



SUSTAINABLE RESOURCE MANAGEMENT - IRP VIEW

“INVESTING IN A CIRCULAR ECONOMY”

EP-GLOBE

Brussels, March, 1st 2017

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INTERNATIONAL POLICY NEEDS A SCIENCE BASE

The international resource panel was created in 2007 as a **science-policy interface** in responding to economic growth, escalating use of natural resources and deteriorating environment and climate change.



Climate Change

IPCC

Biodiversity Loss

IPBES

Hazardous substances

Assessments under the Basel Convention

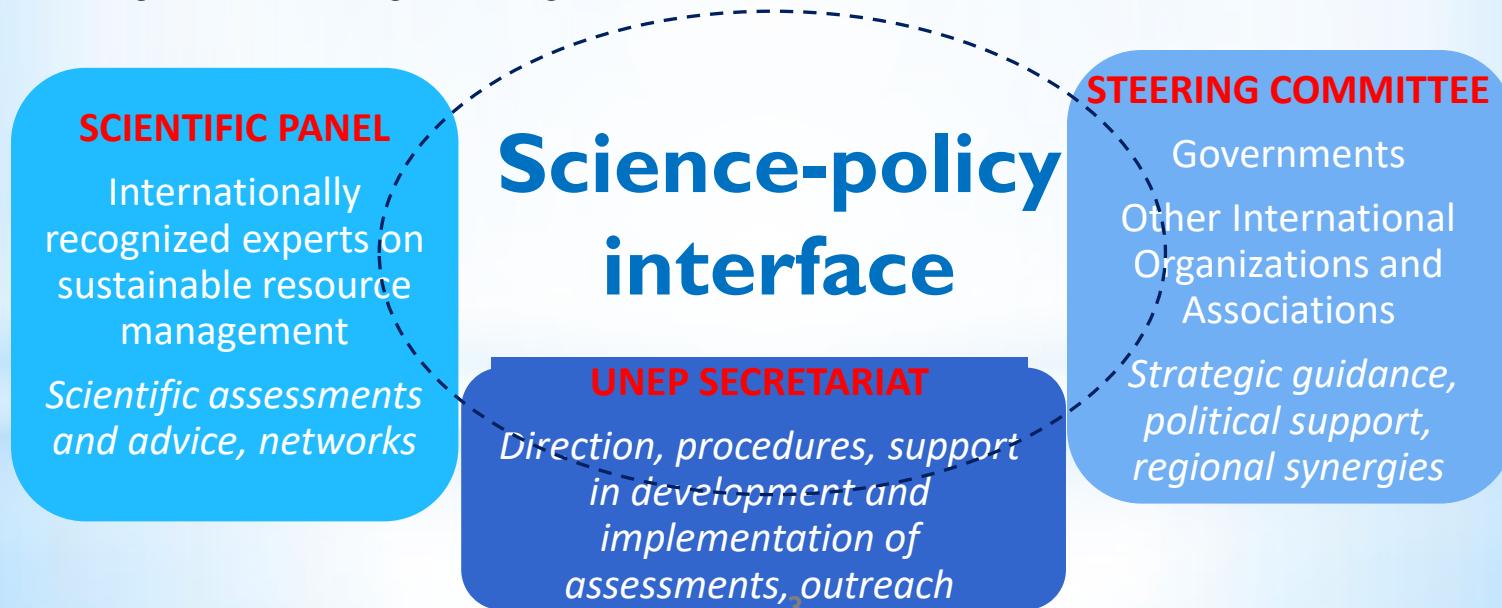
Ozone Depletion

Montreal Protocol's Scientific Assessments

Resource Efficiency

International Resource Panel IRP

- INDEPENDENT AND AUTHORITATIVE SCIENTIFIC ASSESSMENTS OF POLICY RELEVANCE ON THE SUSTAINABLE USE OF NATURAL RESOURCES
- BETTER UNDERSTANDING OF HOW TO DECOUPLE ECONOMIC GROWTH FROM RESOURCE USE AND ENVIRONMENTAL DEGRADATION





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PUBLISHED REPORTS



Assessing **biofuels**: towards sustainable production and use of resources (2009)

Priority products and materials: assessing the environmental impacts of **consumption and production** (2010)

Metal stocks in society: a scientific synthesis (2010)

Recycling rates of metals: A status report (2011)

Decoupling natural resource use and environmental impacts from economic growth (2011)

Measuring **Water Use** in a Green Economy (2012)

City-level Decoupling: Urban Resource Flows and the Governance of Infrastructure Transitions (2013)

Metal Recycling: Opportunities, Limits, Infrastructure (2013)

Environmental Risks and Challenges of Anthropogenic **Metals Flows and Cycles** (2013)

Assessing **Global Land Use**: Balancing consumption with sustainable supply (2014)

Decoupling: Technological Opportunities and Policy Options (2014)

Managing and Conserving the **Natural Resource Base** for Sustained Economic and Social Development (2014)

Policy Coherence of the **SDGs** - A Natural Resource Perspective (2015)

International Trade in Resources: A biophysical assessment (2015)

10 Key Messages on **Climate Change** (2015)

Green Energy Choices: The Benefits, Risks and Trade-offs of Low Carbon Technologies for Electricity Production

Options for **Decoupling** Economic Growth from **Water** Use and Water Pollution (2016)

Rapid Assessment on **Global resource efficiency** prospects and economic implications (2016)

Food Systems and natural resources (2016)

Global Material Flows and Resource Productivity (2016)

Unlocking the Sustainable Potential of **Land Resources** (2016)



WORLD
IN WHICH WE LIVE

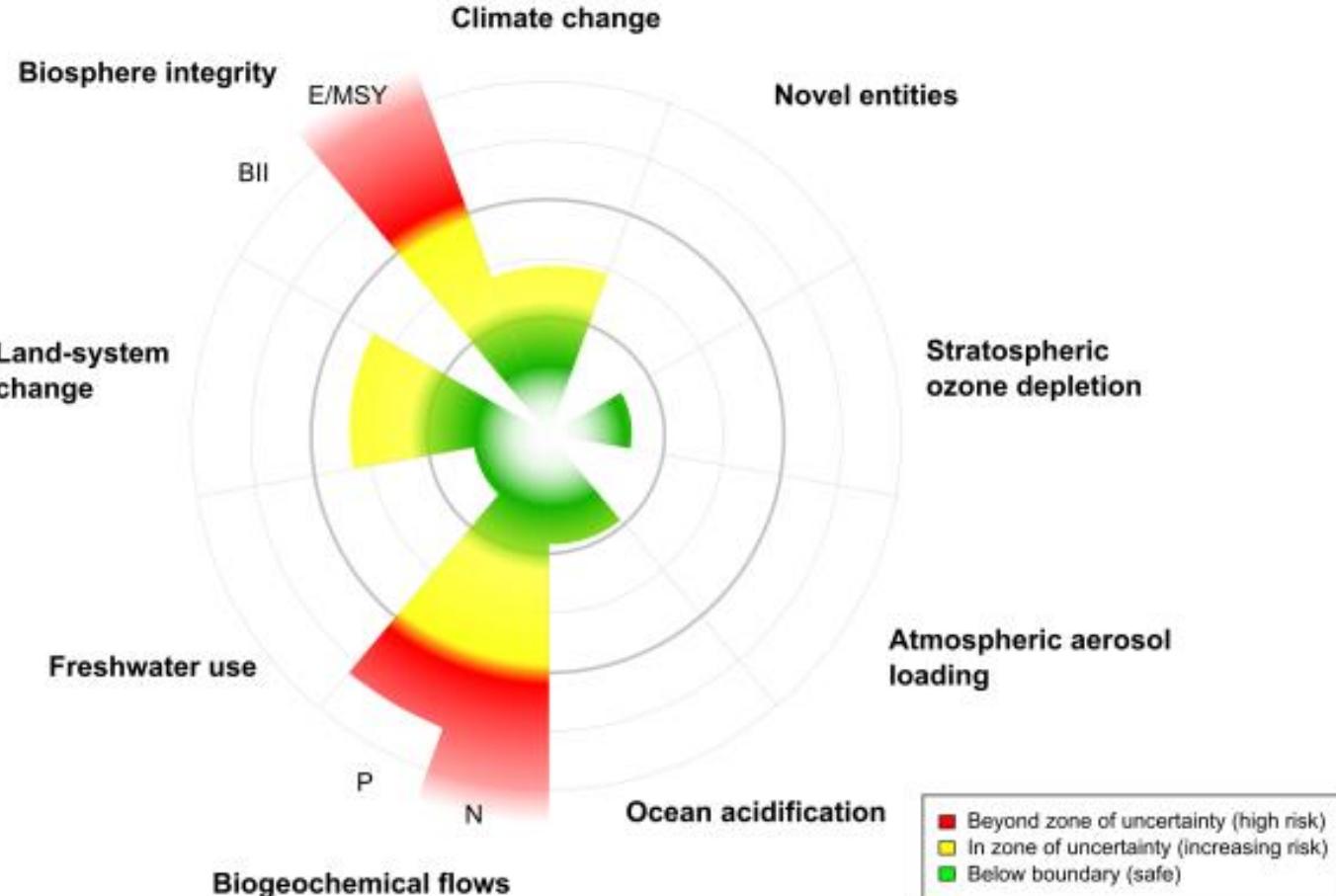
20th CENTURY

THE GREAT ACCELERATION

- *Growth of population by a factor 3.7*
- *Annual extraction of construction materials grew by a factor of 34, ores and minerals by a factor of 27, fossil fuels by a factor of 12, biomass by a factor of 3.6*
- *Total material extraction grew by a factor of 8*
- *GHG emissions grew by a factor of 13*
- *Globalisation*



“PLANETARY BOUNDARIES”



Source: Steffen et al. 2015

21th CENTURY FACTS WE CAN NOT IGNORE

- *Population growth (2050 - 9.7 billion)*
- *Per capita consumption growth (McKinsey estimates up to 3 billion consumers moving from low to middle class consumption till 2030)*



21th CENTURY

FACTS WE CAN NOT IGNORE - RAPID URBANISATION

- *52% of urban fabric* expected to exist by 2050 still needs to be constructed
- Between 2000 and 2030 it is estimated that *developing countries* would have added *400,000 km² of built-up urban area*, equal to the world's built-up area in 2000
- In the three years period (2011-2013), *China* has used more *cement* than the *USA* during the entire 20th century



21th CENTURY FACTS WE CAN NOT IGNORE

- *Poverty and social inequality* (Oxfam Report: 62 people own the same as half of the world and the richest 1% is more wealthy than the rest of the world)
- 60% of *ecosystems* already degraded or used unsustainably
- Increasing evidence of the *climate change* threat



INTERNATIONAL DEVELOPMENTS



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12 SDGs ARE DIRECTLY DEPENDENT ON NATURAL RESOURCES





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Sustainable Consumption and Production is the most efficient strategy to avoid trade-offs and create synergies to resolve the development and environmental challenges articulated in the SDGs.



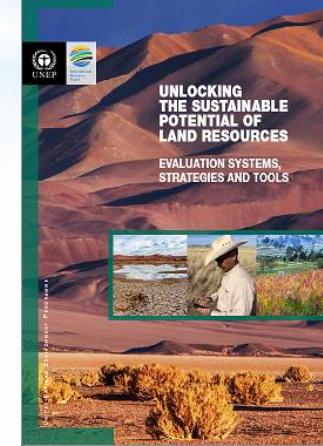
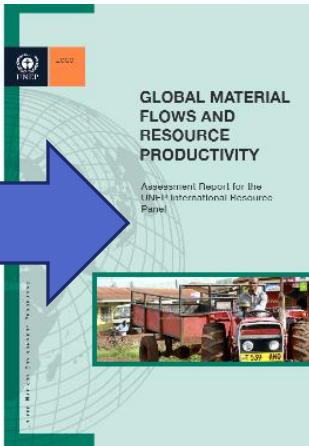
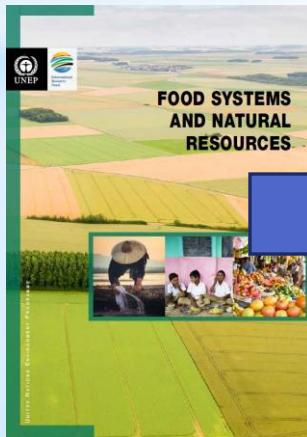
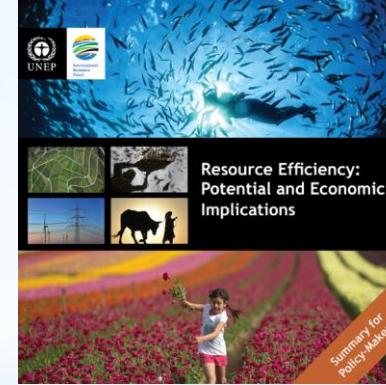
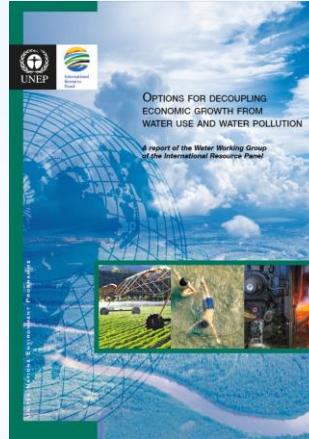
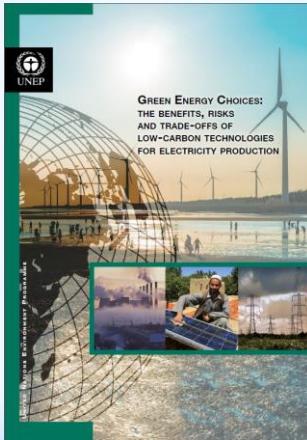
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SDGs DIRECTLY DEPENDENT ON NATURAL RESOURCES





IN THE RECENT MONTHS ...



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THE NEW UNEP IRP MATERIAL FLOW AND RESOURCE PRODUCTIVITY DATA SET



- A *coherent account of material use in the global economy and for every nation, complementary to the System of National Accounts*
- A *large data set covering 40 years (1970-2010) and most countries of the world.*
- *Presents direct and consumption-based material flow indicators, covering total usage, per capita use and material use per US\$.*

GLOBAL MATERIAL USE HAS ACCELERATED

- Annual global extraction of materials grew from 22 billion tonnes in 1970 to around 70 billion tonnes in 2010
- Non-metallic minerals used in construction was the fastest growing group of materials

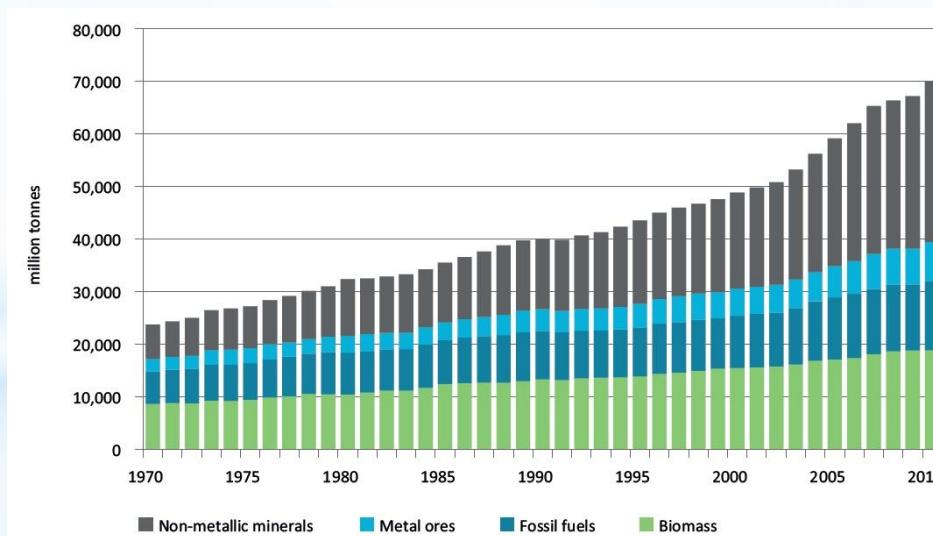


Figure 1. Global material extraction (DE) by four material categories, 1970-2010, million tonnes



MATERIAL EXTRACTION GREW UNEVENLY IN THE GLOBAL ECONOMY

- *Asia and the Pacific had the largest growth, especially China and Southeast Asia*
- *Growth in Asia and the Pacific reverberated in Latin America and Africa who supplied materials to Asia*



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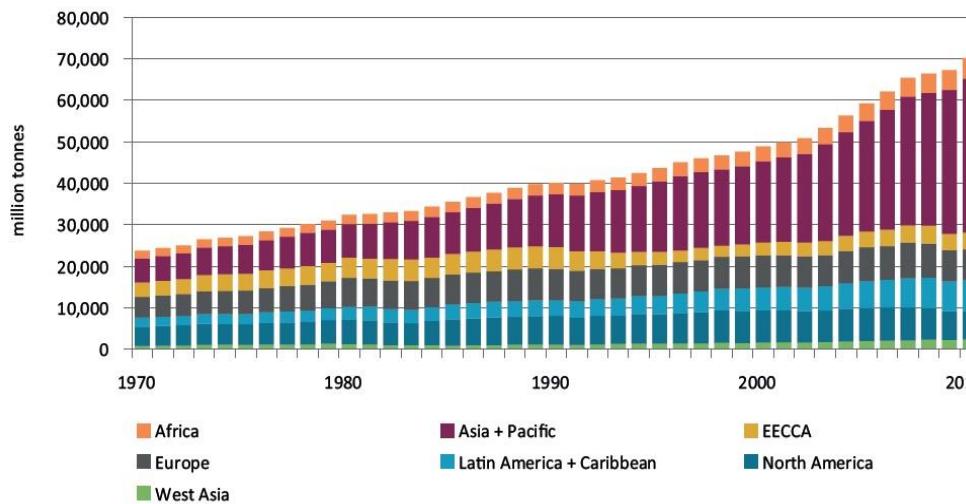


Figure 2. Domestic extraction (DE) by seven subregions, 1970-2010, million tonnes



UNEP

TRADE IN MATERIALS HAS GROWN DRAMATICALLY

- *Trade has grown faster than domestic extraction and direct trade in materials has expanded fourfold since 1970*
- *Per capita global exports of materials doubled from 0.8 tonnes per capita in 1970 to 1.6 tonnes per capita in 2010*

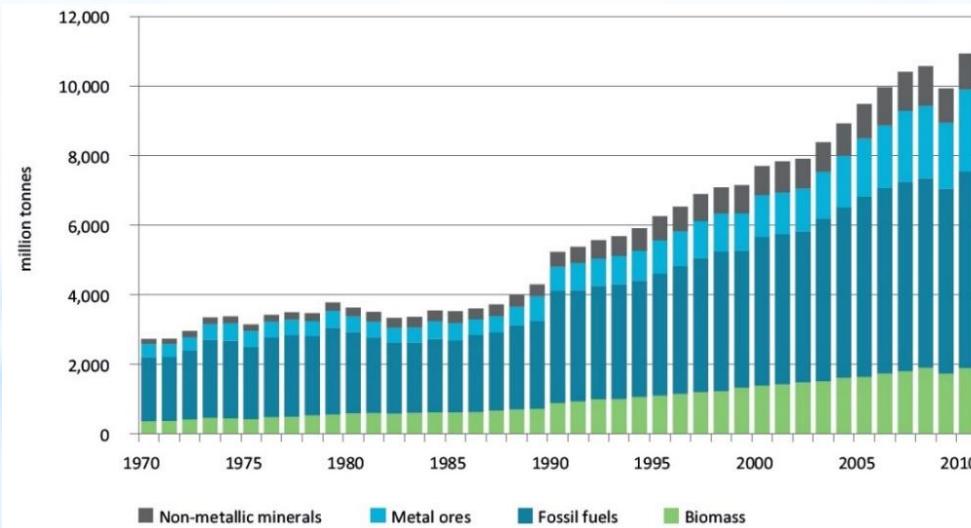


Figure 3. Global exports of materials by four material categories, 1970-2010, million tonnes



TRADE MOBILIZES PRIMARY MATERIALS EXTRACTION

- *The new indicators of raw material equivalents of imports and exports show that **trade mobilizes much greater amounts of materials** than direct traded flows indicate.*



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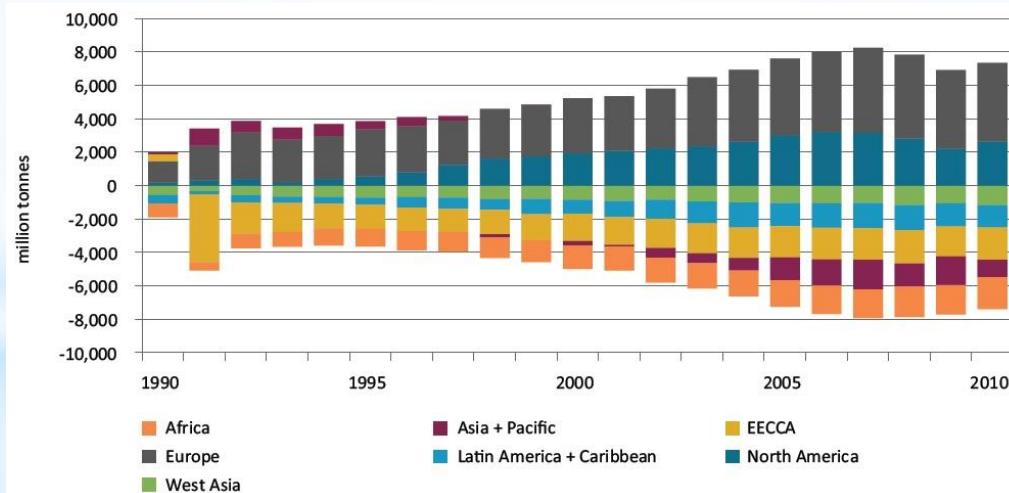


Figure 4. Raw material trade balance (RTB) by seven subregions, 1990-2010, million tonnes



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CONSUMPTION IS DRIVING GLOBAL MATERIAL USE

- *Growth in per capita income and consumption have been the strongest driver of growth in material use, even more important than population growth in recent decades*



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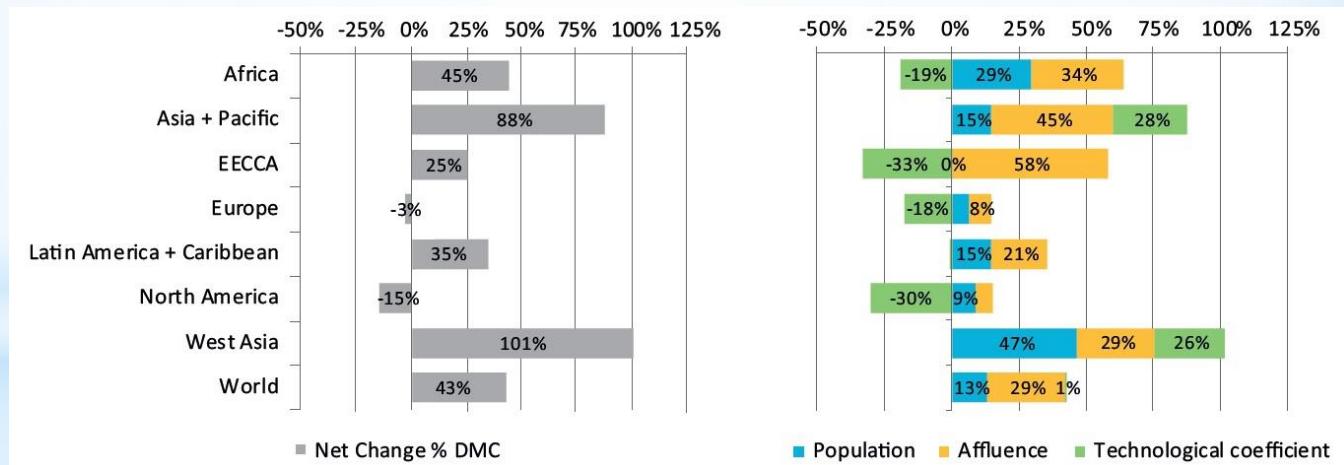


Figure 5. Drivers of net change in domestic material consumption between 2000 and 2010 for world regions: population, affluence, and material intensity



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RICHEST COUNTRIES CONSUME ON AVERAGE 10 TIMES THE MATERIALS AS POOREST COUNTRIES

- Average material footprint of medium HDI countries has grown slowly over past two decades, reaching 5 tonnes per capita, while material footprint in low HDI countries has been stagnant for the past two decades at 2.5 tonnes per capita



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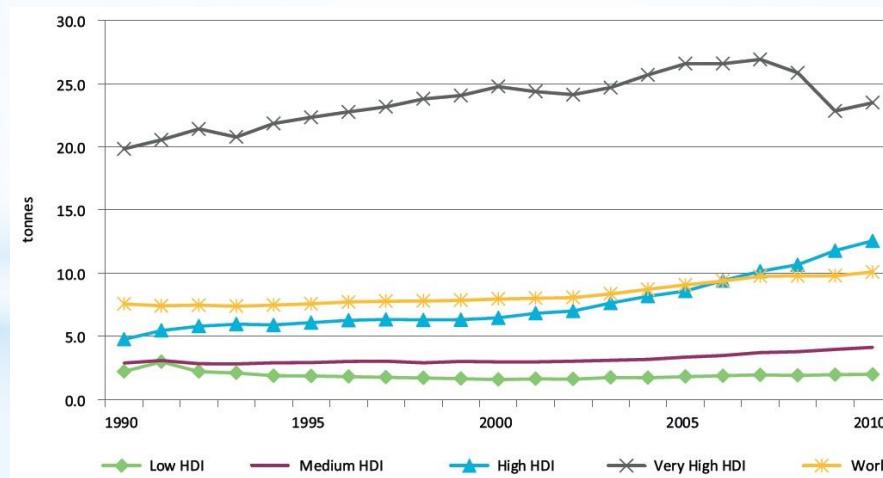


Figure 8. Per capita material footprint (MF) by HDI level, 1990-2010 (the HDI is a compound index on life expectancy, literacy and income)



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OVERALL DECLINE IN MATERIAL EFFICIENCY

- Global economy now needs *more materials per unit of GDP* than it did at the turn of the century
- This has been caused by large *shift of economic activity from very material-efficient economies* such as Japan, the Republic of Korea and Europe *to the much less material-efficient economies* of China, India and Southeast Asia

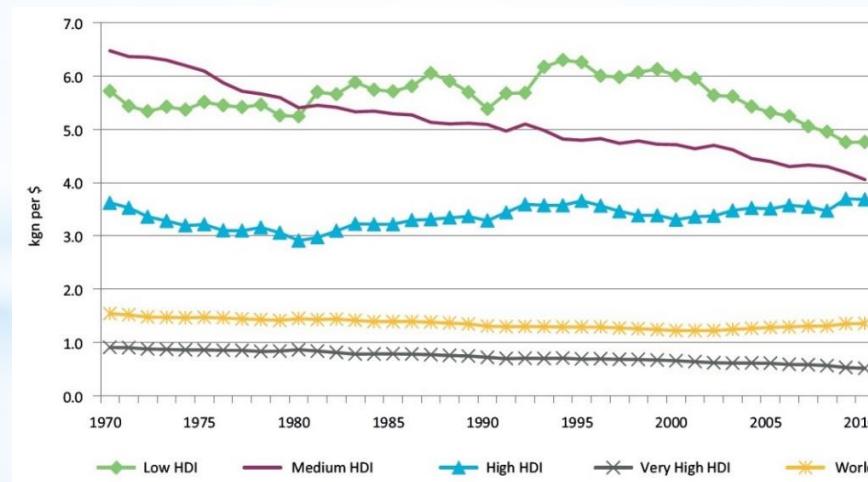


Figure 7. Material intensity by development status and global material intensity, 1970-2010



THE LEVEL OF WELL-BEING ACHIEVED IN WEALTHY INDUSTRIAL COUNTRIES CANNOT BE GENERALIZED GLOBALLY BASED ON THE SAME SYSTEM OF PRODUCTION AND CONSUMPTION

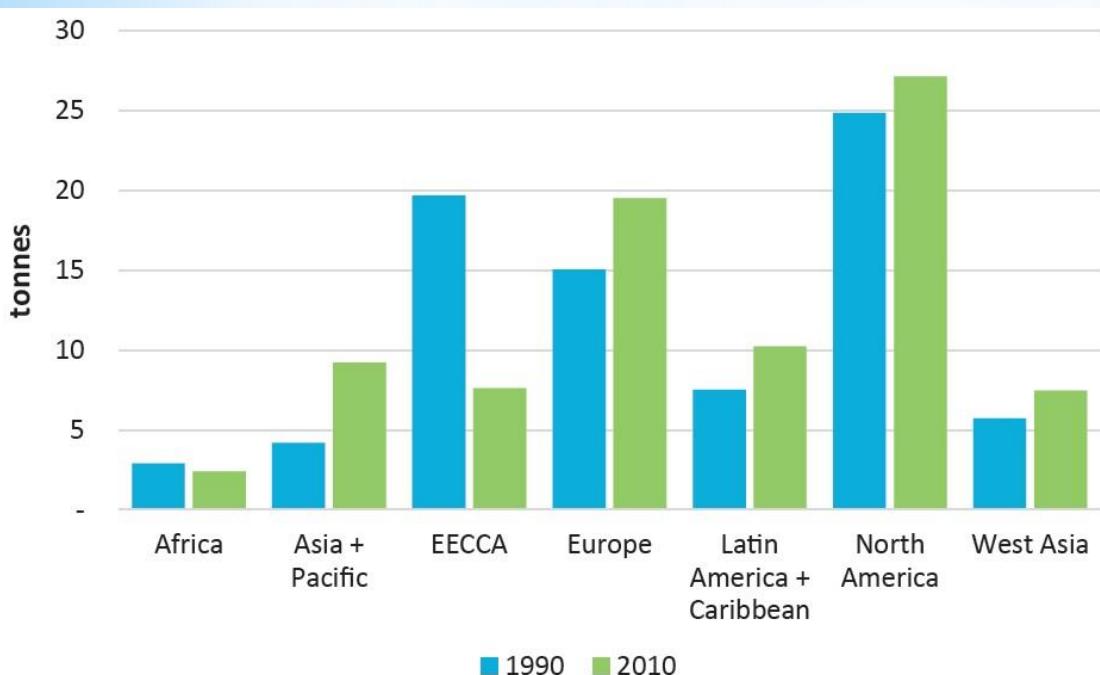


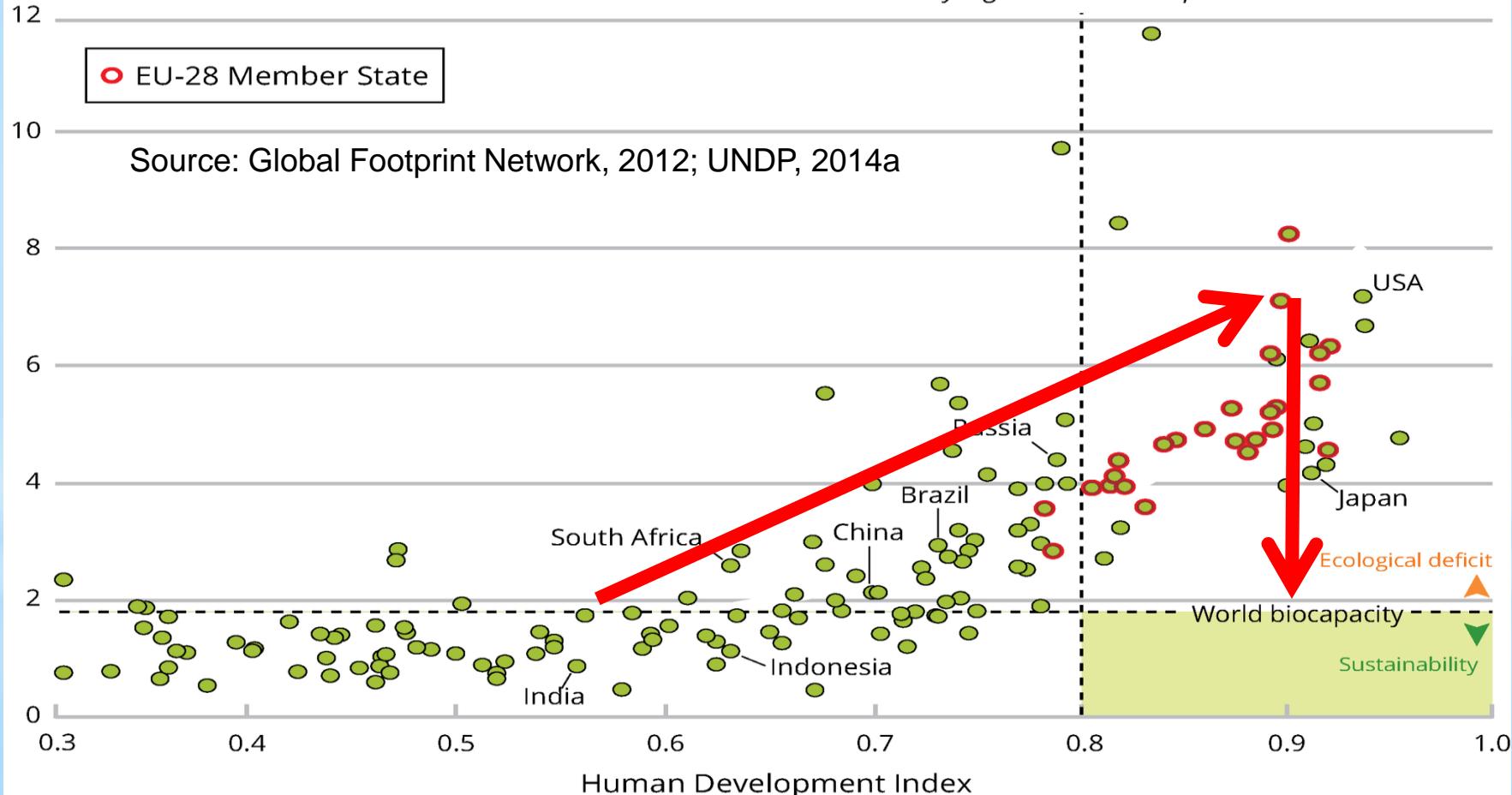
Figure 6. Per-capita material footprint (MF) by seven world regions, 1990 and 2010, tonnes

If current systems of production and provision for major services will not be changed, nine billion people would require about 180 billion tonnes of materials annually by 2050, almost three times today's amounts

DEVELOPMENT TRAJECTORY ...

Ecological footprint
(hectares per person per year)

'Very high human development'



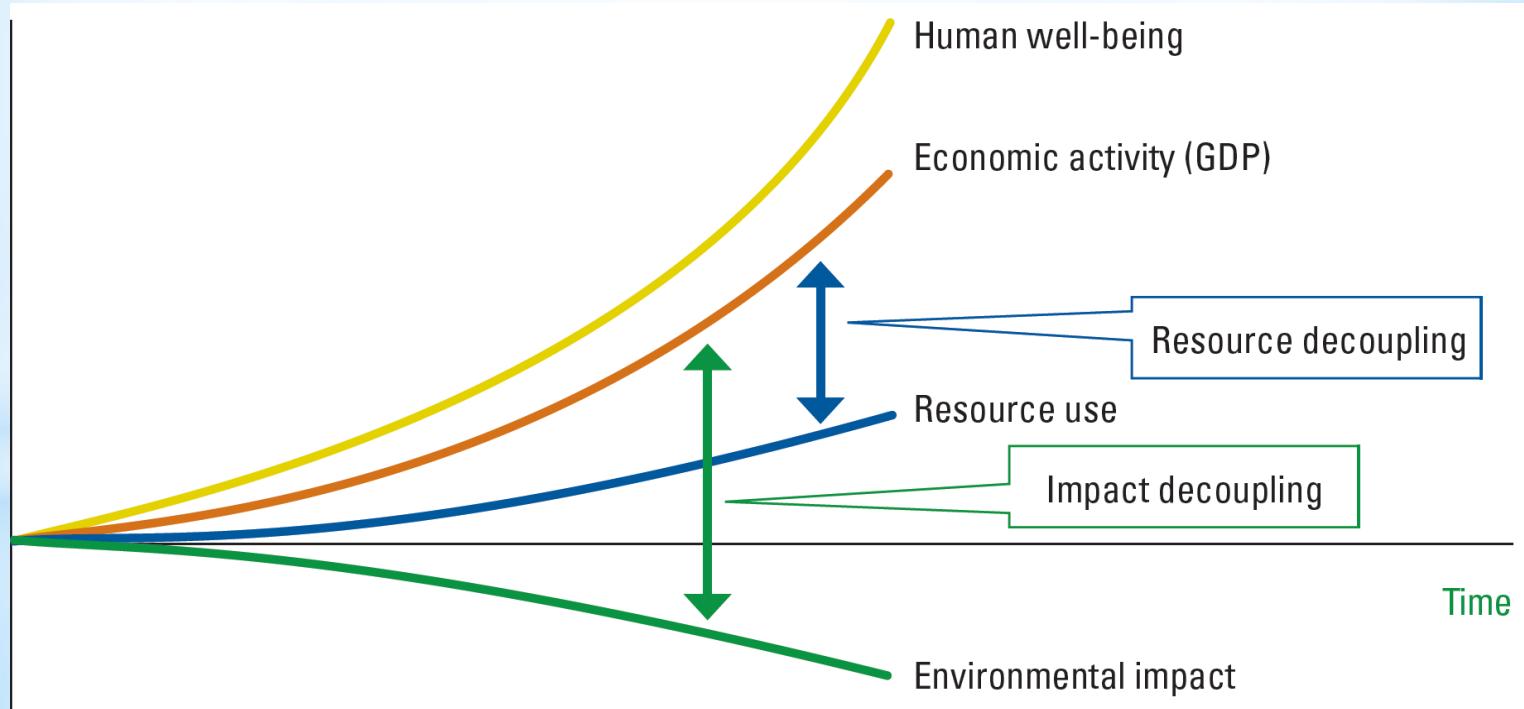
AND ...

SOLUTIONS



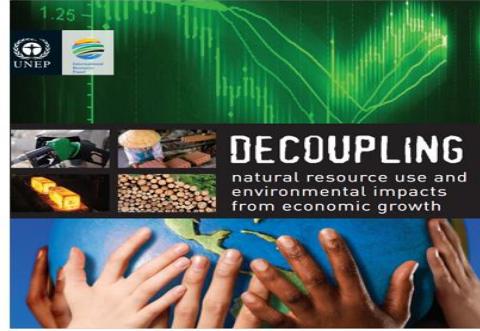
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DECOUPLING IS THE IMPERATIVE OF MODERN ENVIRONMENTAL AND ECONOMIC POLICY



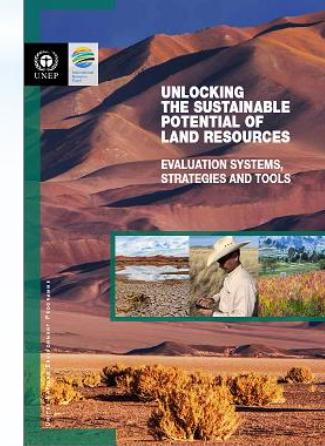
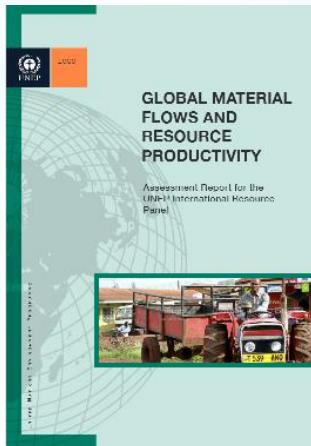
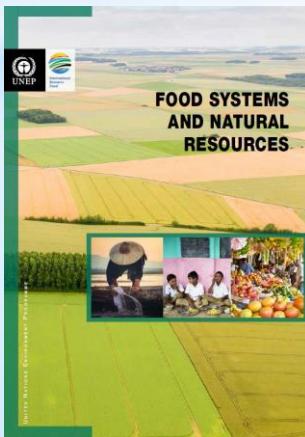
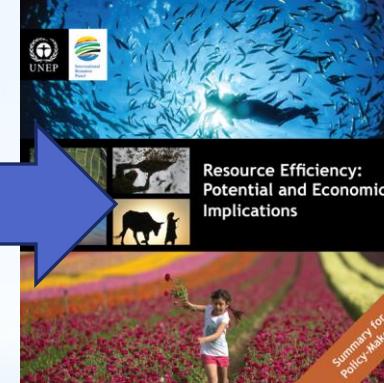
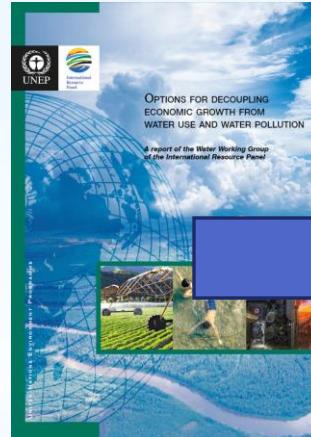
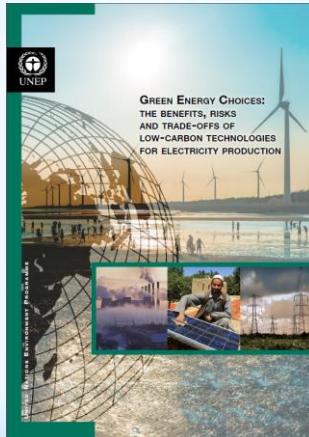


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- *Developed economies will need to adopt strategies that bring their resource consumption down to globally sustainable levels (**ABSOLUTE DECOUPLING**)*
- *Developing nations must strive to improve resource efficiencies and cleaner production processes as their net consumption of natural resources increases for a period until they achieve a societally acceptable quality of life (**RELATIVE DECOUPLING**)*





IN THE RECENT MONTHS ...



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DECOUPLING AND RESOURCE EFFICIENCY POTENTIAL

“With concerted action, there is significant potential for increasing resource efficiency, which will have numerous benefits for the economy and the environment”



SCENARIOS FOR ASSESSING RESOURCE AND CLIMATE FUTURES

RESOURCE USE

GREENHOUSE EMISSIONS AND CLIMATE

3°C+ pathway
(RCP6.0)

2°C pathway
(RCP2.6)

Historical
resource trends

Existing Trends

Climate Only

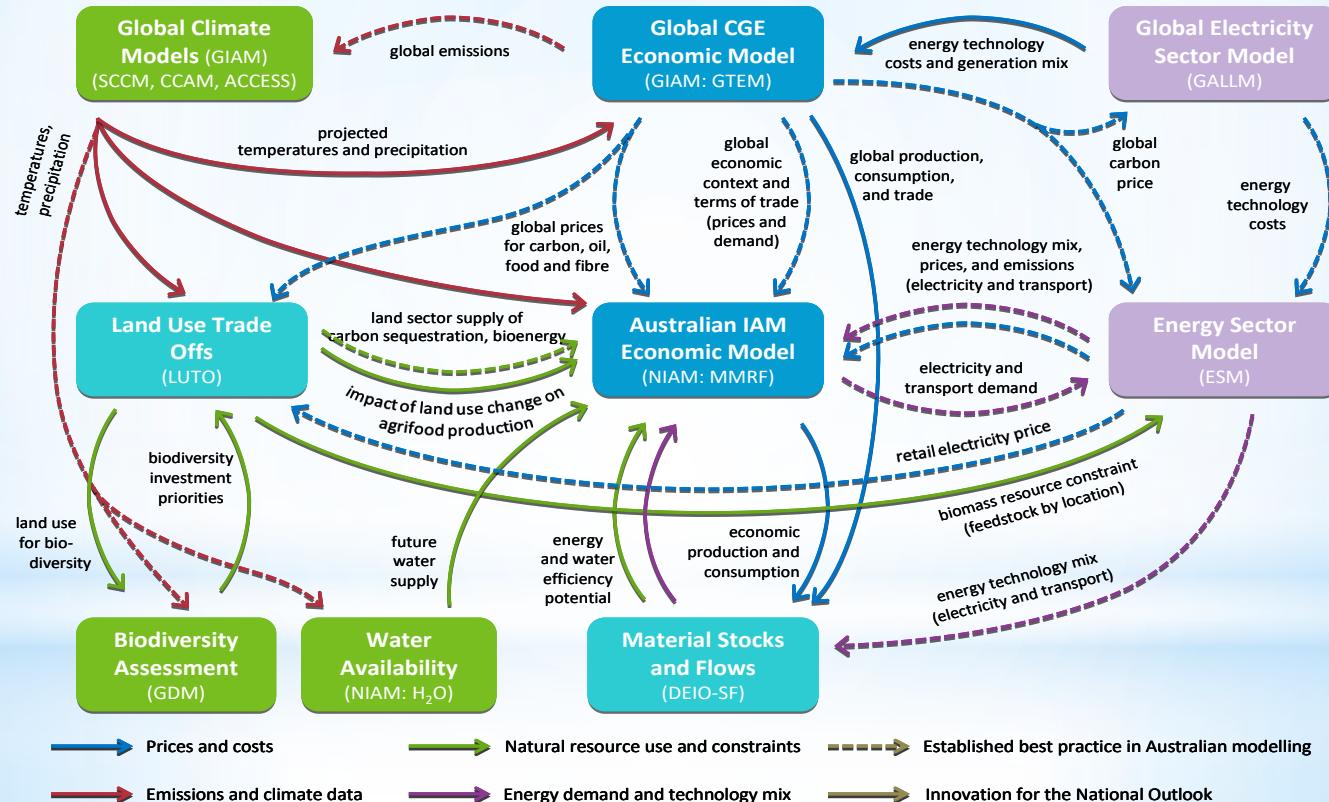
Resource
efficiency

**Resource
Efficiency**

**Efficiency
Plus Climate**

MULTI-MODEL FRAMEWORK

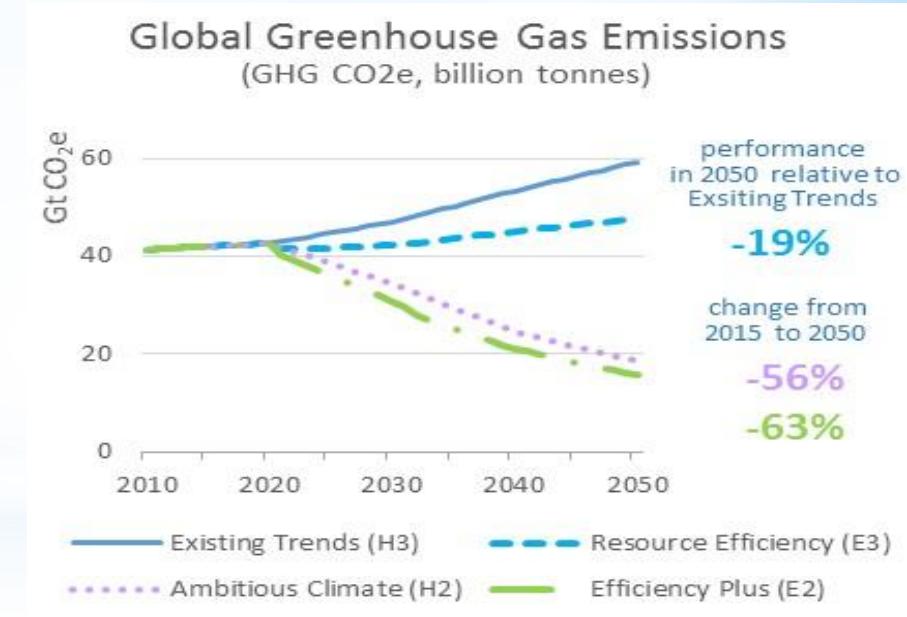
... EXTENDED TO INCLUDE LAND, NATURAL RESOURCES, AND CLIMATE IMPACTS





DECOUPLING AND RESOURCE EFFICIENCY POTENTIAL

“Improving resource efficiency is indispensable for meeting climate change targets cost effectively”



CLIMATE

CARBON MANAGEMENT

LAND

WATER

GHG

MATERIALS

DECOUPLING

RESOURCES

LOW CARBON RESOURCE EFFICIENT ECONOMY



DECOUPLING AND RESOURCE EFFICIENCY POTENTIAL

“Resource efficiency can contribute to economic growth and job creation”

Modelling results differ in size, but all of them show that increasing resource efficiency can lead to higher economic growth and employment, often even when environmental benefits are not accounted.





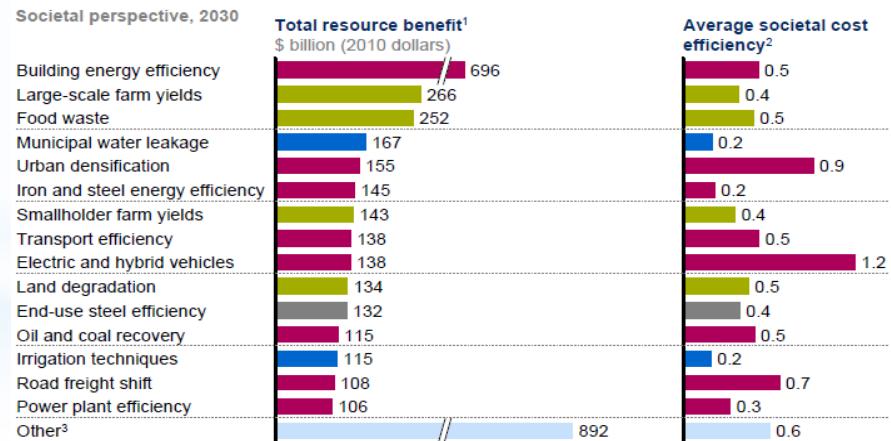
DECOUPLING AND RESOURCE EFFICIENCY POTENTIAL

“There are substantial areas of opportunity for greater resource efficiency ”

The top 15 categories of resource efficiency potential

Fifteen groups of opportunities represent 75 percent of the resource savings

Societal perspective, 2030



1 Based on current prices for energy, steel, and food plus unsubsidized water prices and a shadow cost for carbon.

2 Annualized cost of implementation divided by annual total resource benefit.

3 Includes other opportunities such as feed efficiency, industrial water efficiency, air transport, municipal water, steel recycling, wastewater reuse, and other industrial energy efficiency.

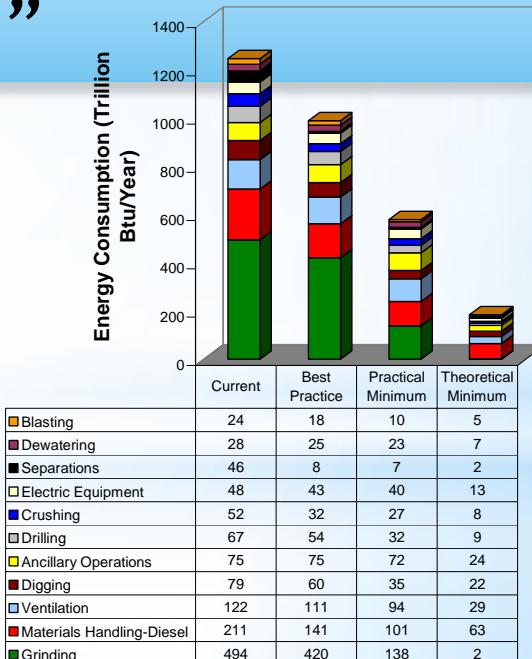
SOURCE: McKinsey analysis



DECOUPLING AND RESOURCE EFFICIENCY POTENTIAL

“Increased resource efficiency is practically attainable”

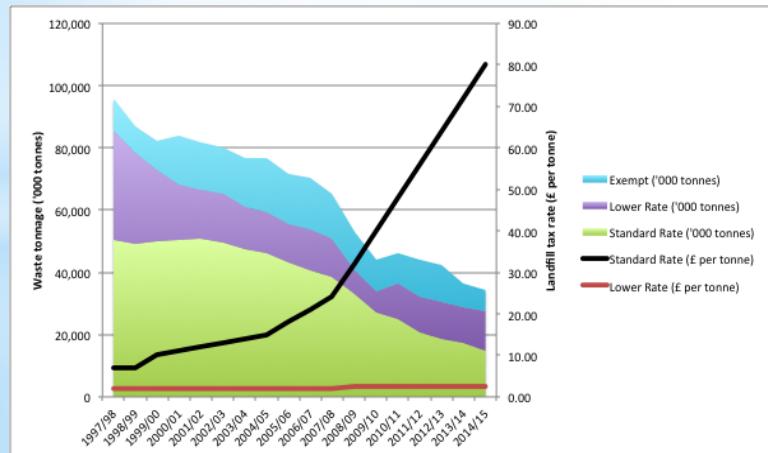
Energy consumption and saving potential by equipment type in US mining industry



THE DISCONNECT BETWEEN RESOURCE EFFICIENCY AND ECONOMIC EFFICIENCY: THE RESOURCE-EFFICIENT OPTION MAY BE MORE EXPENSIVE

There is a need to rebalance the cost of labour, and the costs of resources and pollution by:

- pricing externalities and using taxation to stimulate investment in resource-efficient alternatives
- using dynamic taxes to buffer price fluctuations, thereby reducing volatility and future uncertainty
- creating other incentives for actors to favour paying for labour to save materials, rather than for materials to save labour, such as reducing taxes on labour



UK: Waste tonnage sent to landfill, and landfill tax rates

PRINCIPLE

1

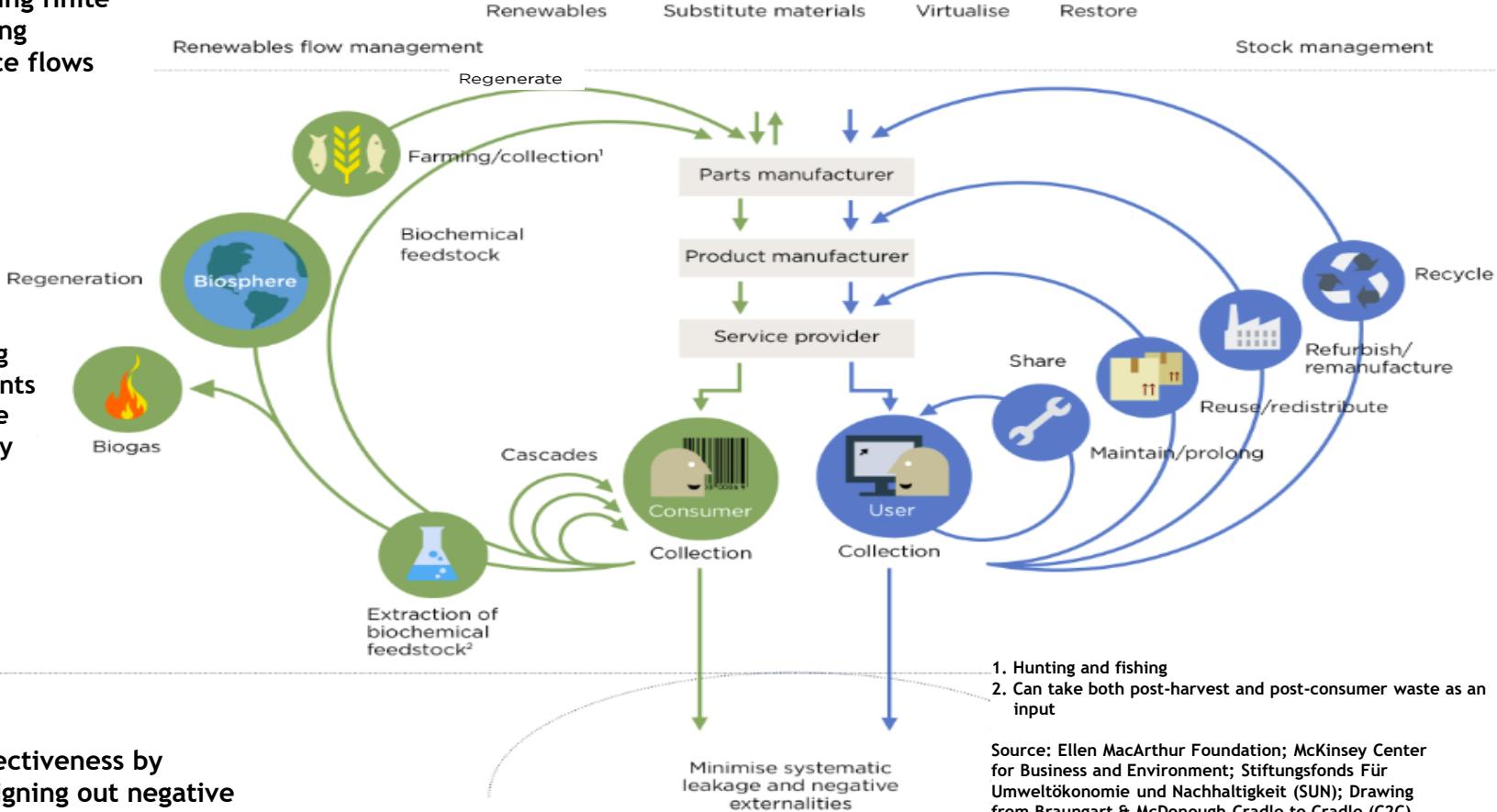
Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows



PRINCIPLE

2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles



Source: Ellen MacArthur Foundation; McKinsey Center for Business and Environment; Stiftungsfonds Für Umweltökonomie und Nachhaltigkeit (SUN); Drawing from Braungart & McDonough Cradle to Cradle (C2C)

PRINCIPLE

3

Foster system effectiveness by revealing and designing out negative externalities



TO CONCLUDE ...

*SUSTAINABLE, LOW-CARBON, CIRCULAR,
GREEN, RESOURCE EFFICIENT, ENERGY
EFFICIENT, DECOUPLING, 3Rs, ECOLOGICAL
CIVILISATION, C2C, BIOECONOMY, ECO-
ECONOMY, BLUE ...*

- *What we actually talk about*



**WE HAVE TO FIX A BROKEN
COMPASS**
(PAVAN SUKHDEV)

**NEW ECONOMIC MODEL BASED ON SCP
INTEGRATING ALL THREE PILLARS OF
SUSTAINABILITY IS**

**NECESSARY
AND UNAVOIDABLE**



MARKETS

**CANNOT ENSURE EFFICIENCY IN THE
ALLOCATION AND USE OF RESOURCES ...**



- *If prices do not reflect the true value and costs of resources,*
- *If rewards to capital are disproportionate to other inputs (financial capital is overvalued, human capital is undervalued and natural capital in many cases not valued at all),*
- *If managers on annual contracts are induced to make short term investment decisions overly influenced by bonuses based on short term share price, if ...*
- *Example: Recent reaction of financial markets on the announcement of president Trump to relax the financial market rules*

Better regulation

is not about less regulation, it is about taking responsibility for public good and creating the conditions for confidence to invest in technologies for the markets of the future

- KNOWLEDGE (*Creation*)
- INNOVATION (*Incentives*)
- PRODUCTS (*Design*)
- CONSUMERS (*Behaviour*)
- BUSINESS MODELS (*Sharing Products to services*)



SPEED OF

TRANSITION

NECESSARY CONDITIONS

1. **SCP SHOULD BE PRIORITY OF THE GOVERNMENT (NOT ONLY ENV):** *Defined in the strategic documents, supported by indicators, monitoring, reporting and linked to the core economic policy decisions.*
2. **ALL ECONOMIC POLICIES SHOULD BE SYSTEMATICALLY ADJUSTED:** *Beyond GDP, natural capital accounting, corporate sustainability reporting, tax policy, state aid, public procurement, product design, use of banking potential, R and D and innovation, investments in infrastructure, education, consumers awareness, new business models, support to SMS, etc.)*
3. **ACTIVE DIALOGUE WITH ALL STAKEHOLDERS IS NECESSARY:** *Transition is only possible if we actively involve those loosing in the process of transition*



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THANK YOU
www.unep.org/resourcepanel