



Global dimensions of sustainable growth in Europe

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2. Objectives and methodology
3. European and global resource flows
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Background: economic perspectives

- **Expected long-term rise** in commodity prices
 - Energy, metals, cereals, timber, etc.
 - Increasing demand & scarcity of resources
- **Rising competition** over natural resources
- **Europe: high dependency** on imports:
iron ores: 83%, bauxite: 80%, copper: 74%
 - EU Trade Strategy “Global Europe” (2006)
“More than ever, Europe needs to import to export. Tackling restrictions on access to resources ... must be a high priority.”

Background: environmental perspectives

- Early environmental policy: focus on **regional pollutants**
- Significant improvements through traditional environmental policy instruments

- Sustainability policy: focus on **overall scale of production and consumption system**
- No real progress → new environmental policy instruments needed

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Objectives

1. Assess the **resource base** of the European economy in a global perspective, including embodied resources in internationally traded products

2. Investigate **world-wide implications** of a European ETR
 - Economic consequences for other OECD countries, emerging economies and developing countries
 - Impacts on European export industries
 - Changes of world-wide patterns of natural resource extraction, energy use and CO₂ emissions

Two complementary models

1. Global Resource Accounting Model (GRAM)

Multi-regional input-output (MRIO) model extended by world-wide data on material extraction

- 50 countries plus 2 world regions (OPEC, RoW)
- Base year: 2000; 8 aggregated material categories

- Comprehensive resource use indicators and physical trade balances

Two complementary models

2. Global Interindustry Forecasting System (GINFORS)

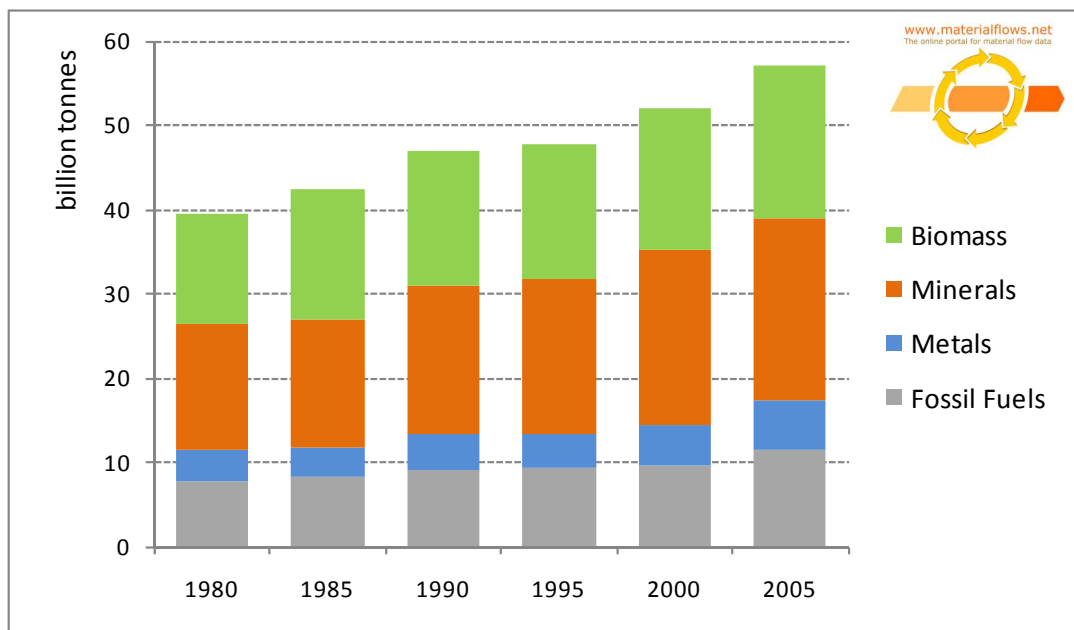
Detailed econometric simulation model with global coverage including energy and environmental data (presented in detail yesterday)

- Assessment of the global impacts of the ETR scenarios in Europe

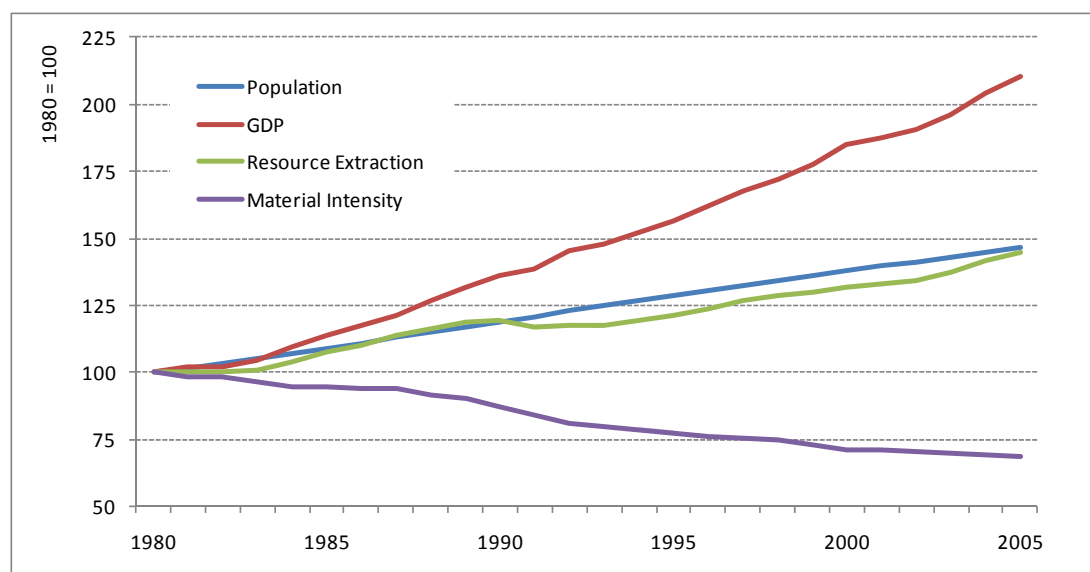
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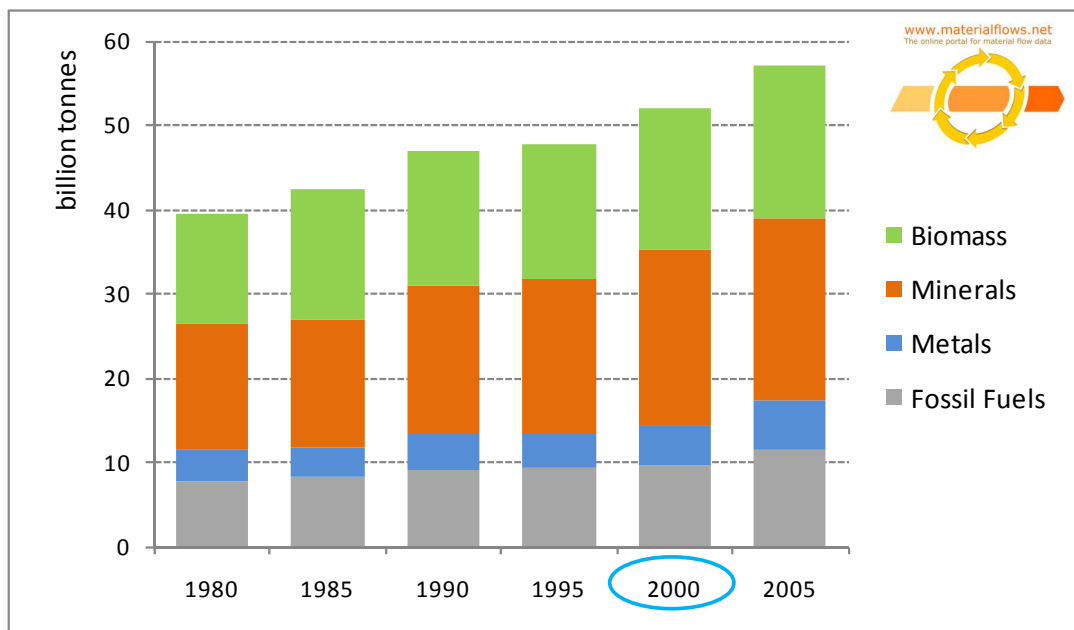
Global resource extraction, 1980 – 2005



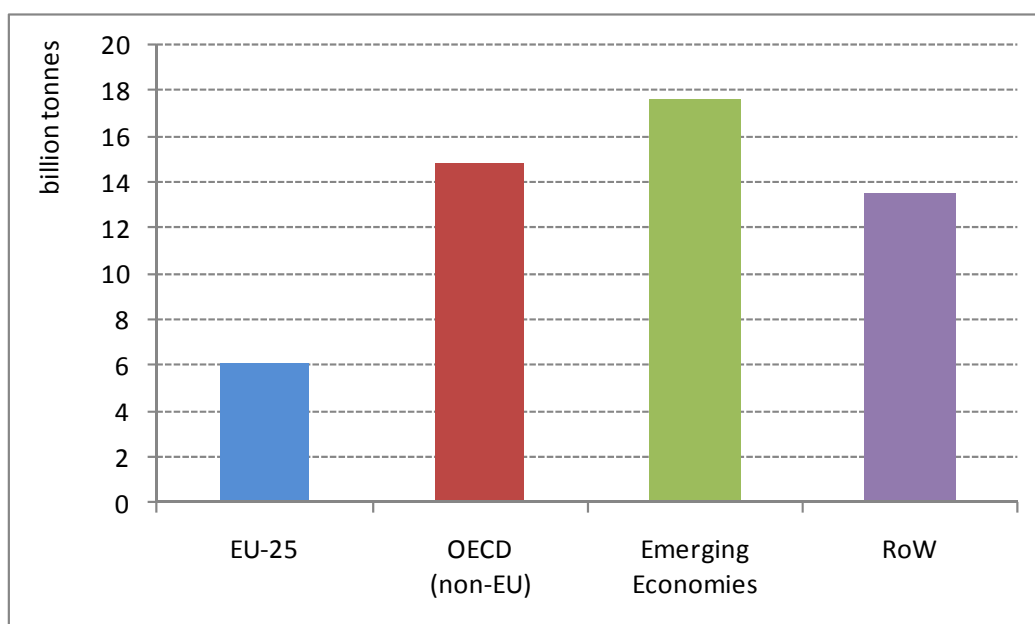
Relative decoupling, 1980 – 2005



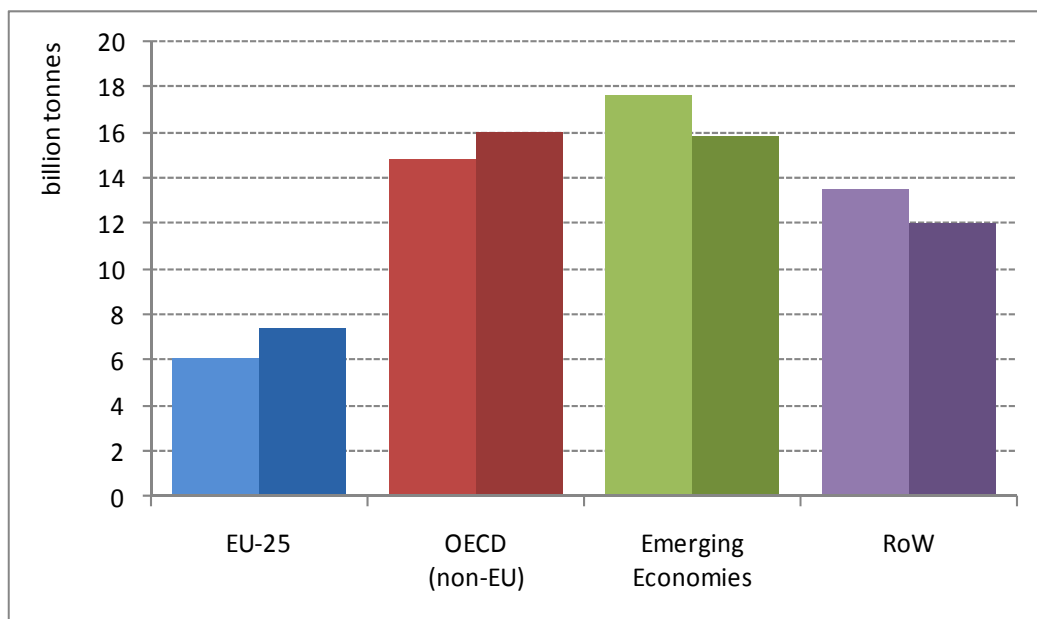
Global resource extraction, 1980 – 2005



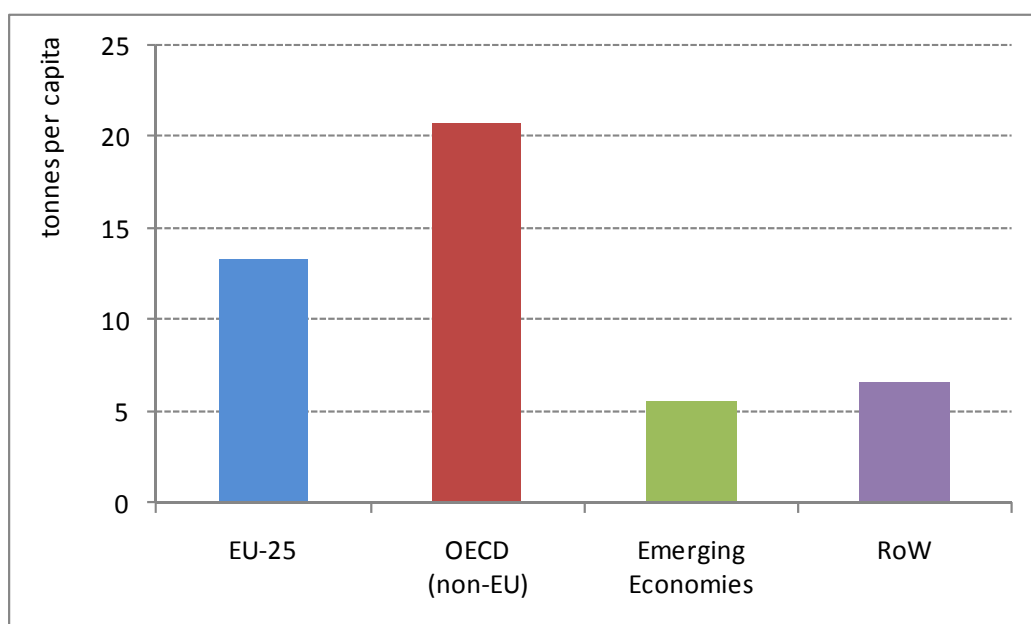
Resource extraction, 2000



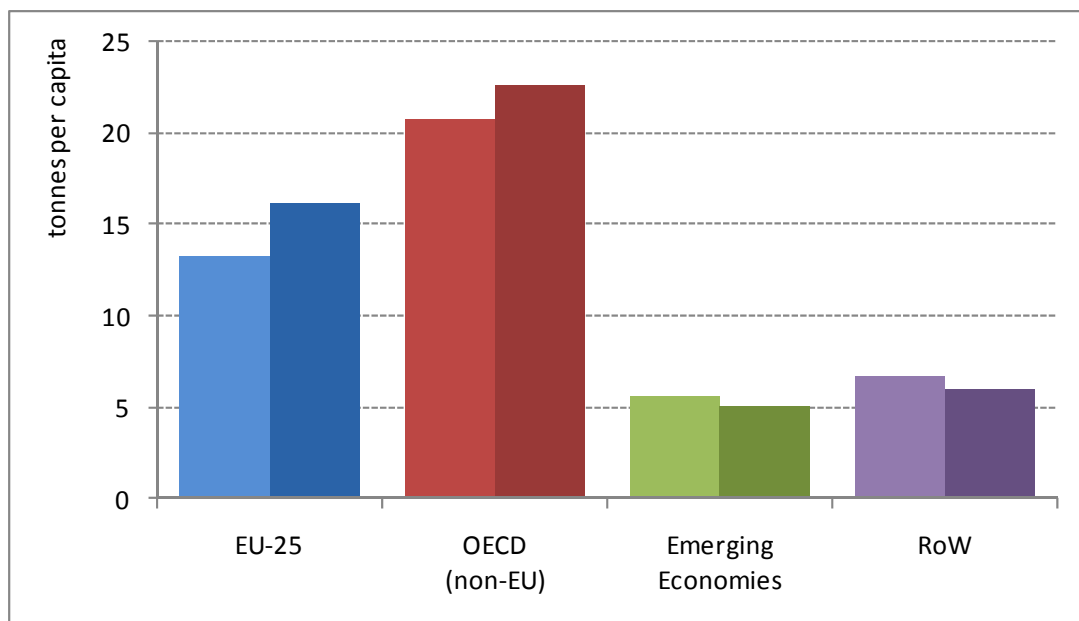
Resource extraction vs. consumption, 2000



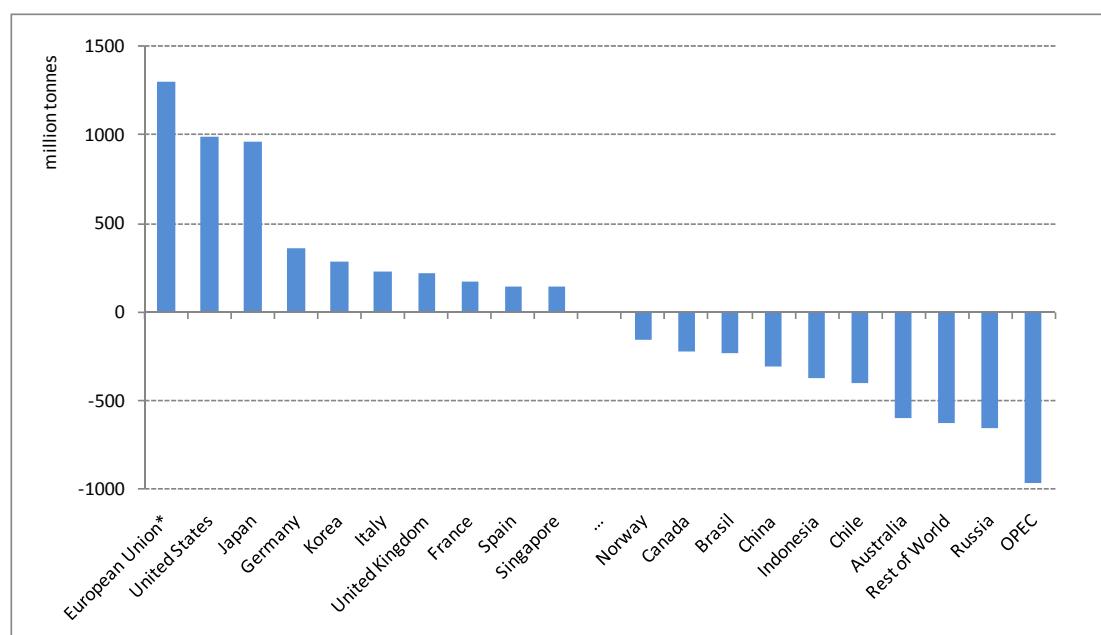
Resource extraction per capita, 2000



Extraction vs. consumption per capita, 2000

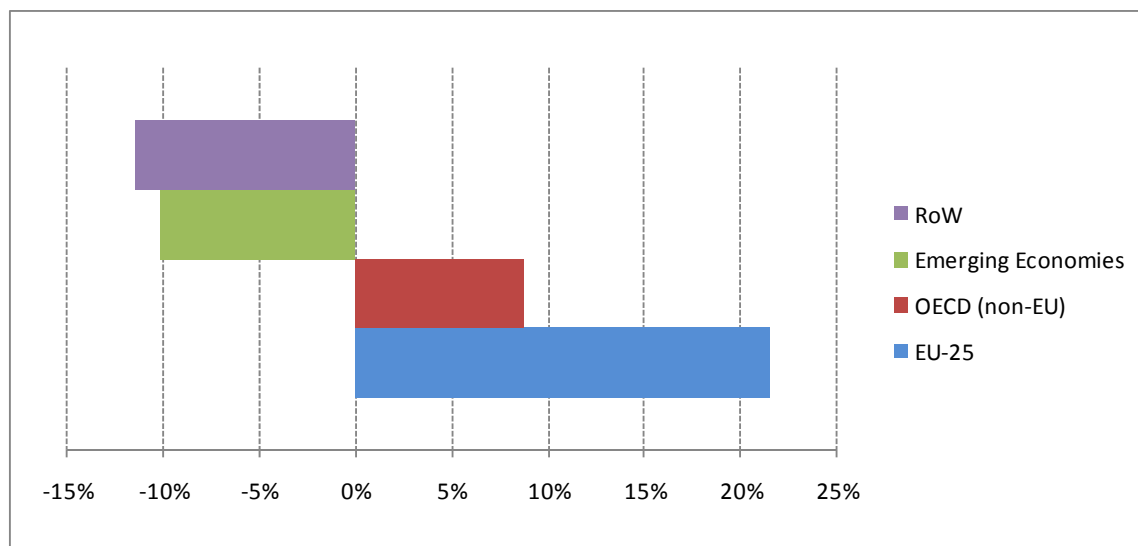


Raw Material Trade Balance, 2000



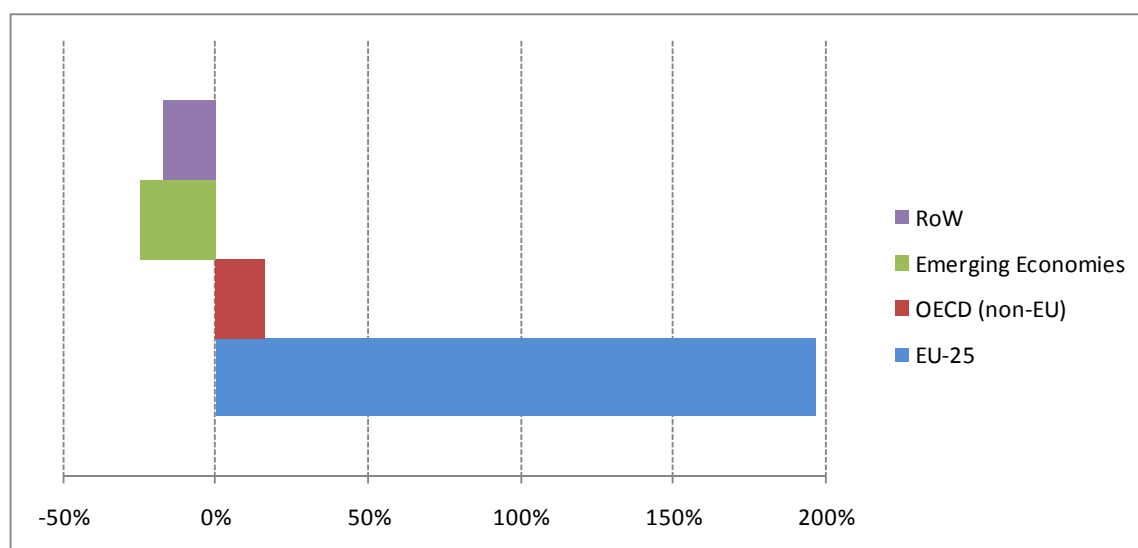
Trade dependency, all resources, 2000

Net-imports in relation to domestic extraction



Trade dependency, metal ores, 2000

Net-imports in relation to domestic extraction



Summary of results (I)

- Resource use: European economy highly interconnected with the rest of the world and dependent on resource imports (metal ores & fossil fuels)
 - Possible strategies:
 - ensure access to foreign resources
 - increase domestic extraction and supply
 - increase resource productivity
 - reduce demand
- Need to consider global dimension in environmental and resource policies (responsibility of consumption)

Summary of results (I)

- International trade:
 - Net-flows of resources from low- and middle-income countries to high income countries
 - Trade reinforces inequalities in resource extraction and resource consumption
 - Role of resource exports in development strategies
 - Sustainable development: contraction & convergence?

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Issues (baseline and policy scenarios)

Economic issues:

- Impacts of ETR on **economic growth**
- Impacts of ETR on European **export industries**

Environmental issues:

- Impacts of ETR on **resource use**
- Impacts of ETR on **CO₂ emissions**

GDP: Average annual growth rates, baseline

Average annual growth rates	1995-2000	2000-2005	2005-2010	2010-2015	2015-2020
In % (based on USD PPP, 2004)					
EU-27	3.1	1.9	2.2	2.5	2.2
OECD (non-EU)	3.8	2.6	2.0	3.0	2.9
Emerging Economies	6.2	8.0	8.7	8.3	6.8
RoW	3.8	4.9	5.1	3.7	2.9
World	4.2	4.8	4.4	4.9	4.4

GDP: Shares in world GDP, baseline

Shares in world GDP	2000	2005	2010	2015	2020
In % (based on USD PPP, 2004)					
EU-27	25.4	22.4	20.4	18.4	16.8
OECD (non-EU)	41.3	37.5	33.8	31.2	29.3
Emerging Economies	27.9	31.4	37.0	42.0	46.0
RoW	5.9	9.2	9.5	9.0	8.5

GDP: impacts of scenarios

	Total value of GDP, baseline (in billion USD 2000, PPP)	Absolute deviation of S1H from baseline in 2020	Percentage deviation of S1H from baseline in 2020	Absolute deviation of S3H from baseline in 2020	Percentage deviation of S3H from baseline in 2020
EU-27	15,931	-92	-0.6	-297	-1.9
OECD (non-EU)	27,840	28	0.1	-78	-0.3
Emerging Economies	43,699	53	0.1	-688	-1.6
RoW	8,033	6	0.1	-266	-3.3
World total	94,926	-3	0.0	-1,313	-1.4

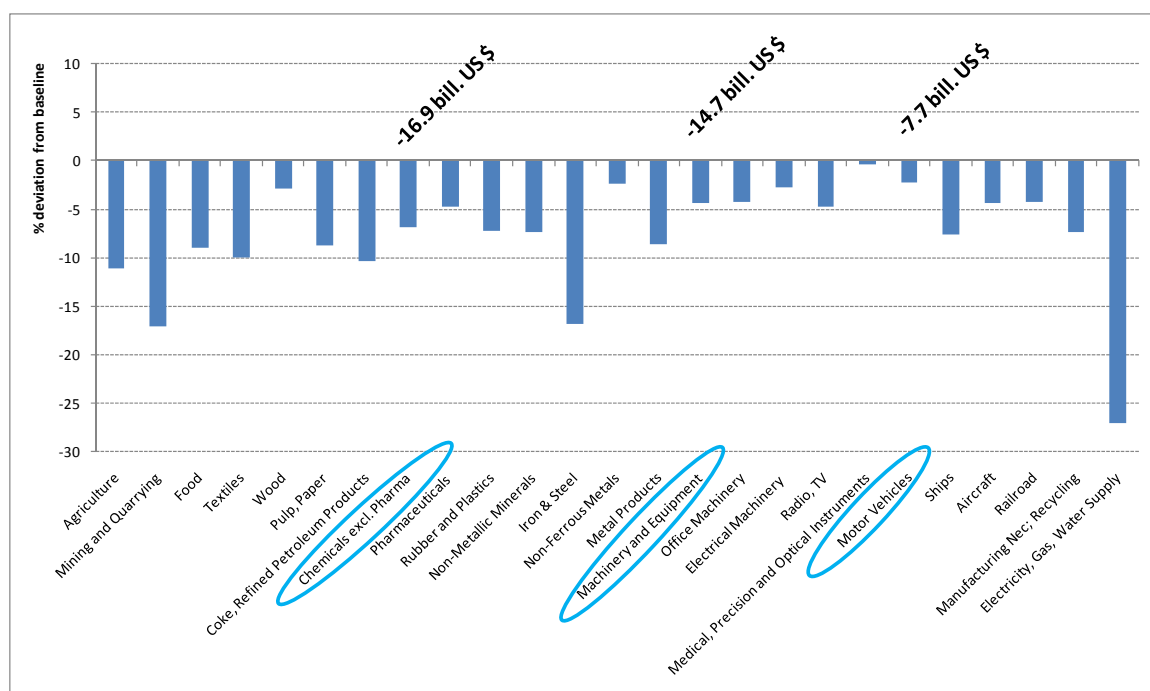
Exports: developments in the baseline

Average annual growth rates	2000-2005	2005-2010	2010-2015	2015-2020
	In % (based on USD, 2000)			
EU-27	3.7	3.1	2.6	2.9
OECD (non-EU)	7.7	5.1	3.1	2.5
Emerging Economies	5.1	9.3	5.4	6.1
RoW	8.7	8.3	5.3	5.8

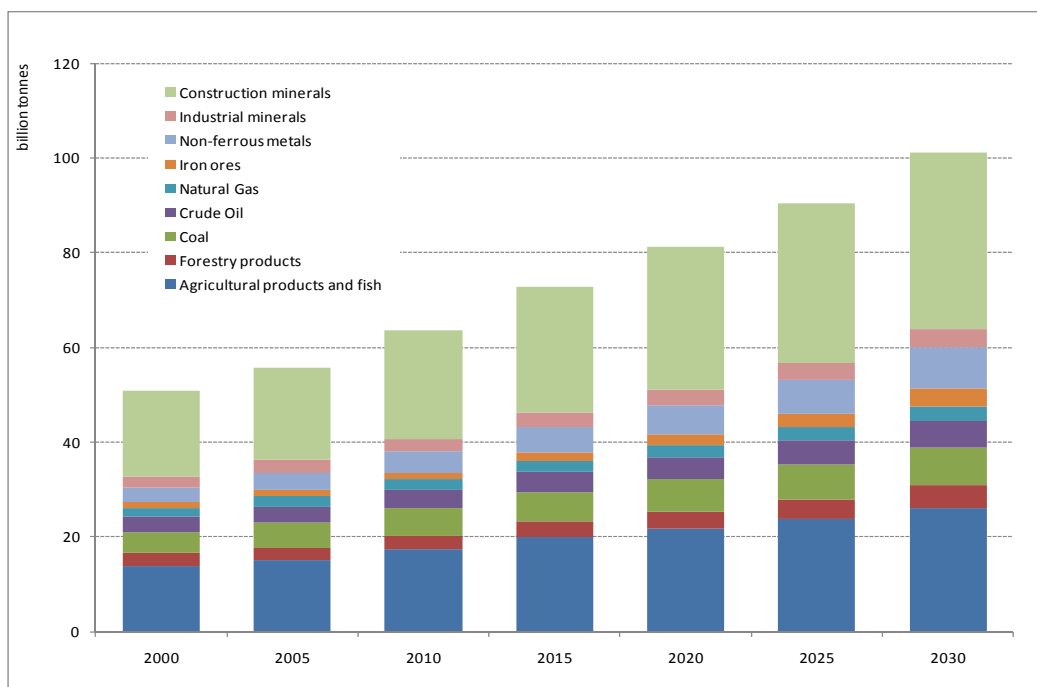
Exports: impacts of scenarios

	Total value of exports, baseline , 2020 (PPP bn USD)	Absolute deviation of S1H from baseline in 2020	Percentage deviation of S1H from baseline in 2020	Absolute deviation of S3H from baseline in 2020	Percentage deviation of S3H from baseline in 2020
EU-27	7972.0	-60.1	-0.8%	-264.2	-3.3%
OECD (non-EU)	5505.1	14.1	0.3%	-29.5	-0.5%
Emerging Economies	11036.0	19.8	0.2%	-159.2	-1.4%
RoW	4913.9	7.4	0.2%	-73.2	-1.5%

Exports: impacts of scenario SH3

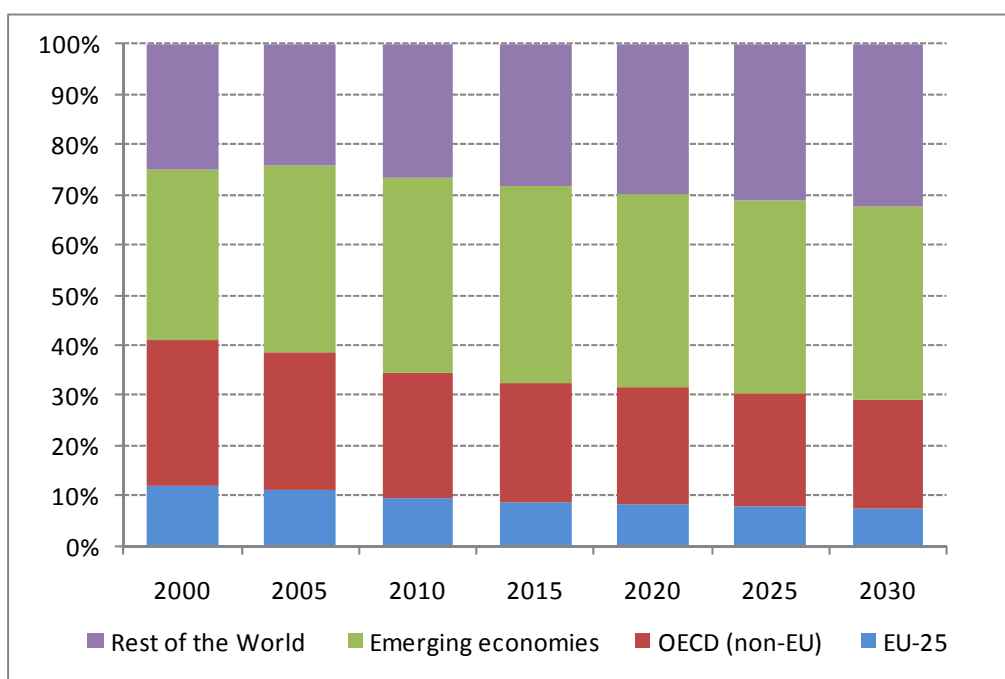


Global resource extraction: baseline

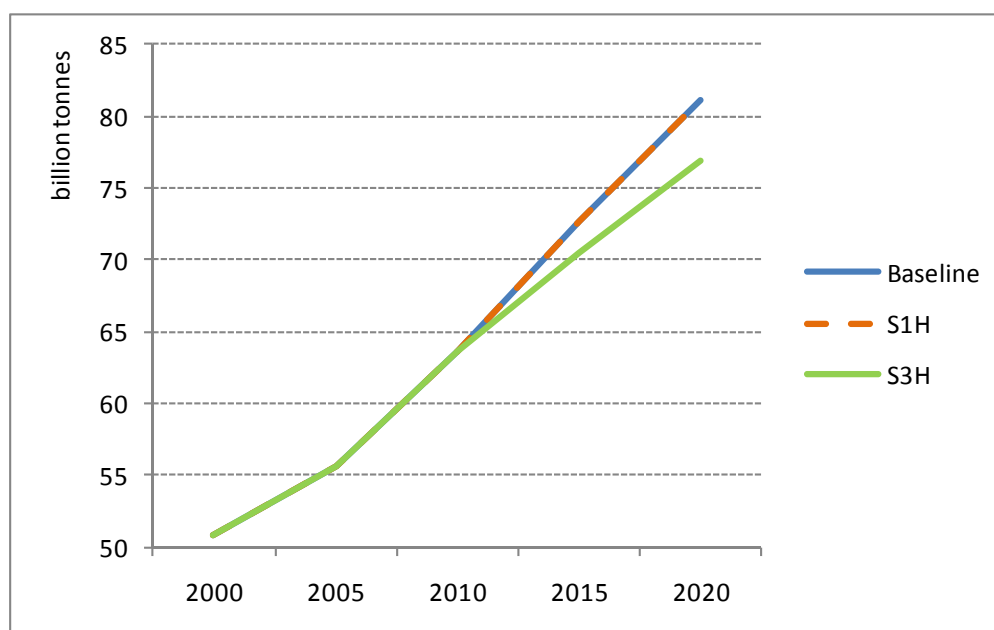


Resource scarcities (so far) not considered!

Global resource extraction: shares



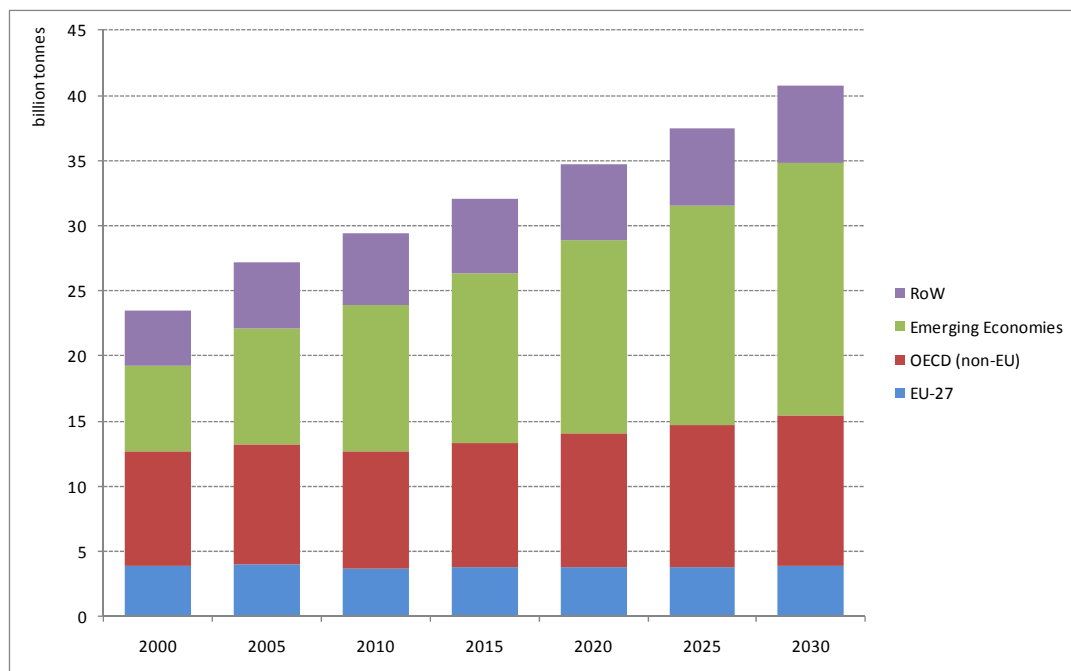
Global resource extraction: scenarios



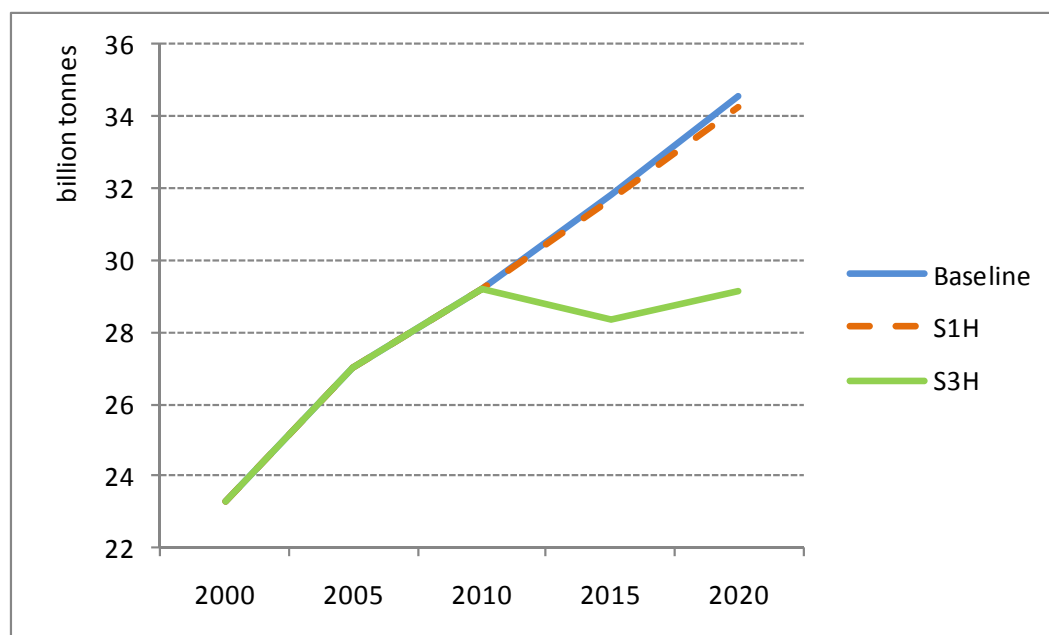
Scenario impacts on material extraction

	Total extraction, baseline , 2020 (in billion tonnes)	Absolute deviation of S1H in 2020 (in billion tonnes)	Percentage deviation of S1H from baseline in 2020	Absolute deviation of S3H in 2020 (in billion tonnes)	Percentage deviation of S3H from baseline in 2020
EU-25	6.8	-0.10	-1.47 %	-0.24	-3.6 %
OECD (non-EU)	18.7	0.02	0.10 %	-1.03	-5.5 %
Emerging Economies	31.5	0.01	0.03 %	-2.23	-7.1 %
RoW	24.2	-0.02	-0.08 %	-0.79	-3.3 %
Global	81.2	-0.09	-0.11 %	-4.30	-5.3 %

Global CO₂ emissions: baseline



Global CO₂ emissions: scenarios



Scenario impacts on CO₂ emissions

	Total CO ₂ emissions in baseline , 2020 (in Mt)	Total change in S1H in 2020 (in Mt)	Relative change in S1H , % in 2020	Total change in S3H in 2020 (in Mt)	Relative change in S3H , % in 2020
EU-25	3776.3	-318.8	-8.4 %	-722.4	-19.1 %
OECD (non-EU)	10244.6	10.4	0.1 %	-1829.1	-17.9 %
Emerging Economies	14835.5	2.3	0.02 %	-2741.9	-18.5 %
RoW	5854.9	0.4	0.01 %	-141.4	-2.4 %
Global	34526.7	-272.8	-0.8 %	-5398.6	-15.6 %

Summary of results (II)

- Global economic **growth** only marginally effected by scenarios, also in SH3 (-1.4% compared to baseline)
- **EU exports**: less effected in SH1 (-0.8%) than in SH3 (-3.3%); resource-intensive sectors loose in shares, main EU export industries loose in volumes
- **Material** extraction: reduction in SH3 (-5.3% compared to baseline) due to climate policy measures, but continued growth of resource use
- **CO₂ emissions**: significant reduction through policy package (SH3: -15.6% compared to baseline)

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Policy implications

- Unilateral actions by EU:
 - Do not drastically harm the economy – if combined with other measures (e.g. resource efficiency measures), results can be further improved
 - But produce insignificant environmental results on the global level → international cooperation required
- Producer vs. consumer responsibility

Production vs. consumption CO₂ emissions

Year	Production-based emissions (Mt CO ₂)	Consumption-based emissions (Mt CO ₂)	Net-change (%)
2000			
OECD	12,088	14,037	+ 16%
Emerging Economies	6,821	5,687	- 17%
RoW	2,848	2,446	- 16%

Source: Nakano et al. 2009

→ Sharing the costs of CO₂ reductions

Policy implications

Resource use and resource productivity

- Resource security will remain on policy agenda
- Policy measures insufficient to reverse growth trends
- Required: “Kyoto Process” for natural resources
 - Targets (also in the EU!)
 - Package of instruments (efficiency increases, closing (regional) cycles, resource taxes, consumer information, etc.)

The end thank you!

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