Resource efficiency targets and indicators

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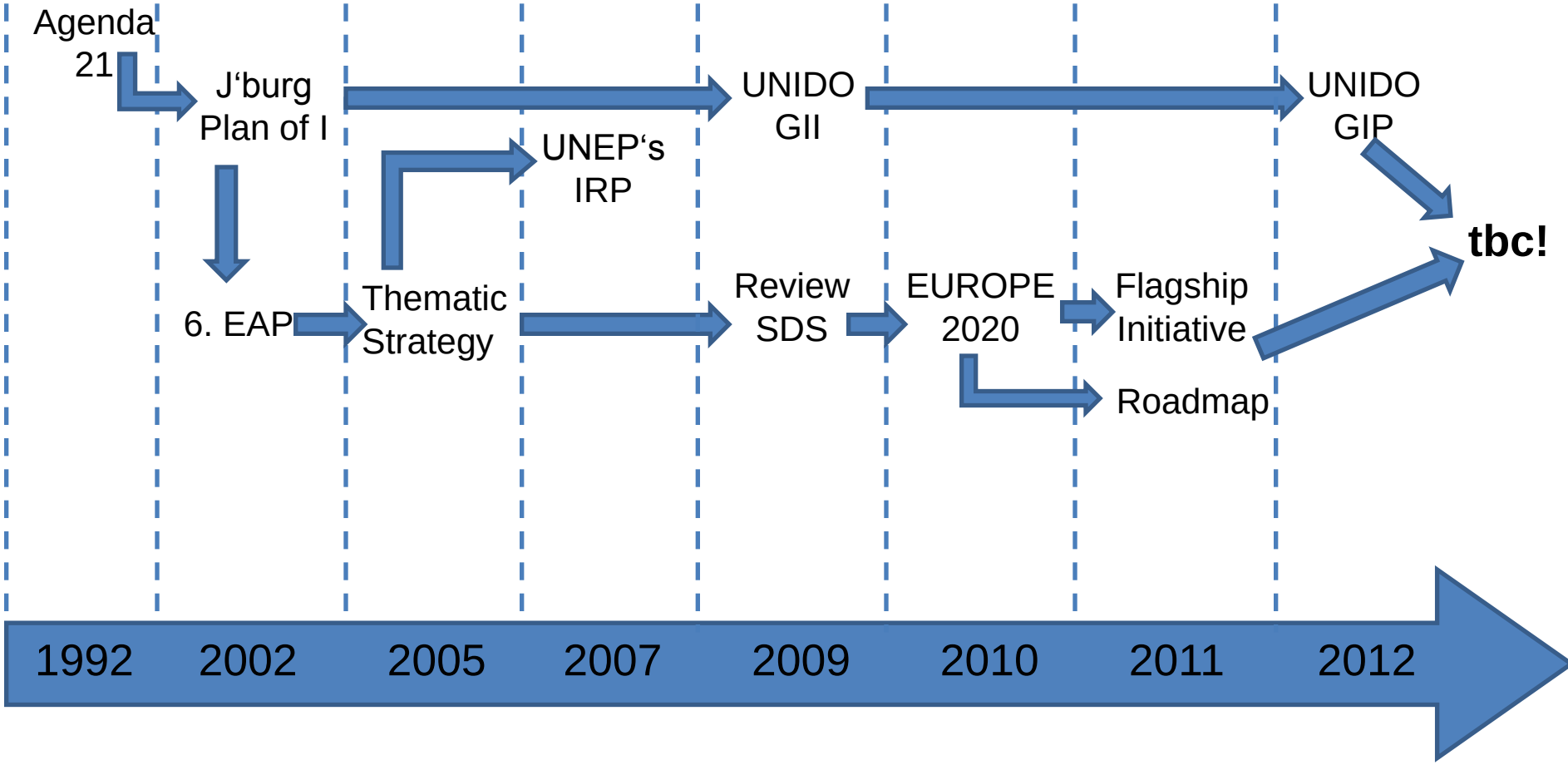
Development of the resource efficiency (RE) agenda

- RE – creating more value with less resource input + less environmental impacts
- RE – what is the resource scope?
- International and European – wide resource definition
  - UNEP (2011): energy, materials, water and land
  - EU Commission (2011): raw materials, energy, water, air, land and soil
- Diversity of resources included and to be targeted for RE

Development of the RE agenda



Resource Efficiency targets

	Policy	(qualitative) Targets
International	Agenda 21	changing consumption patterns and the conservation and management of resources for development
	J'burg Plan of Implementation	Changing unsustainable patterns of consumption and production Protecting and managing the natural resource base of economic and social development

Resource Efficiency targets

	Policy	Targets
European	Europe 2020	Low-carbon, resource-efficient EU – 20/20/20 target: Reduce GHG emissions by 20% compared to 1990 (by 30%, if the conditions are right) 20% share of renewable energy sources in final energy consumption 20% increase in energy efficiency
	Flagship Initiative „A resource-efficient Europe“	reducing resource use while supporting economic performance and boosting the EU's competitiveness by identifying and creating new opportunities for economic growth and greater innovation 20% increase in energy efficiency
	Roadmap to a Resource Efficient Europe	Sustainable consumption and production Turning waste into a resource Environmentally harmful subsidies and getting the prices right

RE targets

- Variety of targets and indicators, differing according to
  - Resource in focus
  - Input, output, combined focus

RE targets

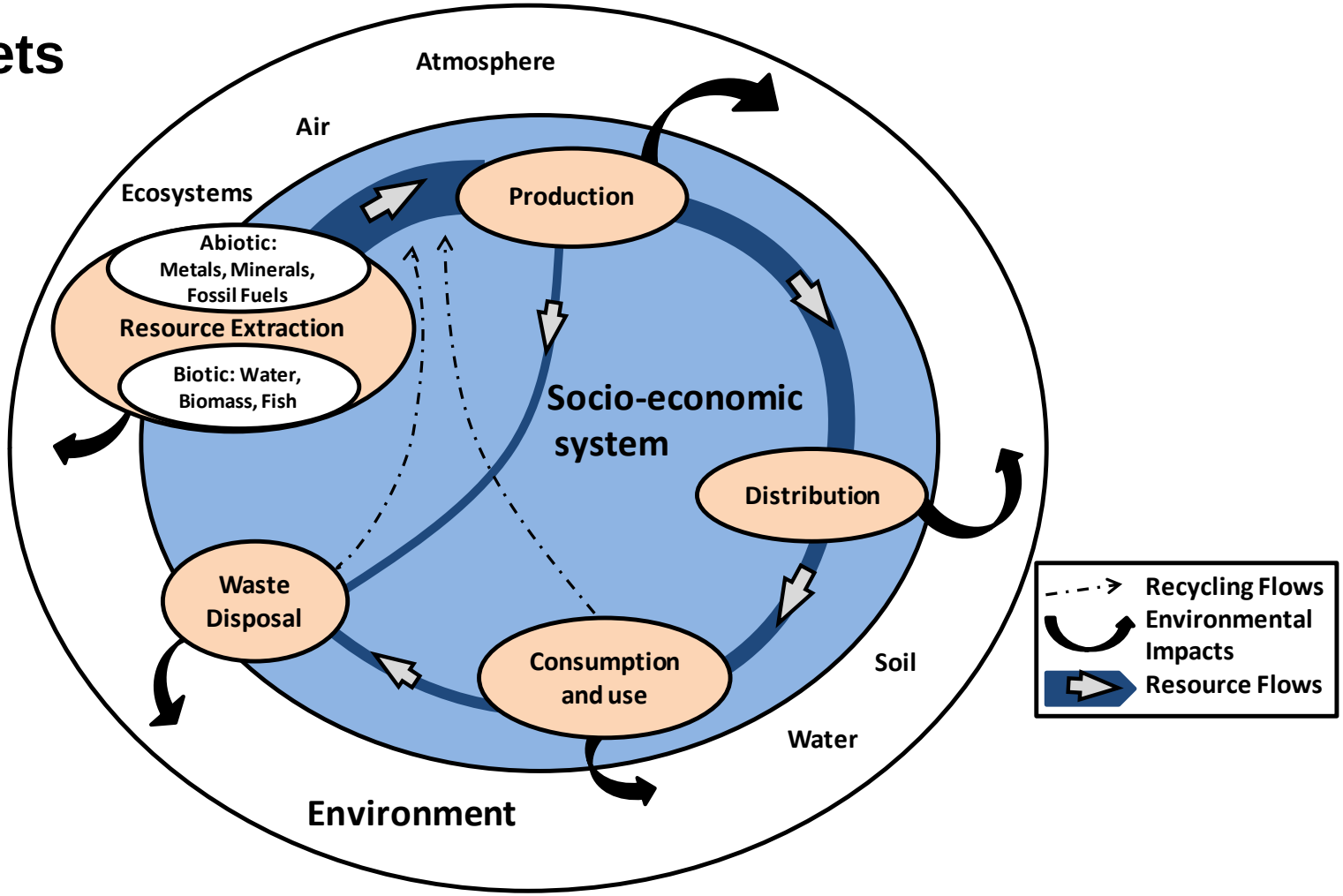


Figure adpated from UNEP (2011): Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel. Fischer-Kowalski, M., Swilling, M., von Weizsäcker, E.U., Ren, Y., Moriguchi, Y., Crane, W., Krausmann, F., Eisenmenger, N., Giljum, S., Hennicke, P., Romero Lankao, P., Siriban Manalang, A.

Study on resource efficiency indicators - Background

- Integrating resource efficiency, greening of industrial production and green industries – scoping of and recommendations for effective indicators
- Progress needed, also in relation to MDGs and SDGs
  - No specific targets for industries and industrial development
  - Few indicators for resources with industry relevance (water, energy)
- Sustainable development benefits from industrial development and needs stronger industry commitment

=> progress needed in greening of industries and fostering green industries

- BUT: how to measure progress?

Study on resource efficiency indicators - Methodology

- Indicators are needed to measure human resource use to monitor progress and identify needs for further adjustment and efforts
- “You can’t manage what you don’t measure”
- Required to effectively apply policy instruments and for benchmarking (top-runner concepts)
- Diversity of indicators available, albeit with varying applicability for greening of industries and fostering green industries

Study on resource efficiency indicators - Methodology

- List of 32 indicators reviewed and assessed according to the following criteria (non-exhaustive list, e.g. Giljum et al. 2011)
  - LCA compatibility
  - Coverage of industries and industrial development
  - Sustainability impacts coverage
  - Required data efforts
  - Policy relevance
- Top ten ranked indicators chosen for further analysis (data availability)

Study on resource efficiency indicators – main findings

Indicator	ranking
Environmentally weighted material consumption	1
Energy intensity by sector	2
Production based CO2 productivity	3
Sustainable Process Index	4
Water consumption by sector	5
Water abstraction rates and water stress	6
Corporations' turnover, value added and exports of the environmental goods and services sector	7
Resource Productivity	8
Total Material Consumption	9
Ecological Footprint	10

Study on resource efficiency indicators – main findings

Environmentally weighed material consumption (EMC)	
Methodology/Calculation	Integrate environmental impacts and materials extraction / use; MFA and LCA data
LCA compatibility	aggregated composite indicator derived from LCA
Coverage of industries and industrial development	Based on DMC => material categories => specific industries/sectors
Sustainability impacts coverage	+ includes environmental impacts of base materials - covers only the materials selected
Required data efforts & Data availability	MFA and LCA data needed Data available nationally, updated only every10 years
Policy relevance	EMC able to measure the environmental impacts of material use from cradle to grave => decoupling

Study on resource efficiency indicators – main findings

Energy Intensity by sector	
Methodology/Calculation	energy used per unit of value added manufacturing (megajoule (MJ) per USD of value added), passenger transport (MJ per passenger-km), and freight transport (MJ per tonne-km).
LCA compatibility	Theoretically compatible, but with significant additional data collection, preparation and use efforts
Coverage of industries and industrial development	Potentially product specific could be calculated for different sectors
Sustainability impacts coverage	not directly measure environmental and social impacts, but economic impacts
Required data efforts & Data availability	Easy to obatin national or sectoral data At product level significant efforts required
Policy relevance	Energy intensity of the economy is a key indicator for measuring Europe 2020

Study on resource efficiency indicators – main findings

Production-based CO_2 productivity	
Methodology/Calculation	calculated as GDP generated per unit of energy-related CO_2 emitted.
LCA compatibility	Energy LCA could be combined with monetary data on value added or contribution to GDP
Coverage of industries and industrial development	measure industry performance over time in reducing emissions from energy use in production
Sustainability impacts coverage	environmental impact of energy-related CO_2 emissions linkages between economic growth and CO_2 emissions
Required data efforts & Data availability	GHG emissions data reported to the Secretariat of the UNFCCC, GDP data readily available for many countries
Policy relevance	indicator measures progress towards national or international commitments to reduce GHG emissions.

Study on resource efficiency indicators – main findings

Water consumption by sector	
Methodology/Calculation	annual water consumption per sector in meters^3/year or as a percentage of total water consumption
LCA compatibility	LCA for products, services and sectors can measure water consumption along the life-cycle chain
Coverage of industries and industrial development	measures the performance of specific sectors in terms of water consumption
Sustainability impacts coverage	Measures only pressure water abstraction, not its impacts; no indication as to water scarcity
Required data efforts & Data availability	national data available, but quality of industrial water use data limited due to lacking industry reports
Policy relevance	Indicator highlights importance and vulnerability of a sector in the total demand for water.

Study on resource efficiency indicators – main findings

Resource Productivity	
Methodology/Calculation	GDP / DMC, aggregate measure of material efficiency of an economy
LCA compatibility	based on DMC => address different life cycle stages; but only for input, not for environmental impacts
Coverage of industries and industrial development	DMC => material categories => generalization to product categories or industry sectors
Sustainability impacts coverage	indicates quantities used for value generation, does not address resource scarcity/environmental impacts.
Required data efforts & Data availability	DMC and GDP data, MFA and GDP data available for many countries
Policy relevance	progress towards decoupling of economic growth Provisional headline indicators EU Roadmap

Study on resource efficiency indicators – main findings

Ecological Footprint	
Methodology/Calculation	biologically productive land / water area required to a) provide resources and b) absorb wastes generated measured in global hectares
LCA compatibility	Applicable to single activities, products, or industries Can reflect life cycle aspects only to a limited extent
Coverage of industries and industrial development	can be applied to studying the performance of specific industries
Sustainability impacts coverage	resource consumption, no precise information on ecosystem impact; not for social or economic impacts
Required data efforts & Data availability	Based on international data sets published by UN FAO, the UN Statistics Division and IEA 2010
Policy relevance	relates resource use to carrying capacity Very good for visualisation

Study on resource efficiency indicators – Discussion

- Relevance for greening of industries and fostering green industries
  - Data requirements and disclosure of information
  - Addressing all life-cycle stages and measuring different impacts
  - Resource specific indicators (materials, energy, water)
  - Policy relevance and potentially politically required indicators

RE indicators – recommendations

- Set of indicators needed, as best as possible balancing
  - Strengths and weaknesses
  - Resources covered
  - Quantities and impacts measured
- To measure progress towards reduction of resource consumption (resource decoupling) and associated impacts (impact decoupling)

RE indicators – recommendations

- Suggested set of indicators
  - EMC (or eco-efficiency or overall environmental impact indicator) to capture environmental impacts;
  - Energy intensity by sector and production-based CO_2 productivity to cover the critical environmental areas energy and climate change;
  - Water productivity by sector and water stress to capture resource efficiency for a second critical environmental resource; and
  - Resource productivity (or TMC over GDP) to capture resource consumption

Thank you for listening.

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