Towards a resource efficient Asia
Policy-relevant findings from the International Resource Panel

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Resource use trends

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

Over the past century global material extraction in these four categories grew:
- 27-fold (ores and industrial minerals)
- 12-fold (fossil fuels)
- 34-fold (construction minerals)
- 3.6-fold (biomass)

Source: Krausmann et al., 2009
...and prices are unpredictable!

Global trade in non-renewable materials clearly dominates trade (vis-vis trade in renewable materials)

Source: "Resources embodied in trade - Part 1” draft report
UNEP International Resource Panel, unpublished
Declining Ore Grades

Global shift in the extraction of minerals and ores to developing countries

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

Source: Source et al., 2010

Figure 2.11. Global extraction of industrial minerals and ores 1980 and 2006, by type of country

Materials embodied in trade/indirect material flows of traded goods increased faster than direct trade flows since 1962

Figure x: Direct trade and materials embodied in trade, 1962-2010

Sources: Dittrich, 2010 for the years 1962 – 2005 and Dittrich 2012 for 2010; *countries included in the assessment of materials embodied in trade

Source: “Resources embodied in trade - Part 2” draft report UNEP International Resource Panel, unpublished

Physical trade volumes: declining importance of European countries vis-à-vis Asian countries

Figure 7: Physical trade volume by continents in %, 1980 – 2010

Source: Dittrich, 2012; note: volume measured as imports plus exports

Source: “Resources embodied in trade - Part 1” draft report UNEP International Resource Panel, unpublished
• Until 2008 Asia had been the largest supplier of fossil fuels worldwide but in 2010 it nearly balanced its net trade of fossil fuels
• Asia was also the largest net importer of metals and biomass in 2010

Material intensity for the Asia-Pacific region is also increasing...

Material intensity (MI = DMC / GDP) for the Asia-Pacific region and Rest of the World, and World, for the years 1970 – 2008

Receiving environment for emissions

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

**Volume of hydrosphere**

**Volume of atmosphere**

**The water sphere** measures 1390 kilometers across and has a volume of 1.4 billion cubic kilometers. This includes all the water in the oceans, seas, ice caps, lakes and rivers as well as ground water, and that in the atmosphere. **The air sphere** measures 1999 kilometers across and weighs 5140 trillion tonnes. As the atmosphere extends from Earth it becomes less dense. Half of the air lies within the first 5 kilometres of the atmosphere. *Image by Dr Adam Nieman.*

Decoupling: doing more with less!

Decoupling human development and economic growth from escalating resource use and environmental degradation

- Resource decoupling: less resource use per unit of output
- Impact decoupling: less environmental impact per unit of output

3 scenarios of resource intensity

Major improvements in resource efficiency might stabilise resource use

**Global metabolic scale**

**Metabolic scale (Gigatons)**

- 1900: 50
- 2000: 150

**Average global metabolic rate**

**Metabolic rate (Gt/yr)**

- 1900: 6
- 2000: 12

*Source: Krausmann et al., 2009 (Development 1900–2005) and own calculations (see text)*

**Land use change and increase in demand for cropland**

- **cropland**
- **built-up**
- **degrad**
- **Additional FFF compensation**
- **grasslands savannahs forests**

*area proportions do not convey reality relations

FFF: Food, Fibres, Fuels
Land Use: policy-relevant findings and implications

1. Growing demand for food and non-food biomass will lead to an expansion of global cropland
2. Reducing excessive consumption provides high untapped potentials for “saving” land
3. Large areas with degraded soils are in need of restoration and better land use planning would help to avoid building on fertile land
4. Product certification cannot control the global expansion of cropland. For that, countries should monitor and control the level of their global land use
5. A more efficient use of biomass and its substitutes is necessary and possible; it requires enhanced efforts toward sustainable resource management at multiple scales
6. In light of global efforts to increase food security, markets for food and fuel should be delinked. This implies reducing biofuel quotas.
Metals: recycling rates

The majority of metals, in particular the so-called specialty metals used for green technologies, have recycling rates lower than 1%.

Metals: policy-relevant findings and implications

• Recycling has become increasingly difficult due to the growing product complexity
• Need to move from Material-Centric to Product-Centric approach to recycling
• Optimizing the recycling of entire products instead of centering on individual materials has a great potential of avoiding losses in efficiency throughout the recycling chain
• Transition towards efficient recycling systems needs all actors in the value chain
• Industry can be the source of driving innovation to maximize resource efficiency
• Making so-called “urban mines” valuable through recycling can only happen if consumers are engaged for the disposal of waste products at collection points operated according to BAT and decide against informal or illegal disposal.
**City-Level Decoupling: policy-relevant findings and implications**

- 80% of global GDP produced on just 2-3% of the land surface.
- 60-80% of global energy consumption
- 75% of carbon emissions
- More than 75% of the world’s natural resources
- Cities mainly depend on the import of **finite material resources** from outside their boundaries.

**Key policy recommendations:**
- Environmental sustainability needs to be **mainstreamed** in urban development policy frameworks
- **Public investments** should support infrastructure that stimulate low-carbon, resource-efficient and equitable urban development
- Cities should set **specific targets** to use resources more efficiently and formulate plans to achieve them
- Private sector need to be engaged in **translating proven innovations** into citywide projects

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**Addressing complex resource inter-linkages through systems thinking**

- Addressing complex inter-linkages and trade-offs between various resources requires more scientific understanding of nexus issues
- Innovations are needed to address “lock-in” issues and prevent rebound effects
- Need to move beyond efficiency and address issues of resource restoration and regeneration, and sustainable consumption
- Need to understand the dynamics of transition and transformation so as to upscale decoupling while preventing burden-shifting
- Need to further mainstream decoupling and sustainable resource management in relevant political processes
- Need to ensure that policy goals and targets are formulated so as to promote the decoupling of socio-economic development from unsustainable depletion of resources and increasing environmental impact