Global Resource Use and Decoupling

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The inconvenient truth (about resources)

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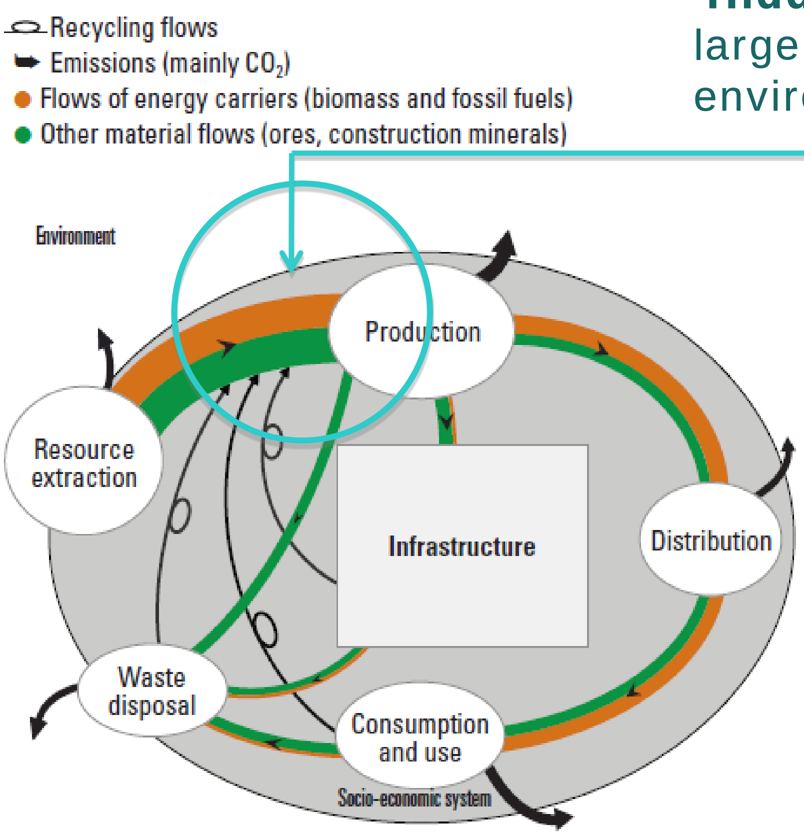
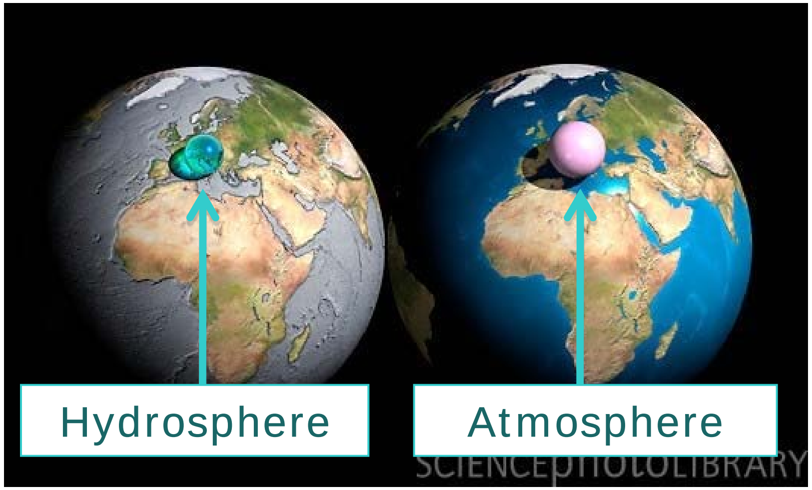


Fischer-Kowalski, 2011

'**Hidden' resources flows** are large and cause significant environmental impacts…

…and the **receiving environments for emissions** are smaller than some might think.



The promise of resource efficiency

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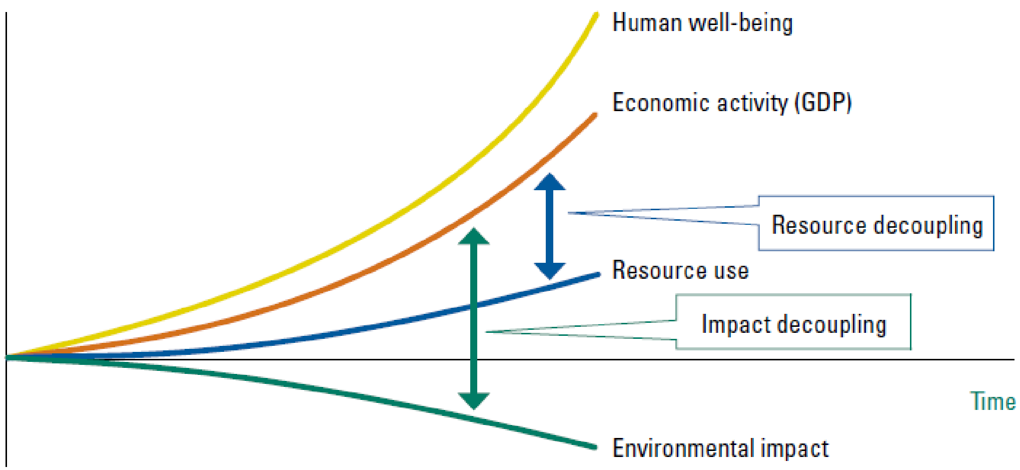
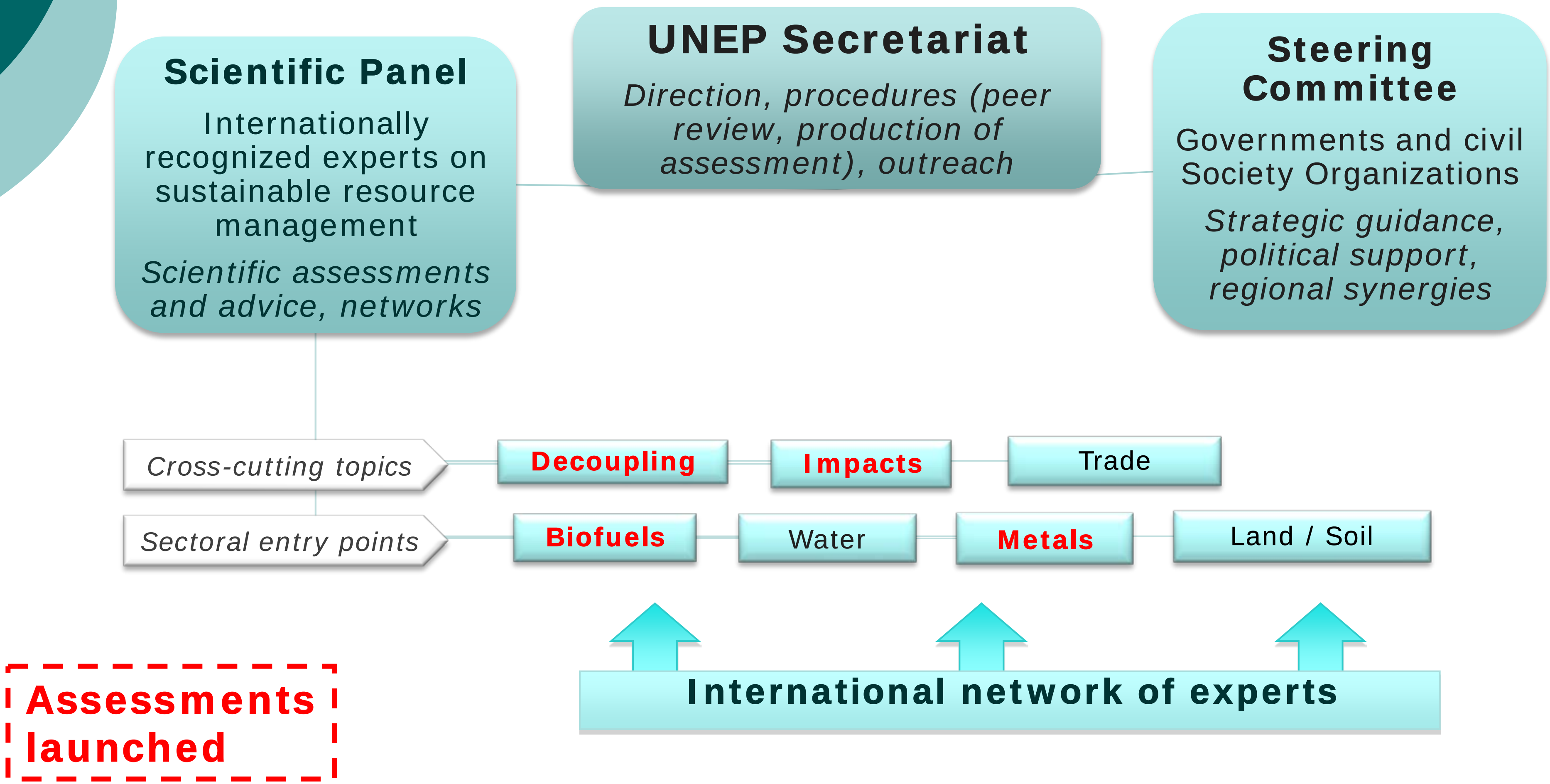
There may be ways **decouple environmental impacts** and resource use from **economic growth**...



... while **avoiding burden shifting** between countries, generations, **and trade-offs** between impact categories and life cycle stages.

International Resource Panel Structure



Steering Committee – a broad partnership

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- **Government and IGOs**: Canada, China, Chile, Denmark, EC, Egypt, Finland, France, Germany, Hungary, Indonesia, India, Italy, Japan, Kazakhstan, Mexico, Netherlands, Norway, Russia, South Africa, Switzerland, Tanzania and USA, OECD
- **Civil Society Organisations**: ICSU, IUCN, and WBCSD
- **Observers**: UK

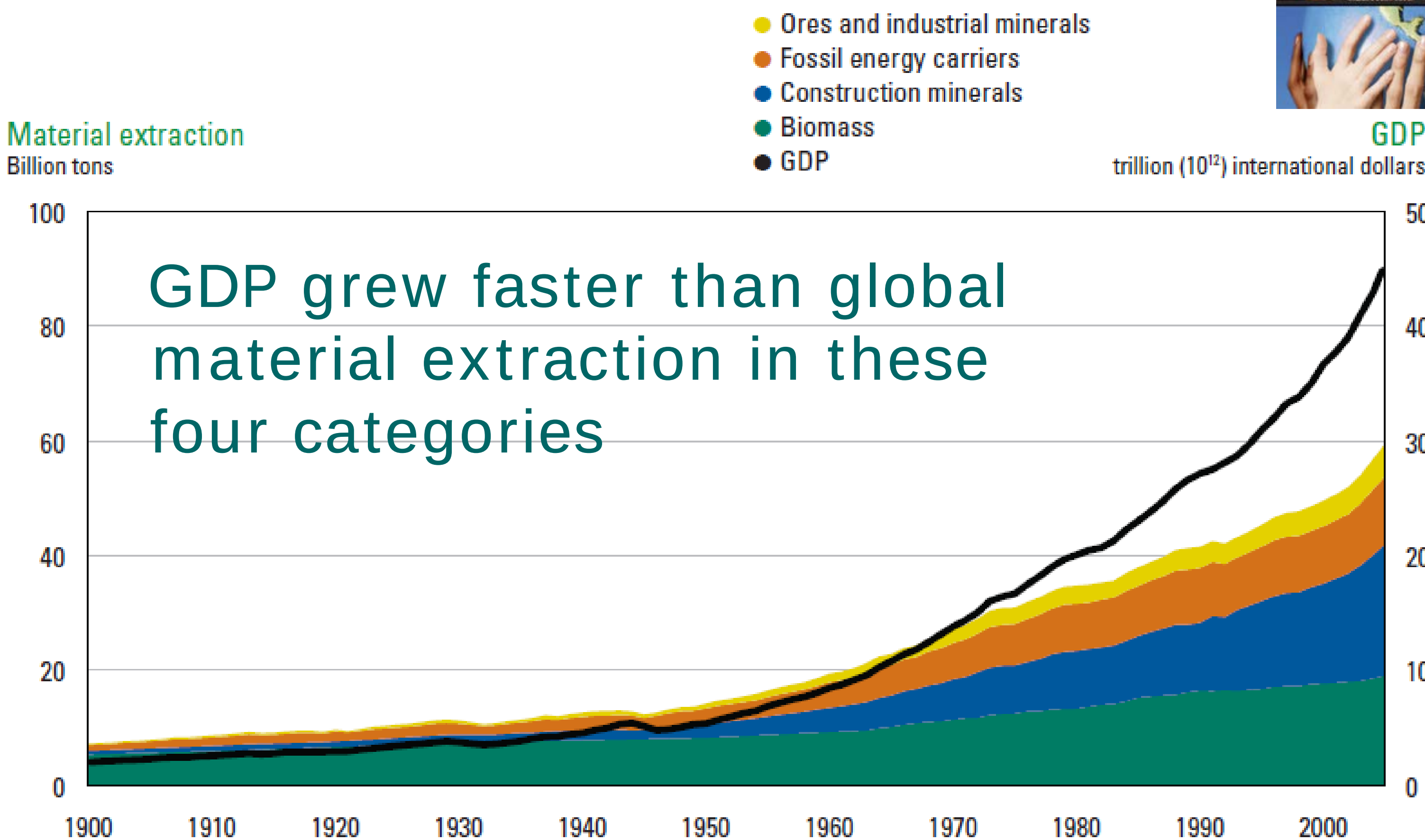
Achievements

Five Assessment Reports launched

Oct 2009: Assessing Biofuels
May 2010: Metals Stocks in Society
June 2010: Priority Products and Materials
May 2011: Decoupling
May 2011: Recycling Rates of Metals

Key findings on resource use and economic growth

Figure 1. Global material extraction in billion tons, 1900–2005

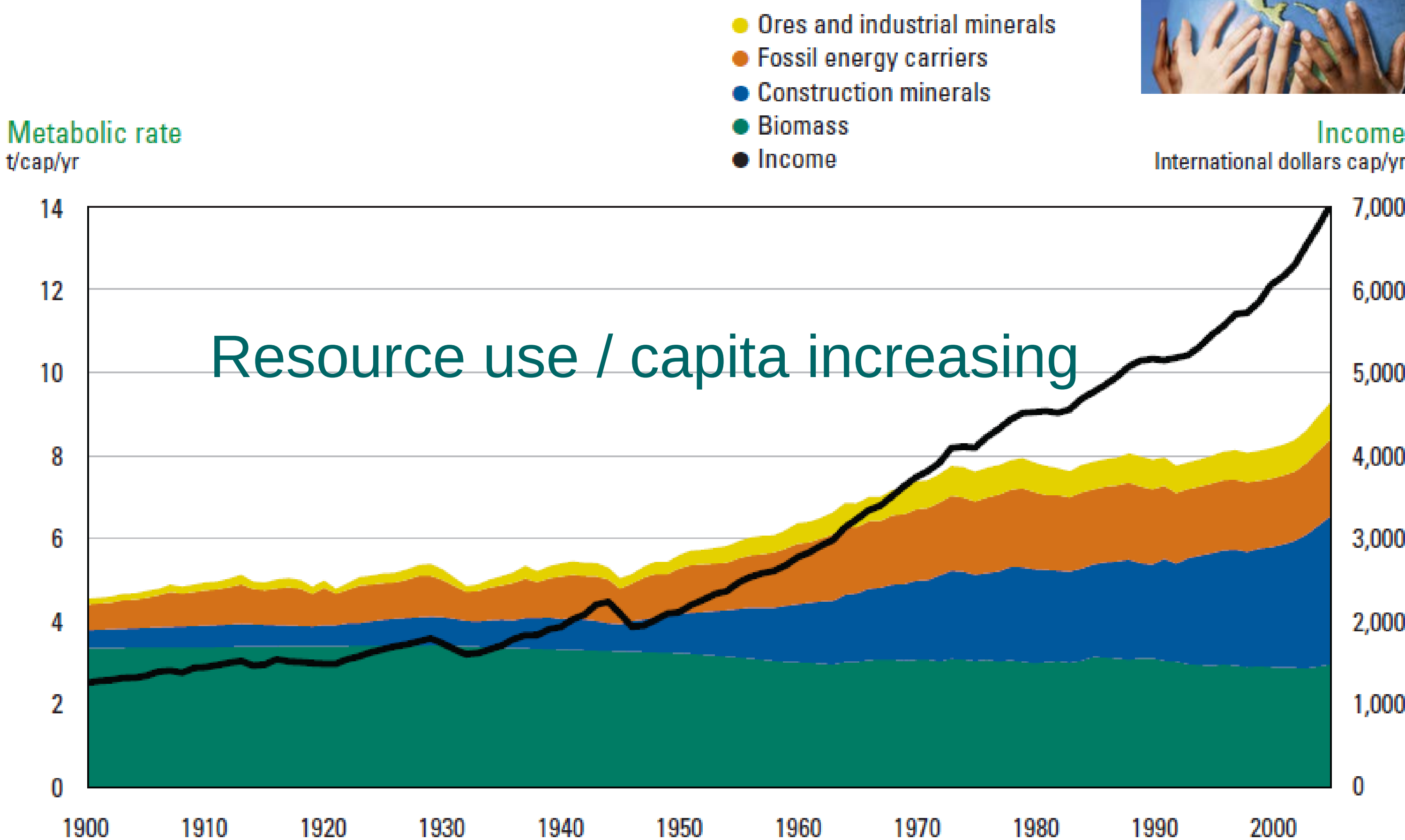


GDP grew faster than global material extraction in these four categories

Source: Krausmann *et al.*, 2009

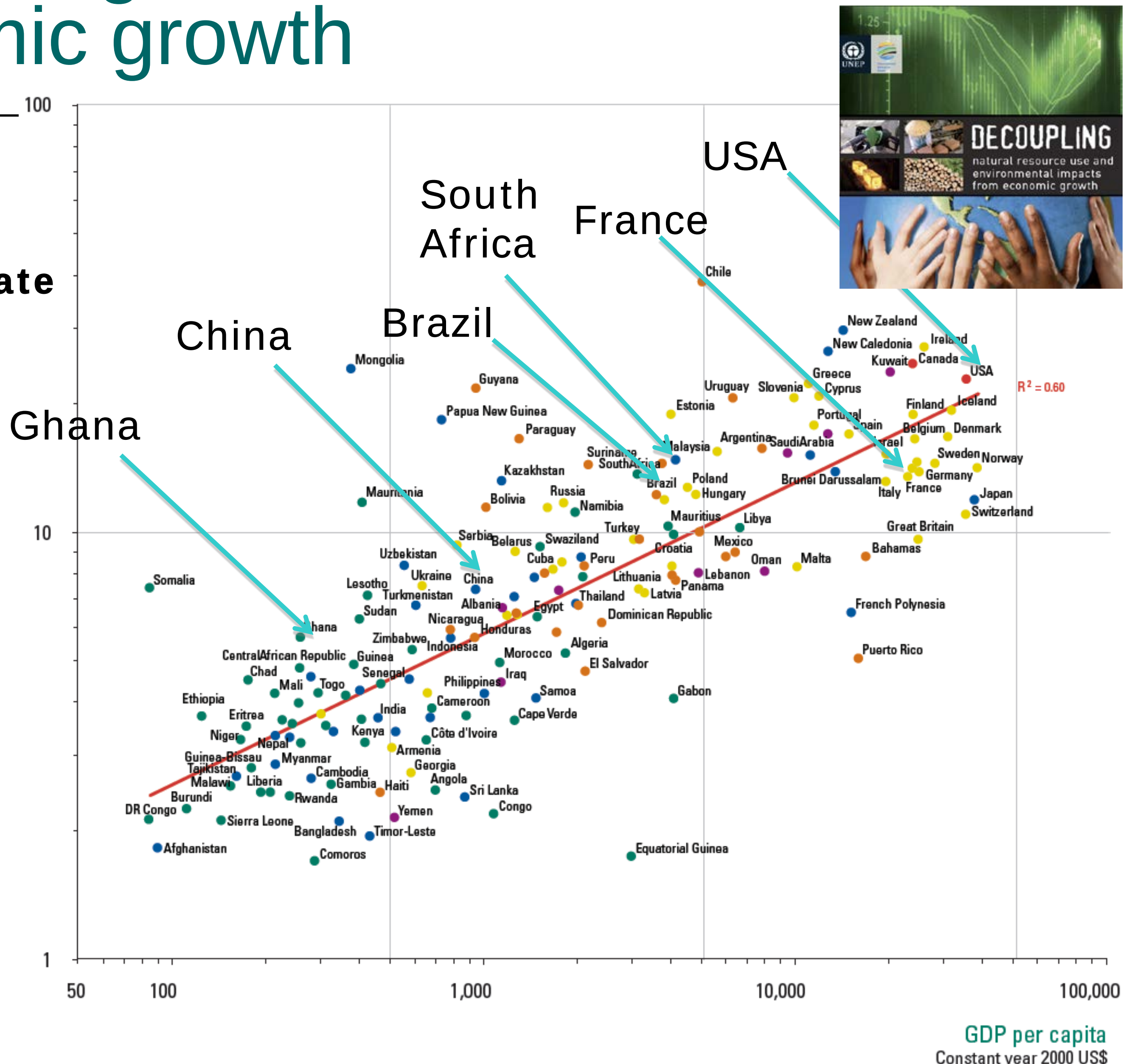
Key findings on resource use and economic growth

Figure 4. Global metabolic rates 1900–2005, and income



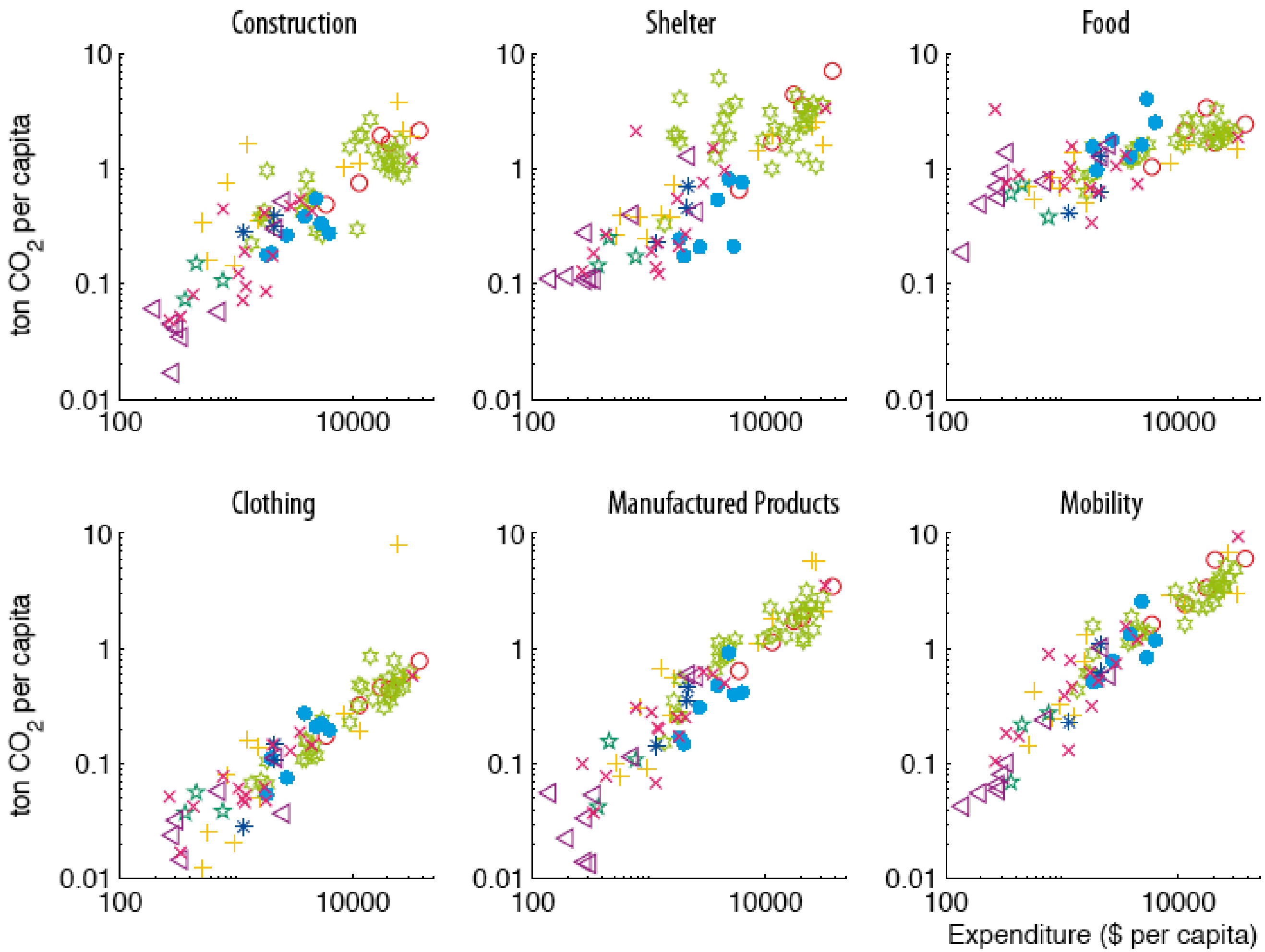
Source: Krausmann *et al.*, 2009; based on Sec Database "Growth in global materials use, GDP and population during the 20th century", Version 1.0 (June 2009): http://uni-klu.ac.at/socec/inhalt/3133.htm)

Key findings on resource use and economic growth



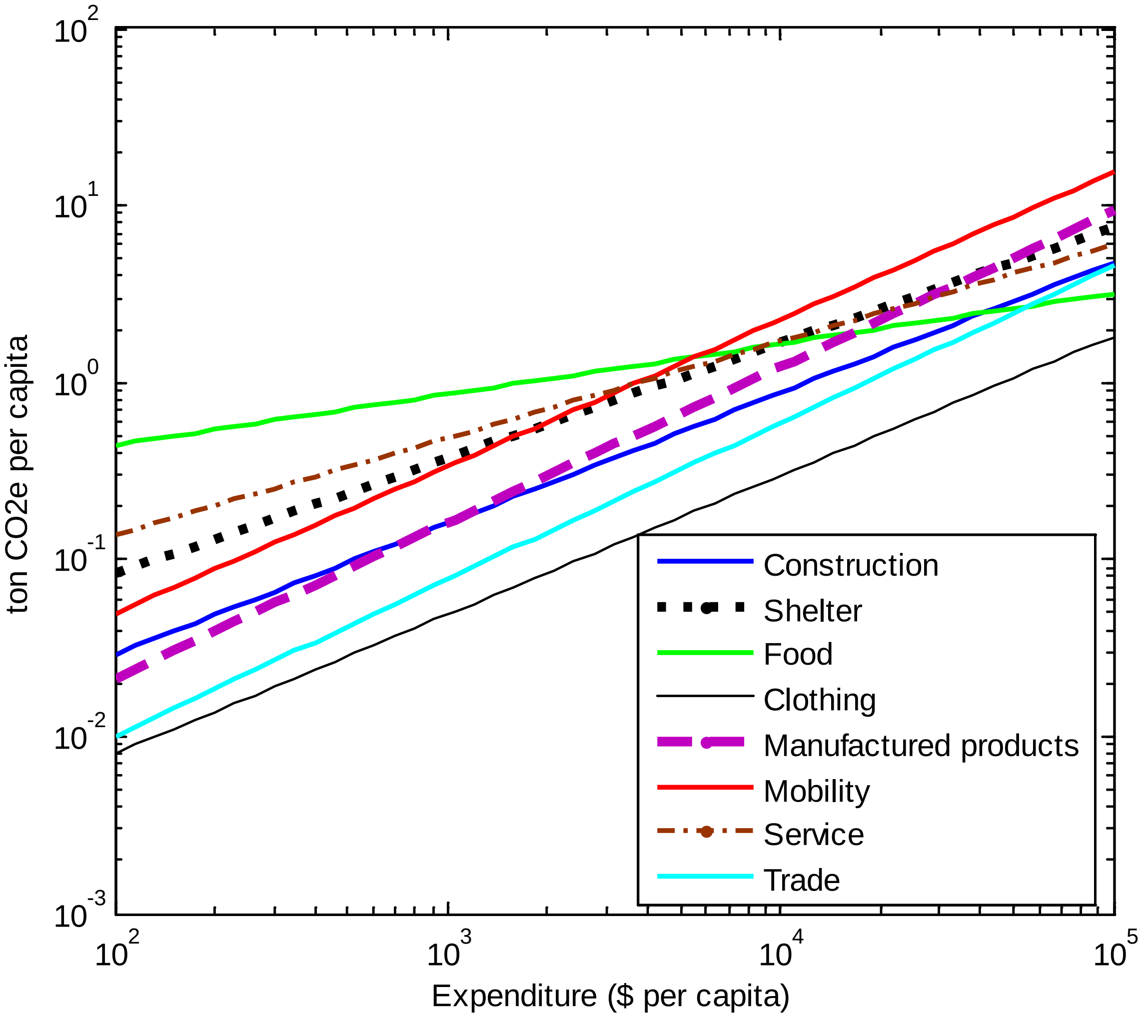
Metabolic rates grow with income

Increasing trend holds across expenditure categories



Carbon footprint also increases with income

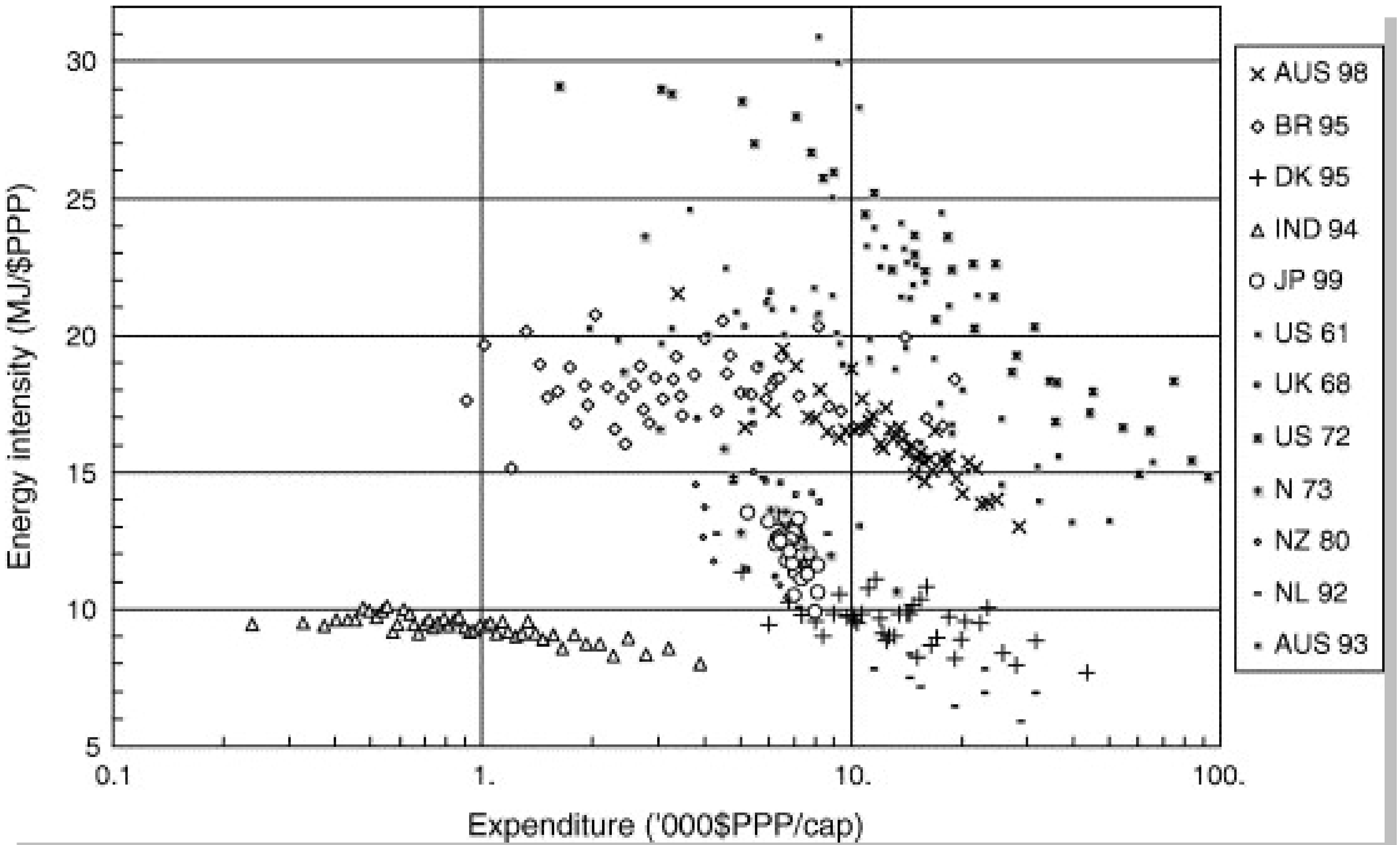
Cross-sectional analysis of carbon footprints: 0<ε<1



	GHG footprint elasticity
Construction	0.74
Shelter	0.65
Food	0.29
Clothing	0.79
Manufactures	0.88
Mobility	0.83
Service	0.55
Trade	0.88

Elasticity of 0.73 implies that if income increases with 100%, GHG emissions increase with 73%

Energy use across household income groups also shows relative decoupling



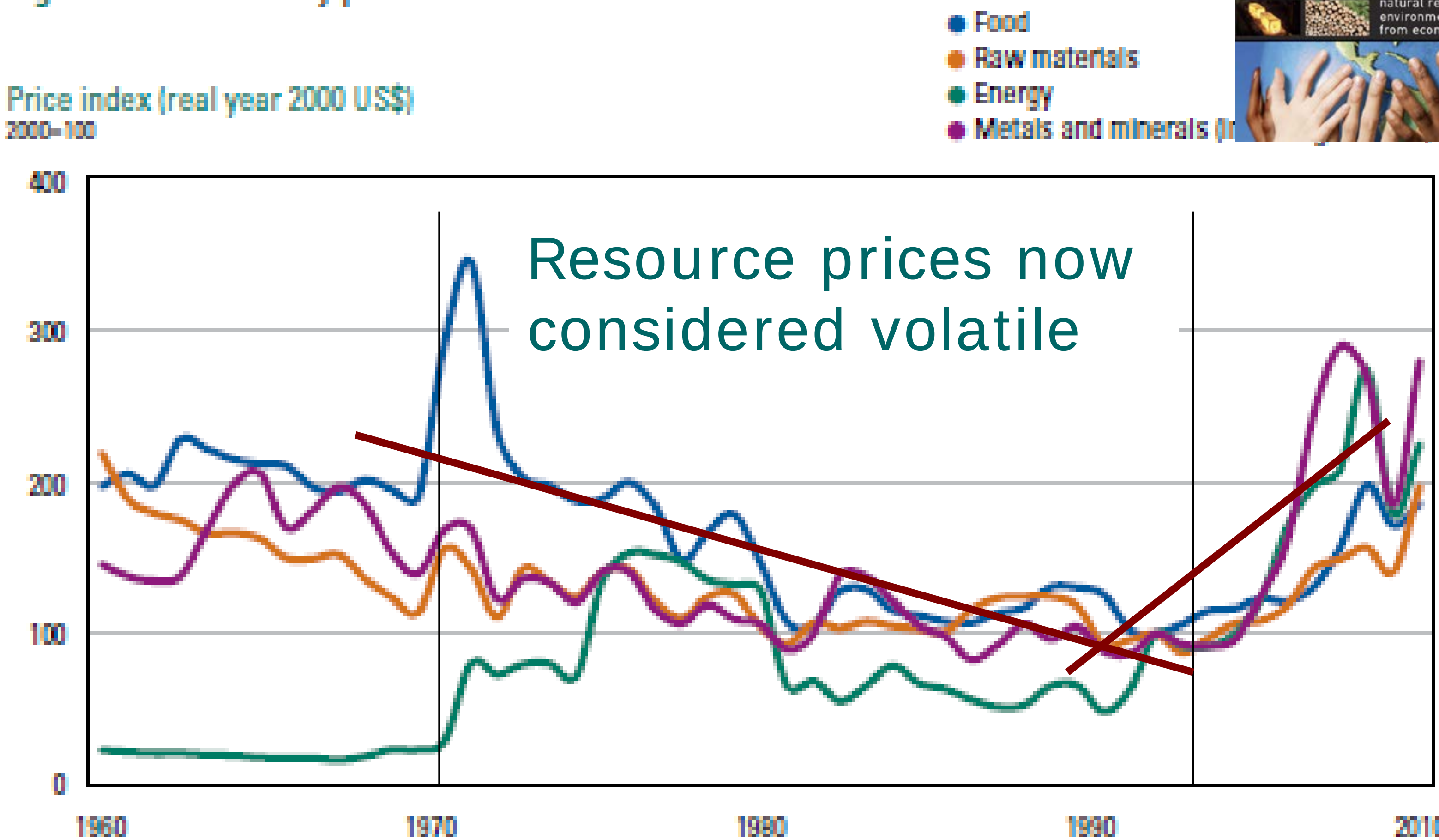
Lenzen et al, *Energy Economics*

Key empirical finding: relative but not absolute decoupling

- We see a relative decoupling: resource use grows, but slower than GDP
- Many studies support this finding: across countries, within countries, longitudinal and cross sectional studies
- There is no demonstration of absolute decoupling: growth has always required increased resource inputs

Key findings on resource use and economic growth

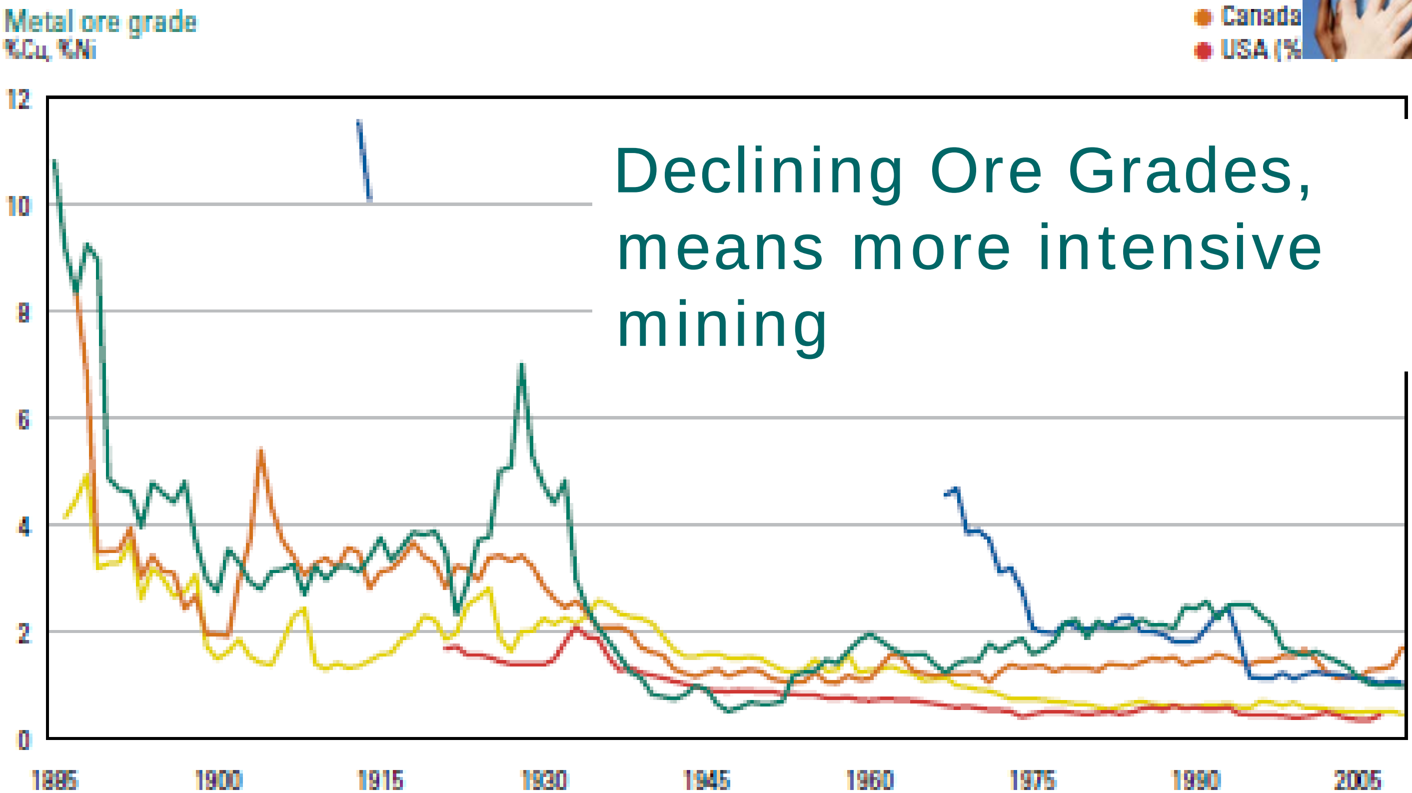
Figure 2.5. Commodity price indices



Source: World Bank Commodity Price Data (Pink Sheet), historical price data, available from http://blogs.worldbank.org/prospects/global-commodity-watch-march-2011

Key findings on resource use and economic growth

Figure 2.14. Ore grades of nickel and copper mines, 1885–2010

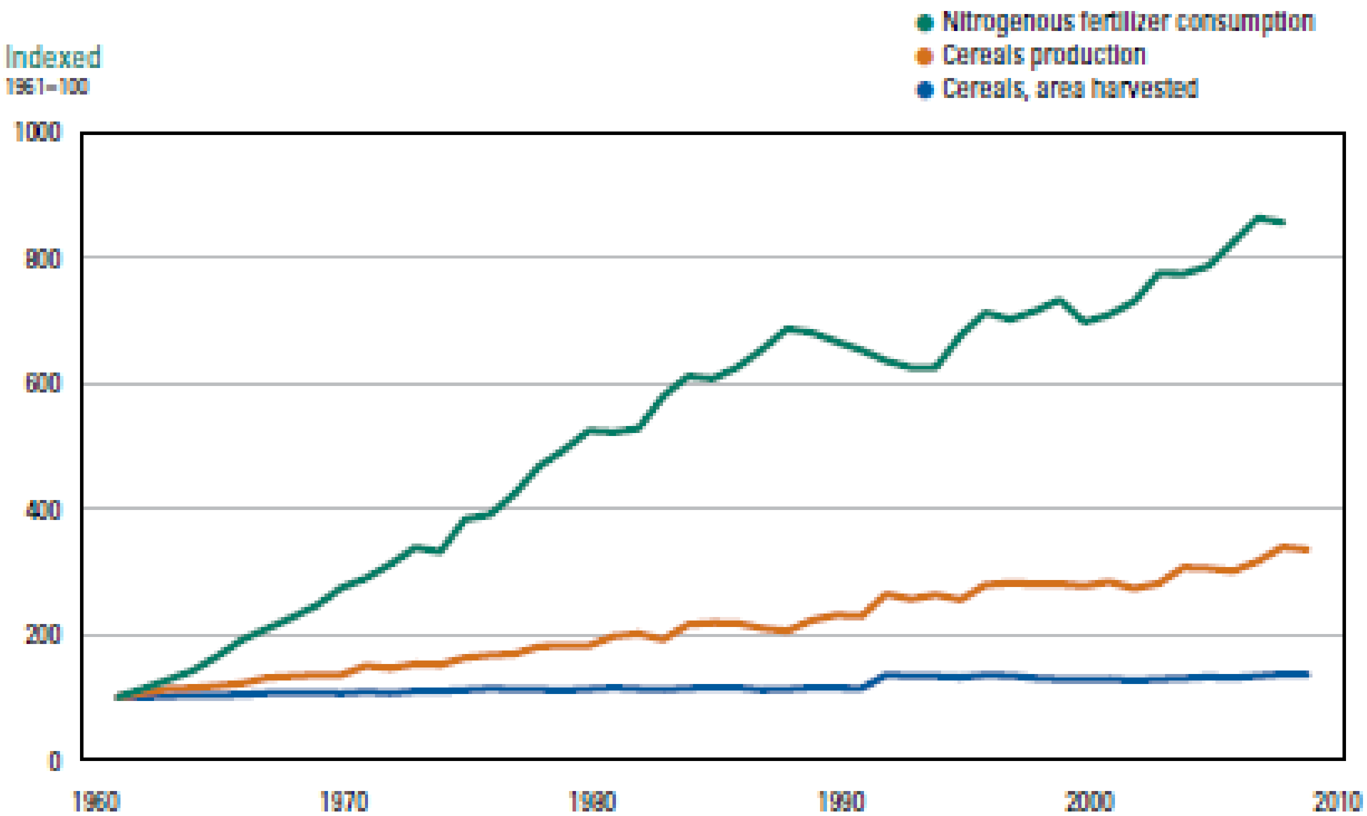


Declining Ore Grades, means more intensive mining

Source: Giurco et al., 2010

Decoupling of cereal production from land area – but at the expense of more fertilizer use

Figure 2.9. Global growth of cereals production and fertilizer consumption



Note: Global growth in the production of cereals since 1961 almost exclusively depended on intensification (nitrogen input, tractors, yields and many other factors not shown on this graph), whereas the expansion of harvested area played an insignificant role.
Source: UNEP GEO Portal, as compiled from FAOSTAT database, Food and Agriculture Organization of the United Nations (FAO), http://geodata.grid.unep.ch

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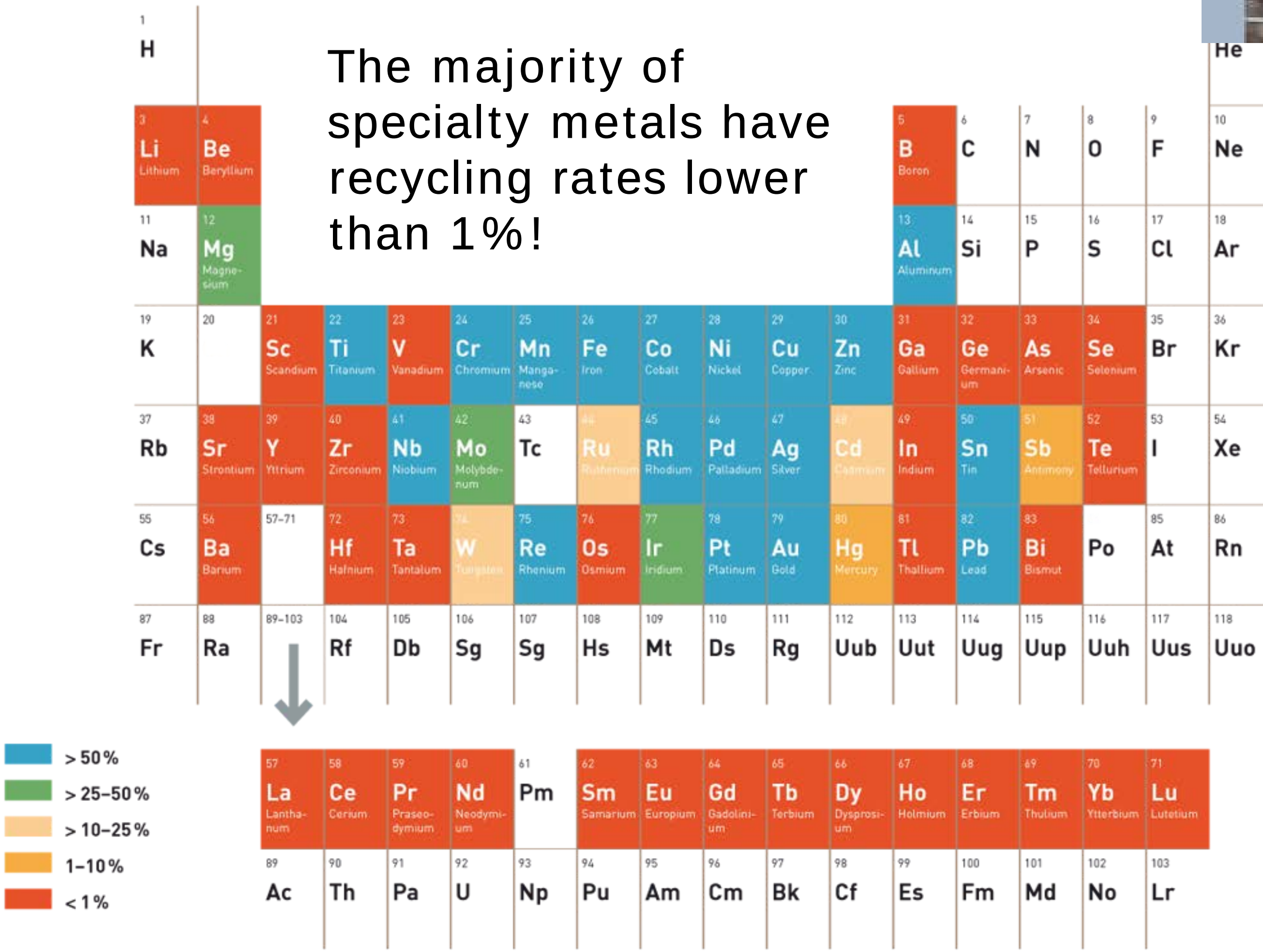
Key findings on metals: Opportunities for recycling

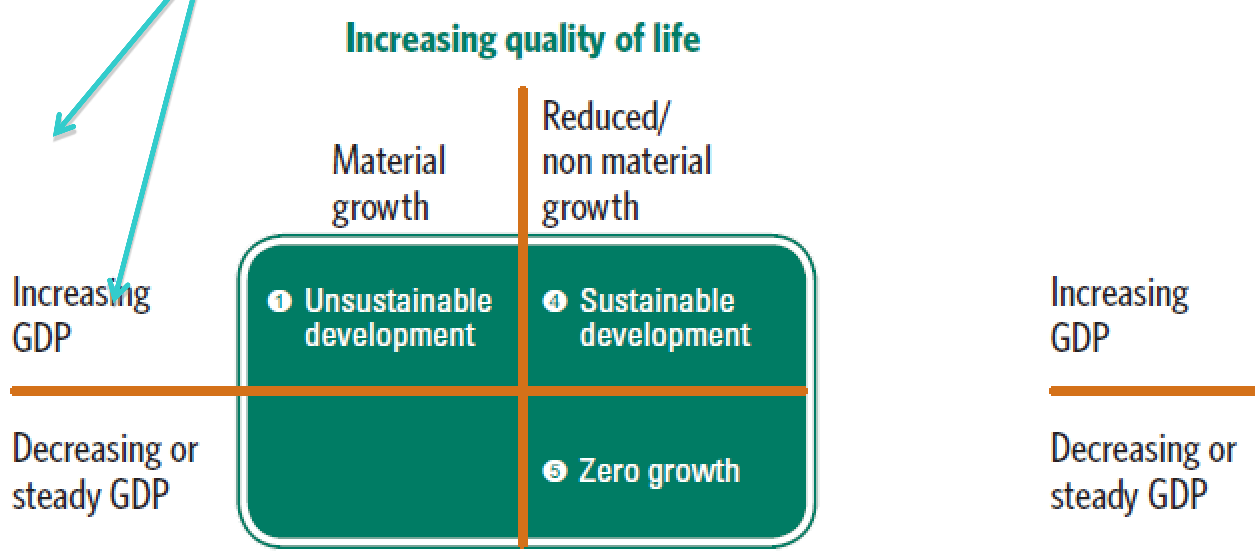
The majority of specialty metals have recycling rates lower than 1%!



Key findings on resource use and economic growth

Rethinking growth to include materials might help

only possible with decoupling



Key findings

- At present, consumption growth outstrips decoupling, leading to an increase in absolute resource consumption
- There are substantial opportunities for increases in resource efficiency
- There is often a trade-off between different resources and environmental impacts => Long-term efficiency limits?
- Focus on decoupling well-being from resource consumption