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.
MISSION AND STRUCTURE

- 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

SCIENTIFIC PANEL
Internationally recognized experts on sustainable resource management

Scientific assessments and advice, networks

UNEP SECRETARIAT
Direction, procedures, support in development and implementation of assessments, outreach

STEERING COMMITTEE
Governments
Other International Organizations and Associations

Strategic guidance, political support, regional synergies

Science-policy interface
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)
Metal Recycling: Opportunities, Limits, Infrastructure (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)
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 (2106)
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
21\textsuperscript{th} 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)
21st 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
21st 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
12 SDGs ARE DIRECTLY DEPENDENT ON NATURAL RESOURCES
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.
SDGs DIRECTLY DEPENDENT ON NATURAL RESOURCES
IN THE RECENT MONTHS ...
• 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.
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.

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

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

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

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

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.

Figure 6. Per-capita material footprint (MF) by seven world regions, 1990 and 2010, tonnes.
Source: Global Footprint Network, 2012; UNDP, 2014a
AND ... SOLUTIONS
DECOUPLING IS THE IMPERATIVE OF MODERN ENVIRONMENTAL AND ECONOMIC POLICY

Diagram showing the relationship between human well-being, economic activity (GDP), resource use, impact decoupling, and environmental impact over time.
• **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 ...
“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

Historical resource trends

Resource efficiency

existing trends

resource efficiency

climate only

efficiency plus climate

GREENHOUSE EMISSIONS AND CLIMATE

3°C+ pathway (RCP6.0)

2°C pathway (RCP2.6)

Assessing global resource use and greenhouse gas emissions CSIRO | Heinz Schandl
MULTI-MODEL FRAMEWORK

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

Assessing global resource use and greenhouse gas emissions CSIRO | Heinz Schandl
“Improving resource efficiency is indispensable for meeting climate change targets cost effectively”
“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.
“There are substantial areas of opportunity for greater resource efficiency”

The top 15 categories of resource efficiency potential

- Building energy efficiency
- Large-scale farm yields
- Food waste
- Municipal water leakage
- Urban densification
- Iron and steel energy efficiency
- Smallholder farm yields
- Transport efficiency
- Electric and hybrid vehicles
- Land degradation
- End-use steel efficiency
- Oil and coal recovery
- Irrigation techniques
- Road freight shift
- Power plant efficiency
- Other

Fifteen groups of opportunities represent 75 percent of the resource savings.
DECOUPLING AND RESOURCE EFFICIENCY POTENTIAL

“Increased resource efficiency is practically attainable”

Energy consumption and saving potential by equipment type in US mining industry
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
1. **Hunting and fishing**
   Can take both post-harvest and post-consumer waste as an input.

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 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.

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

WE HAVE TO FIX A BROKEN COMPASS
(PAVAN SUKHDEV)
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)
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
THANK YOU

www.unep.org/resourcepanel