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Visions, Scenarios and Pathways to a Resource-Efficient Europe

A Presentation to the Final Conference of POLFREE and DYNAMIX
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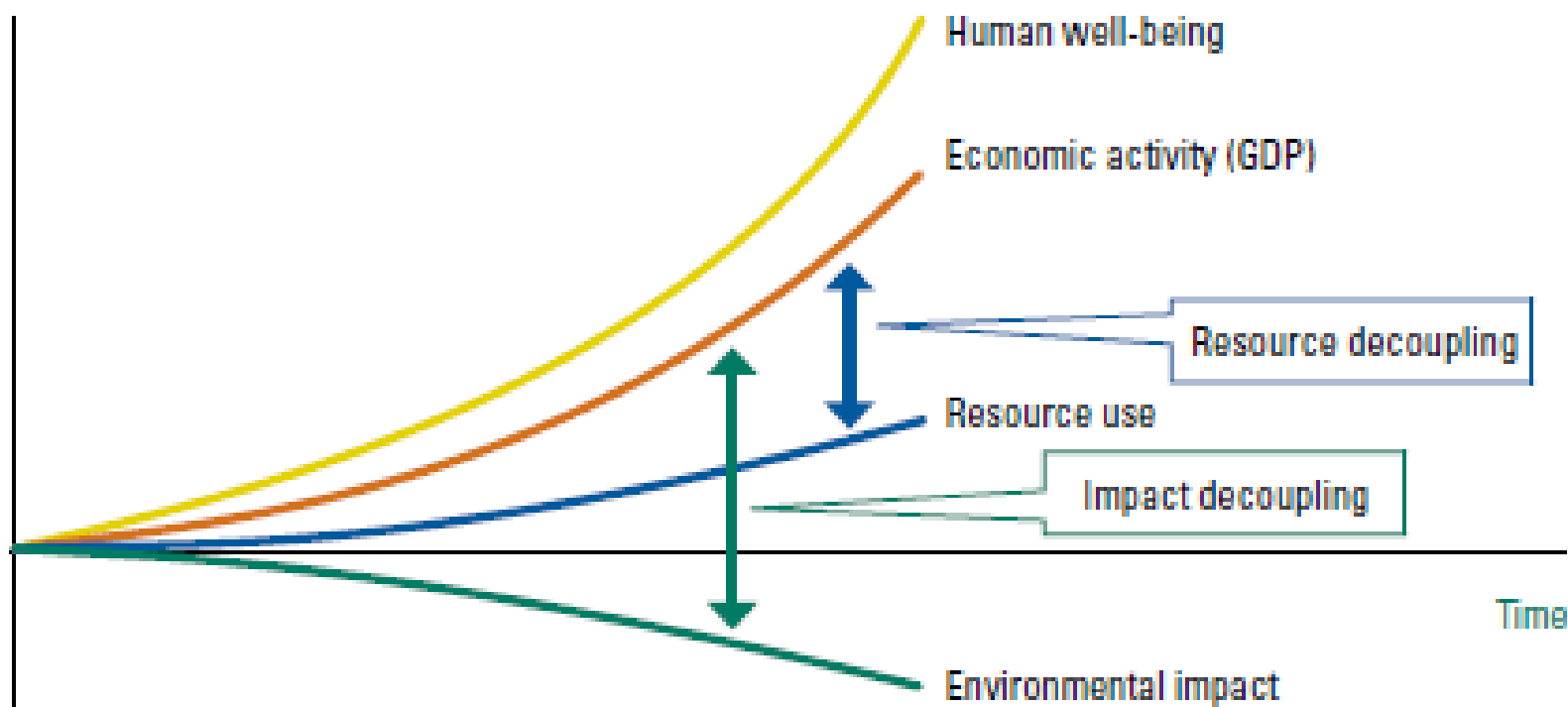
Brussels

POLFREE: Concepts

- **Resources:**
The production and use of goods and services is associated with the use of natural resources: water, land and a range of minerals or materials . A common categorisation of resources is fossil fuels (and associated carbon emissions), construction minerals, metallic minerals, biomass, water and land.
- **Resource efficiency:**
Increasing resource efficiency involves using a reduced quantity of resources to achieve the same or improved service or output (output/resource input), where both input and output are measured in some physical unit, e.g. km/litres of fuel. It is therefore an output/input measure of technical ability to produce “more from less”
- **Resource (or environmental) productivity:**
A measure of the value that is added to material resources; for a national economy this would be GDP/RMC, units EUROS/tonnes
- **Resource (or environmental) intensity:**
Inverse of resource or environmental productivity, e.g. emissions (tonnes)/GDP (EUROS)

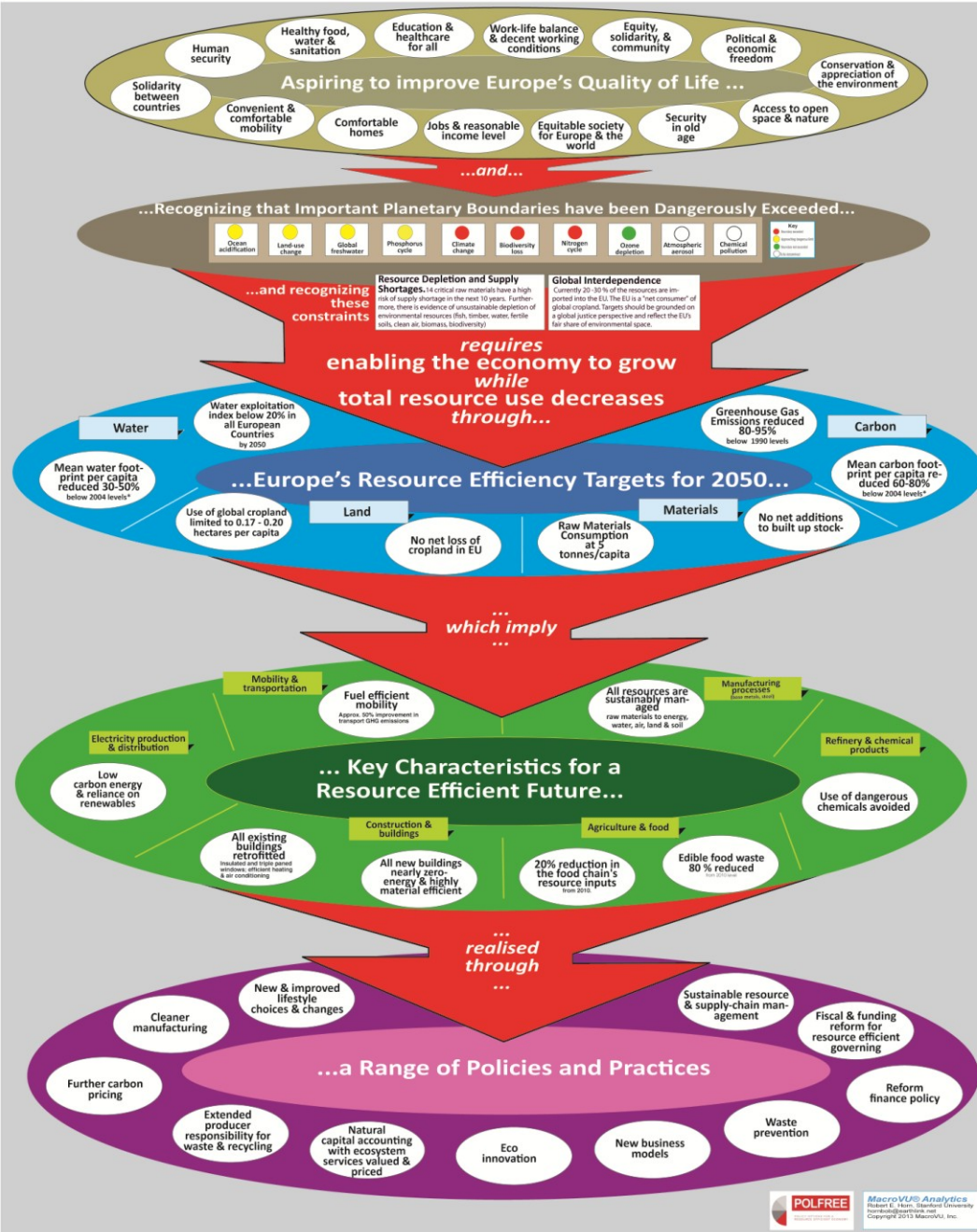
The imperative of double decoupling

Source: UNEP IRP 2011 *Decoupling Natural Resource Use and Environmental Impacts from Economic Growth*





Vision for a Resource-Efficient Europe in 2050

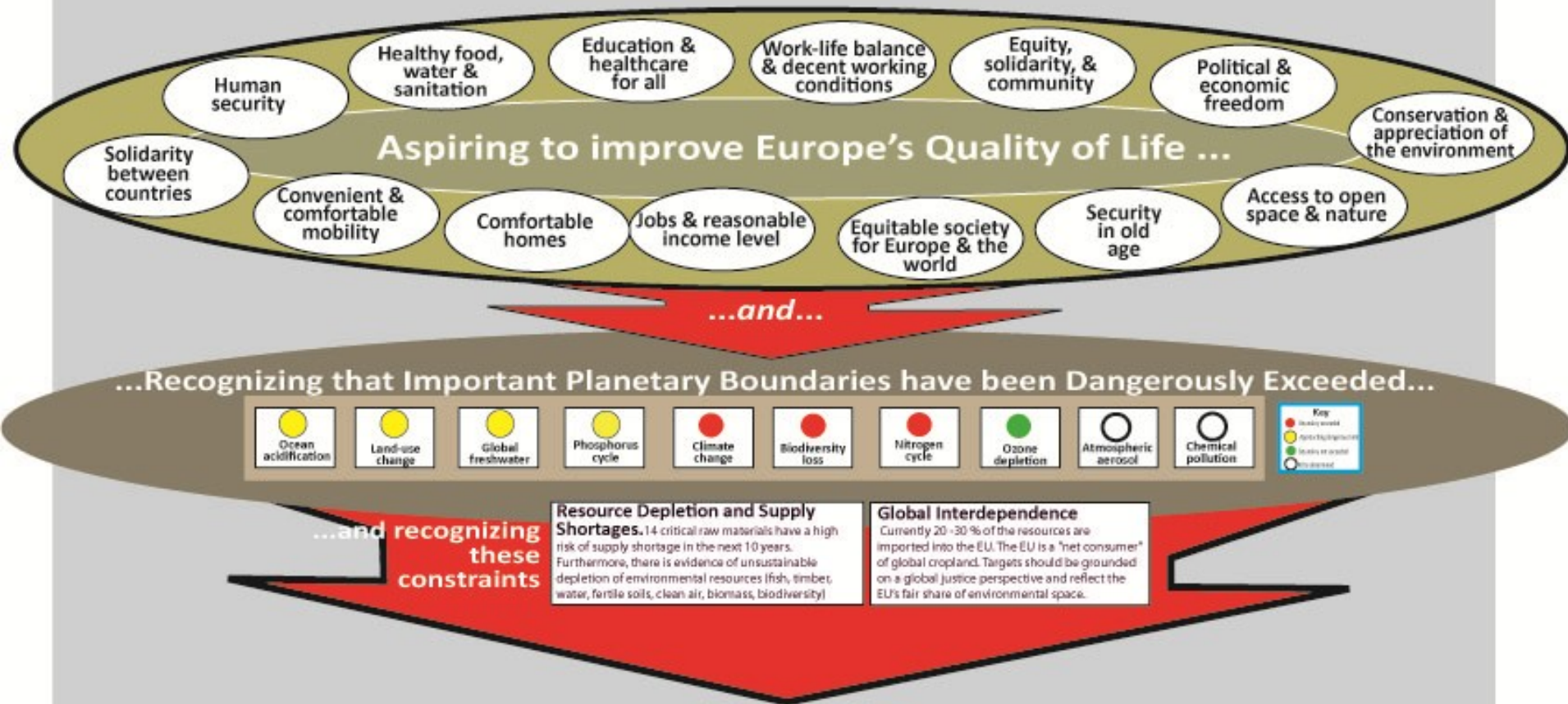


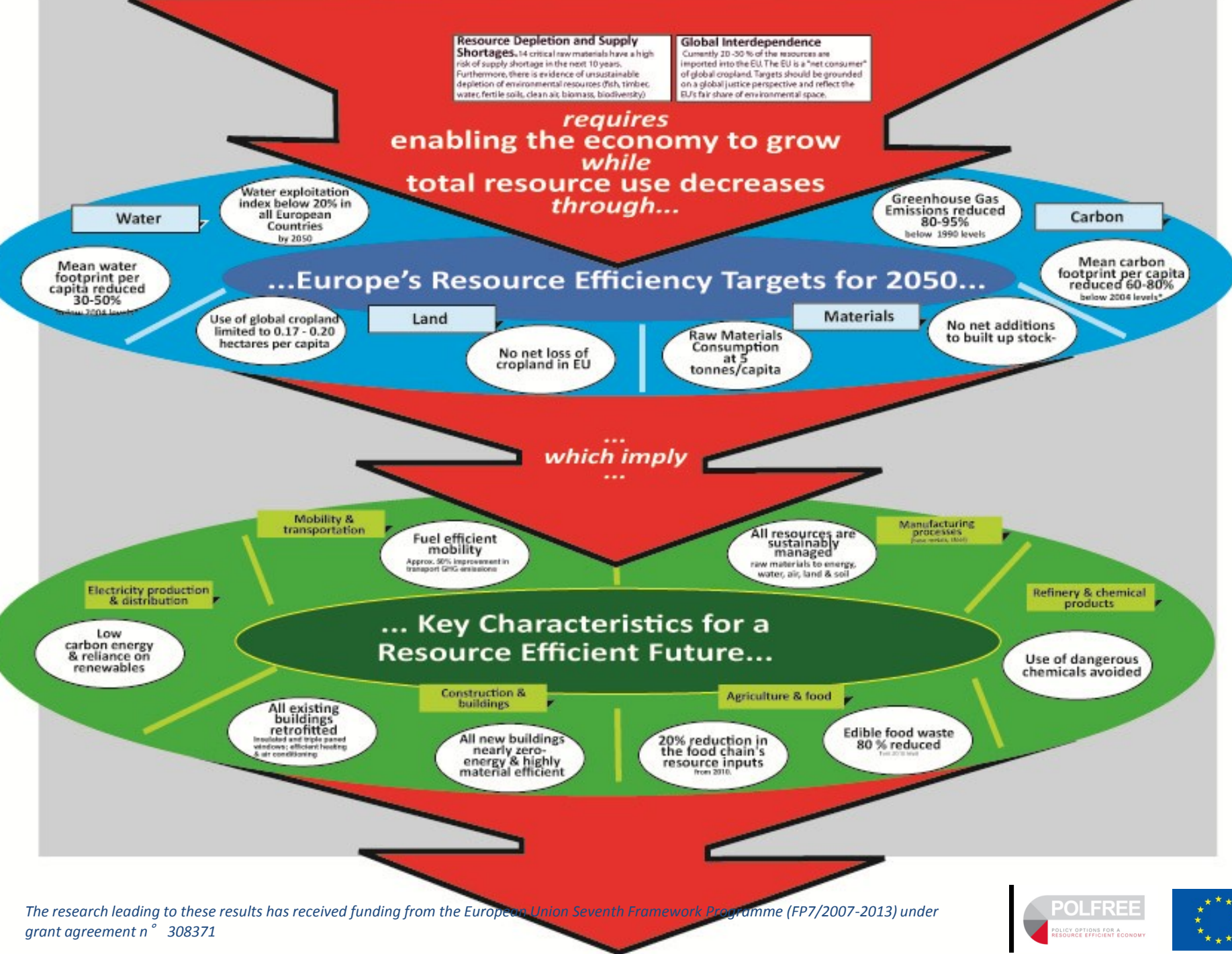
The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 308371

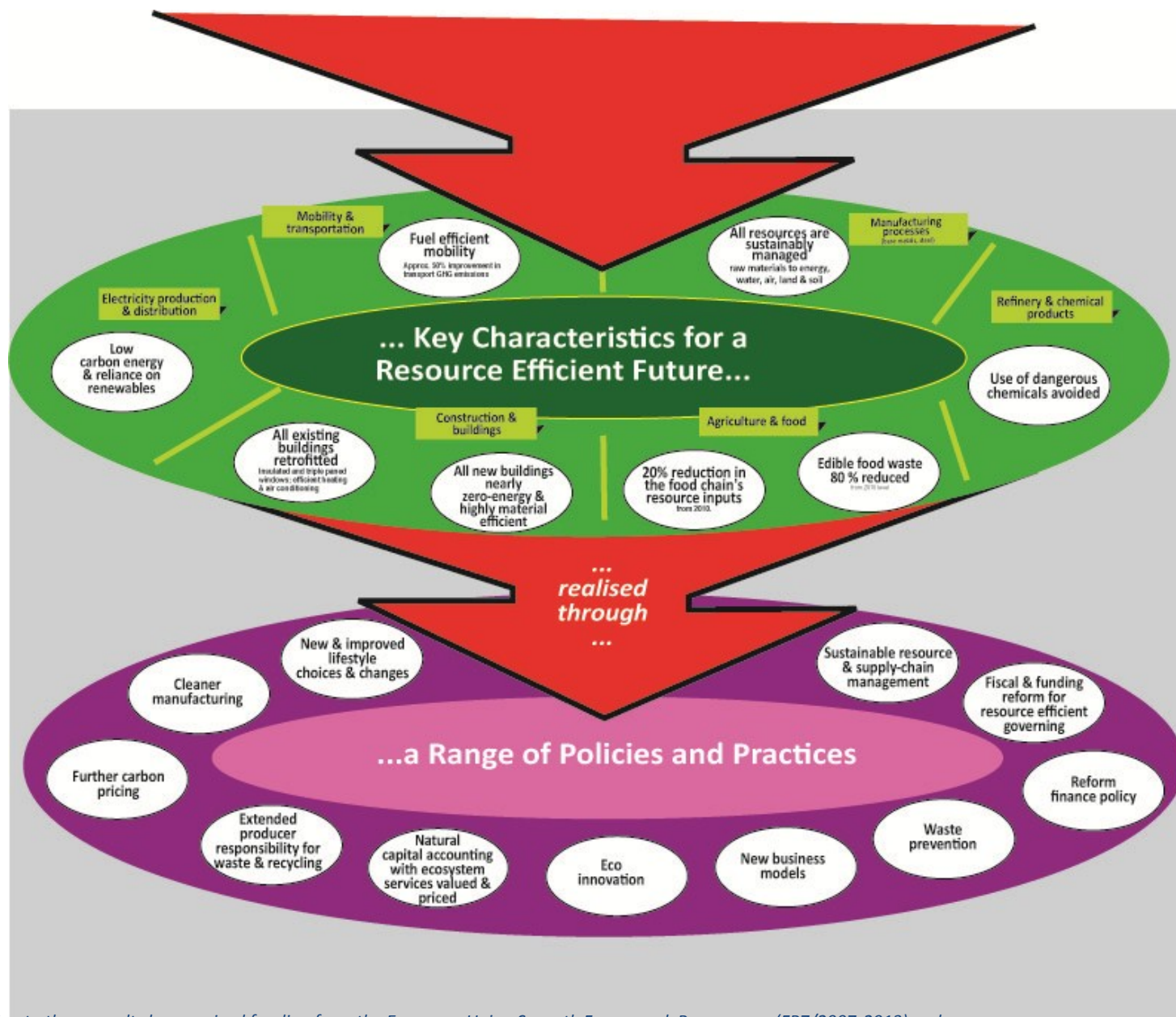




Vision for a Resource-Efficient Europe in 2050







Resource and environmental targets

- Politicians and policy makers set targets and objectives for issues they consider important
- What are environmental and resource boundaries and constraints?
- What is the 'safe operating space'?
- What dimensions should be included?
- How should they be measured?
- What targets should be adopted?

Suggested indicators

Source: BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute (2012) Assessment of resource efficiency indicators and targets. Final report prepared for the European Commission, DG Environment.

	Resource use-oriented		Environmental impact-oriented	
	<i>Domestic resource use</i> <i>(resources directly used for domestic production and consumption)</i>	<i>Global resource demand</i> <i>(domestic resource use plus resource use embodied in trade)</i>	<i>Environmental impacts related to domestic resource use</i>	<i>Environmental impacts related to global resource demand</i>
Material use	Domestic material use Domestic Material Consumption	Global material demand Raw Material Consumption	<i>Territorial part of Life-Cycle Resource Indicator (of Environmentally-weighted Material Consumption)*</i>	Life-Cycle Resource Indicator <i>(Environmentally-weighted Material Consumption)*</i>
Energy use and climate change	Domestic energy use Gross Inland Energy Consumption	Global energy demand Energy Footprint	Domestic GHG emissions Territorial GHG Emissions	Global GHG emissions Carbon Footprint
Water use	Domestic water use Water consumption <i>(Water abstraction)*</i>	Global water demand Water Footprint	Domestic water exploit. Water Exploitation Index	Global water exploit. Global Water Consumption Index
Land use	Domestic land use Domestic Land Demand	Global land demand Actual Land Demand (Land Footprint)	Domestic LU intensity Human Appropriation of Net Primary Production	Global LU intensity <i>eHANPP, LEAC and other indicators on ecosystem quality</i>

Suggested targets

Source: BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute (2012) Assessment of resource efficiency indicators and targets. Final report prepared for the European Commission, DG Environment.

	Ambitious	Moderate	Conservative
GHG emissions (baseline 1990)	-30% by 2020 -95% by 2050	-20% by 2020 -80% by 2050	-20% by 2020 -50% by 2050
Energy consumption (GIEC) (baseline 2005)	-20% by 2020 -40% by 2050	-15% by 2020 -30% by 2050	-10% by 2020 -20% by 2050
Material use (DMC) (baseline 2005)	-30% by 2020 -70% by 2050	-10% by 2020 -30% by 2050	-5% by 2020 -20% by 2050
Land use	Zero net demand of foreign land by 2020	Zero net take of artificial land by 2020	Limit annual net increase of artificial land to 200 km ² by 2020
Water use Water Exploitation Index (WEI)	<20% WEI by 2020 <10% WEI by 2050	<25% WEI by 2020 <20% WEI by 2050	<30% WEI by 2020 <25% WEI by 2050

Legend for feasibility:

Possibility to achieve targets with significant changes in levels of activity and significant advancement from known and future technologies	Possibility to achieve targets with slight changes in levels of activity and greater investments in known technologies	Possibility to achieve targets while maintaining current levels of activity and cost effective investments in known technologies
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POLFREE Targets

Source: O'Brien, M., Hartwig, F., Schanes, K., Kammerlander, M., Omann, I., Wilts, H., Bleischwitz, R. and Jäger, J. 2014 'Living within the safe operating space: a vision for a resource efficient Europe', Eur J Futures Res, 2:48

Table 1 Resource consumption targets

	Materials	Land	Carbon	Water
Target	10 t TMC _{abiotic} / person ^a	0.20 ha cropland / person ^b	1.05 t CO ₂ / person ^c	Not quantified
Implications for EU citizens by 2050	ca. 70 % reduction compared to 2008	ca 45 % reduction compared to 2007 ^d	ca. 90 % reduction compared to 2010	(ca. 30–50 % reduction compared to 2004) ^e
Source	Bringezu 2011 [54]	UNEP 2014b [55], Bringezu et al. 2012 [56]	Roelich et al. 2011 [57]; Lenzen et al. 2012 ^f [58]	Roelich et al. 2011 [57]
Rationale	Return to a global level of mineral extraction equivalent to the year 2000 (without considering erosion)	Halt the loss of biodiversity and keep land use change (LUC) within the safe operating space	Keep global warming within 2 degrees Celsius (67 % probability)	Scenarios based on potential efficiency improvements and demand-side reductions under four “One Planet” scenarios
Calculation	Global total mineral extraction in the year 2000 divided by expected world population in 2050	Max cropland area of 1.6 Mha divided by expected world population in 2030	Global cumulative cap of 750 GtCO ₂ (WBGU 2009); budget of 9.6 GtCO ₂ in 2050 divided by expected world population in 2050	–

- Each scenario was designed to meet, through different policy mixes, the following overarching targets for the EU:
 - A reduction of CO₂ emissions by 80% compared with 1990,
 - A reduction of the cropland footprint by 30 % compared with 2005,
 - A reduction of raw material consumption (RMC) to 5 tons per capita,
 - A water exploitation index below 20% in all countries.

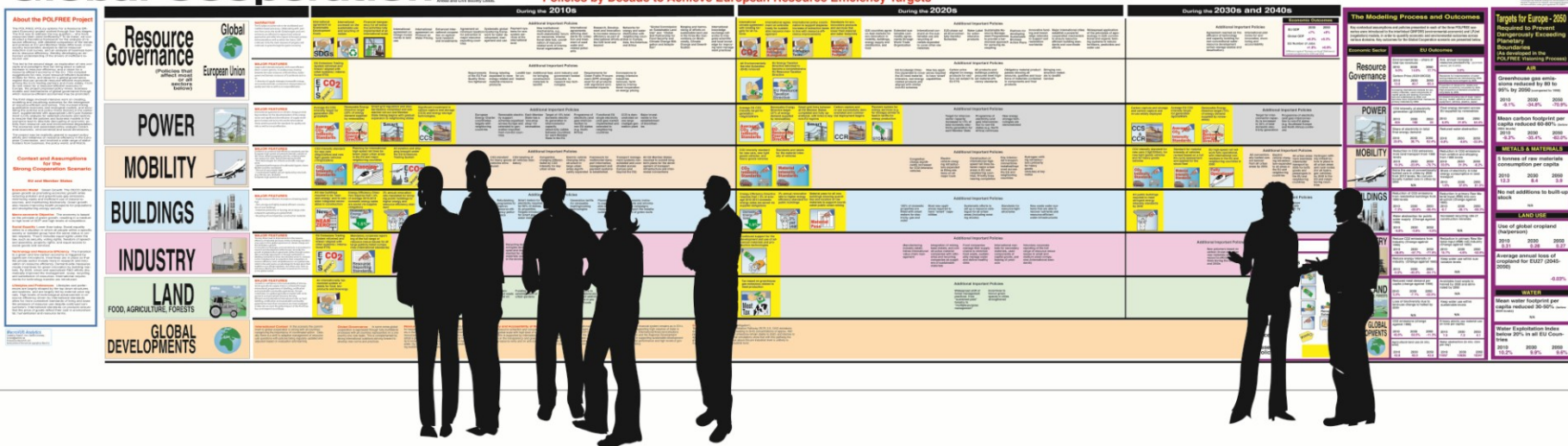
POLFREE Scenarios at a Glance

- A 'Business-as-Usual' scenario, in which an increasing focus or ambition surrounding decarbonisation of resource-efficiency in both EU and non-EU countries fails to materialise.
- 'Global Cooperation' – All countries co-operate through international agreements and harmonized economic and regulatory policy instruments to pursue decarbonisation and a resource-efficient global economy.
- 'EU Goes Ahead' – The EU pursues the development of a low-carbon, resource-efficient economy unilaterally, through strong EU-level economic and regulatory policy instruments instituted by Member States. Non- EU countries only install a moderate low carbon policy.
- 'Civil Society Leads' – Main difference to “EU Goes Ahead”: In the EU civil society, NGOs and businesses drive resource-efficiency through voluntary changes in preferences and behaviour. Policies are introduced to facilitate such changes.

Global Cooperation

This infographic describes one of three scenarios that policy options developed by the POLFREE project will be used to achieve the European Resource Efficiency Targets.

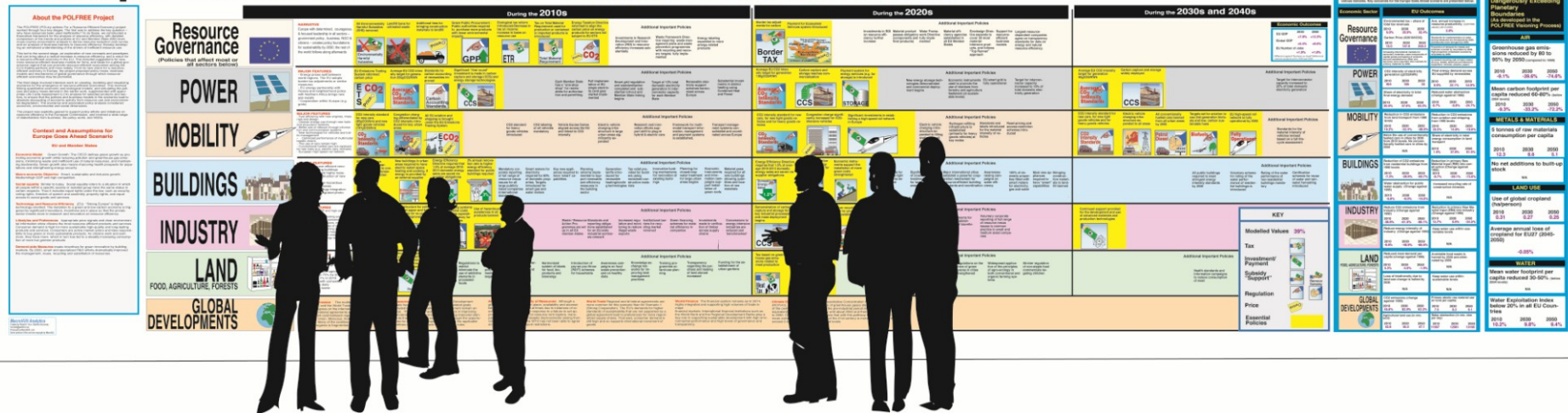
Policies by Decade to Achieve European Resource Efficiency Targets



Europe Goes Ahead

The following describes one of the scenarios
and modelling outcomes developed by the POLFREE
Project. The other two scenarios are listed in the
Appendix to the Policy Options for a Resource Efficient Economy

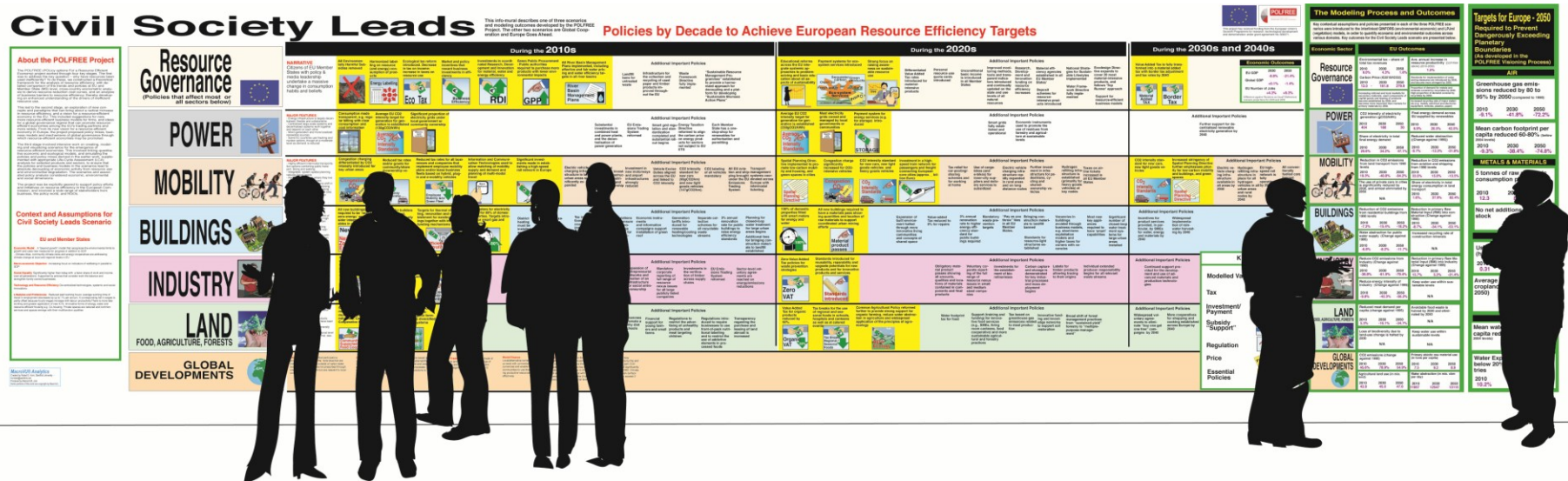
Policies by Decade to Achieve European Resource Efficiency Targets



Civil Society Leads

This infographic describes one of three scenarios and modelling outcomes developed by the POLFREE Project. The other two scenarios are the Business-as-Usual and the Resource Efficiency Leads scenario.

Policies by Decade to Achieve European Resource Efficiency Targets

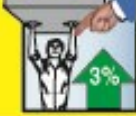


POLFREE Policies for Resource Efficiency



Europe Goes Ahead

During the 2010s

Resource Governance (Policies that affect most or all sectors) 	All Environmentally Harmful Subsidies (EHS) removed Landfill bans for untreated waste Additional fees for bringing construction materials to landfill Green Public Procurement: Public authorities required to purchase more products with lower environmental impacts Ecological tax reform introduced: Decrease in tax on income; increase in taxes on resource use Tax on Total Material Requirement used for production or contained in imported products is introduced      
POWER 	EU Emissions Trading System reformed: carbon price Average EU CO₂ intensity target for generation 250gCO₂/KWh Standards for carbon accounting of renewables improved Significant "first round" investment is made in carbon capture and storage (CCS) and energy storage technologies Each Member State has a "one-stop-shop" for renewables for authorisation and permitting    
MOBILITY 	CO₂ intensity standard for new cars (95gCO₂/km) and new light goods vehicles (147gCO₂/km) Congestion charging differentiated by CO₂ intensity introduced for key urban areas All EU aviation and shipping is brought under the EU Emissions Trading System Additional Important Policies CO₂ standard for heavy goods vehicles introduced CO₂ labeling of all vehicles mandatory Vehicle Excise Duties aligned across the EU and linked to CO₂ intensity   
BUILDINGS 	All new buildings required to be "near-zero-energy" and to consider integrated renewables in construction New buildings in urban areas required to have electric water/ space heating and cooking, if energy is provided by an external supplier Energy Efficiency Directive requires that 1.5% of average 2010-2013 domestic energy sales are saved via supplier obligation 3% annual renovation rate to higher energy efficiency standard for public buildings required Mandatory corporate reporting of full range of resource nexus issues for all large publicly listed companies (international standards) Smart meters for electricity required for 80% of domestic properties. Targets introduced for smart gas and water meters    

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