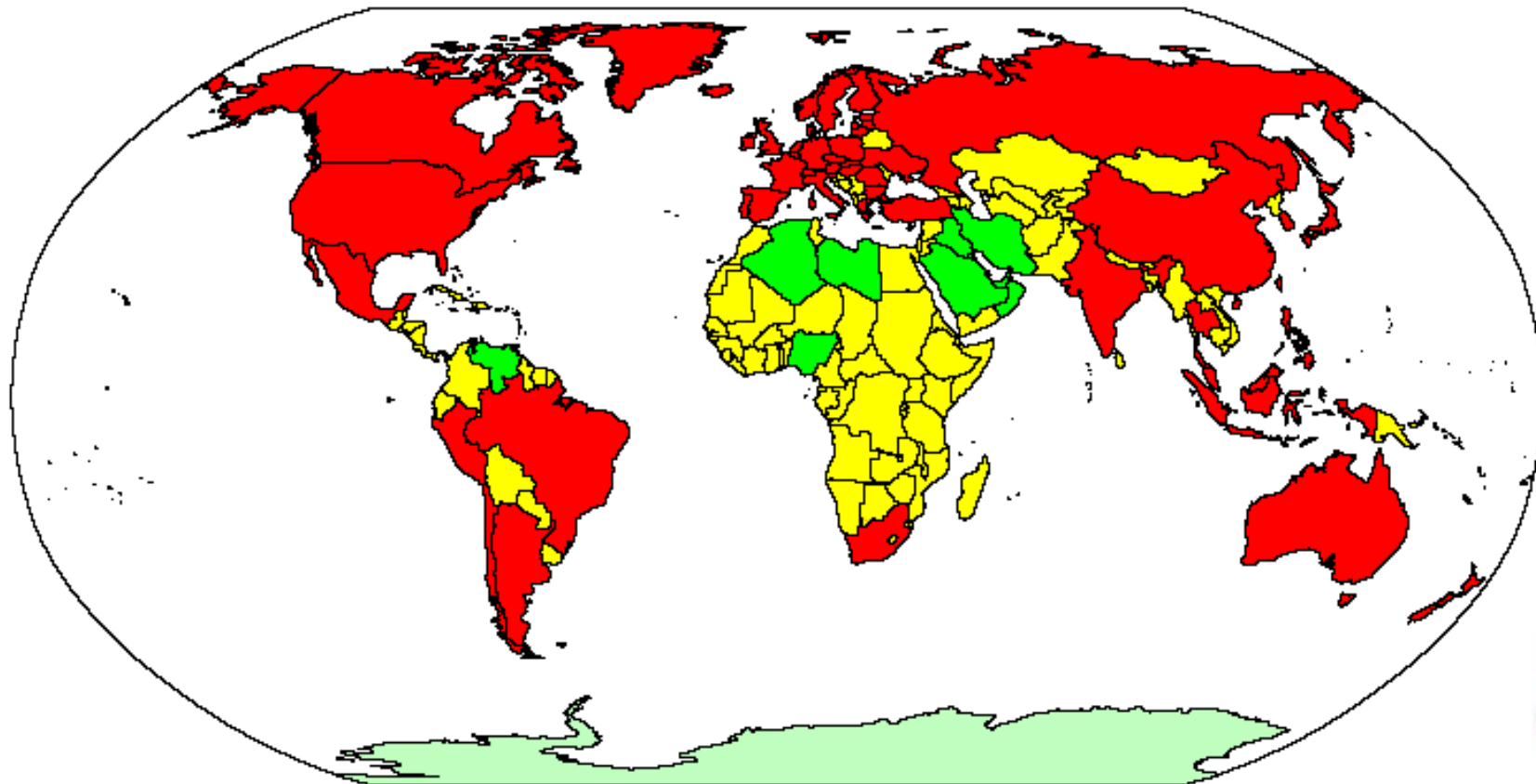
Modelling material flows with the GINFORS Model

GINFORS: multi-country (56 countries/world regions), multi-sectoral (41 sectors) input-output model system, including international trade and energy use

MOSUS: extension by material input (and land use) models (in physical units)

Sustainability scenarios: implications of EU environmental policy measures on resource extraction and use (Europe and world-wide)

◆ country coverage



country models

OPEC ex. Indonesia

ROW

www.materialflows.net

The online portal for material flow data



[Background](#)

[Global trends](#)

[Data sets](#)

[Literature](#)

[Links](#)

[Home](#)

www.materialflows.net is an online portal for material flow data, providing links and access to material flow data sets on the national level.

- » [Learn more about the importance and policy relevance of material flows](#)
- » [Explore world-wide trends of natural resource use](#)
- » [Jump directly to the material flow data sets](#)

Featured publication **[September 2006]**

Tracking Europe's Natural Resource Consumption

A Consensus Statement on the Importance of National Material Flow Accounting

The consensus statement was developed by SERI, the Wuppertal Institute, the Global Footprint Network and Friends of the Earth Europe and is so far endorsed by Best Foot Forward, the Charles University Environment Center and the Factor 10 Institute.

In the statement, we emphasise that providing for the well-being of a still growing world population within the limits of a finite planet is the key challenge for our future. Physical



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Economic development and energy use

Economic growth:

BASE: 18,000 € / capita (2005) to 24,000 € (2020)

HIGH: + 4% (2020) – “Aachen Scenario”

Total Primary Energy Supply (TPES):

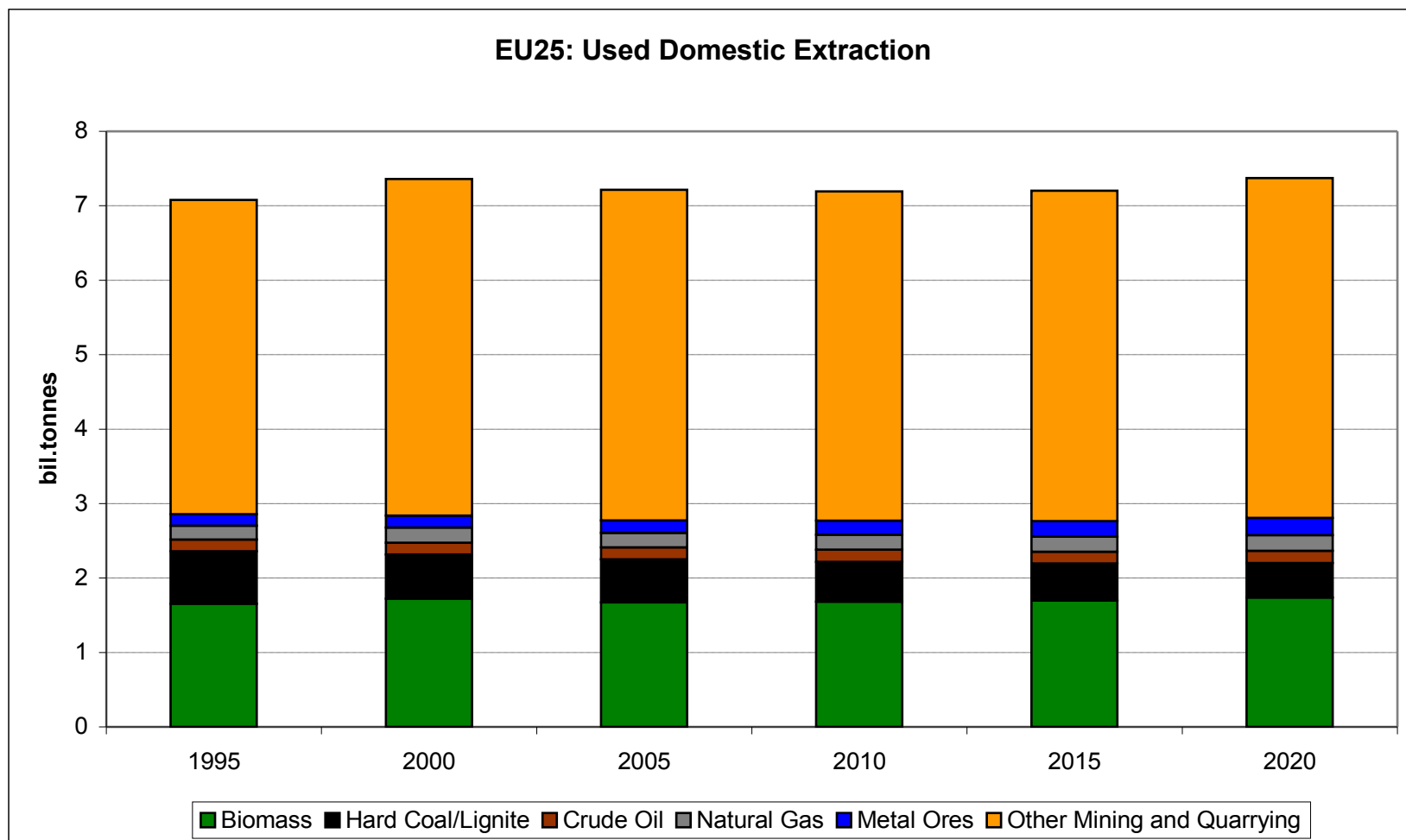
BASE: + 16% (2005 → 2020)

HIGH: - 10% compared to BASE

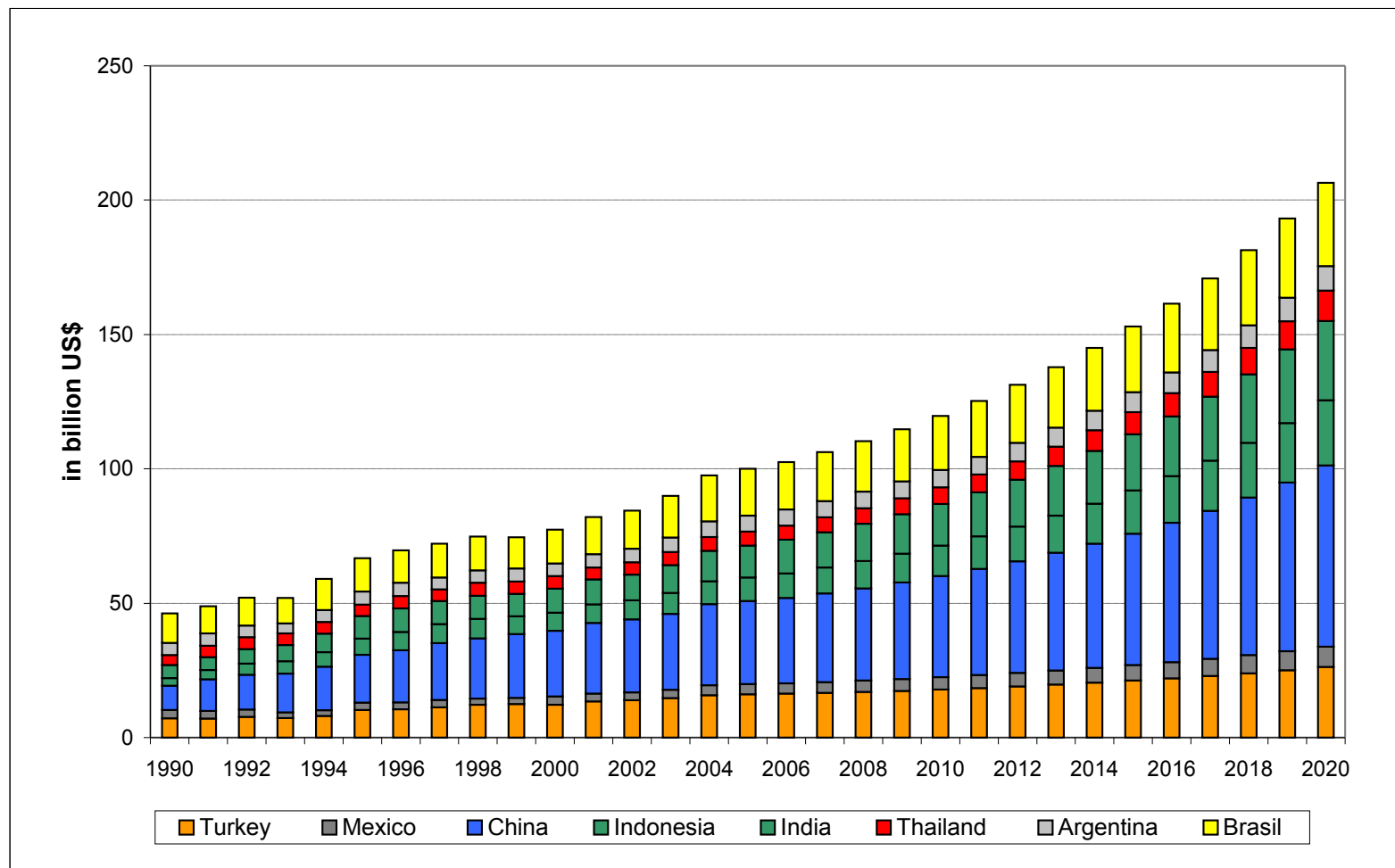
CO₂ emissions:

HIGH: -19% compared to BASE (Kyoto target reached)

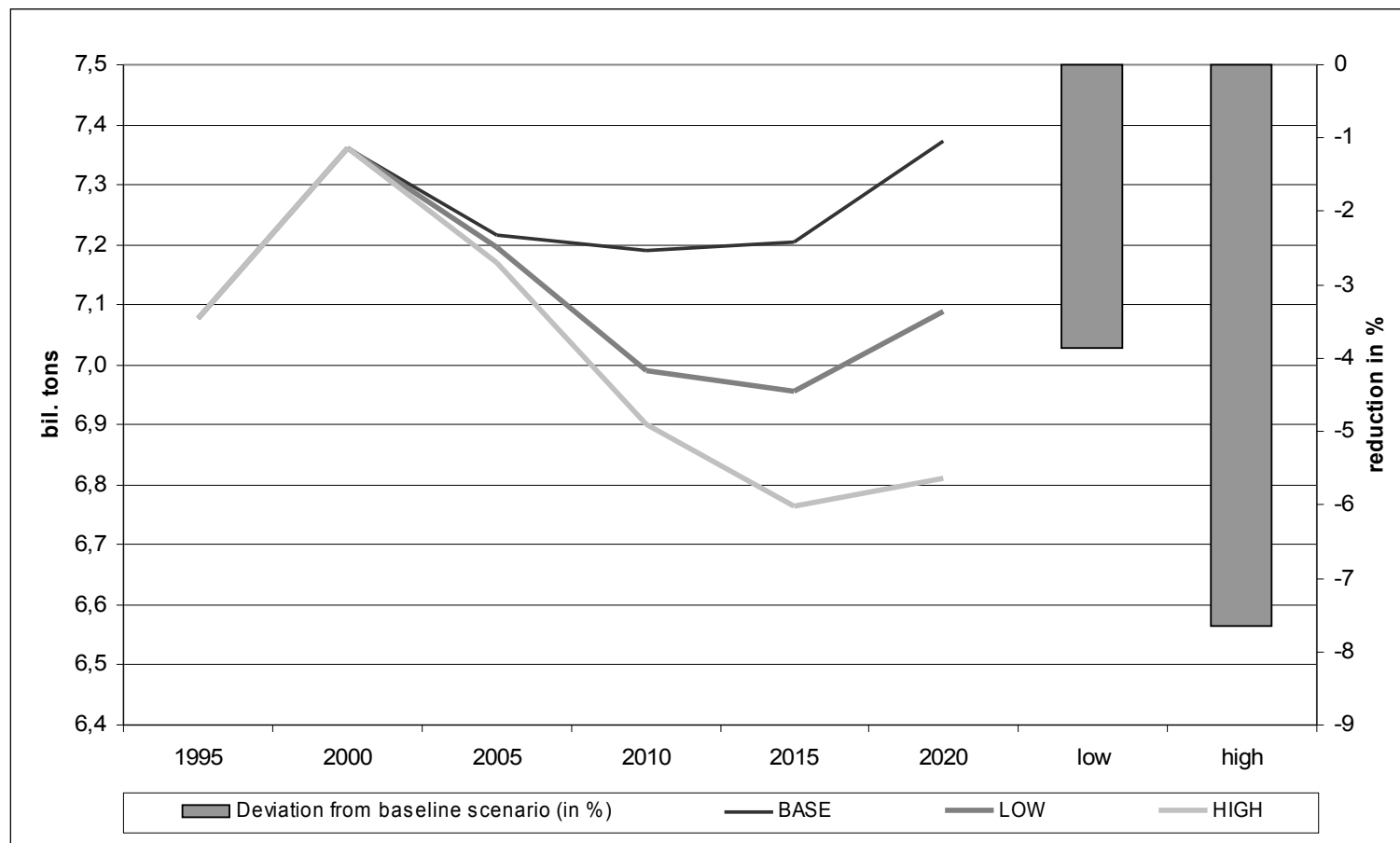
Used domestic extraction (BASE), EU-25



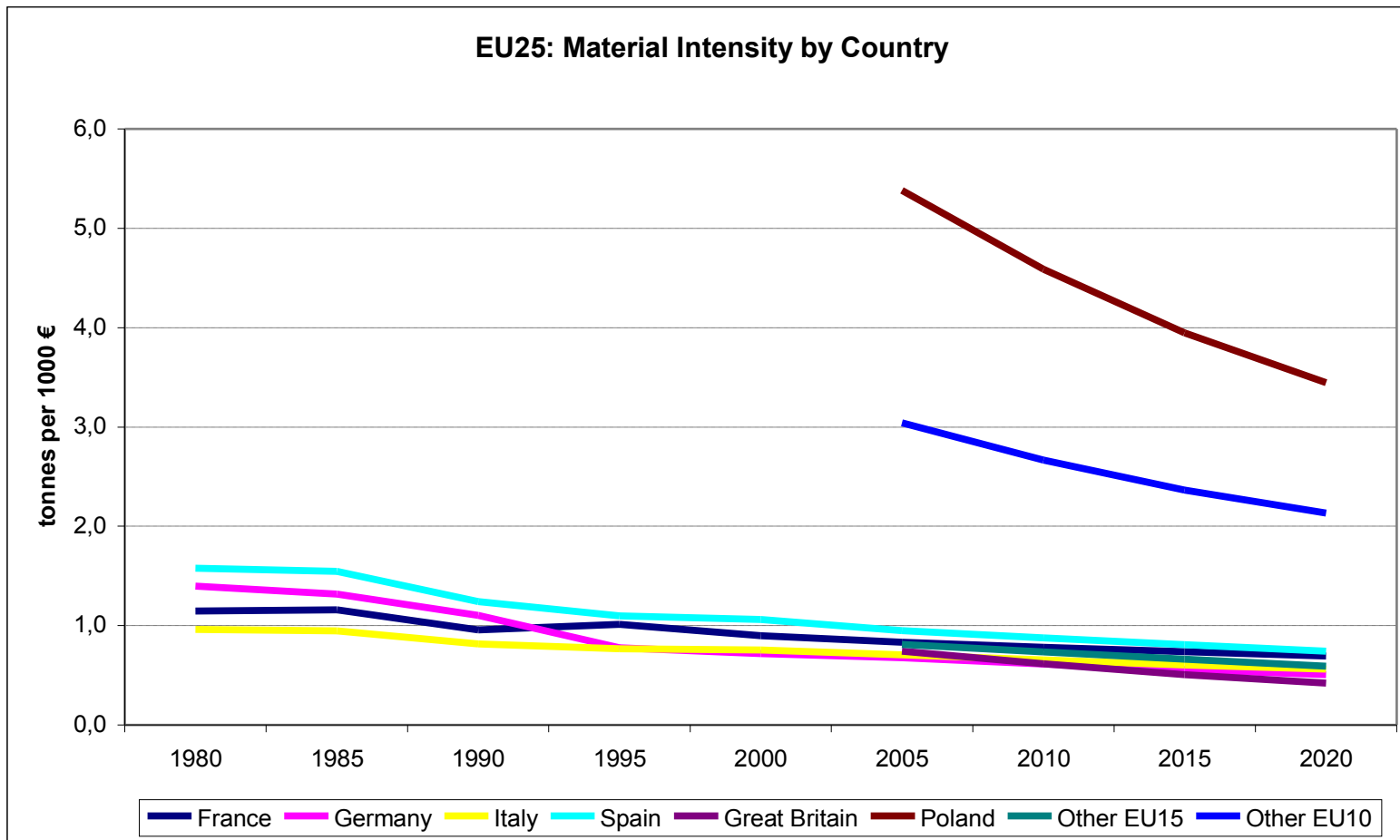
Resource-intensive imports from “Anchor countries”



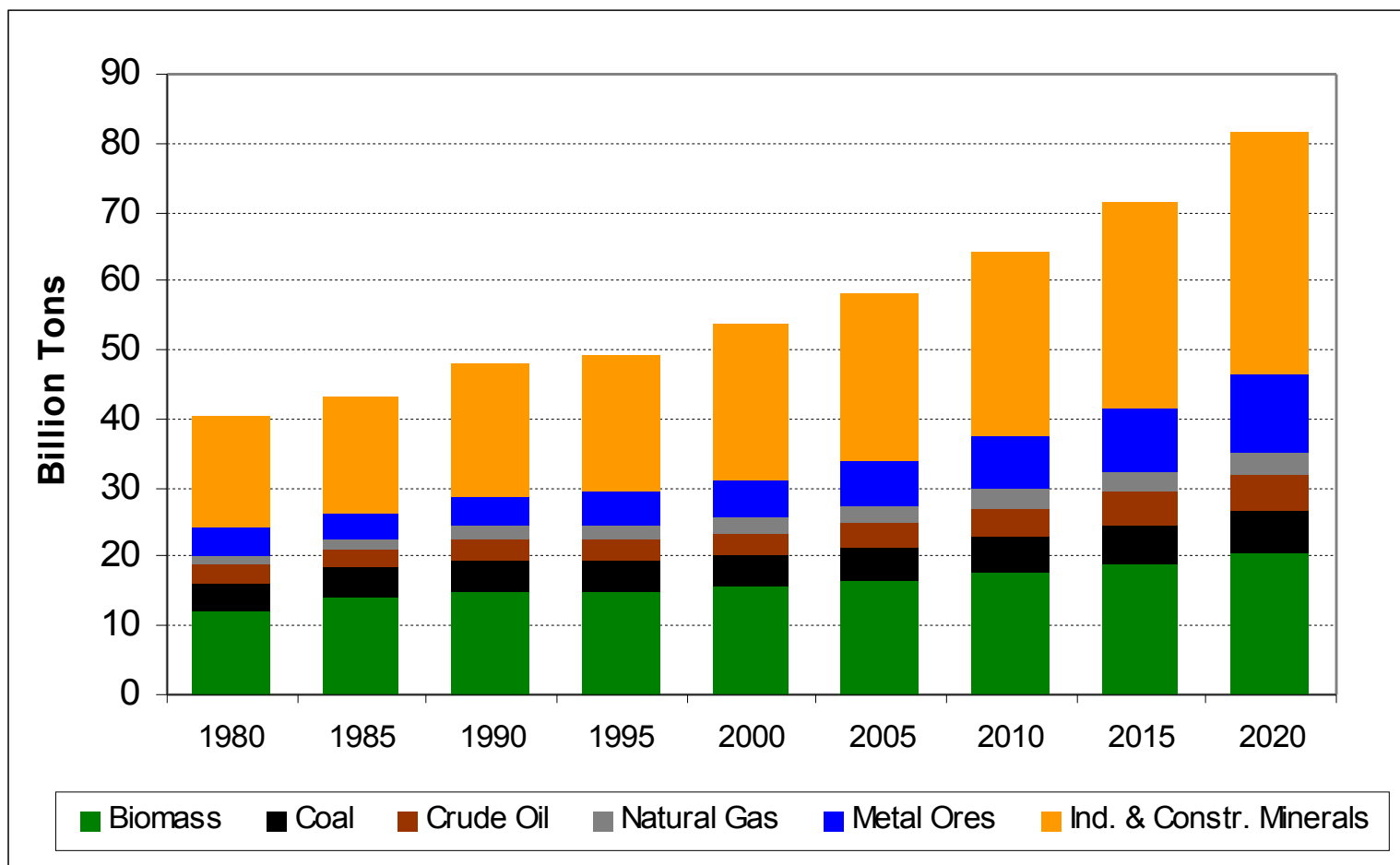
Used domestic extraction, EU-25, three scenarios



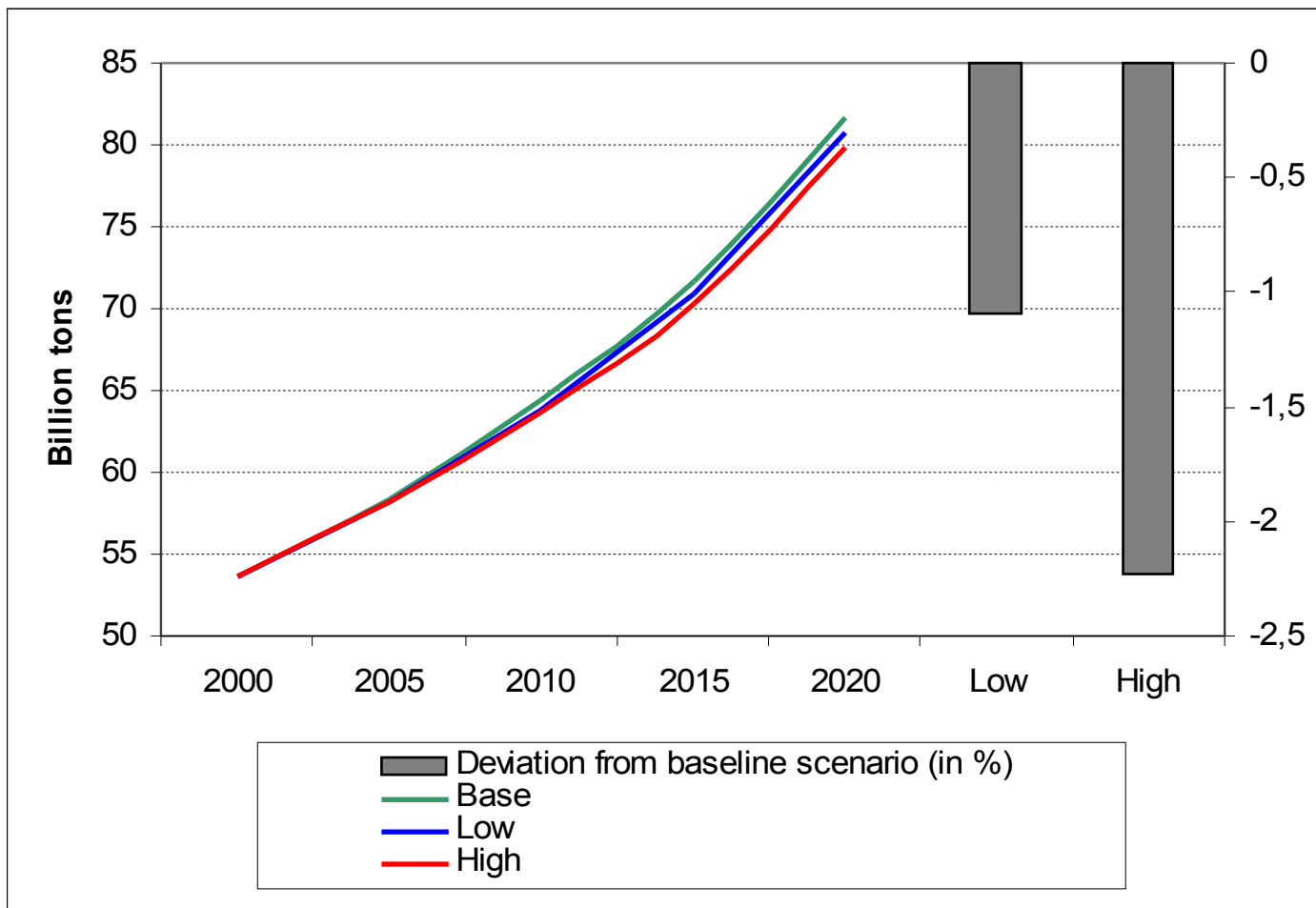
EU-25: Material Intensity by Country (BASE)



Worldwide used extraction (BASE)



Worldwide used extraction, three scenarios



- Win-win situation for economy & environment
- Rebound effects – resource prices
- More ambitious dematerialisation policies required (sufficiency? Work-life-balance!)
- Action on the global level needed (e.g. environmental taxes also in developing countries)

Thank you for your attention!

Download this presentation from
www.seri.at/news



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