International Resource Panel

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Four categories of primary raw materials

- Fossil fuels
- Construction minerals
- Metal Ores & industrial minerals
- Biomass
GDP grew by a factor of 23, resource use by a factor of 8
epochal transitions - socio-metabolic transformations - Fischer-Kowalski et al

- temp settlements, meat, wild food, fire
- soils, land, building materials, water, biomass
- + fossil fuels, minerals & metals, 8.7b ha of land, 120 b tons of stuff, + pollution
- - fossil fuels, - pollution
- Materials + solar energy

Hunter/gatherers

over 100 000 years ago

Last ice Age - 13 000 years ago

250 years ago

start of the Anthropocene

‘The Great Green Technological Transformation’?

sustainability era?
The concept of decoupling

Figure 1. Two aspects of 'decoupling'

- Human well-being
- Economic activity (GDP)
- Resource use
- Environmental impact

Innovation holds the key

Resource decoupling
Impact decoupling
A hundred years of decline of resource prices
Resource prices on the rise, recently

all 5 previous global growth periods were able to access cheap primary resources
Three forced future scenarios for 2050

Global metabolic scales in billion tonnes

Baseline 2000  Freeze & catching up  Factor 2 & catching up  Freeze global DMC

Construction minerals
Ores and industrial minerals
Fossil fuels
Biomass

Global metabolic rates in t/cap

Baseline 2000  Freeze & catching up  Factor 2 & catching up  Freeze global DMC

Assumptions: pop in 2050 is 9.5b; living stds in developed & developing world are the same. For BAU scenario: ‘freeze’ = resource use in developed world in 2050 same as in 2005.
Africa as net resource exporter

• Africa is a net exporter of non-renewable resources & net importer of biomass (renewables)

• Non-renewables: export 500 mt of fossil fuels, import 100 mt (mainly refined fuels)

• Biomass: export 14.5 mt, import 95.8mt (mainly cereals followed by biomass-products - mainly vegetable fats and oils, timber and sugar crops)
Africa’s challenges....

- New scramble for African resources – resource sector down to 24% of GDP, but still 80% of exports
- rise of resource wars, 20 of the top 30 failing states are in Africa
- 30% of all Africans are undernourished
- ecosystem degradation: 65% of agric soils degraded
- will suffer most from climate change having contributed least
- Urbanisation: 375m in 2010, 1.2 b by 2050
Materials:
8t/c
CO₂: 4.5 t/cap

Materials:
6t/c
CO₂: 2.2 t/cap