UN environment

International Resource Panel

ReMaTec 2019

23-25 June RAI Amsterdam The Netherlands

Product Value Retention

What it is? Why does it matter and where next?

JANEZ POTOČNIK
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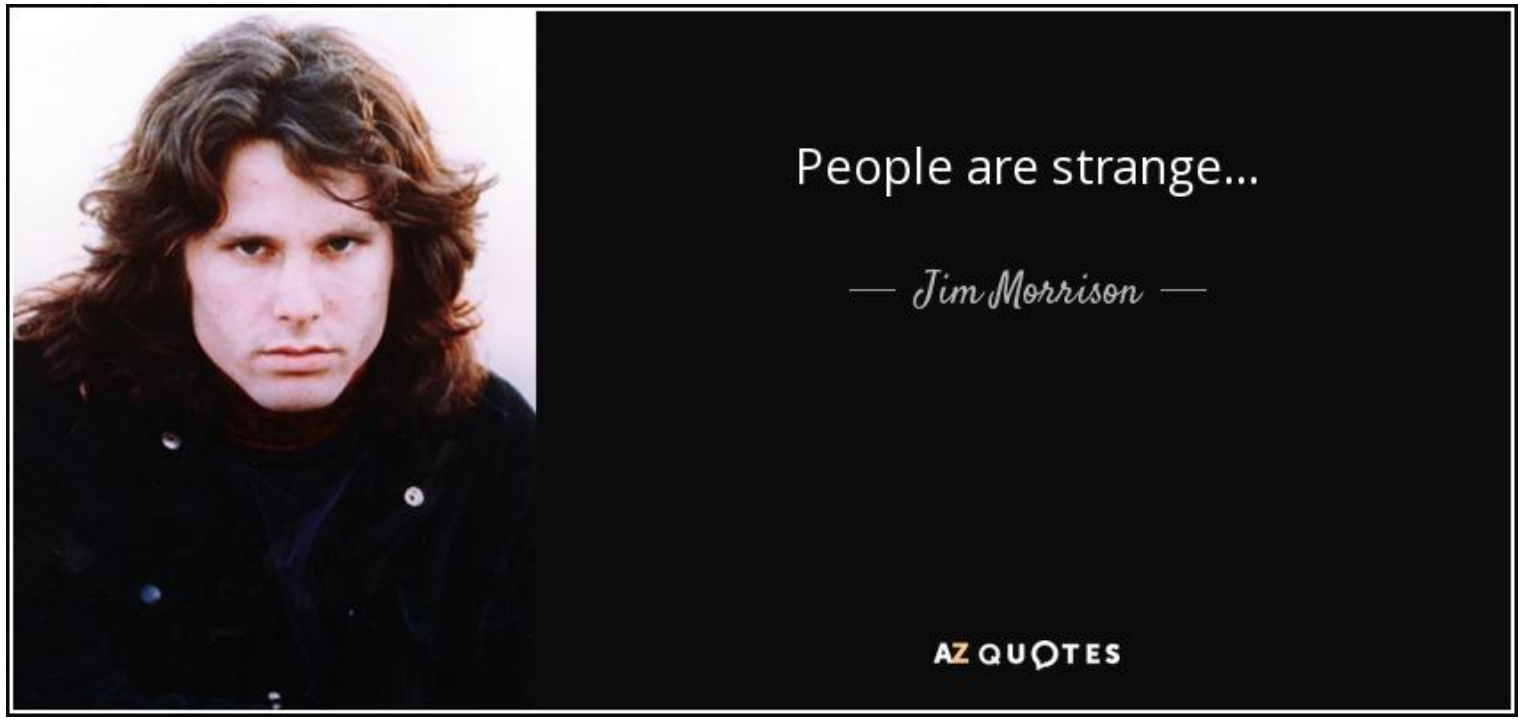
Partner SYSTEMIQ

24th June 2019

OUR WORLD

SOME FACTS ABOUT FUTURE RISKS

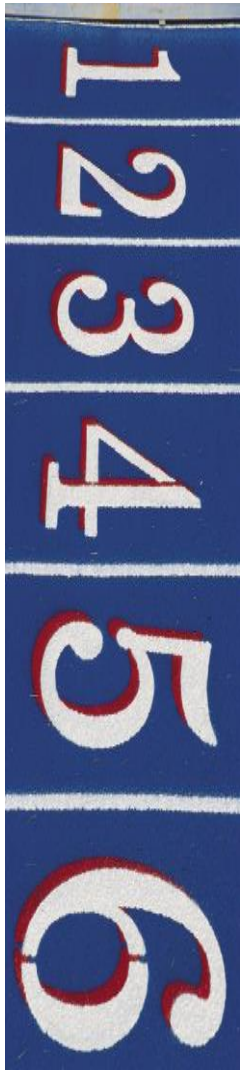


We want changes …

but we do not want to change

THE TASTE OF 21ST CENTURY

- *Population growth (2050 – 9.7 billion)*
- *Per capita consumption growth will increase - consumers moving from low to middle class consumption*
- *Few people own the same as the poorest half of the world and the richest 1% is more wealthy than the rest of the world*
- *800 million people are hungry, over 2 billion suffer from micronutrient deficiencies, over 2 billion people are obese*
- *We throw away one third of the food we produce*
- *More than 50% of urban fabric expected to exist by 2050 still needs to be constructed*
- *2011-13 China has used more cement than USA in 20th century*



THE TASTE OF 21ST CENTURY

- *Climate change experts warned us that emissions need to be about halved by 2030 to limit warming to 1.5˚C*
- *60% of ecosystems already degraded or used unsustainably*
- *Biodiversity: Living Planet Index – 60% fall in just 40 years*
- *85 % of the world's fisheries are at (beyond) biological limits*
- *1/3 of soils is degraded or used unsustainably due to various reasons*
- *7 millions premature deaths yearly globally due to air pollution*
- *A million of plastic bottles are bought every minute. 9% of plastic recycled, 12% incinerated, 79% landfills or environment*
- *If drinking only bottled water one consumes 130,000 plastic particles per year from that source alone, compared to 4,000 from tap water*
- *We are the first generation more likely to die as a result of lifestyle choices than infectious disease*

THE TASTE OF 21ST CENTURY

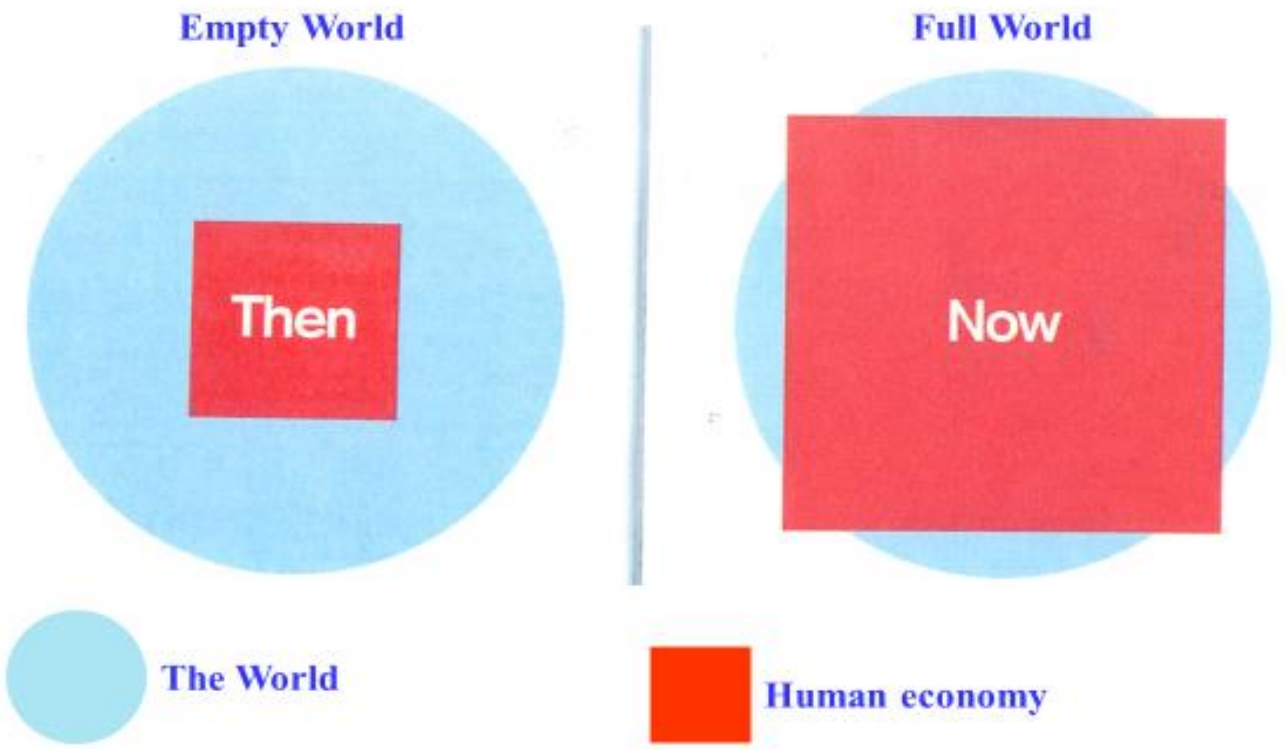
- *Nearly half of all the work we do, will be able to be automated by mid of the century*
- *In 1997, DeepBlue beat Gary Kasparov – world Chess champion - using an algorithm conceived in the 1950s and lots of human data. In 2017, AlphaGo beat Ke Jie - world Go champion – discovering by itself the principles of the game and how to play it - Era of artificial intelligence*

For the first time in a human history we face the emergence of a single, tightly coupled human social-ecological system of planetary scope.

We are more interconnected and interdependent than ever.

Our individual and collective responsibility has enormously increased.

Empty World and Full World

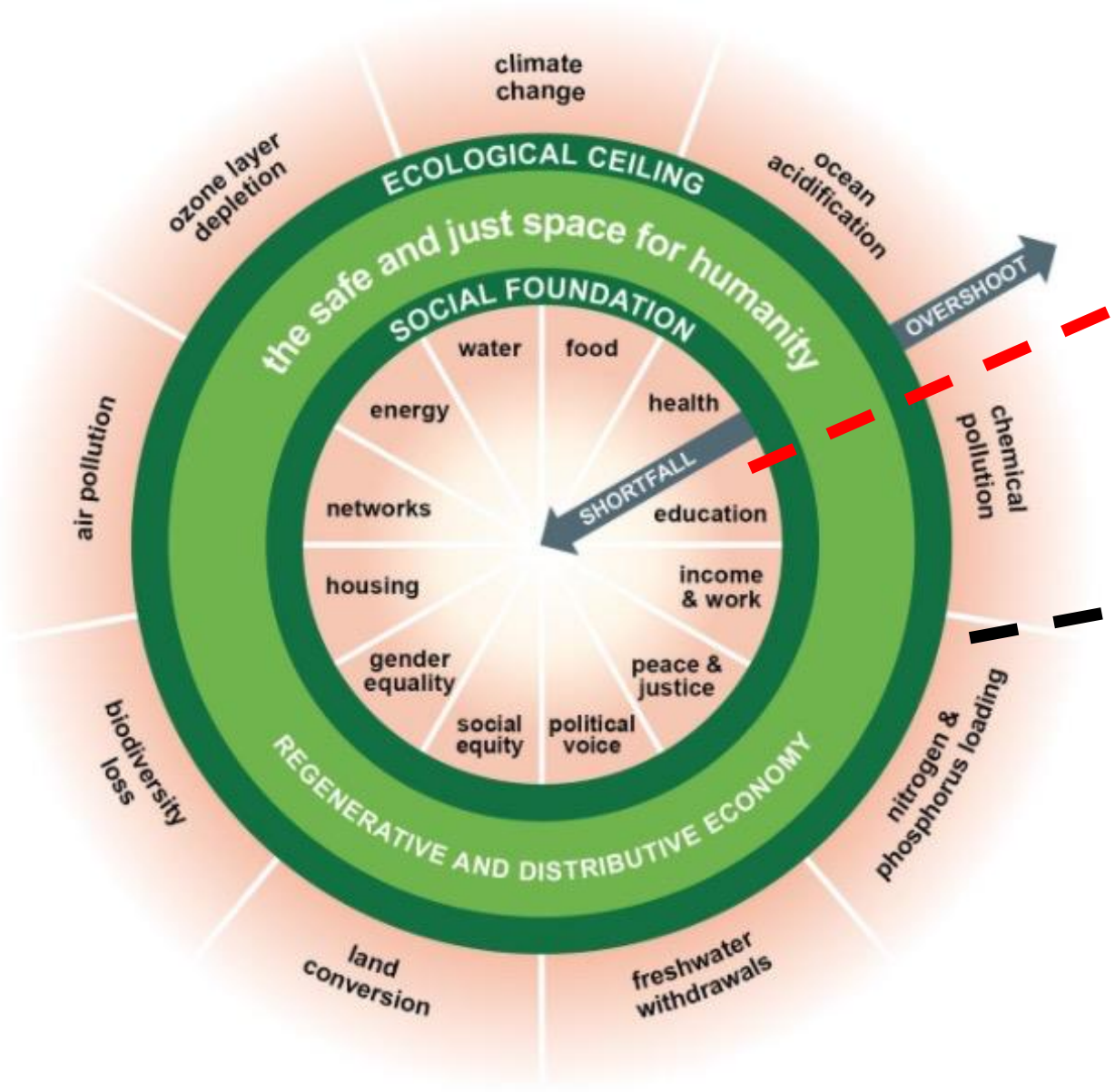


Source: Club of Rome: Simplified after Herman Daly

Labour and Infrastructure limiting factors of human wellbeing

Natural resources and Environmental sinks limiting factors of human wellbeing

Safe Operating Space - "doughnut" perspective



Basis human needs

incl. minimum requirements

of resource supply

Outer limit by Planetary

Boundaries

Adapted from Raworth 2017

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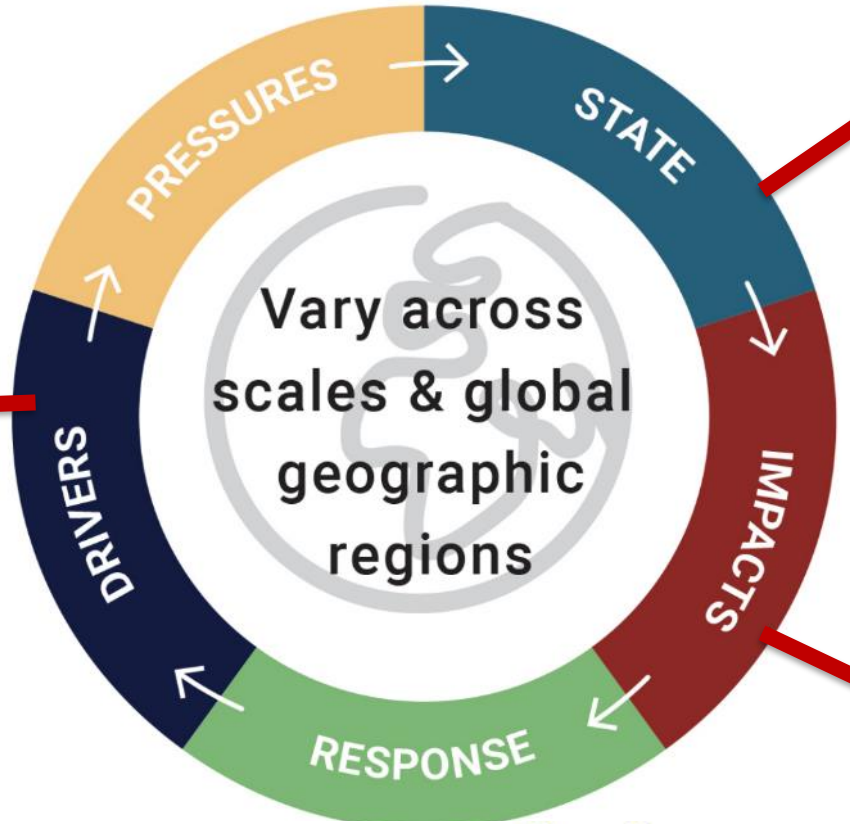

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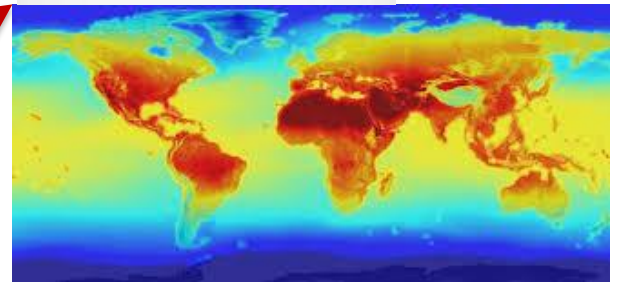
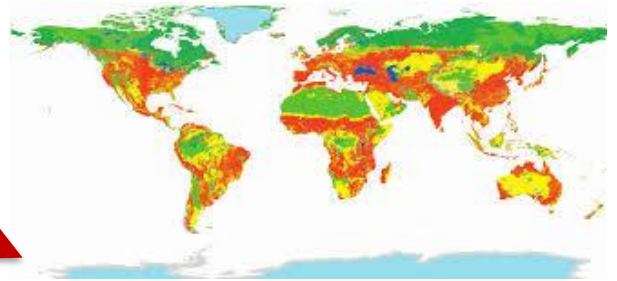


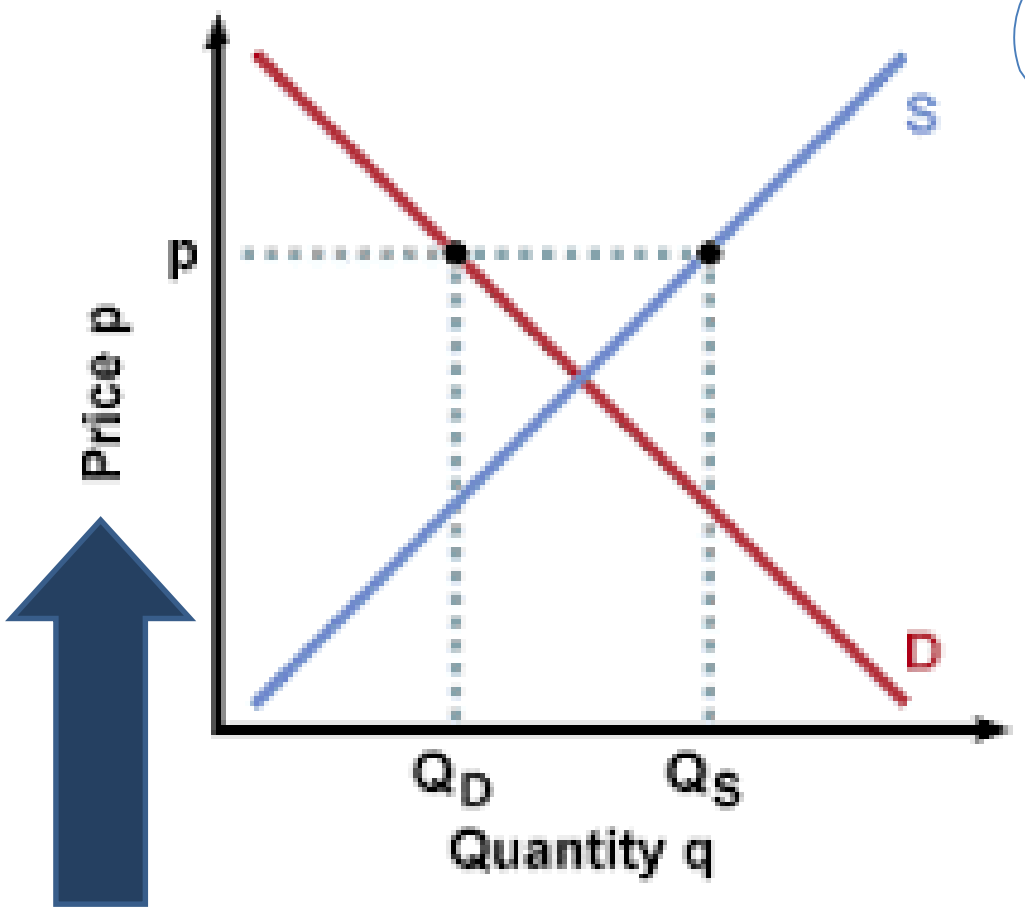


Convention on Biological Diversity

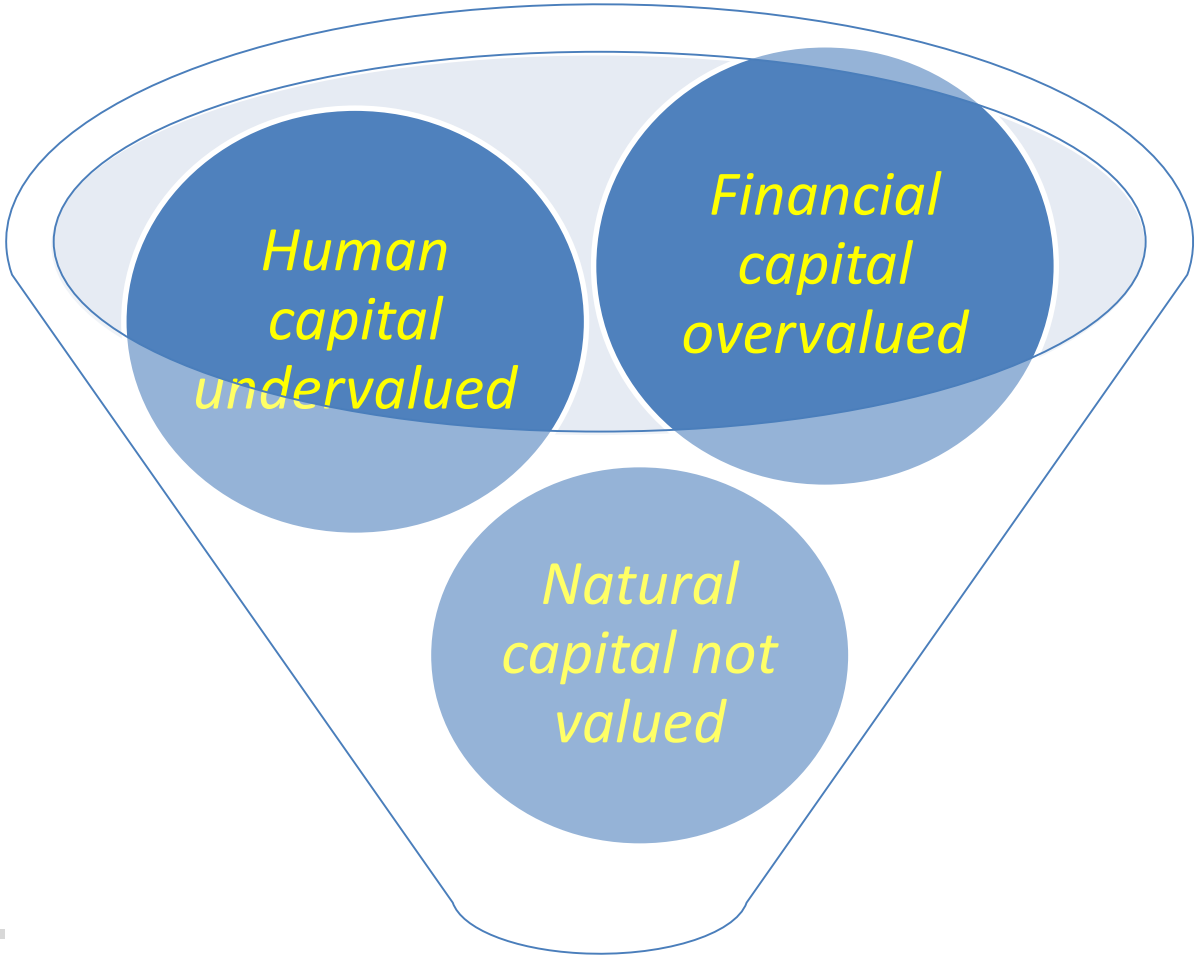
ipbes
Science and Policy for People and Nature

OUR ECONOMY

Producers/Consumers Rational Behaviour



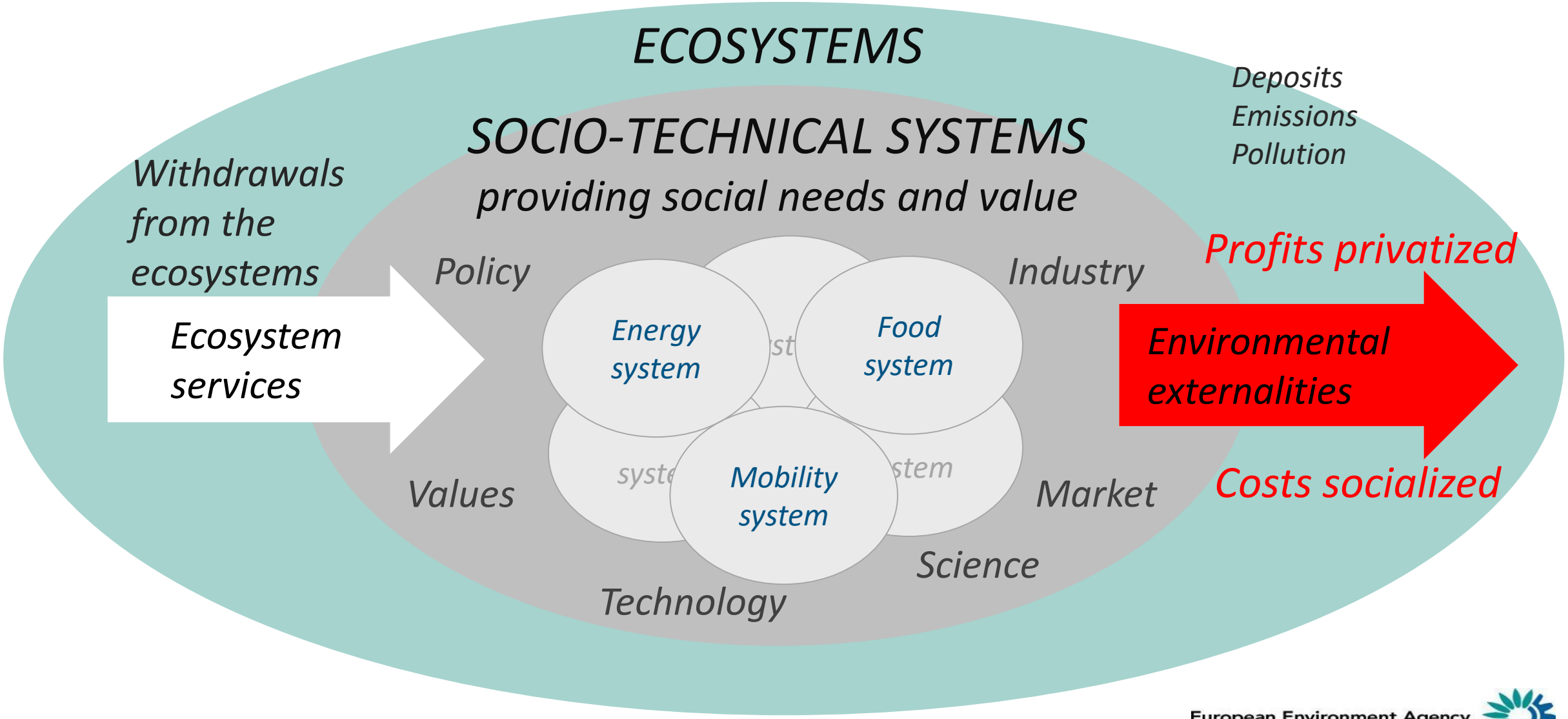
Market Economy



Economic, social and environmental (in)balance

LIVING WELL WITHIN ECOLOGICAL LIMITS

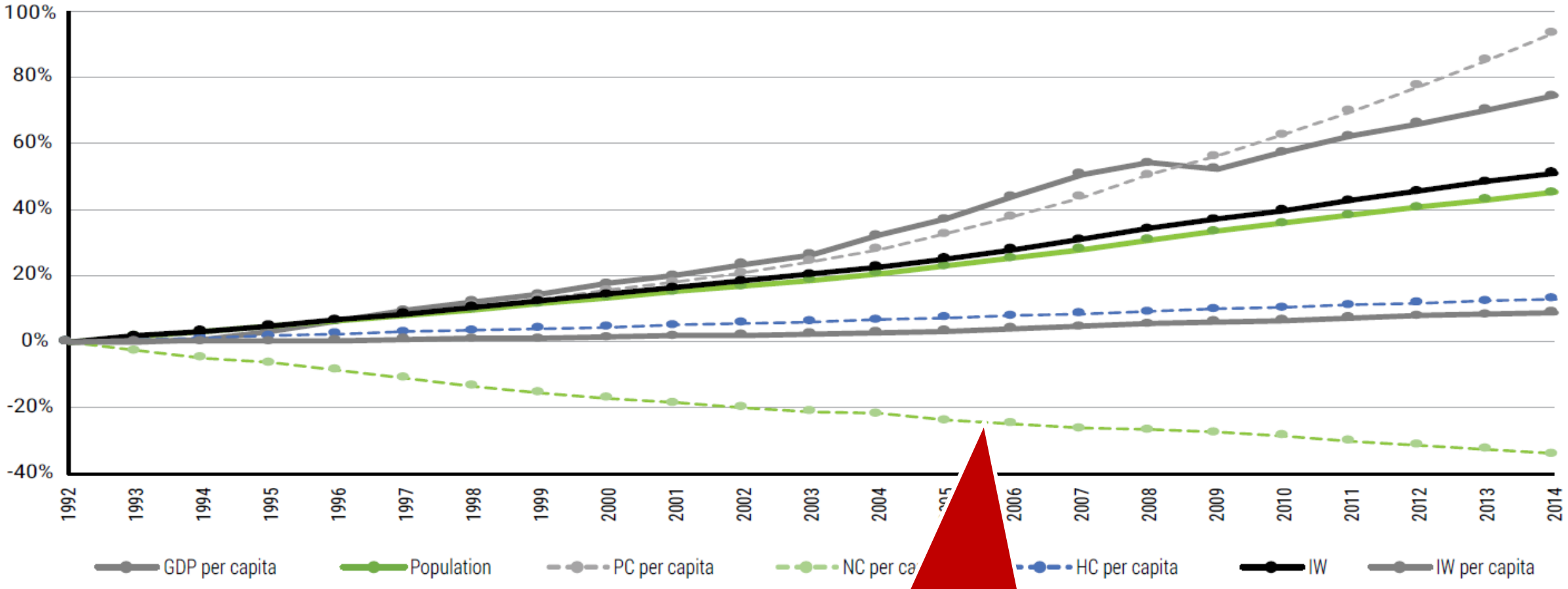
ECONOMIC SYSTEM FUNCTION OF ECOSYSTEM



European Environment Agency

Inclusive Wealth (IW) Index (and its components) evolution - 1992 to 2014

Source: UN, 2018 Inclusive Wealth Report 2018



IW – Inclusive Wealth

PC – Production capital

HC – Human capital

NC – Natural capital

Growth of GDP and social capital in the past decades has been achieved at the cost of depleting natural capital

RESOURCES

THE MISSING LINK

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SDGs DIRECTLY DEPENDENT ON NATURAL RESOURCES

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Trade-offs among various SDGs are unavoidable.
Sustainable Consumption and Production is the most efficient strategy to mitigate trade-offs and create synergies to resolve the development and environmental challenges articulated in the SDGs.

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FOCUS ON SUSTAINABLE PRODUCTION AND CONSUMPTION

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NATURAL RESOURCES FOR THE FUTURE WE WANT

Biomass, Fossil Fuels, Metals, Non-metallic Minerals, Land, Water

Relentless demand: Global resource use, Material demand per capita and Material productivity

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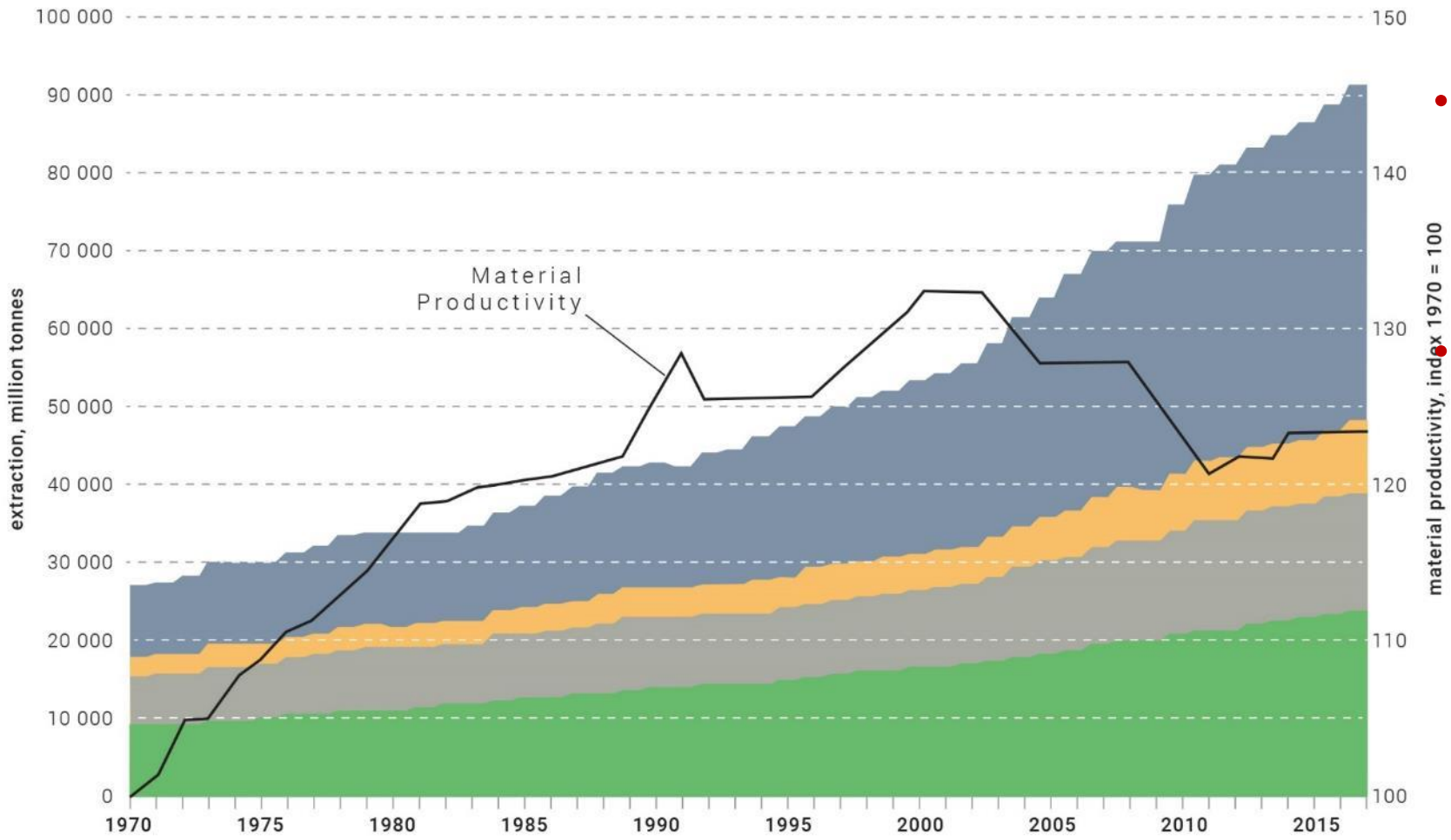
Global material extraction and material productivity, 1970 - 2017



- *Global resource use has more than tripled since 1970*
- *Global material demand per capita grew from 7.4 tons in 1970 to 12.2 tons per capita in 2017*
- *Material productivity started to decline around 2000 and has stagnated in the recent years*

Non-metallic minerals
Metals
Fossil fuels
Biomass

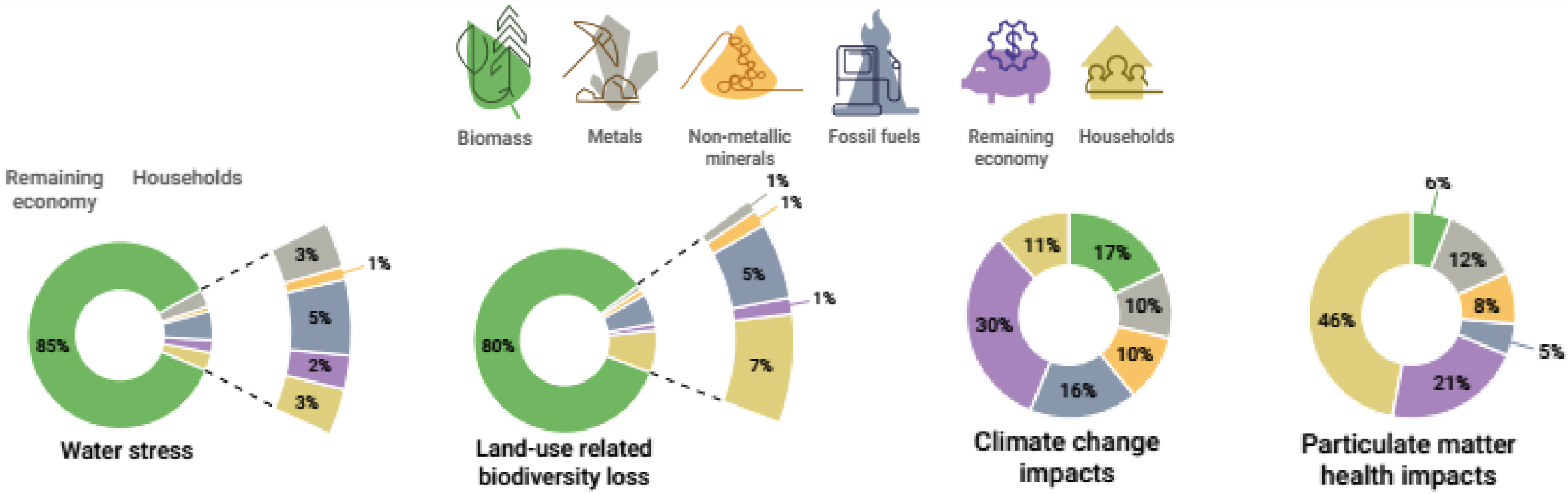
Environmental impacts in the value chain

resource extraction and processing phase

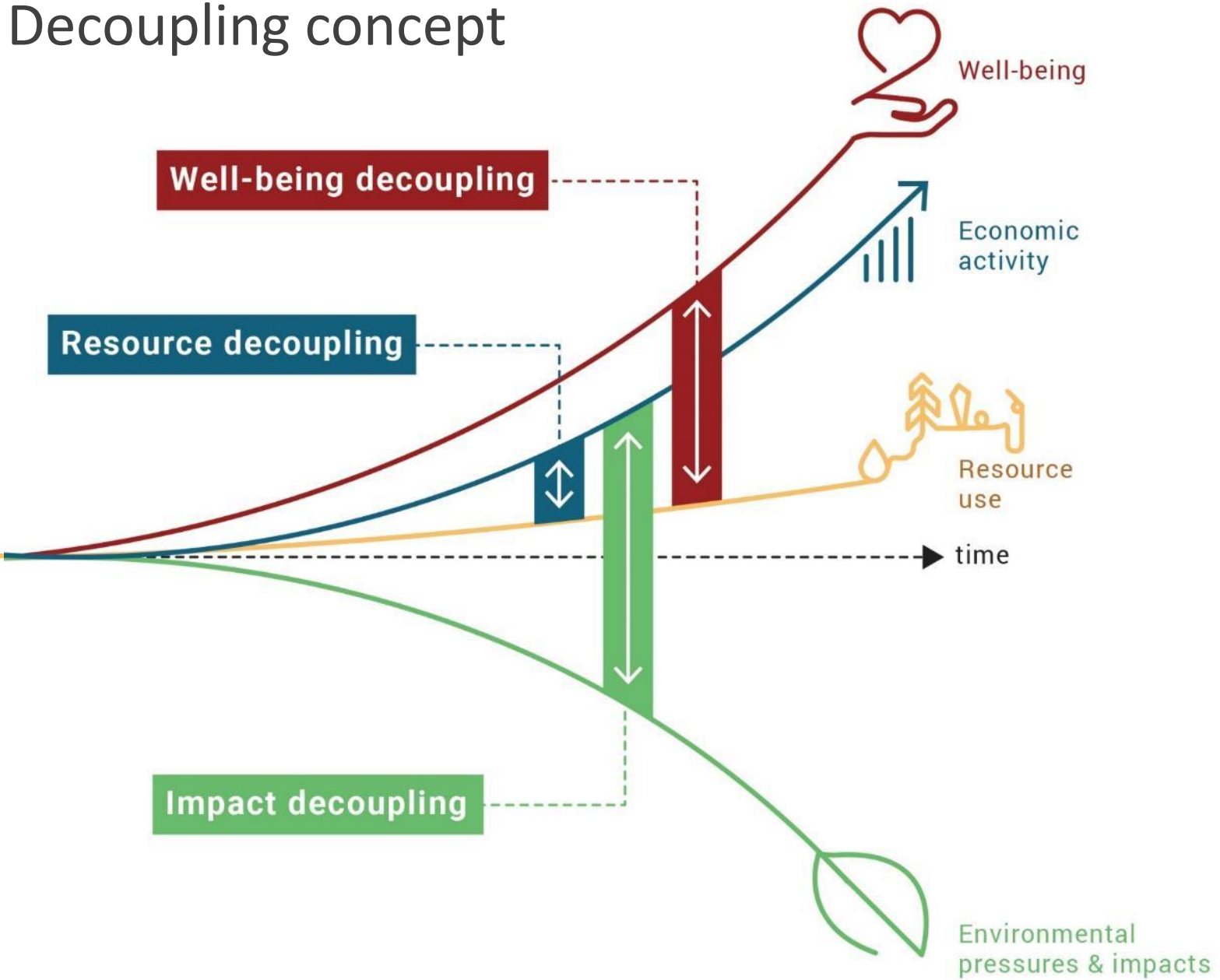
90%** of global **biodiversity loss** and **water stress

***50%** of global **climate change** impacts*

***1/3 of air pollution** health impacts*



Decoupling concept



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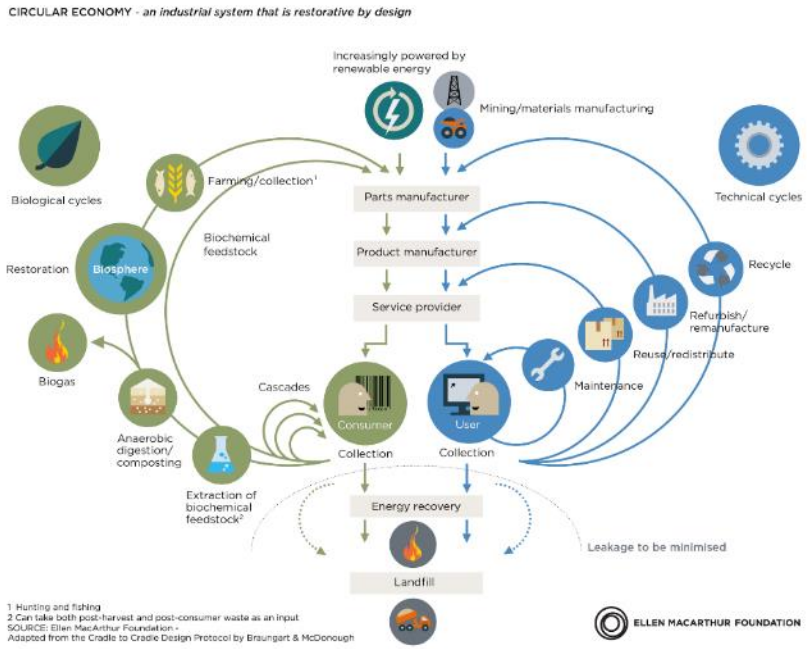
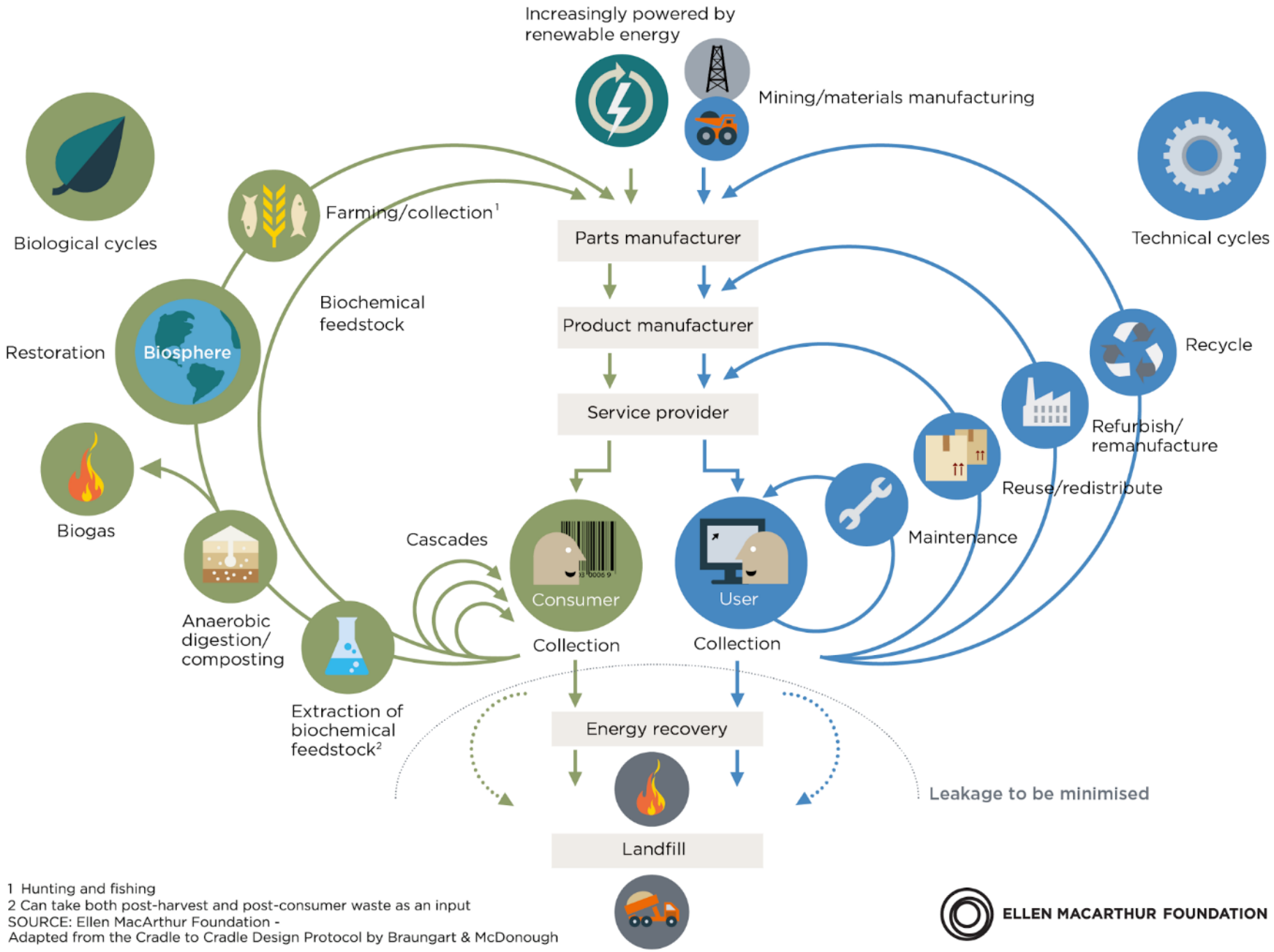
CIRCULAR ECONOMY



Should be seen as an instrument to deliver decoupling and as a part of the bigger picture of economic, societal and cultural transformation needed to deliver the SDGs

CIRCULAR ECONOMY - *an industrial system that is restorative by design*



1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input
SOURCE: Ellen MacArthur Foundation -
Adapted from the Cradle to Cradle Design Protocol by Braungart & McDonough

ELLEN MACARTHUR FOUNDATION

RETAINING VALUE IN CIRCULAR ECONOMY

RETAINING VALUE IN THE SWEDISH MATERIALS SYSTEMS
The Case of Plastics

- *Offical statistics on plastic waste recycling* *53%*

- *Value end of use plastic each year* *10 bil SEK*
  - *80% incinerated – energy value* *0.4 bil SEK*
  - *16% new plastics* *0.9 bil SEK*
  - *4% landfield* *0.0 bil SEK*
- *All value retained* *1.3 bil SEK*
- *Value retained/Value end of use* *13%*

Source: Material Economics

Redefining Value: The Manufacturing Revolution

Access the full report

www.resourcepanel.org/reports/re-defining-value-manufacturing-revolution

What we know: The manufacturing sector has particular potential for untapping circular benefits

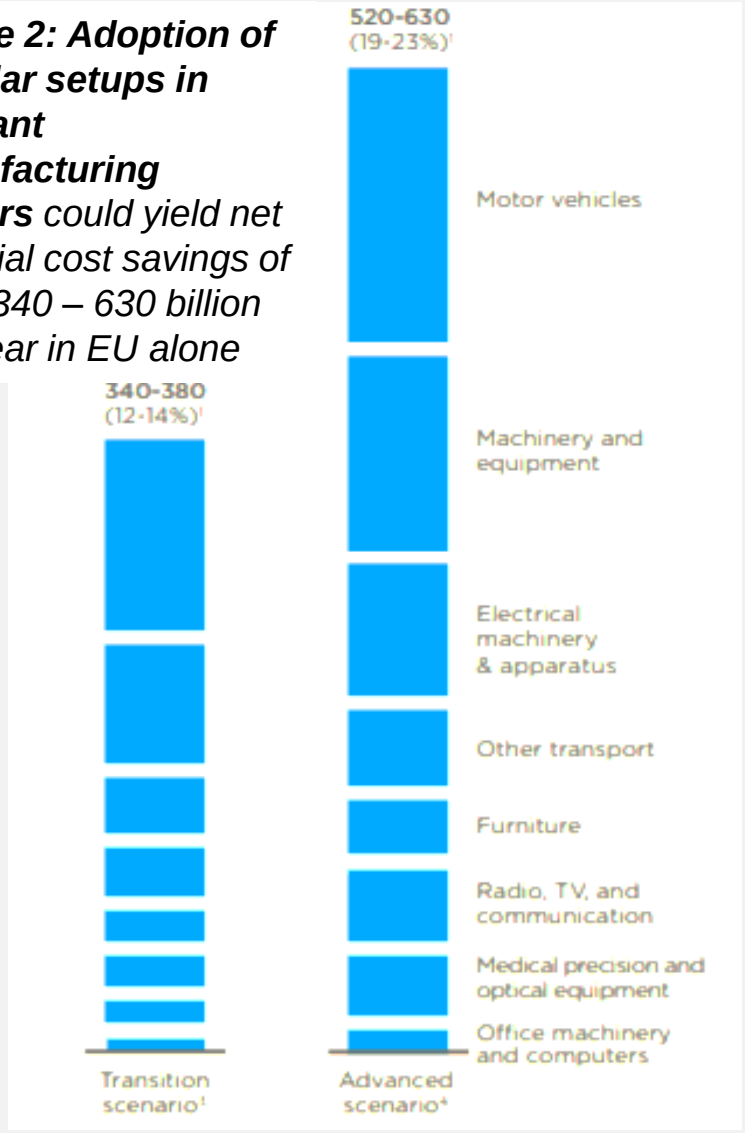


Figure 2: Adoption of circular setups in relevant manufacturing sectors *could yield net material cost savings of USD 340 – 630 billion per year in EU alone*

- *Manufacturing accounted for 12% of global emissions and 19% of EU's carbon footprint (WRI 2017, Eurostat, 2018)*
- *Materials and components constitute 40-60% of the total cost base of manufacturing firms in Europe (EMF, 2017)*
- *CE could save 12-23% of material costs across viable manufacturing sectors (Figure 2, EMF 2014)*

… but evidence of viable benefits of specific circular processes is still scarce

New evidence now quantifies benefits of circular models - 'Value Retention Processes' - in key manufacturing sectors

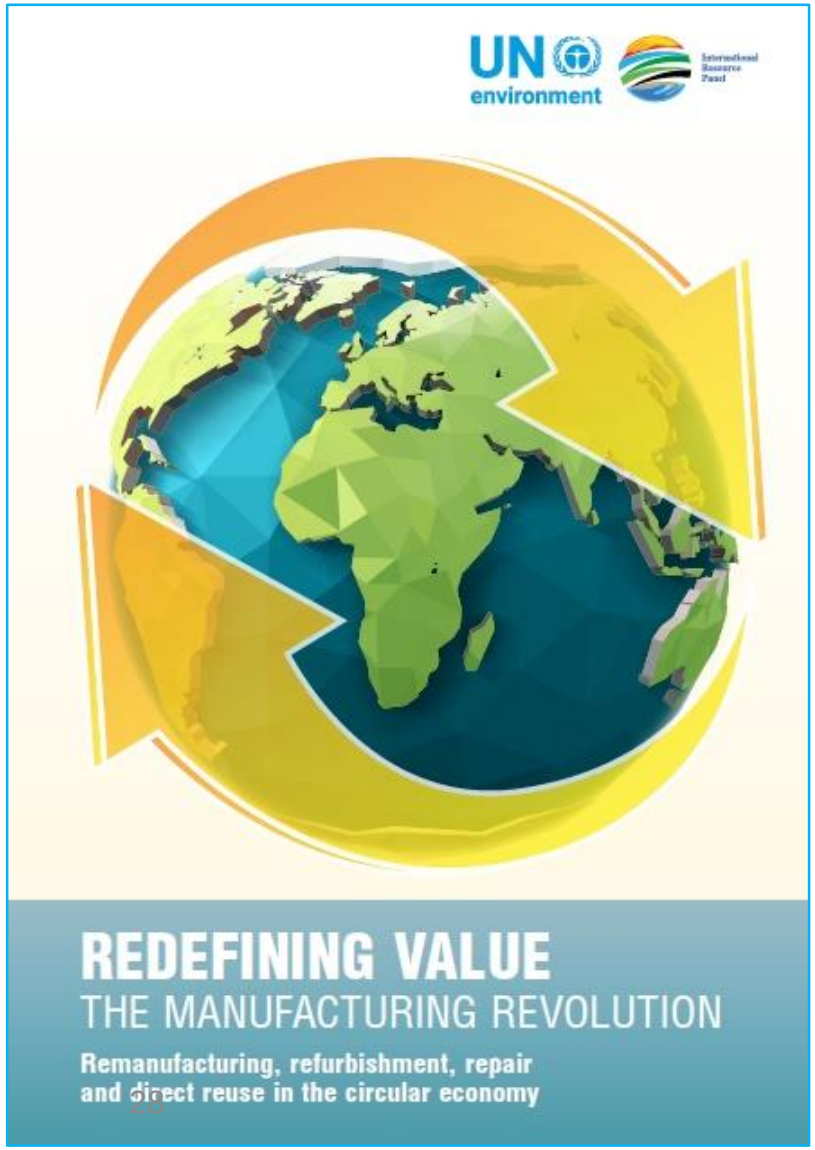
Circular 'Value Retention Processes' (VRPs) assessed

- *Remanufacturing*
- *Comprehensive Refurbishment*

→ *Full service-life VRPs*

- *Repair*
- *Arranging Direct Reuse*

→ *Partial service-life VRPs*



3 Case Study Sectors, 9 Case Study Products, 4 Sample Economies

Case Study Sectors	Case Study Products	Sample Economies
• *Industrial Digital Printers*	• *Digital Production Printer* • *Digital Printing Press #1* • *Digital Printing Press #2*	 • *Brazil* • *China* • *Germany* • *USA*
• *Vehicle Parts*	• *Vehicle Engine* • *Vehicle Alternator* • *Vehicle Starter*	
• *Heavy-Duty and Off-Road (HDOR) Equipment Parts*	• *HDOR Engine* • *HDOR Alternator* • *HDOR Turbocharger*	

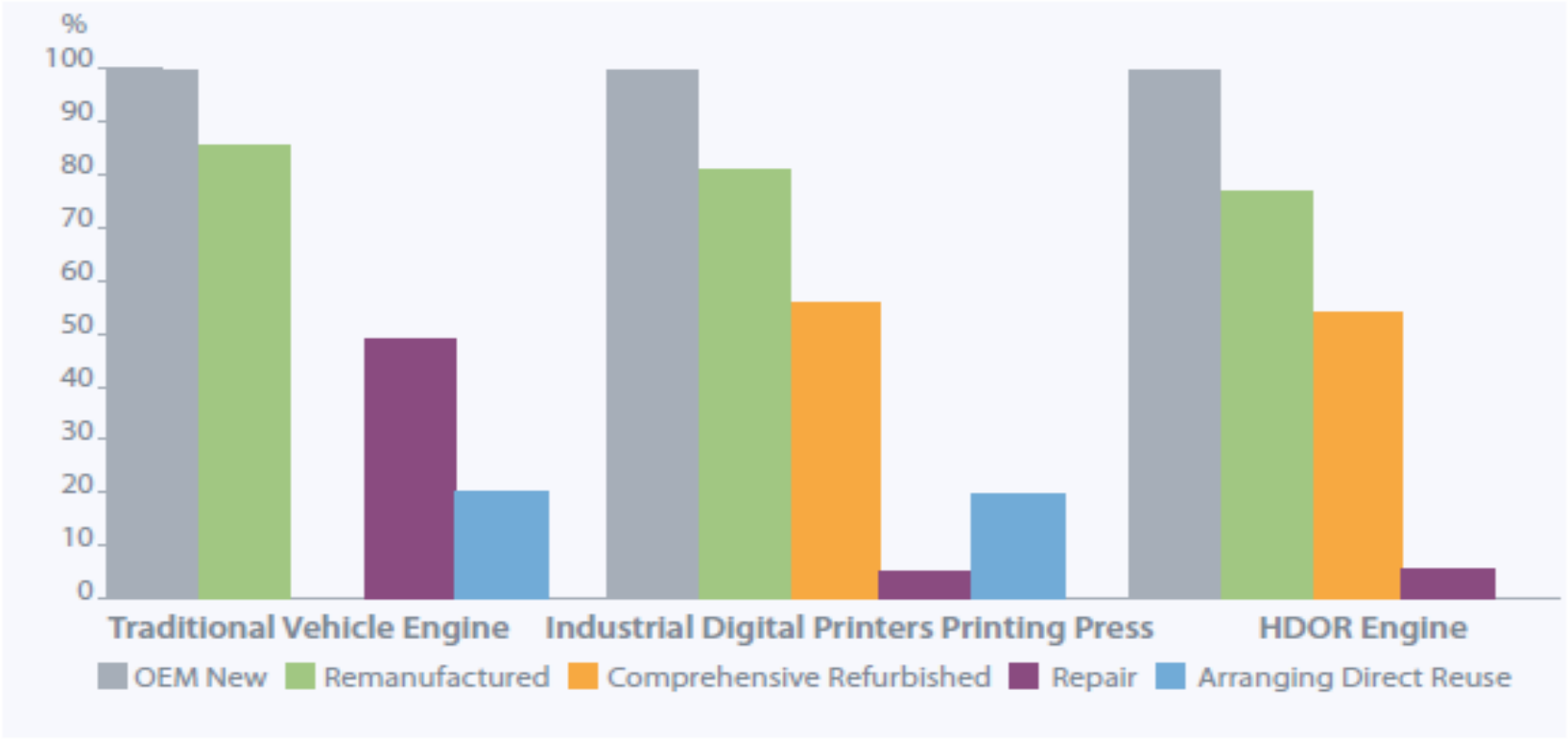
*Report finds that production of same quality products can save up to 40% of cost and up to 90% of emissions through circular VRPs**

Benefits of full service-life VRPs*	***Remanufacturing***	***Comprehensive Refurbishment***
Saving in new material input	*80% - 98%*	*82% - 99%*
Reduction in embodied energy & material emissions	*79% - 99%*	*80% - 99%*
Reduction in process energy needs and emissions	*57% - 87%*	*69% - 85%*
Reduction in production waste	*90%*	*80% - 95%*
Job creation at offset labor costs	*Increased requirements for skilled labor*	
Reduction in product cost	***Up to 23%***	***Up to 44%***

** Compared to same product manufactured from new material inputs*

VRP cost benefits across sample products: Savings of over 40% for same quality products (over 90% for repair) are possible

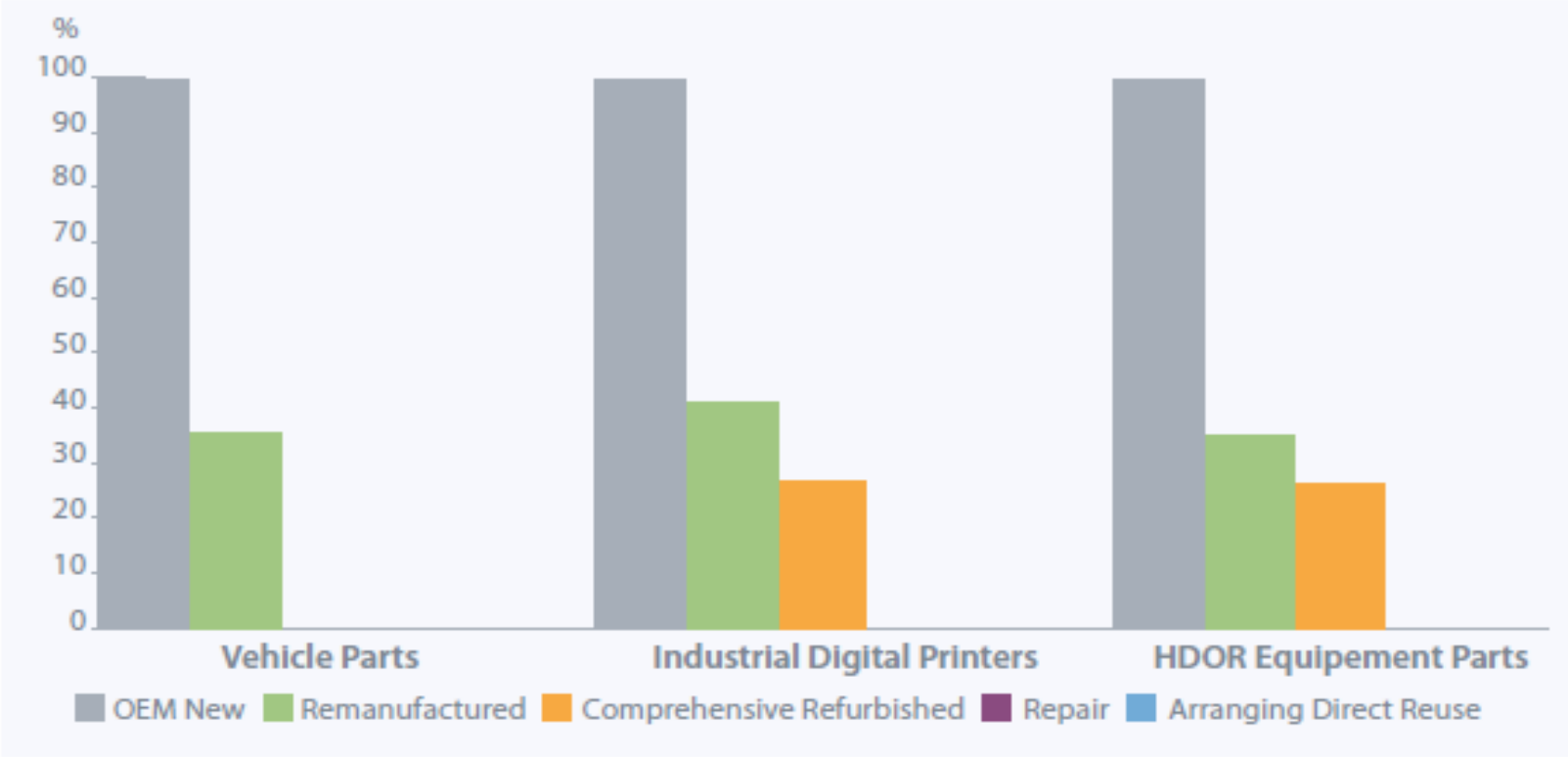
Figure 9: Cost of VRP productions relative to traditional OEM New products



11 - Once case study product per sector analyzed: Traditional cast iron vehicle engine (for Vehicle Parts); Industrial Digital Printing Press #2 (for Industrial Digital Printers); and HDOR engine (for HDOR Equipment Parts). Note that there is typically no comprehensive refurbishment undertaken for vehicle parts, and there is typically no direct reuse arranged for HDOR equipment parts.

VRP energy and emissions savings across sample products: Reduction of over 60% are possible at same quality

Figure 7: Weighted average process energy and emissions impacts of VRPs relative to traditional OEM New production



8- Note that there is typically no comprehensive refurbishment undertaken for vehicle parts, and there is typically no direct reuse arranged for HDOR equipment parts.

Different circular processes untap different benefits – the best VRP to use depends on product type and design

VRP type benefits in comparison

"Full service-life VRPs"

Remanufacturing

Comprehensive Refurbishment

- *Less environmental benefits per life cycle*
- *Less cost savings per life cycle*

- *Longer service-life*
- *More future service-lives possible (up to 8 in the study)*
- *Higher job creation potential (at offset cost)*
- *-> Higher value-retention*

"Partial service-life VRPs"

Repair

Direct Reuse

- *More environmental benefits per life cycle*
- *Higher cost savings per life cycle*

- *Shorter (~half) service-life*
- *No or limited future service-lives*
- *Lower job creation potential*
- *-> Lower value-retention*

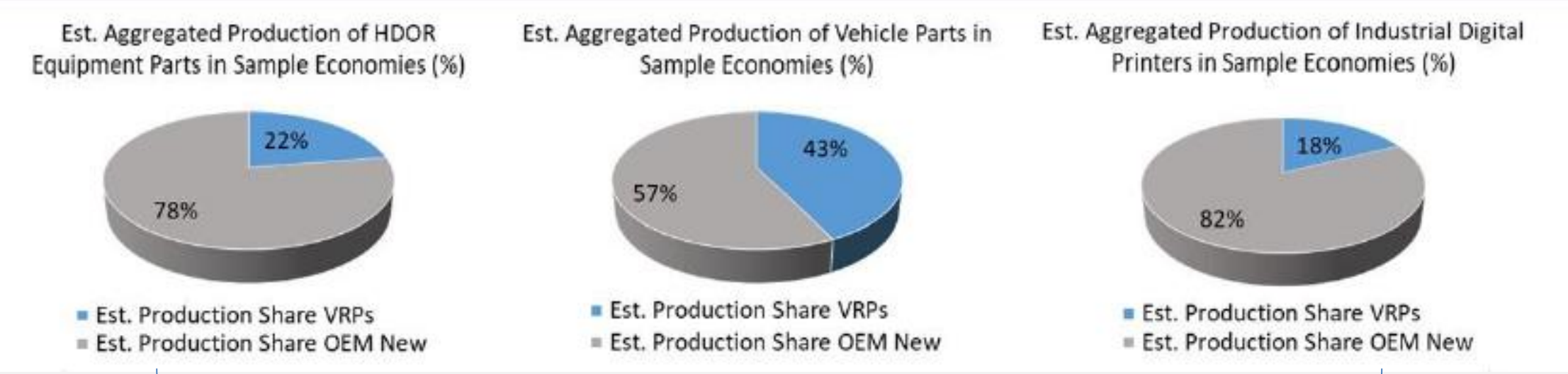
Choice of relative best VRP today depends on:

- *Complexity of VRP for product (modules)*
- *life-cycle energy requirements*
- *residual value*
- *Durability and material of product*

Scaling of best value retention in the future depends on design choices for today

VRPs are commercially available to 41% of the manufacturing sector already today and could reduce 11% of global industrial energy use

Figure 3: VRPs are currently used in only small shares of the case study sectors*



…and the case study sectors only account for 11% of VRP viable manufacturing

- *VRPs are available (almost) immediately to 41% of manufacturing in the sample economies***
- *Viable sectors include automotive, marine, locomotive, heavy-duty, aerospace, furniture, mobile phones*
- *Globally, VRPs have potential to reduce 6 – 11% of global industrial energy use*

** Unpublished figure; **41% of manufacturing GDP (Mfg. GDP)*

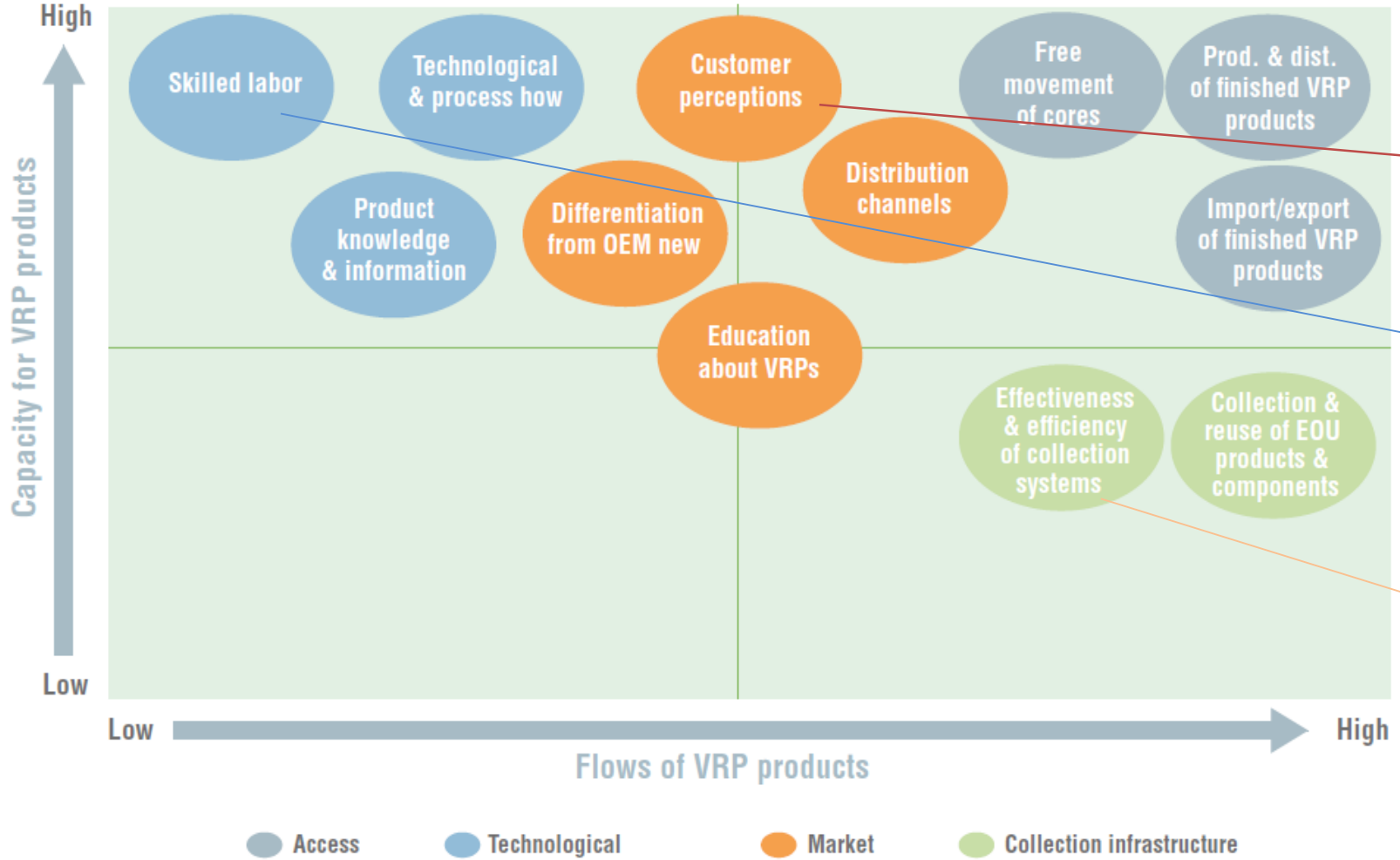
Manufacturers can capture the opportunity of VRPs through immediate changes and longer-term strategies to tackle barriers

Figure 4: Success factors for capturing the benefits of VRPs

Adopt a systems view and select right VRP	*Innovate products and business models*	*Use existing operating environment*	*Take leadership in collaboration to tackle barriers*
• *Assess material and value streams beyond the company* • *Choose best immediate VRP for the product*	• *Redesign for VRPs, focus on durability, upgradability and reparability* • *Develop performance-based business models*	• *Start from existing regional infrastructures, formal or Informal (particularly in reverse logistics)* • *Expand infrastructure in collaboration*	• *Cooperate across industry to tackle tech and market barriers, e.g. through standardisation* • *Engage with policy makers to tackle regulatory and market barriers, also internationally*

Relatively modest condition changes can help significant scaling of VRPs

Figure 6: Differentiated barrier alleviation strategies for different economic objectives



Exemplary barrier alleviation actions by policy and industry

Customer demand can be raised e.g. through standards and quality control

Technical universities and schools and industry traineeship must teach VRP skills

Public-private cooperation can adapt or built cost efficient reverse logistics

Policy recommendations worth of your attention:

For Policy Makers, For Business Organisations and For both

Remanufacturing - A hidden pathway to a low-carbon circular economy

- *"The European Remanufacturing Network (ERN) - Market Study" (2016)2*
- *"Re-Defining Value – The Manufacturing Revolution" UN IRP (2018)3*

https://www.ellenmacarthurfoundation.org/our-work/activities/ce100/co-projects

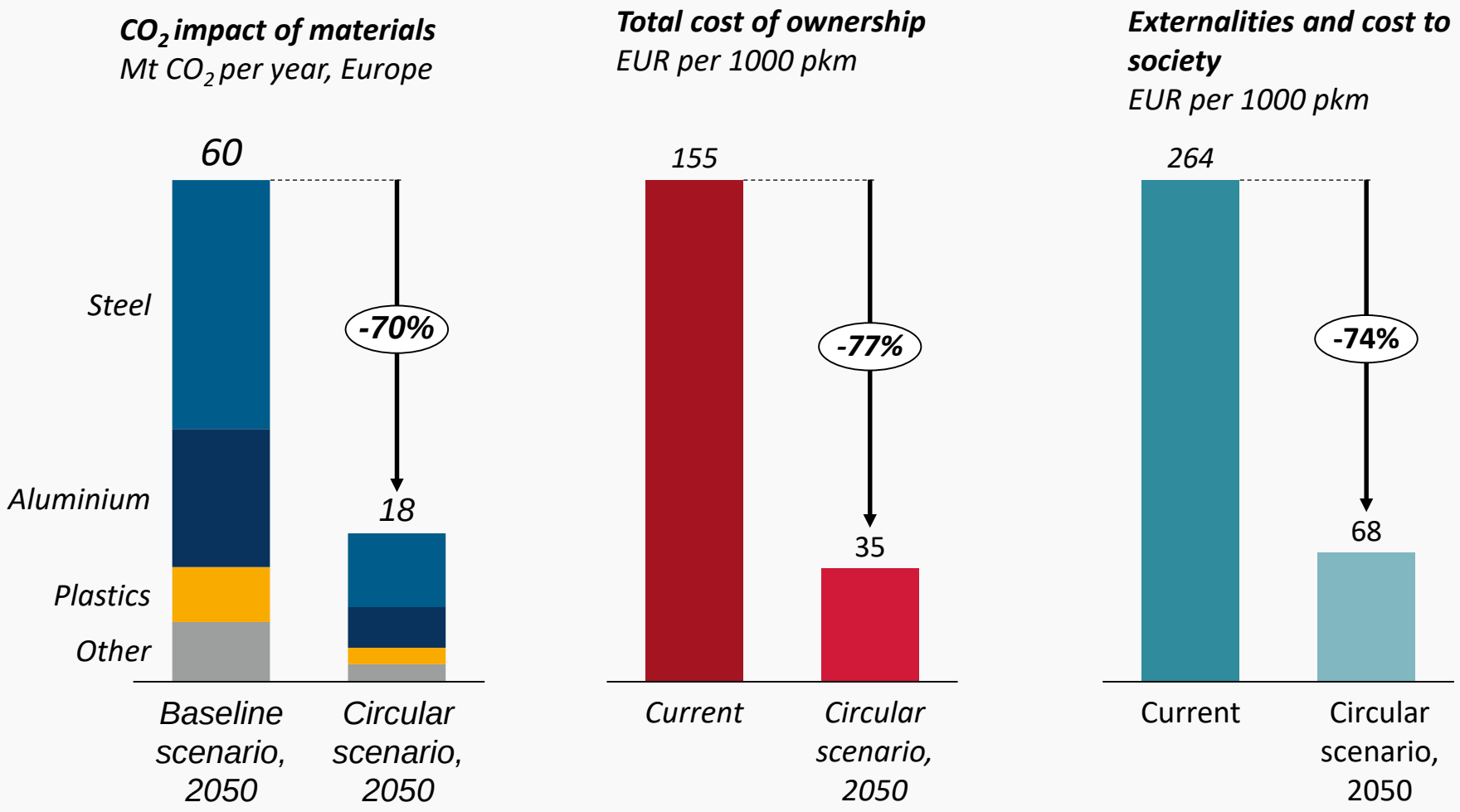
CIRCULAR ECONOMY

AS AN ESSENTIAL INGREDIENT IN A FIGHT AGAINST CLIMATE CHANGE

PILLARS FOR EFFICIENT CLIMATE CHANGE POLICY

SUPPLY SIDE SOLUTIONS	DEMAND SIDE SOLUTIONS	NATURE BASED SOLUTIONS
Energy, Carbon management	Circular Economy, Land, Water, Materials Management	Eco-system services Environmental sinks

A SHARED MOBILITY SCENARIO IS A HIGHLY ATTRACTIVE VISION FOR PASSENGER CARS



MATERIAL ECONOMICS

BUSINESS and REGULATION

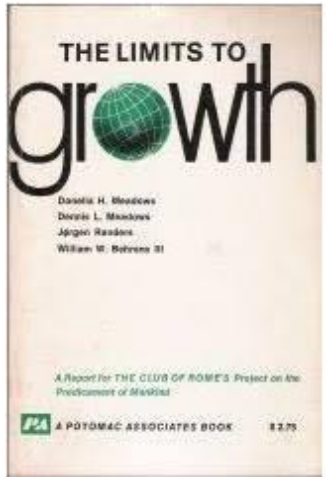
We should continue working actively to bringing together the leading business actors. Many businesses express that they are not afraid of more regulation but of unfairness, free riders and uncertain risk. If we make policies fair, consistent and reliable – we can work together across policy and business actors for a real transition.

WHAT NEXT?
European Commission

- *Circular Economy a priority of the next European Commission*
- *Establish a credible, mutually reinforcing link between circular economy/SDGs and competitiveness.*
- *Build new coalitions for CE change by broadening ownership of the CE idea - partnering with those dealing with climate change, bio-economy, health, digital transformation, regional policy, research and innovation, international relations, development aid, trade …*
- *Continue working on plastics but add also the product groups beyond the plastics (textile, food …) into future CE programmes, improve the extended producer responsibility and eco-design to deliver the whole potential and focus on economic signals and drivers – taxes, subsidies, public procurement.*
- *Continue working on data, reporting, and on greening the financing. Focus on retaining value in the CE process and on social aspects of CE transition.*

TO CONCLUDE

WHY AND HOW?

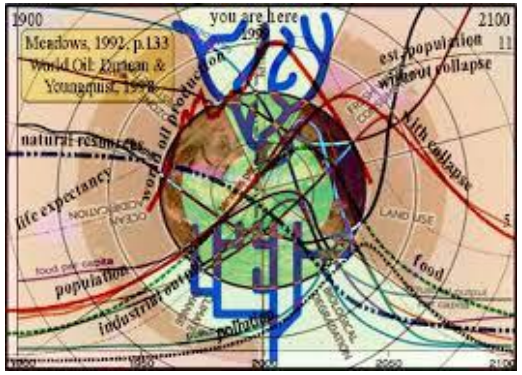


From

Limits to growth

To

Growth of Limits



- *Those that will be best able to cope with these limits (i.e. those that will create most value with least virgin or finite resources) should/will also be most competitive*
- *We need more creative destruction rather than destructive creation*

MAJOR CHALLENGES WE FACE

- *Political cycles, public and financial institutions, have inbuilt short term focus and logic. The challenges we face require a real deep system change and rethinking of the the way how we govern our society.*
- *Production and consumption systems are based on the logic of consumerism, quantities and GDP fuelled growth (you will not reach the goal faster, if you are walking in the wrong direction). There is a lack of clear identification of future risks and of an appropriate effective risk management and there is a clear lack of understanding what really matters for our safe future.*
- *Transition to a more sustainable economy and society will be only possible if it is just, fair and inclusive. We are currently failing to deliver. We need to make our societies more equitable and do more in the fight against poverty. Social unrest is growing even in the high-income countries and it is high time to hear the echo of the streets and the voice of frustrated young generation.*

We need more “Circularity ” even in the

GLOBAL GOVERNANCE

Sharing sovereignty instead of owing sovereignty

Transition to a more sustainable economy and society

Is unavoidable!

And humans are supposed to be intelligent. It is high time to prove it.

We have to fix a broken compass!

SDGs

"North Star" guiding our policies and behaviour

INTER-GENERATIONAL AGREEMENT

A Program for the Future Generations

"Sustainability First"

Circular Economy is not a new concept

It is the oldest concept on the earth. All nature is organized based on the principles of the circular economy. Nothing is lost and everything has its purpose.

That is why it would make common sense to embrace it and finally start to behave accordingly.

In essence there is only question we have to answer:

Do we agree that we humans are part of the nature too?

To answer this question we probably do not need the help of the most famous Belgium detective, but his advise is always useful

HERCULE POIROT

When asked why he is speaking about himself always in a third person he replied something like that:

If one is such a genius like myself, it is very important to establish a healthy distance to himself.

Advise of Prof. Guy McPherson:

”If you think the economy is more important than the environment (and health), try holding your breath while counting your money".

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THANK YOU

For more information

Contact IRP Secretariat at resourcepanel@un.org

Visit our website at http://resourcepanel.org/