

Close the Glass Loop

Natural Resource Management in Focus

JANEZ POTOČNIK
Co-chair UNEP International Resource Panel (IRP)
Partner SYSTEMIQ

London, 30th June 2022

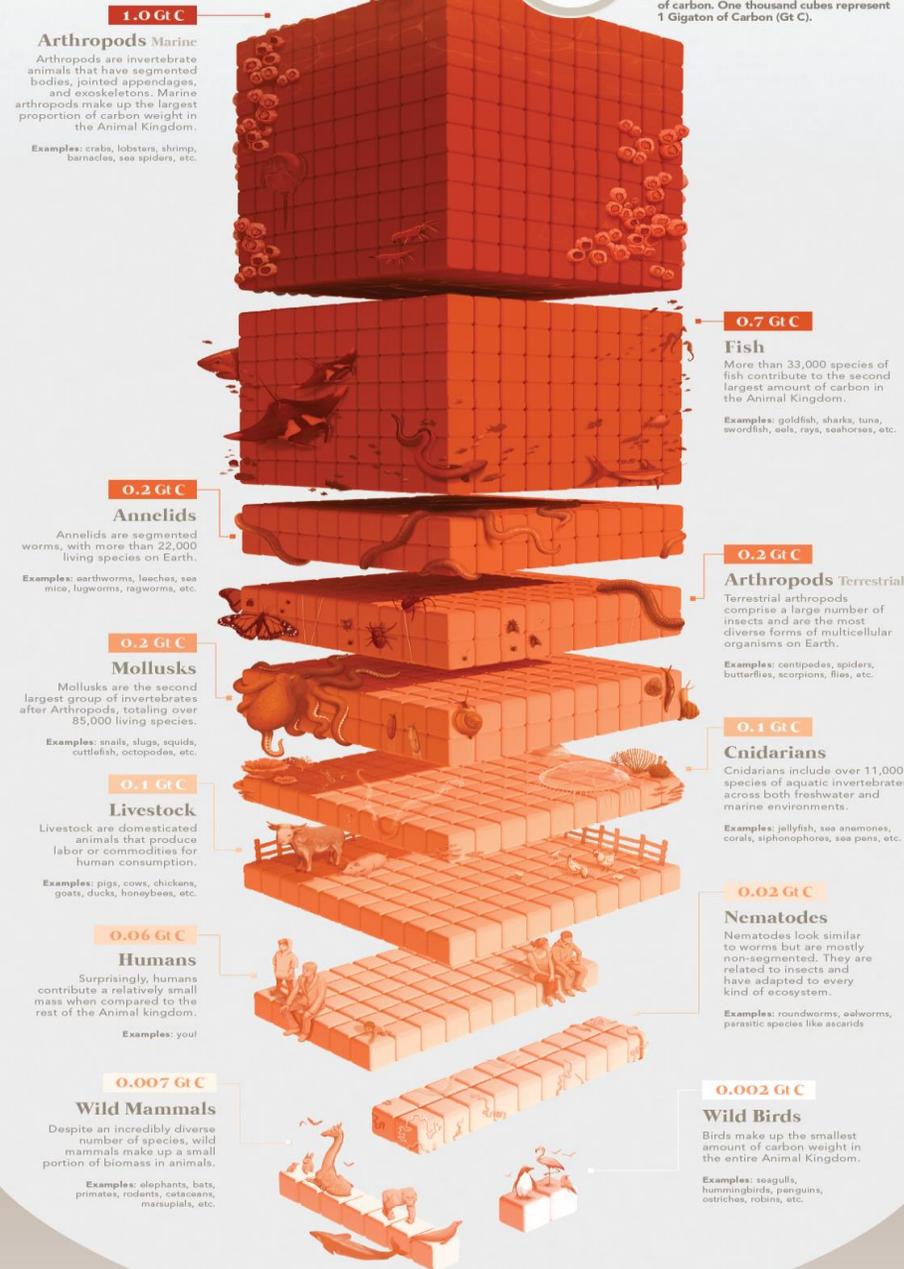
Main Challenges

The diagnosis of the problem

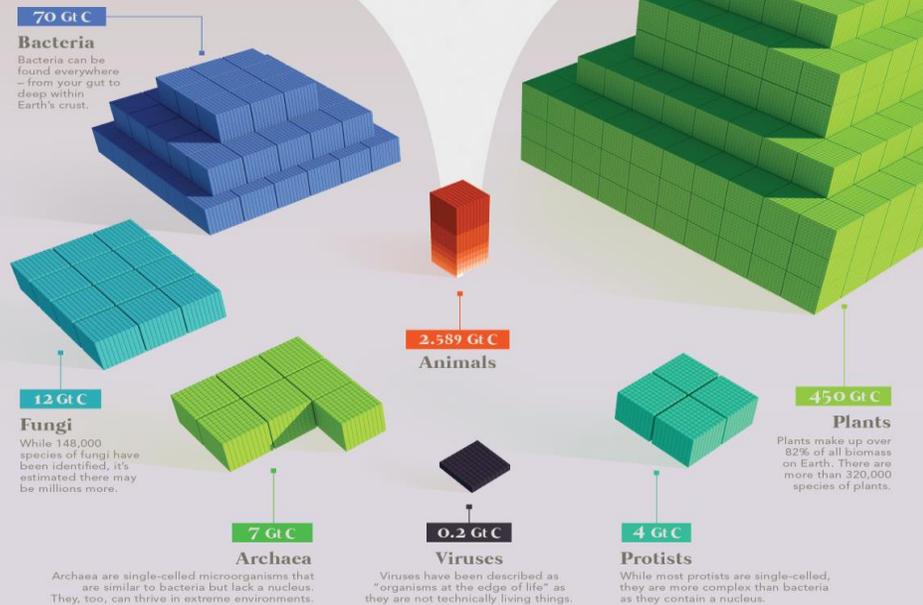
The Biomass of Animals

Biomass is measured by the amount of carbon an organism contains. Carbon is a primary component of all known life on Earth, used in complex biological molecules and compounds.

One cube represents 1 million metric tons of carbon. One thousand cubes represent 1 Gigaton of Carbon (Gt C).



Comparing All Biomass of Life on Earth



Humans make up approximately 0.01% of all biomass on Earth.

SOURCE: Bai-Chi, Y.M., Phillips, R., Mile, R., 2018. The biomass distribution on Earth. Proceedings of the National Academy of Sciences 115, 6506–6511. doi:10.1073/pnas.1711842115



COLLABORATORS RESEARCH + WRITING Anupa Iman Ghosh | DESIGN Mark Belan | ART DIRECTION Mark Belan

[f](#) [v](#) [t](#) [@visualcap](#) [visualcapitalist.com](#)

Biomass of Life Humans in Perspective

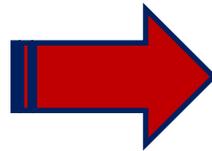
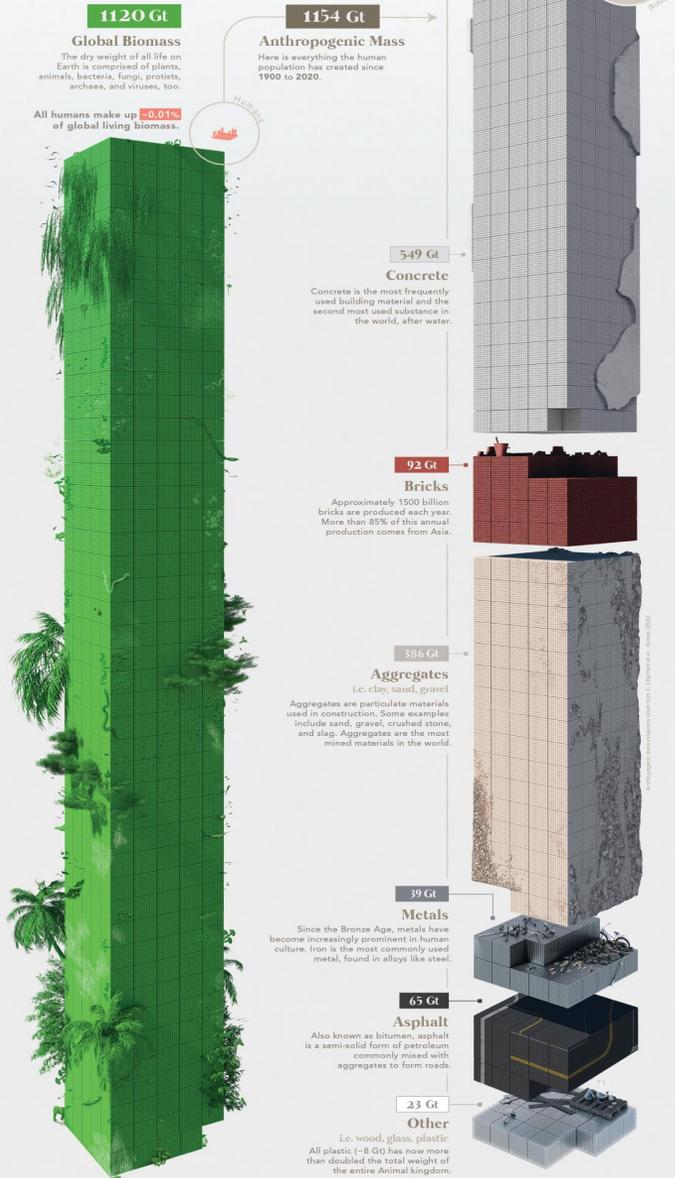
Source: Visualcapitalist.com

Visualizing the Scale of Anthropogenic Mass

Anthropogenic mass, or human-made mass, refers to the materials embedded within inanimate solid objects that are made by humans.

In 2020, the amount of anthropogenic mass exceeded the weight of all global living biomass.

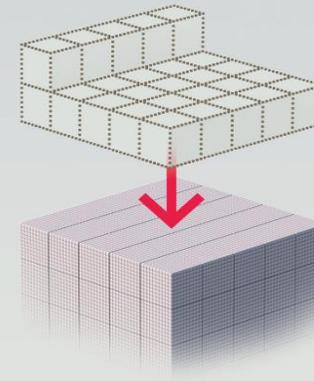
As humans continue to dominate Earth, questions surrounding our material output are increasing. We break down the composition of all human-made materials and the rate of their production.



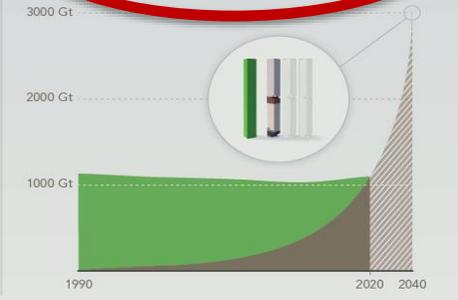
The Accumulation of Anthropogenic Mass

The current rate of accumulation for human-made mass is approximately **30 Gt of mass per year**.

This is equal to each person on Earth producing their own weight in human-made mass every week.



As accumulation rates increase, the amount of human-made mass is predicted to almost **triple the total amount of global living biomass by 2040**.



These trends highlight the alarming speed and volume in which human contributions are impacting the world.

SOURCE Elhacham, E., Ben-Ur, L., Grozovski, J., Bar-On, Y.M., Milo, R., 2020. Global human-made mass exceeds all living biomass. Nature 588, 442–444. doi:10.1038/s41586-020-3010-5



COLLABORATORS RESEARCH + WRITING Bruno Venditti | ART DIRECTION + DESIGN Mark Belan

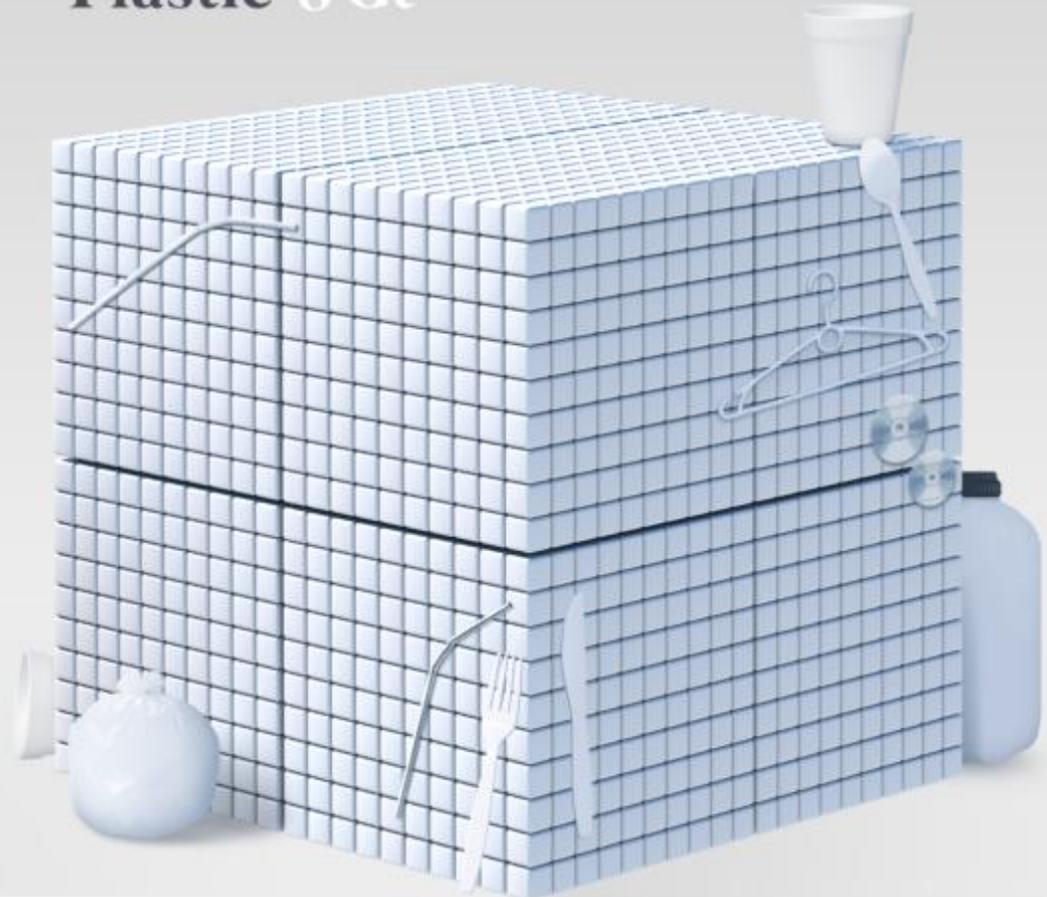
Facebook icon /visualcapitalist Twitter icon @visualcap Instagram icon visualcapitalist.com

Source: Visualcapitalist.com

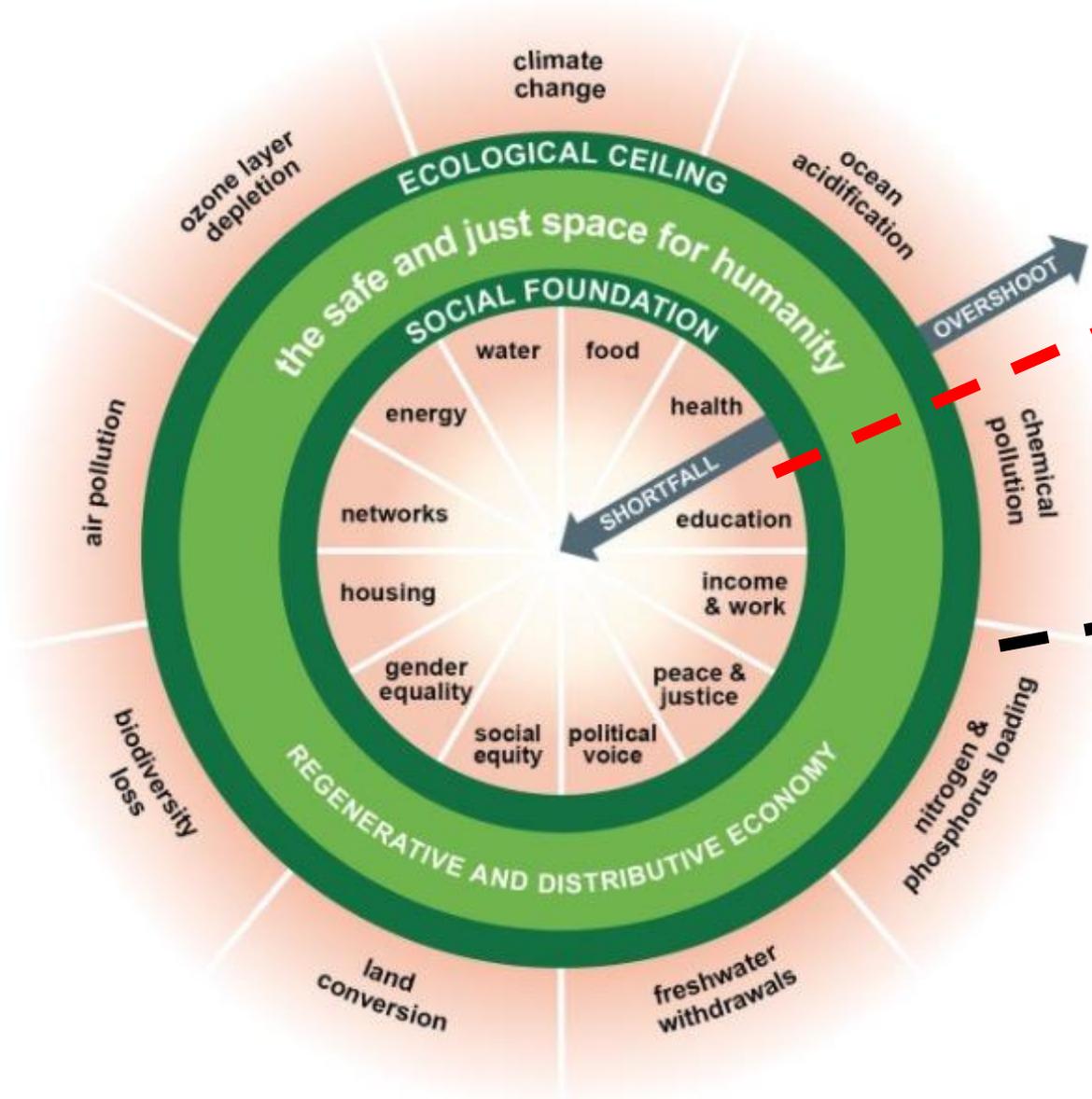
Animal Kingdom 4 Gt



Plastic 8 Gt



A compass for human prosperity

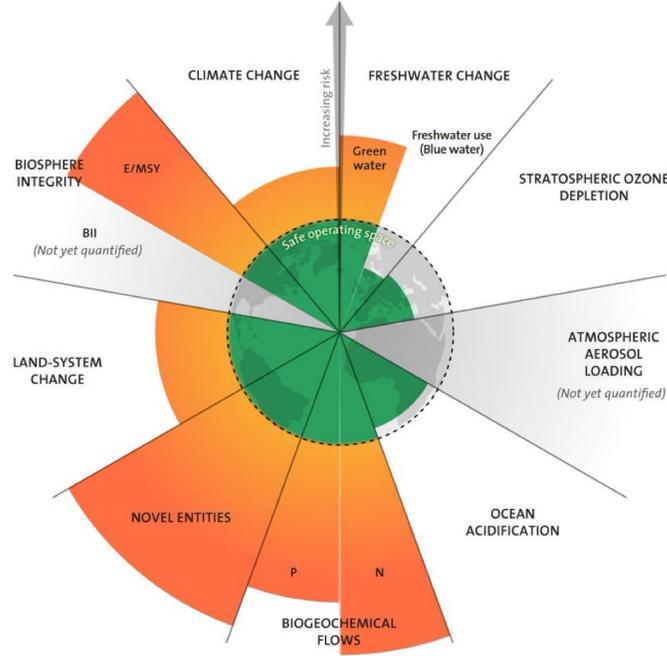
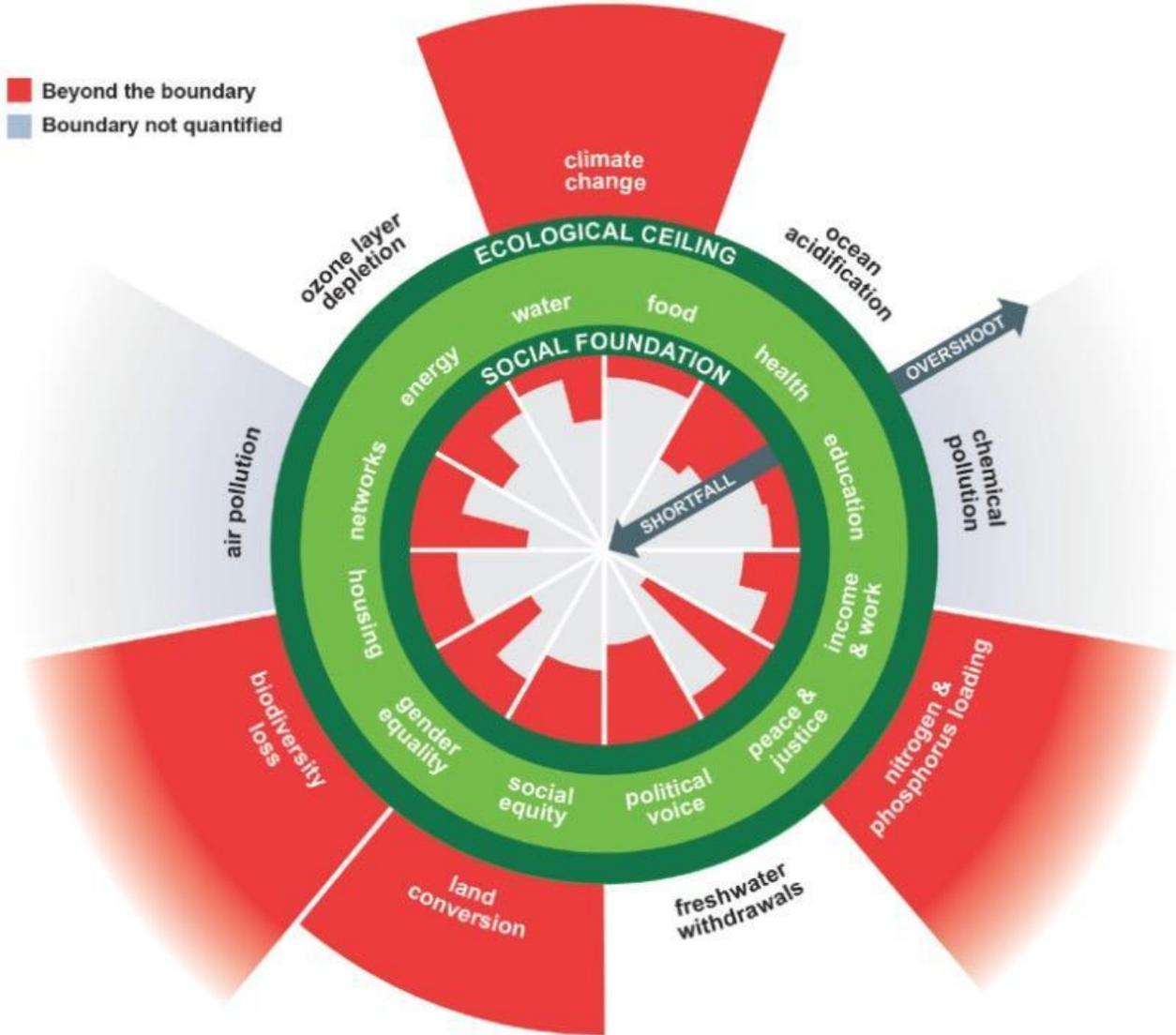


*Basis human needs
incl. minimum requirements
of resource supply*

*Outer limit by Planetary
Boundaries*

Adapted from Raworth 2017

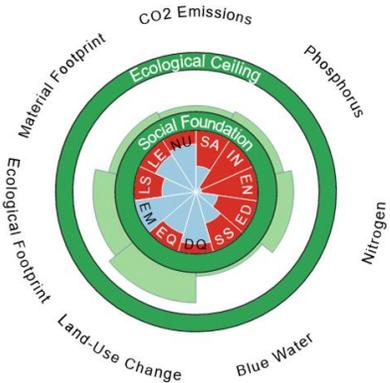
Humanity is living far out of balance



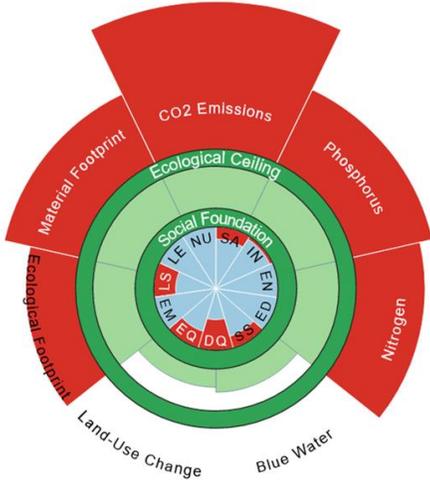
Source: Potsdam Institute for Climate Impact Research, 2022 reassessment

Divergent national contexts

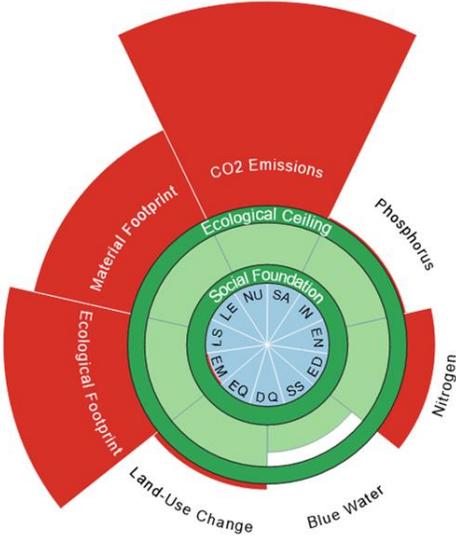
goodlife.leeds.ac.uk



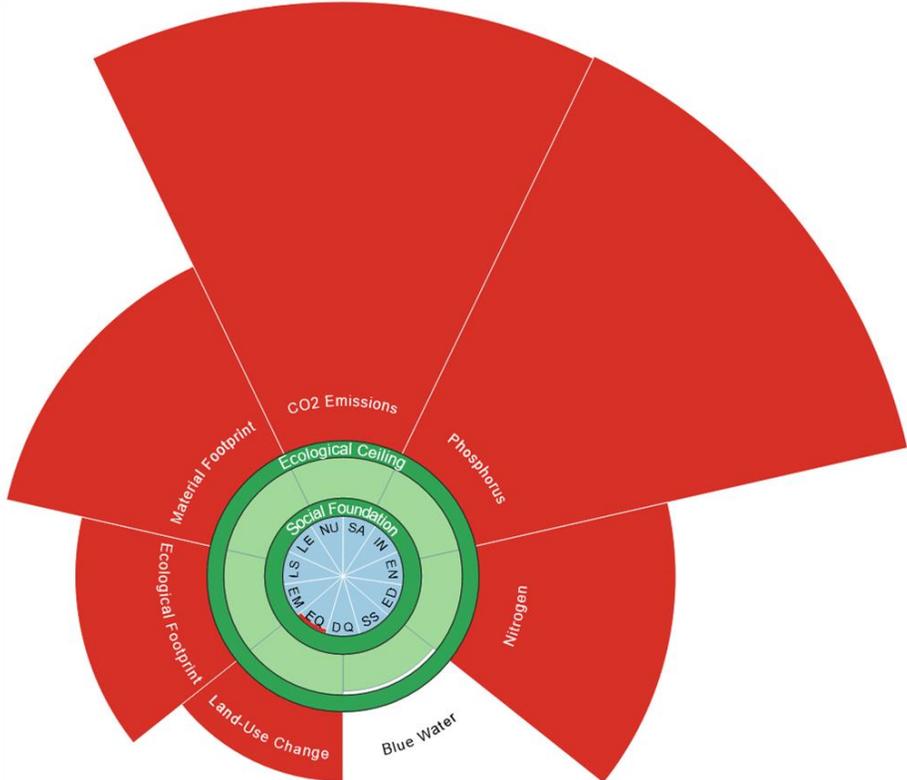
Malawi
\$1,000 pc



China
\$17,200 pc



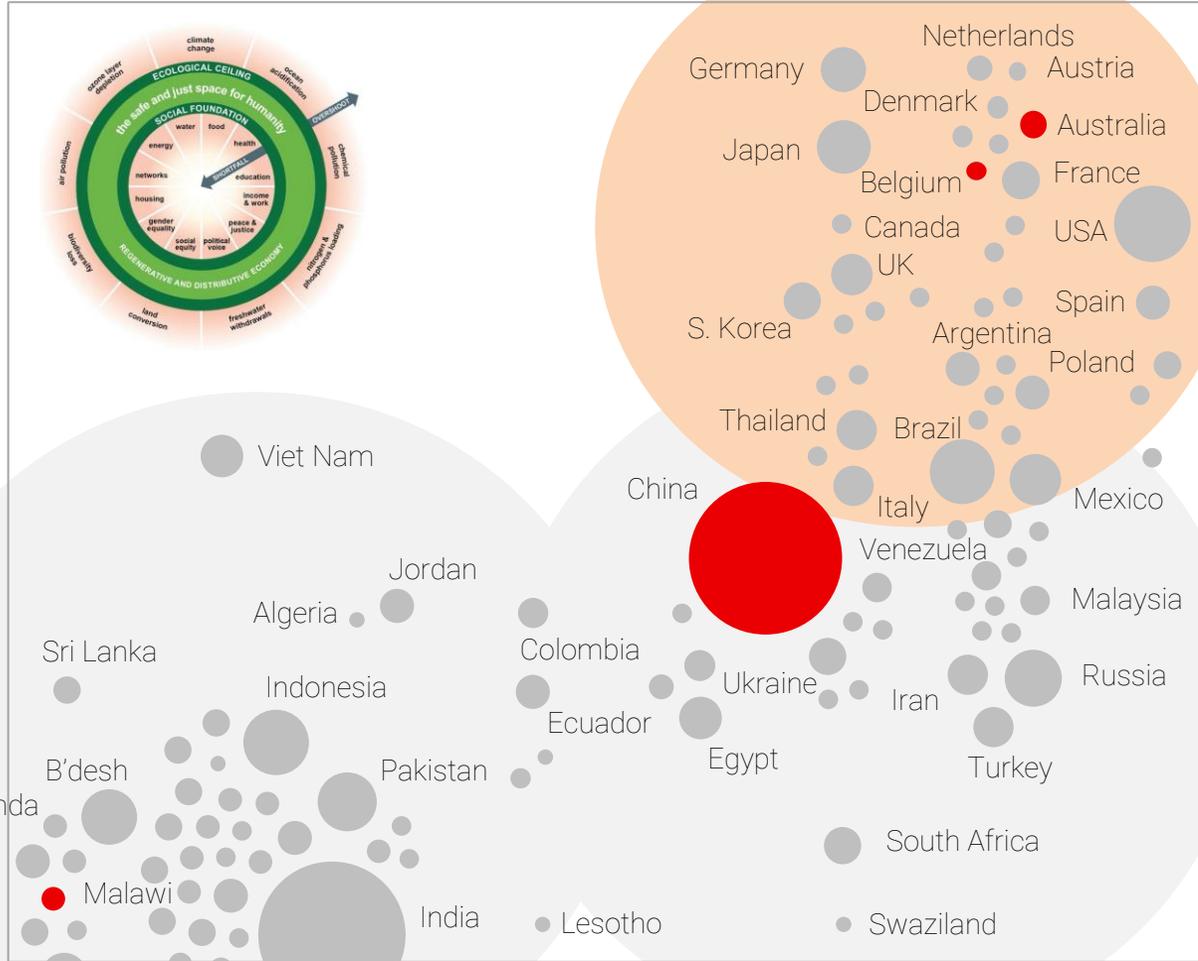
Belgium
\$54,000 pc



Australia
\$54,900 pc

Humanity's sweetspot

Social Thresholds Achieved →



- colonialism*
- military power*
- trade & finance rules*
- resource extraction*
- climate-change impacts*

Biophysical Boundaries Transgressed →

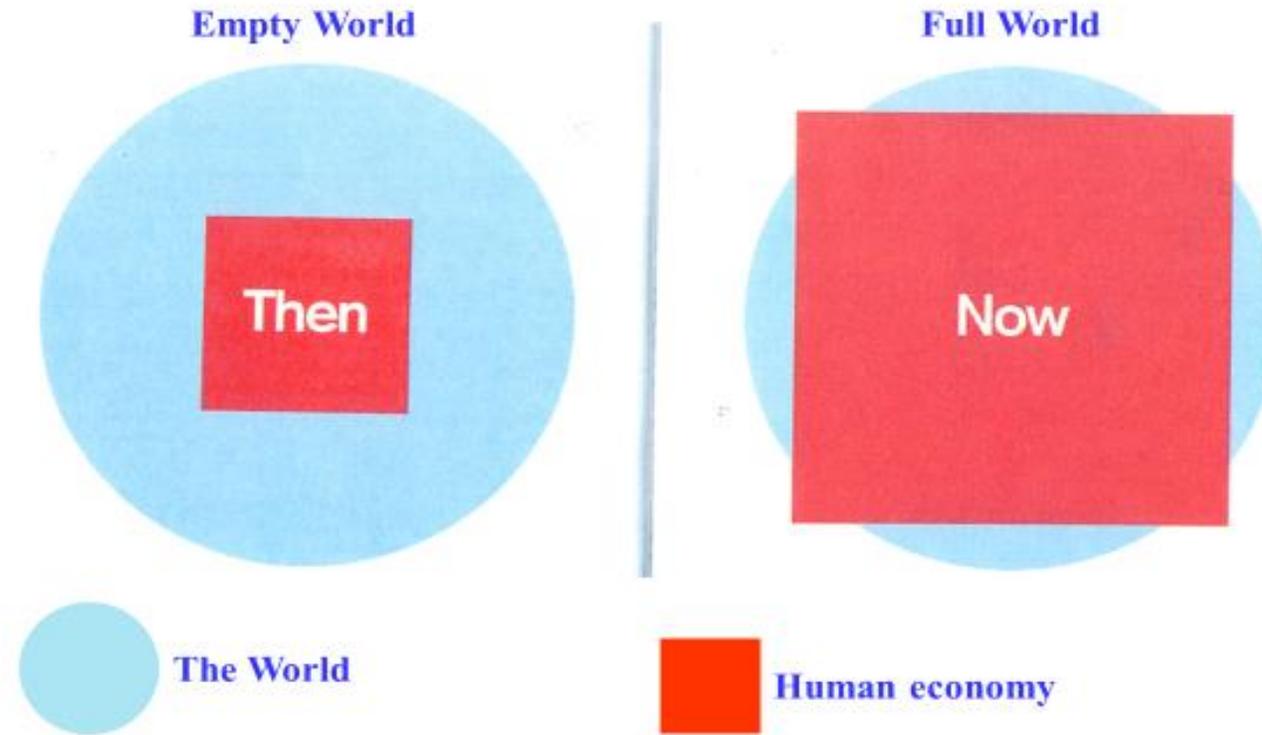


*For the first time in a human history we face the emergence of a single, tightly coupled human **social-ecological system of planetary scope.***

*We are more **interconnected** and **interdependent** than ever.*

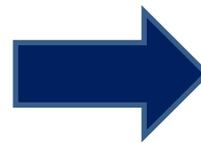
*Our individual and collective **responsibility** has enormously increased.*

From “Empty” World to “Full” World



Source: Club of Rome: Simplified after Herman Daly

Labour and Infrastructure limiting factors of human wellbeing



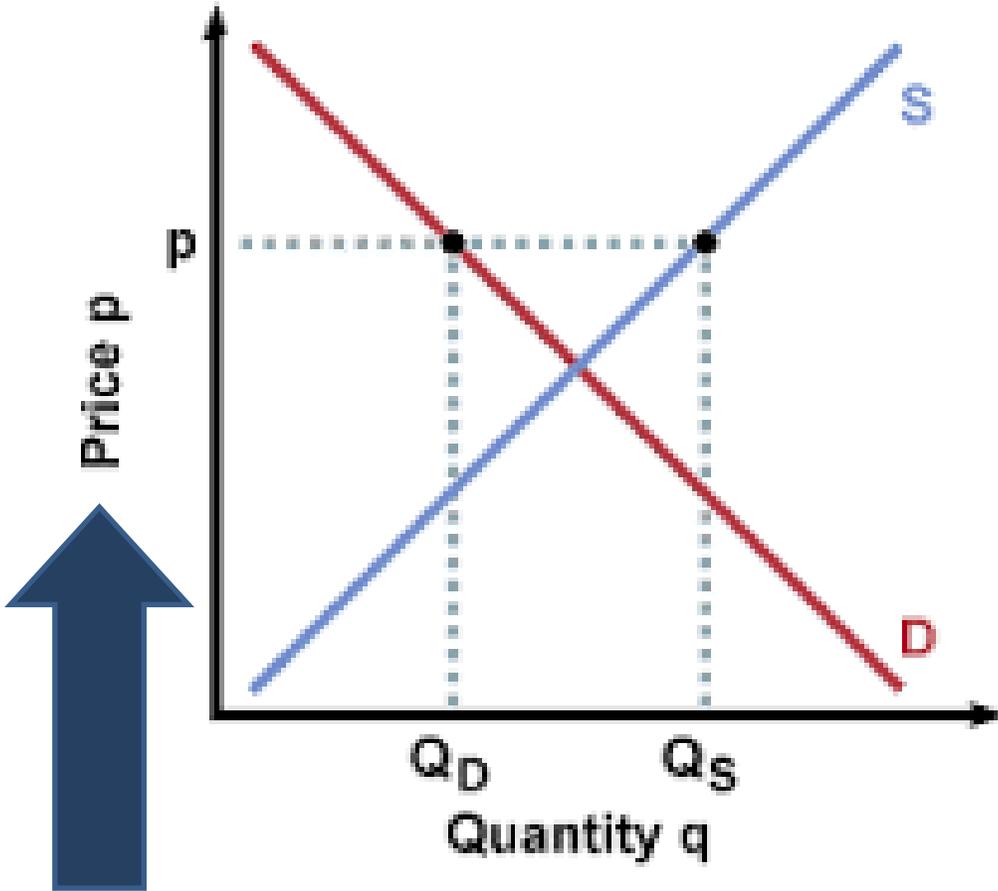
Natural resources and Environmental sinks limiting factors of human wellbeing



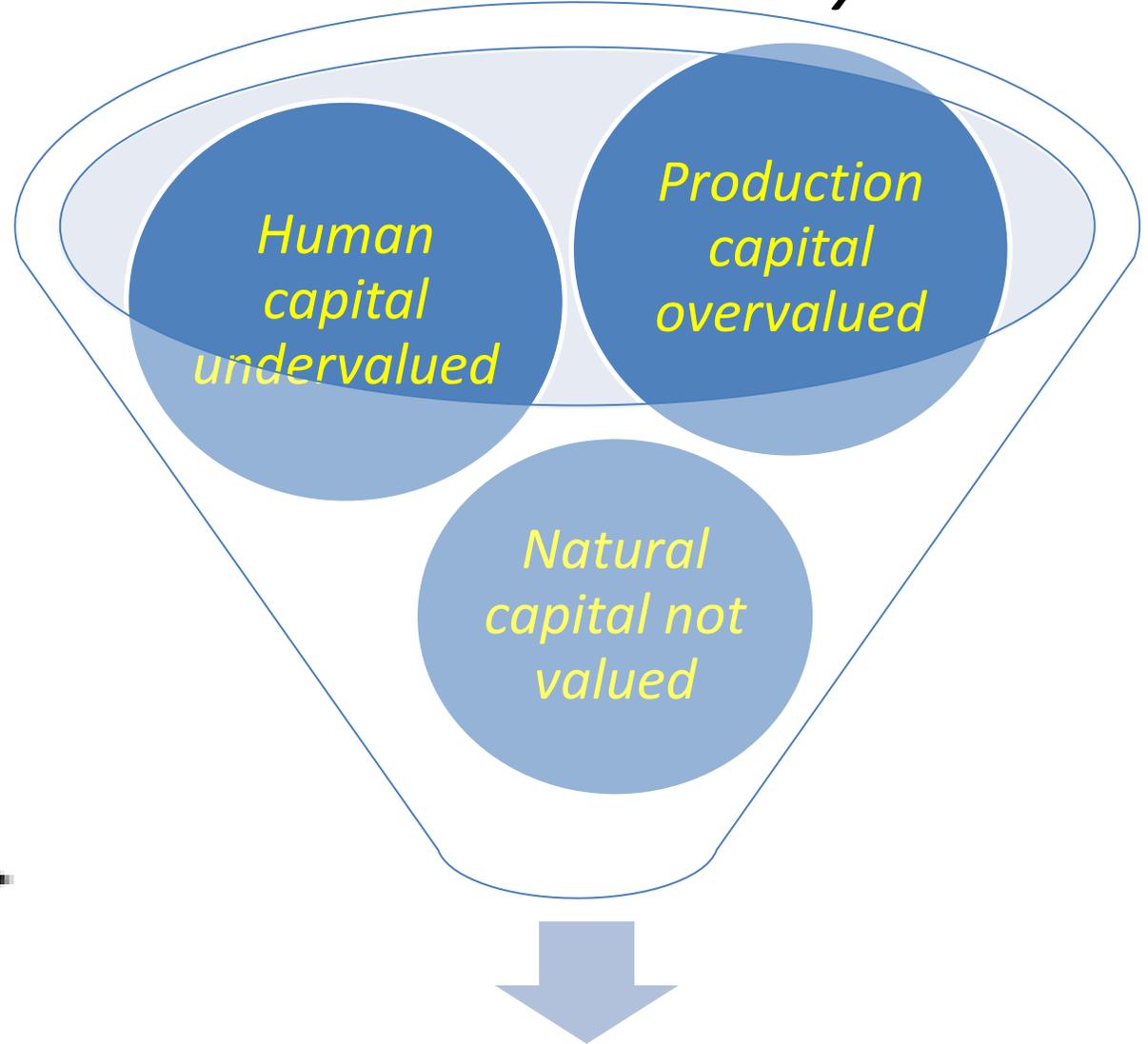
The Dasgupta Review

Main reasons for the current situation - it highlights institutional failure and the failure of contemporary economics to acknowledge that we are embedded in, and not external to nature, and to act accordingly.

*Producers/Consumers
Rational Behaviour*



Market Economy

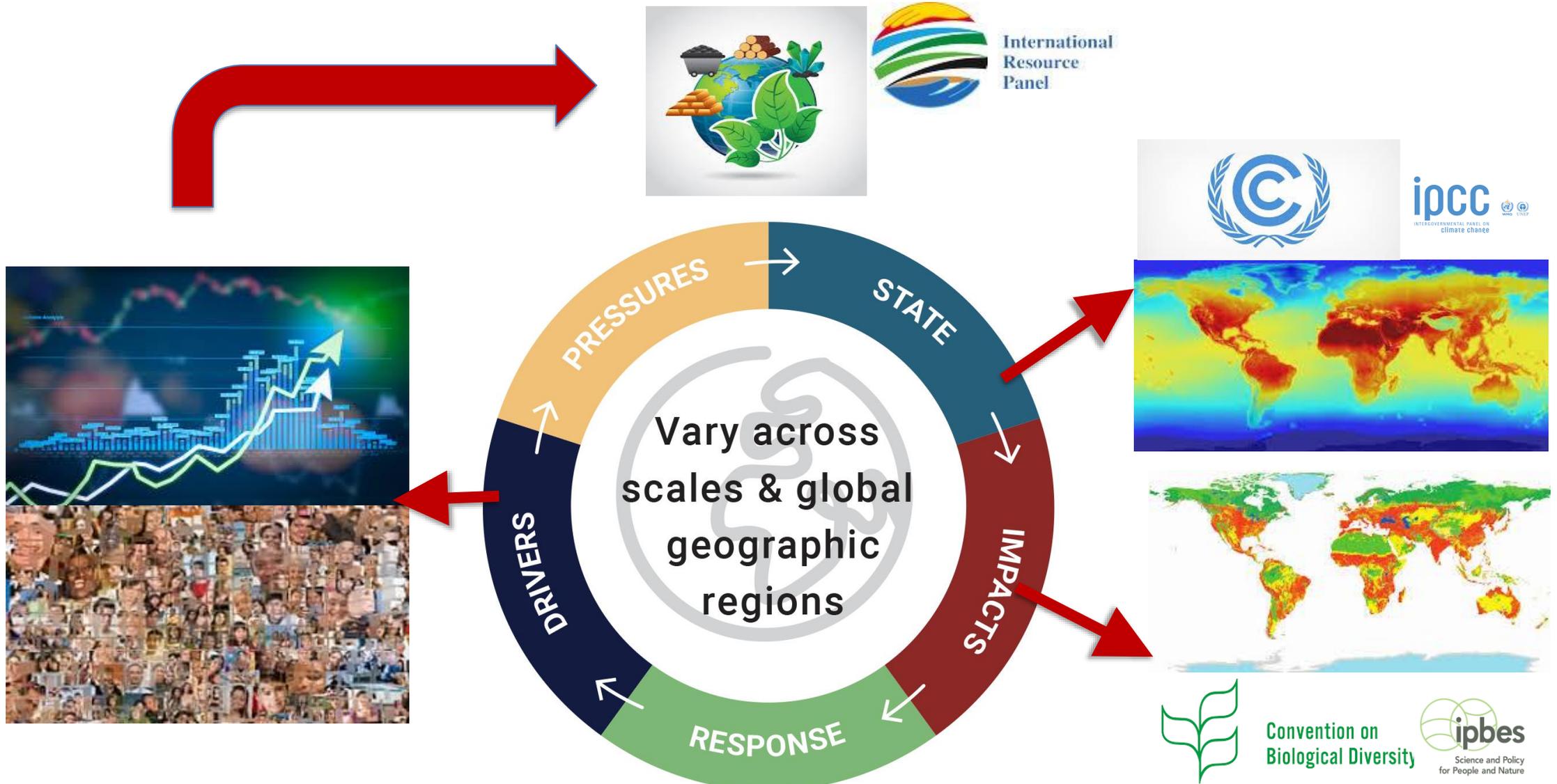


*Economic, social and environmental
(in)balance*

Resource Management

The scientific backbone

Natural resources are the **bridge** between economy and competitiveness on one hand and climate change, biodiversity loss, pollution and health implications on the other





- *Natural resources have been in the human history **always closely related to stability, conflicts, wars** (land, water, oil, precious minerals ...)*
- *According to the UN IRP, in the mid-term, except in specific cases, resource shortage will not be the core limiting factor of our (economic) development ...*
- ***But the environmental** (climate change, biodiversity loss, pollution ...) **and health consequences caused by excessive and irresponsible use of resources will be!***

Natural Resources:

Provide the foundation for the goods, services and infrastructure that make up our current socio-economic systems



Biomass (wood, crops, including food, fuel, feedstock and plant-based materials)



Fossil fuels (coal, gas and oil)



Metals (such as iron, aluminum and cooper...)



Non-metallic minerals (including sand, gravel and limestone)

Materials
Extracted from
earth



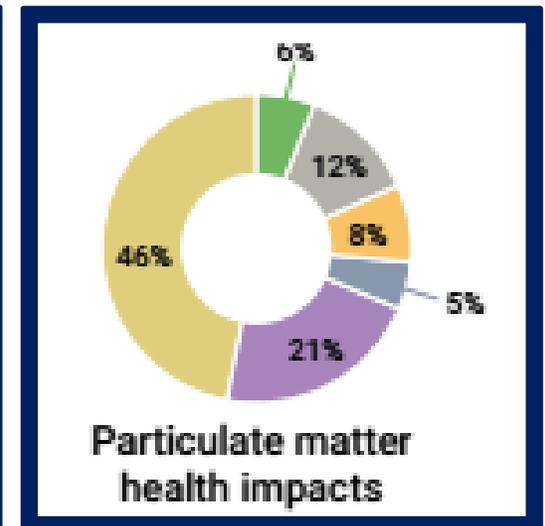
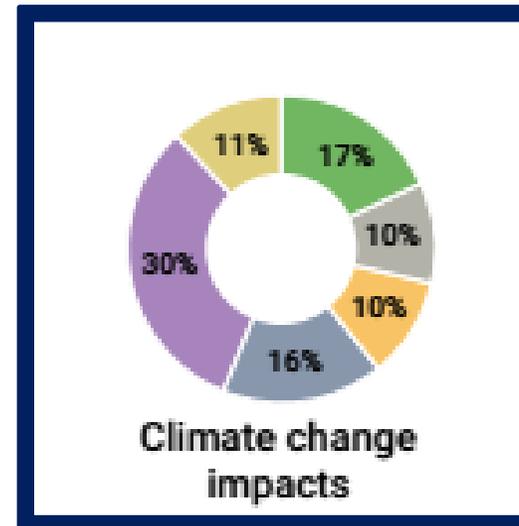
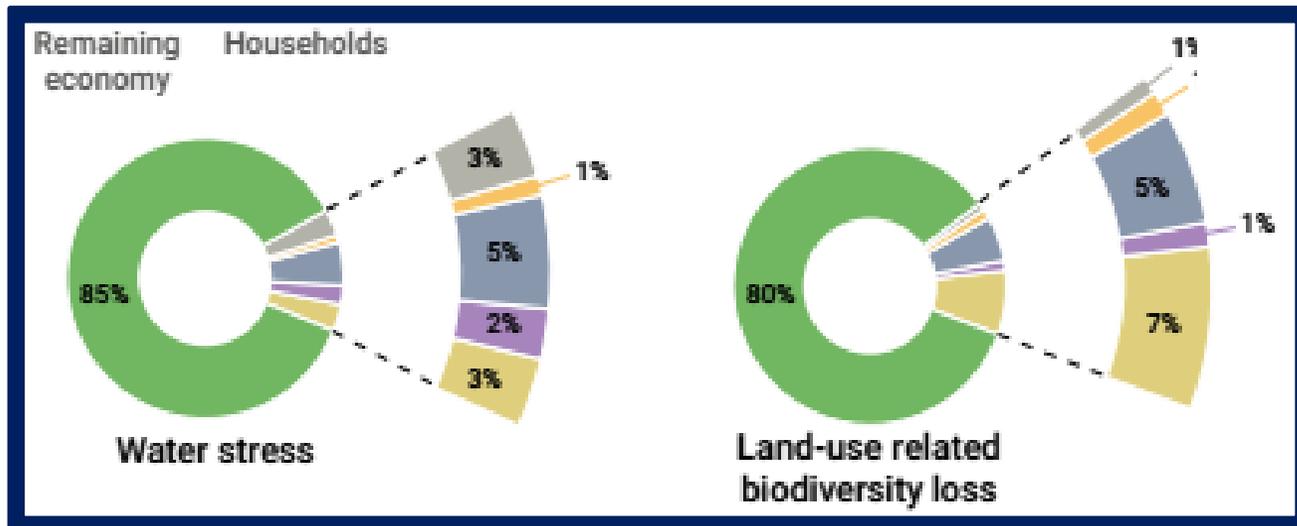
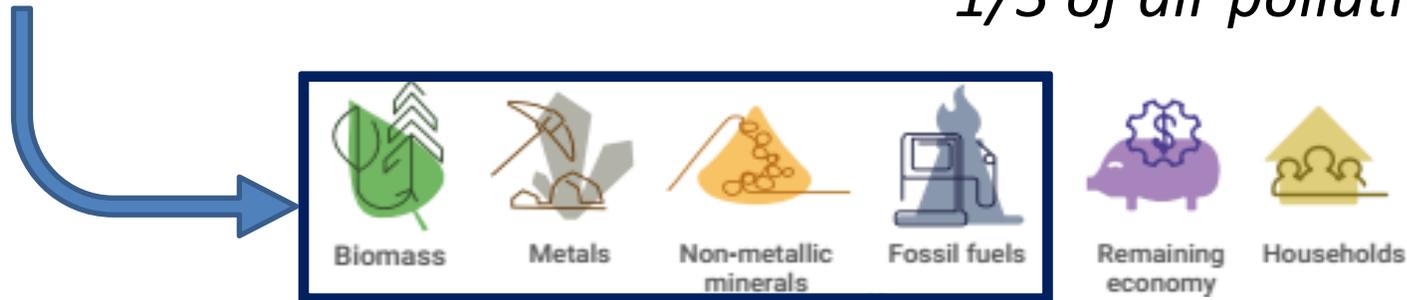
Water and Land



Extraction and Processing of Natural Resources Drives all Aspects of the Triple Planetary Crisis

Environmental impacts of materials in the value chain in extraction and processing phase

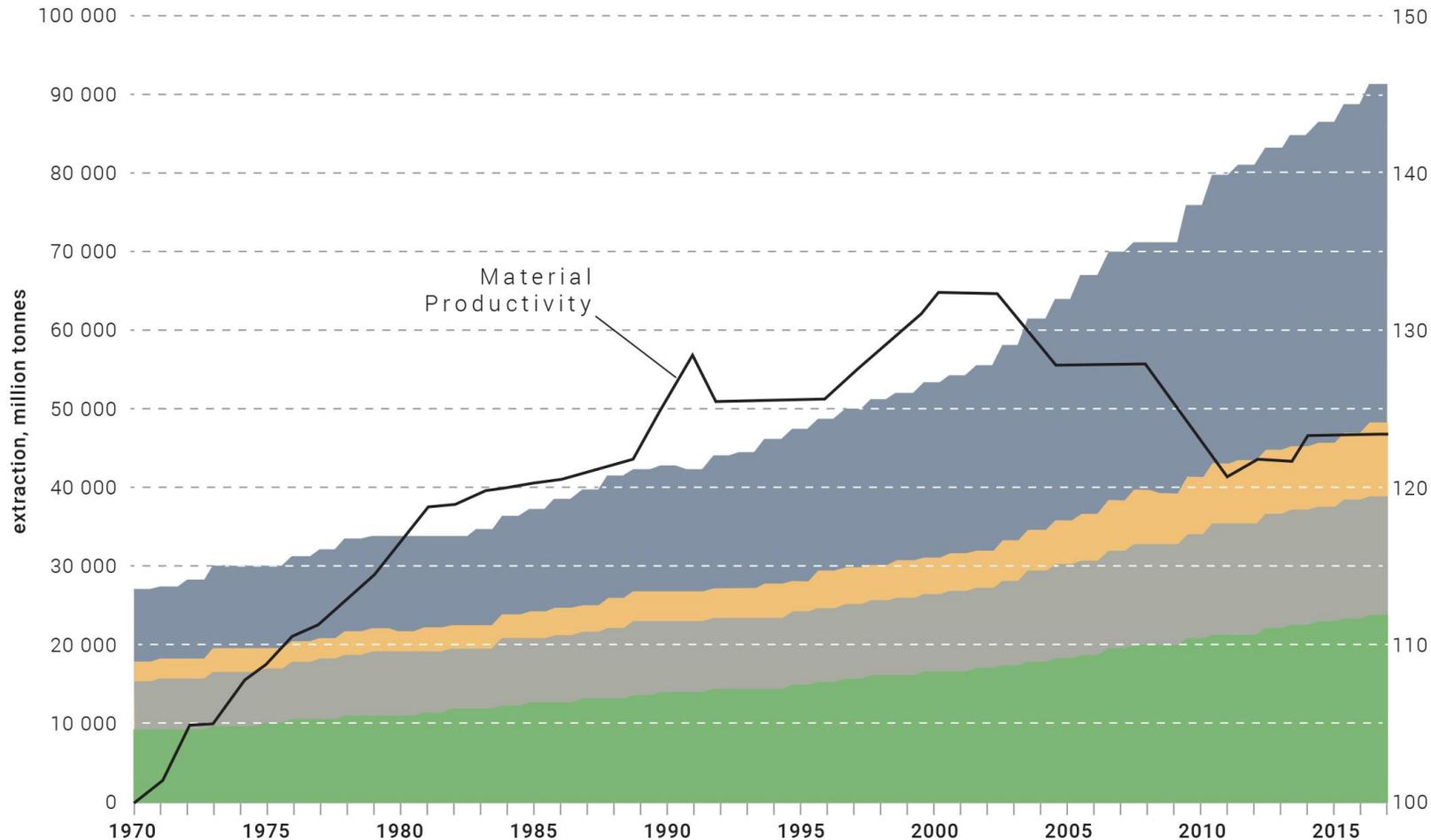
90% of global land related biodiversity loss and water stress
50% of global climate change impacts
1/3 of air pollution health impacts



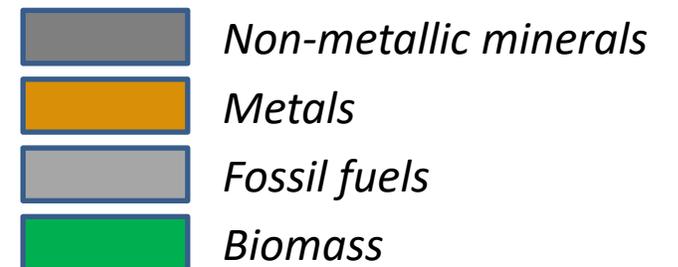
Global material use

Material demand per capita and Material productivity

Global material extraction and material productivity, 1970 - 2017

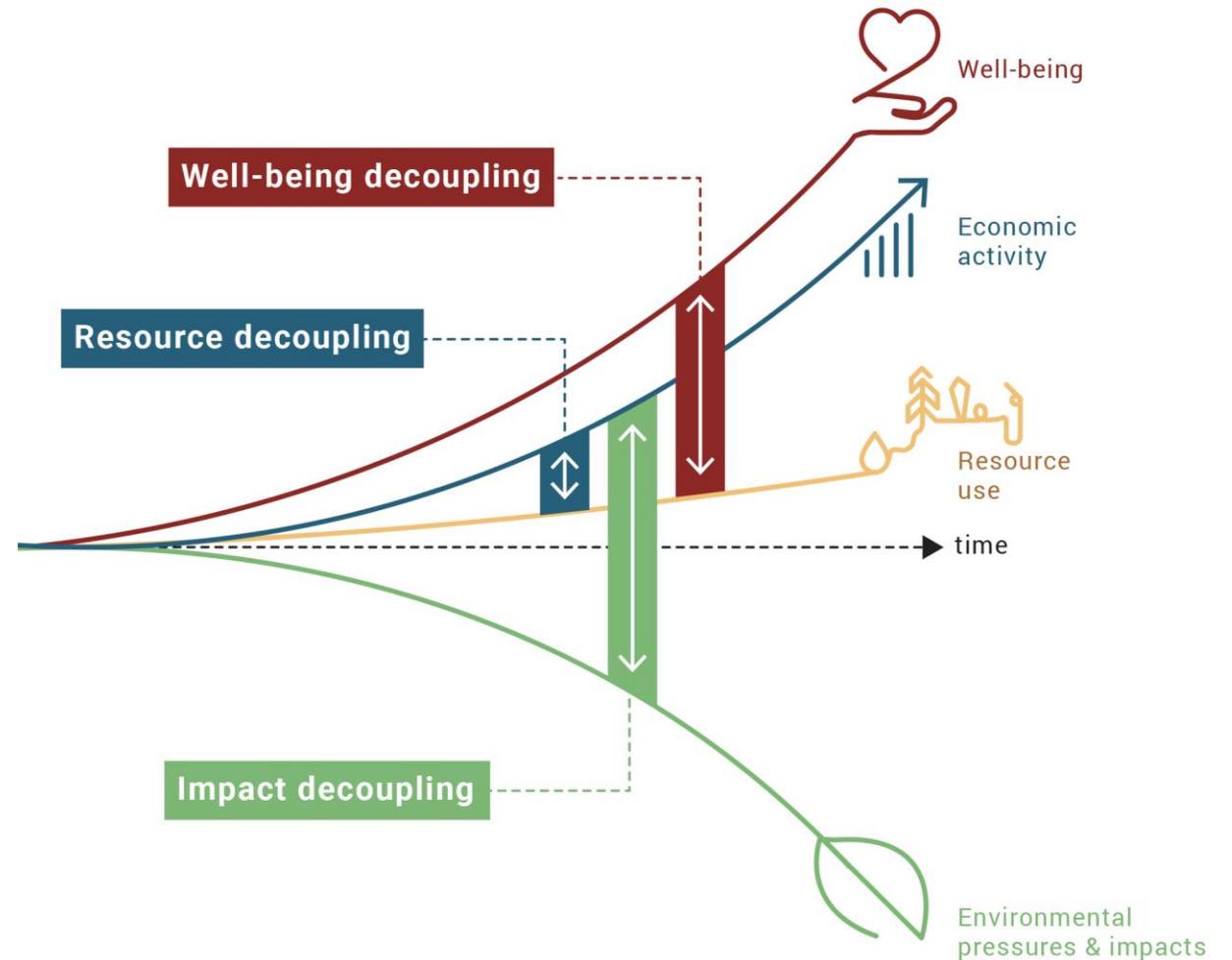


- *Global material use has more than tripled since 1970*
- *Global material demand per capita grew from 7.4 tons in 1970 to 12.2 tons per capita in 2017*
- *Material productivity started to decline around 2000 and has stagnated in the recent years*



If current trends would continue, global material consumption is predicted to double by 2060

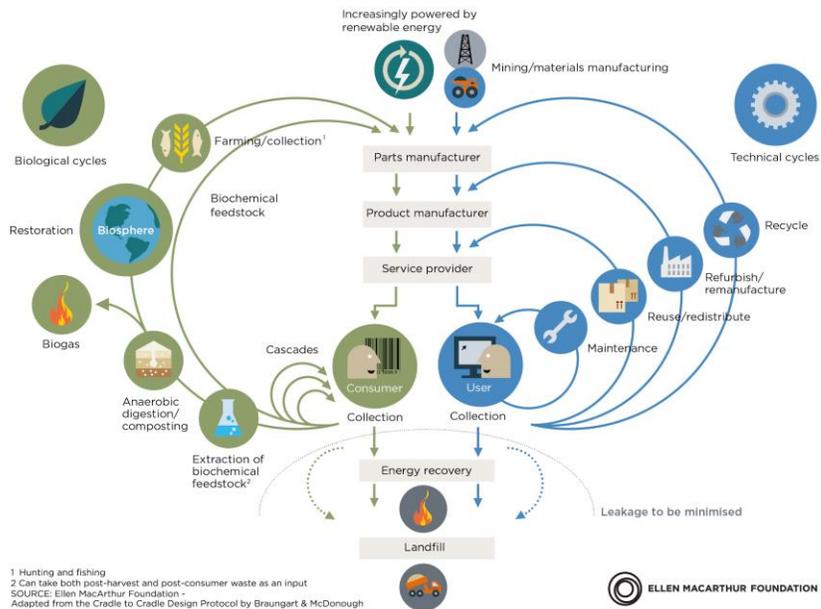
Decoupling



CIRCULAR ECONOMY

When, What, Who ... Why

CIRCULAR ECONOMY - an industrial system that is restorative by design



*It should be seen as an **instrument for deliver decoupling** of economic growth from resource use and environmental impacts and as a **part of the bigger picture of economic, societal and cultural transformation** needed to deliver the SDGs.*

The first dimension is often overlooked...



From Product Maximisation to Providing Human Needs

It is not not about owing it is about using

We do not need cars

...

We need mobility

We do not need light bulbs

...

We need light

We do not need chairs

...

We need to sit

We do not need refrigerators

...

We need chilled and healthy food

We do not need CDs

...

We want to listen to the music

We do not need pesticides

...

We want healthy plants



From selling light bulbs to selling light

Dematerialisation and Decoupling



videohive.net

Light bulbs sold to the consumer are the basis for producers' profit



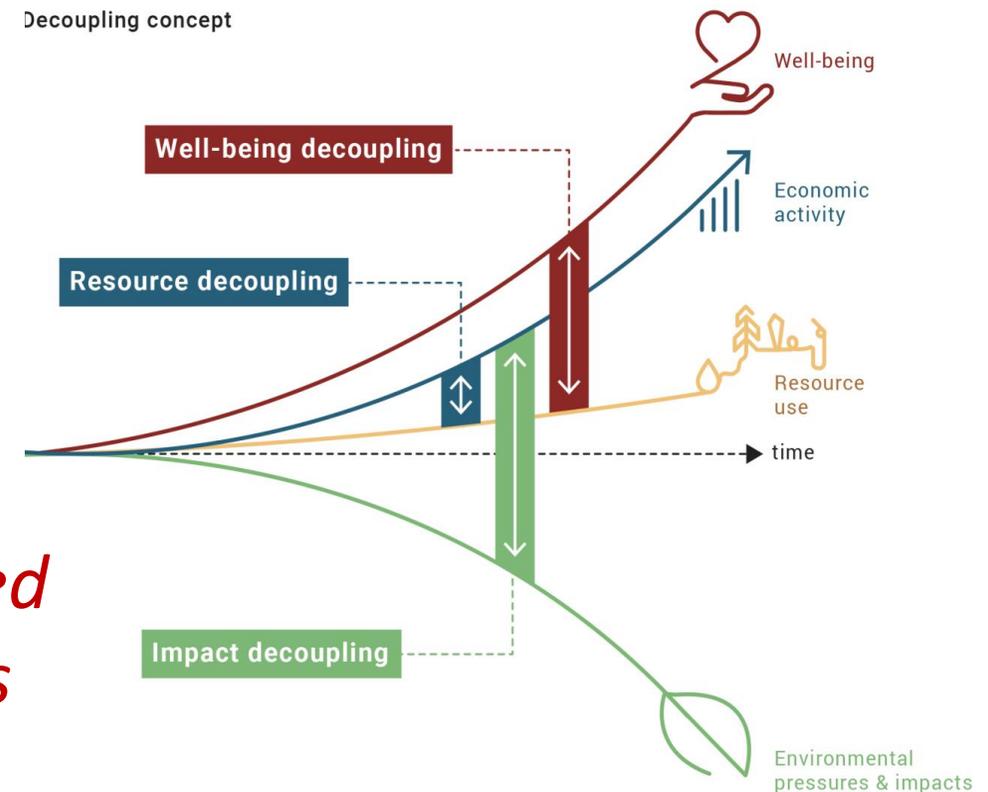
letstalkscience.ca

Light bulbs used to provide the light to the consumer are producers' cost

Ownership and product (under)utilisation - Consumer

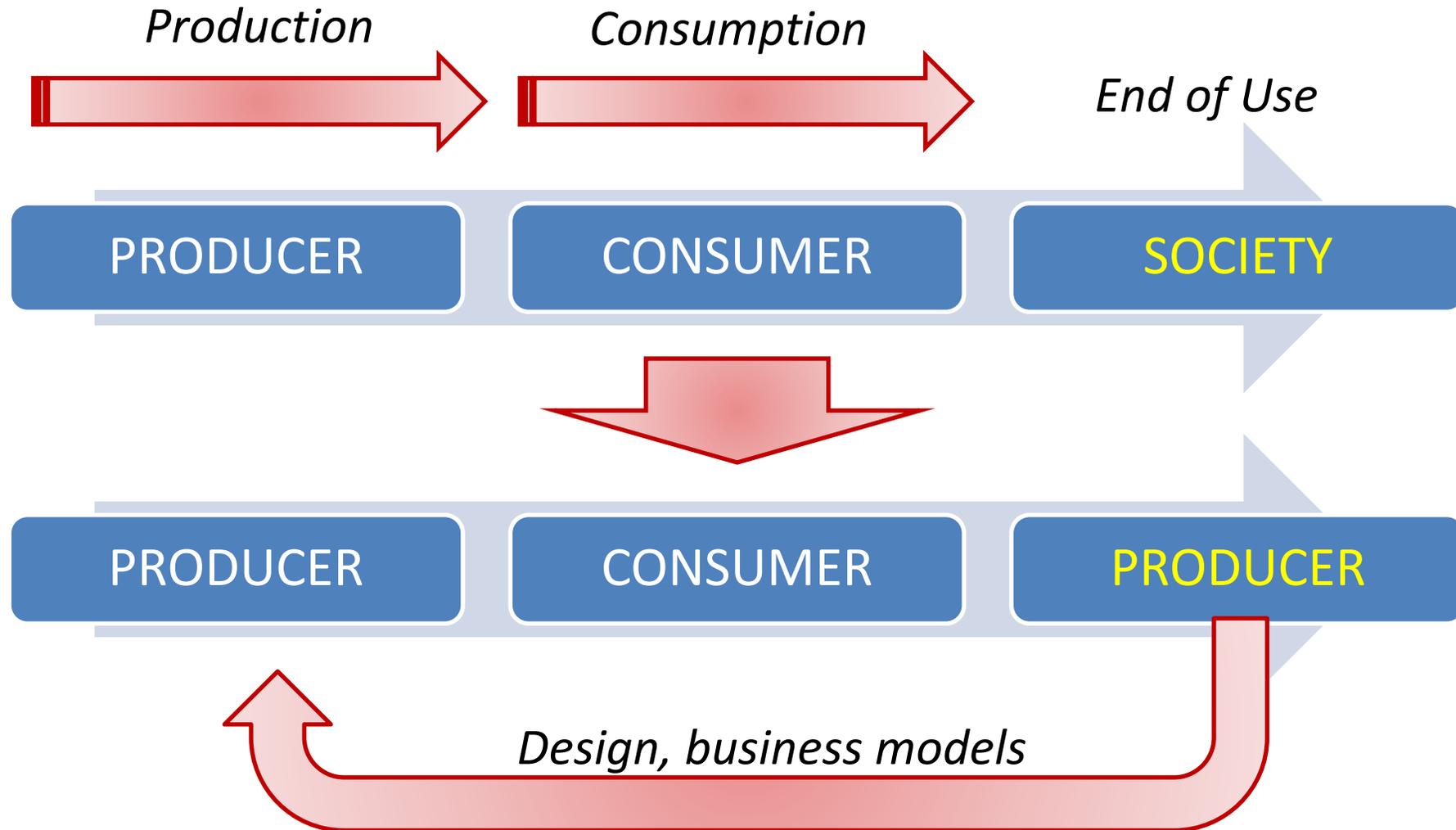
It is not not about owing it is about using

- **Problem:** Preferences from consumers to own products like houses, cars, refrigerators, cloth ... are driving consumption in a massive lock-in in underutilization
- **Solution:** Explore the opportunity that the young generation has less ownership biased constraints and provide alternative options



Ownership and resource (under)utilisation - Producer

Better Connecting Producer with his Product – Extended Producer Responsibility



Retaining the Value, Rethinking Ownership, aligning Incentives with Regulation

*Towards Sustainable and
Equitable World
System Change Compass*

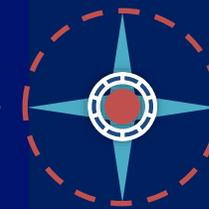
The System Change Compass contributes to the implementation of the ambitions of the European green Deal



Ambition of the EGD is high...



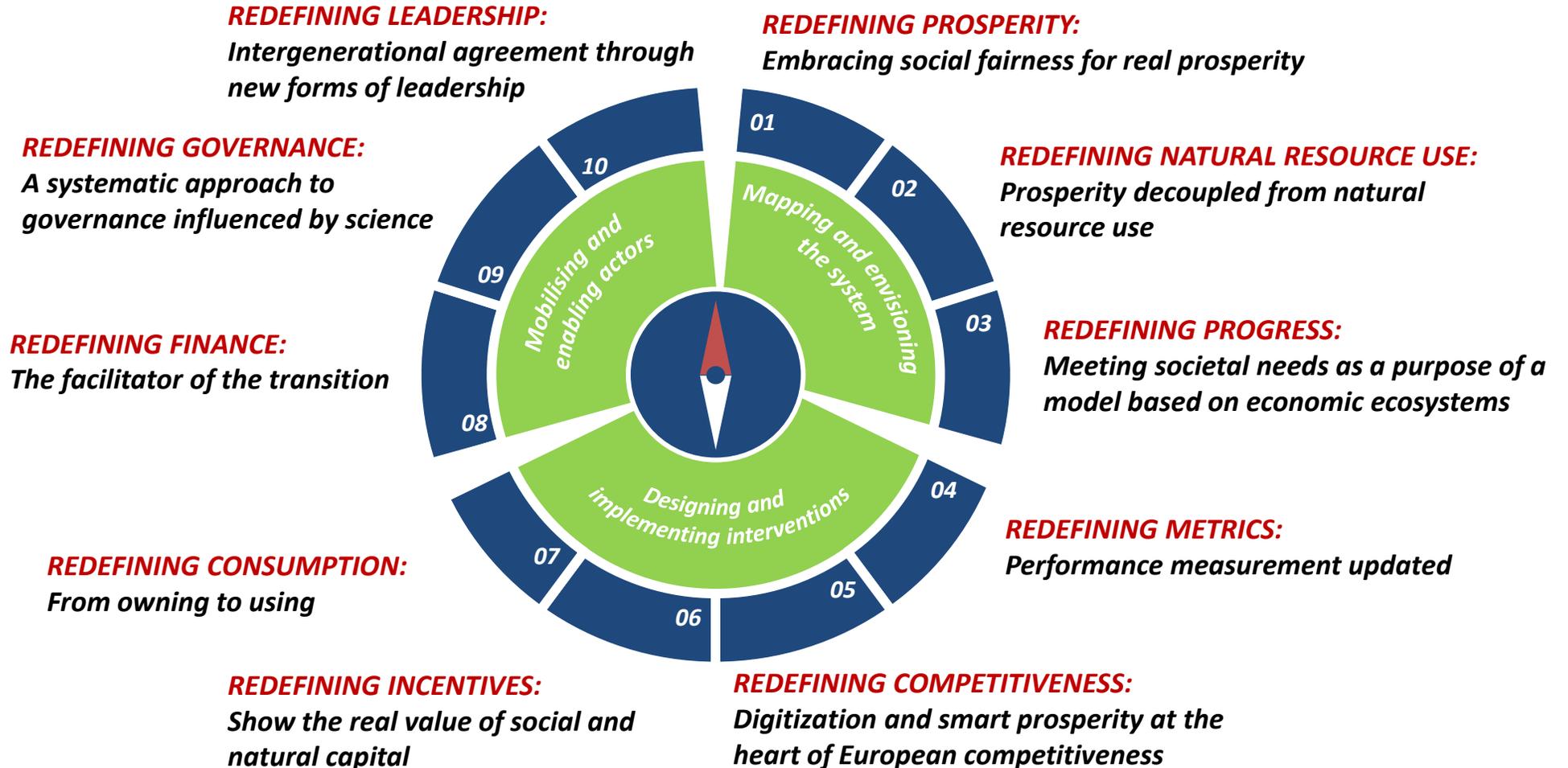
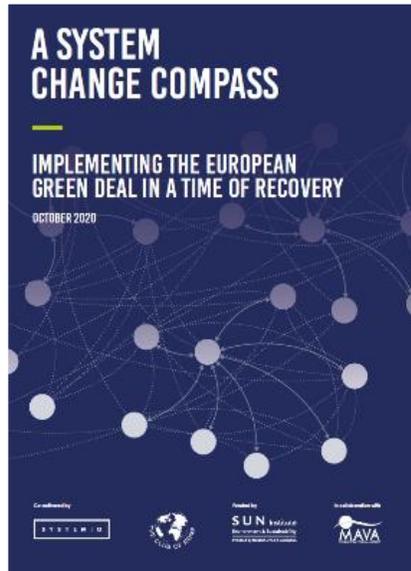
...but implementation is uncertain



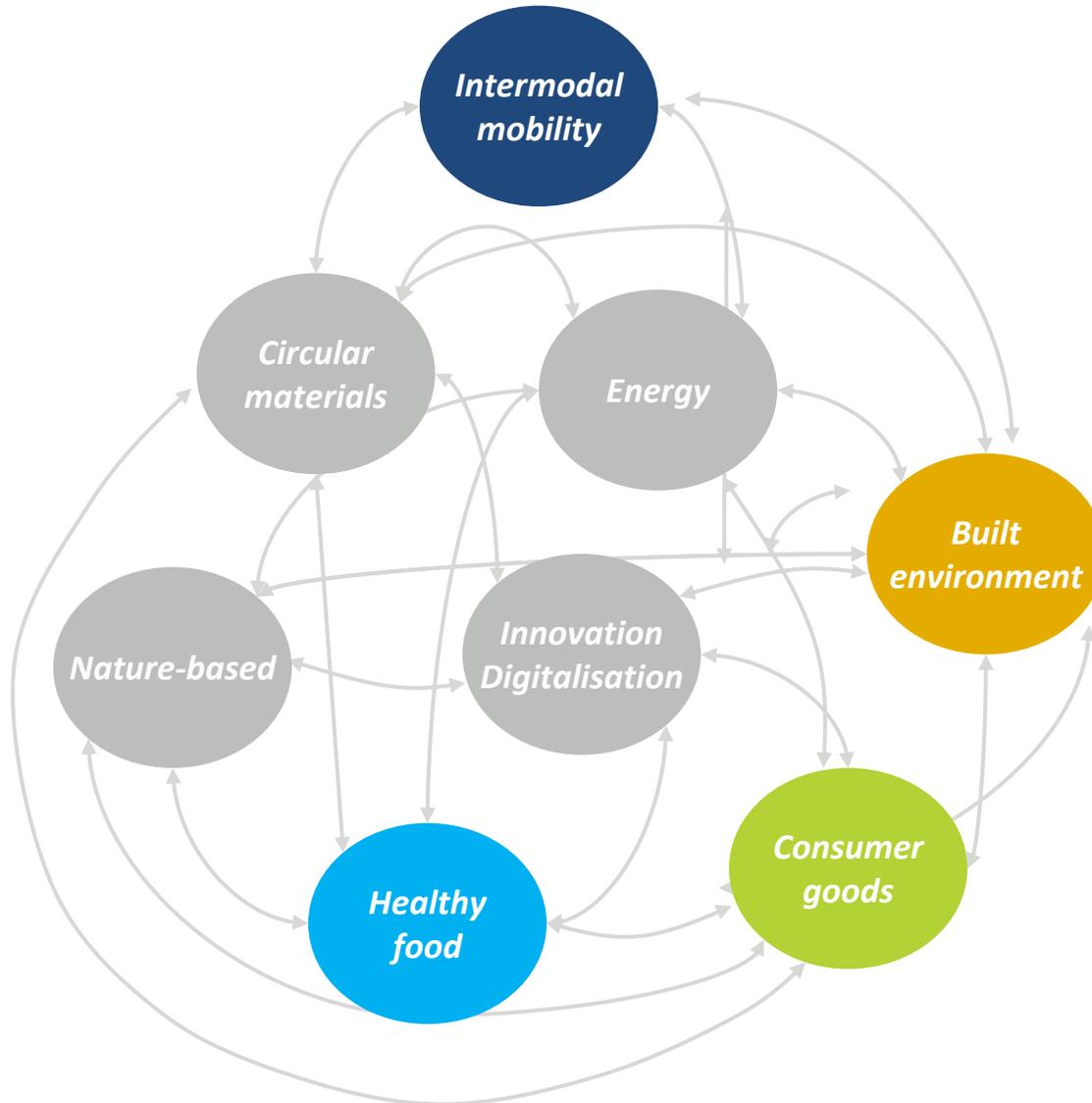
The System Change Compass guides action on all levels of the system

- **Sets zero net emissions** of GHG by **2050** and **decoupling of growth and resource use**
- Acknowledges need for fair and **just transition**
- Aims at **strongly interlinked and mutually reinforcing** policy recommendations
- **Does not sufficiently address drivers and pressures** that cause environmental damage
- **Does not offer systemic perspective** to guide decision-making
- Implementation is put at extra risk due to **COVID-19 recovery and war in Ukraine**
- **Maps and envisions** the system in service of people and planet
- **Derives system level orientations** towards desired state
- Charts pathway towards prosperity and wellbeing **within planetary boundaries**

Redefining the Socio-Economic System



Provisioning Systems



Related to resource intensive human needs

- Nutrition
- Mobility
- Housing
- Daily functional needs
- Resource relevant systems enabling and supporting the provisioning systems delivering societal needs

50+ nascent industrial investment opportunities that should be supported to built ecosystems based on compass orientations

Healthy food



- Organic food and beverages
- Regenerative agriculture
- Sustainable aquaculture and fishing
- Reduce and valorise food waste
- Urban agriculture
- Product reformulation for nutritious food
- Alternative proteins

Built Environment



- Smart urban planning
- Rethink built environment ownership
- Repurpose underutilized buildings
- Retrofit existing buildings
- Fluid and sufficiency-oriented space management
- Circular and net-zero housing

Intermodal Mobility



- Fast charging infrastructure
- High-speed railway infrastructure
- Modern and adapted transit infrastructure
- Car- and ride-sharing models
- End-of-life management for cars
- Electric and autonomous vehicles
- Infrastructure to improve traffic flow and AV adoption
- Green aviation
- Green shipping
- Walking/cycling infrastructure

Consumer goods



- Product-as-a-Service models
- Maintenance and value retention in products
- Peer-to-peer product sharing platforms

Nature-based



- Restoration of degraded land and coasts
- Smart forest management
- Urban greening
- Systems for paid ecosystem services
- Seaweed
- Marine and land-based environmental protection areas
- Ecotourism

Energy



- Renewable power generation
- Energy storage
- Hydrogen economy
- Smart metering and (point-of-use) energy management
- Grid integration and technologies
- Production of low-carbon gaseous and liquid fuels (transition technology only)
- Carbon capture infrastructure (transition technology only)

Circular Materials



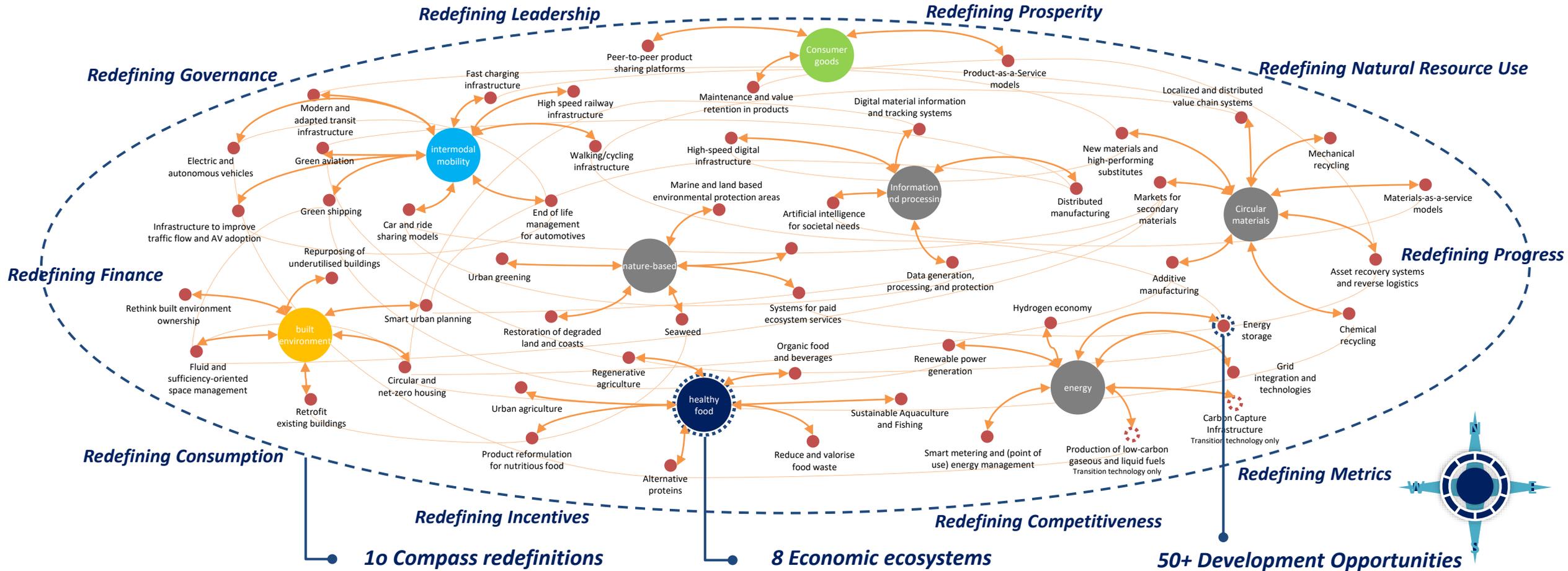
- Localised and distributed value chain systems
- Asset recovery systems and reverse logistics
- Markets for secondary materials
- High-value material recycling
- Materials-as-a-Service models
- New materials and high-performing substitutes
- Additive manufacturing

Information and processing



- Distributed manufacturing
- High-speed digital infrastructure
- Digital material information and tracking systems
- Data generation, processing, and protection
- Artificial Intelligence for societal challenges

System Change Compass



New organization of economic activities

One overarching system that consolidates the European economy in its entirety.

Economic ecosystems can meet a specific societal need (e.g. intermodal mobility system) or support the fulfilment of multiple societal needs (e.g. new energy system).

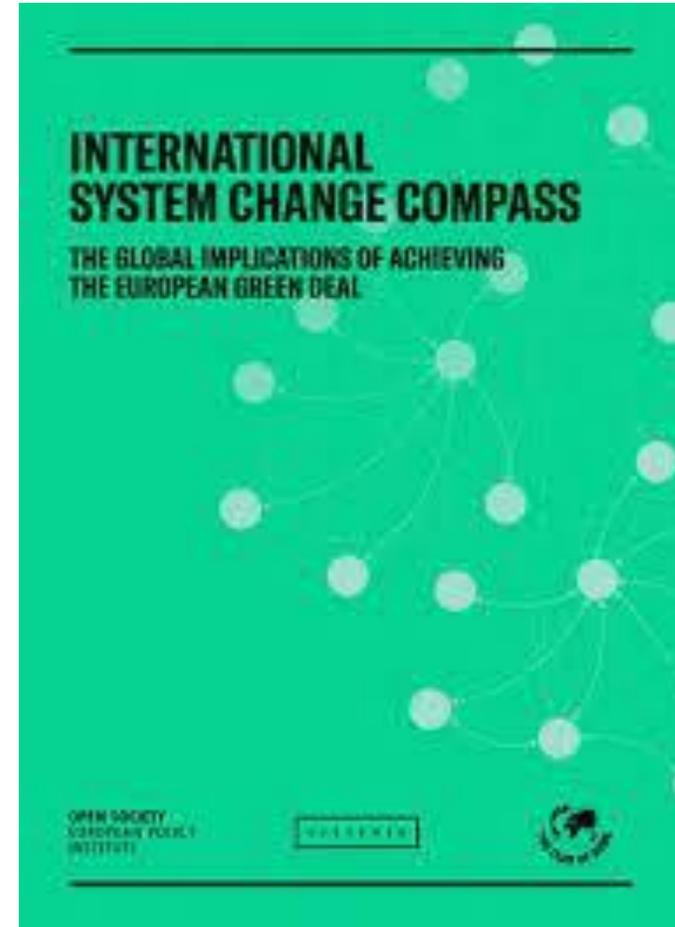
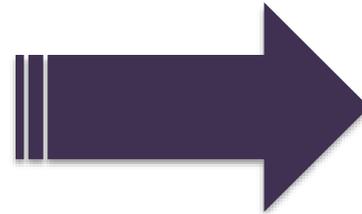
“Champions” are economic subsystems which could become the new spearheads of the green, resilient and fair post-COVID economy Europe wants to build

Application of the compass on each level

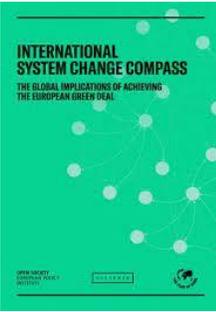
10*3 = 30 system-level policy orientations

3-5 specific economic ecosystem policy orientations 50+ economic subecosystems orientations

From Internal to External Focus

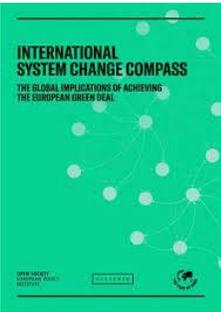


EGD is an important European and also global North star. Implementation will have important international consequences, which should be well integrated in policy approach.



- *EGD is “a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are **no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use.**” ... “At the same time, this transition must be **just and inclusive**”*
- ***How we should prepare and address the consequences which decarbonisation, decoupling and just and inclusive transition commitment will have on geo-political relations and trade flows?***

High income-countries are surpassing planetary boundaries most and need to lead the transition by example



- In overusing Earth's resources, and by distributing the benefits unfairly, our economic model is taking far more than the planet can sustainably give. Resource use has significantly improved living standards and wellbeing of many, in particular in high-income countries, but this now comes at an unprecedented cost to climate, environment and health.*
- The problem is that humankind has never separated out economic growth from ever-rising demand for resources. As a result, we are now overstepping planetary boundaries, again in particular in high-income countries, and locking ourselves out of the safe operating space in which human societies evolved.*
- This is not an easy shift, but it is certainly possible. For example, take any well-functioning city with high scores in quality of life: they all provide high levels of active mobility, compact yet balanced neighbourhoods, and access to local, healthy food - they deliver a high quality of life through shifts in provisioning systems where we need to save virgin resources at scale.*

Main Blind-spots in Policy Making

System approach

Public leaders lack capacity or knowledge of how to translate system change visions into their concrete policies/investment structures which ends in conflicting policy logics that hinder real transformation

Resource perspective

Resource management is not given enough importance within policy making which is linked to the lack in actionable system thinking insights for concrete decisions

Demand side focus

Policy attention is mainly given to the supply side of the economy, to the cleaning of the existing economic system - lacking the attention to the demand side which is leaving out an important solutions potential and questions of responsibility and equity.

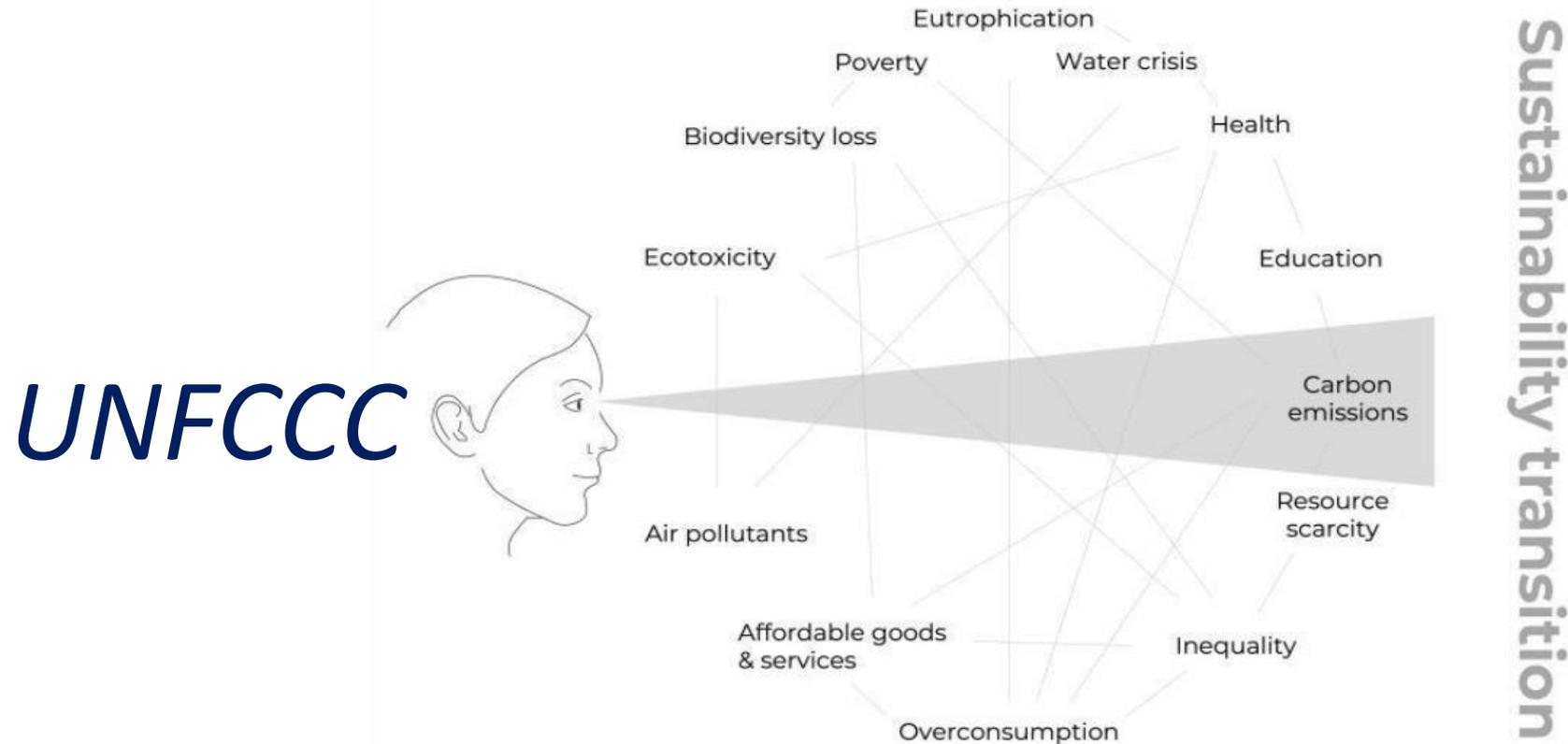
Climate Change Example

Main Blind-spots in Policy Making

System approach

Public leaders lack capacity or knowledge of how to translate system change visions into their concrete policies/investment structures which ends in conflicting policy logics that hinder real transformation

We need to extend the optic and potential policy options beyond the currently prevailing energy supply



This leads to trade-offs and future lock-ins rather than synergies and potential multiple-benefits ▸ and resilient economy and society

A 'Glasgow Breakthrough' was announced on road transport aiming for zero emission vehicles to be the new normal, accessible, affordable, and sustainable in all regions by 2030.



**UN CLIMATE
CHANGE
CONFERENCE
UK 2021**

IN PARTNERSHIP WITH ITALY

System change in road transport means less and more efficient traffic, for more value



Five Levers for Sustainable Car-Based Transport

Reduce demand for car-based transport



- **Reduce overall mobility need** (e.g., through remote work)
- **Modal shift** from cars to foot, bike, & public transport
- **Higher utilization of vehicles** through sharing

Ensuring remaining vehicles are as sustainable as possible



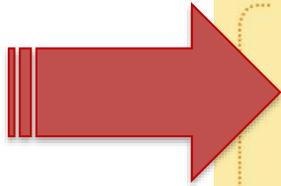
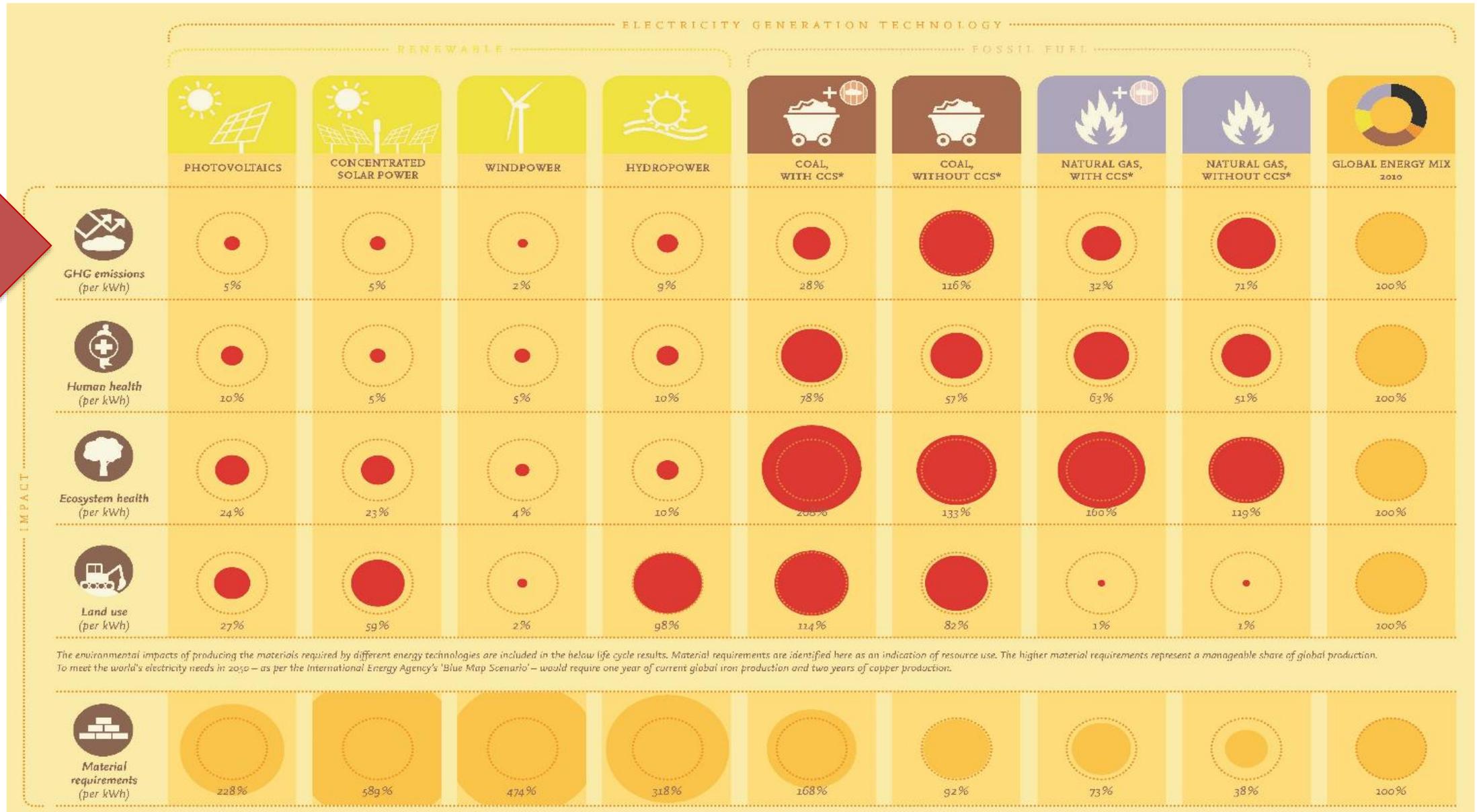
- **Electrification** based on renewable energy
- **Circularity**, maximizing value of used materials

Main Blind-spots in Policy Making

Resource perspective

Resource management is not given enough importance within policy making which is linked to the lack in actionable system thinking insights for concrete decisions

Impact of Electricity Generation Technologies

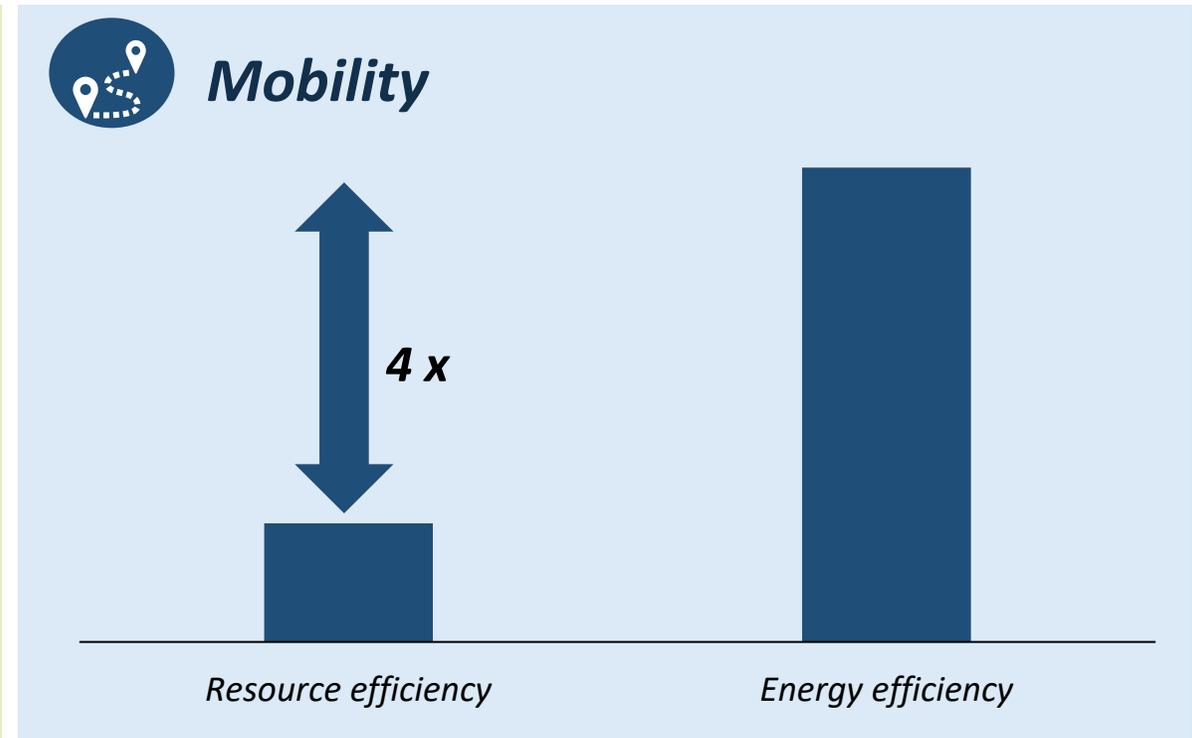
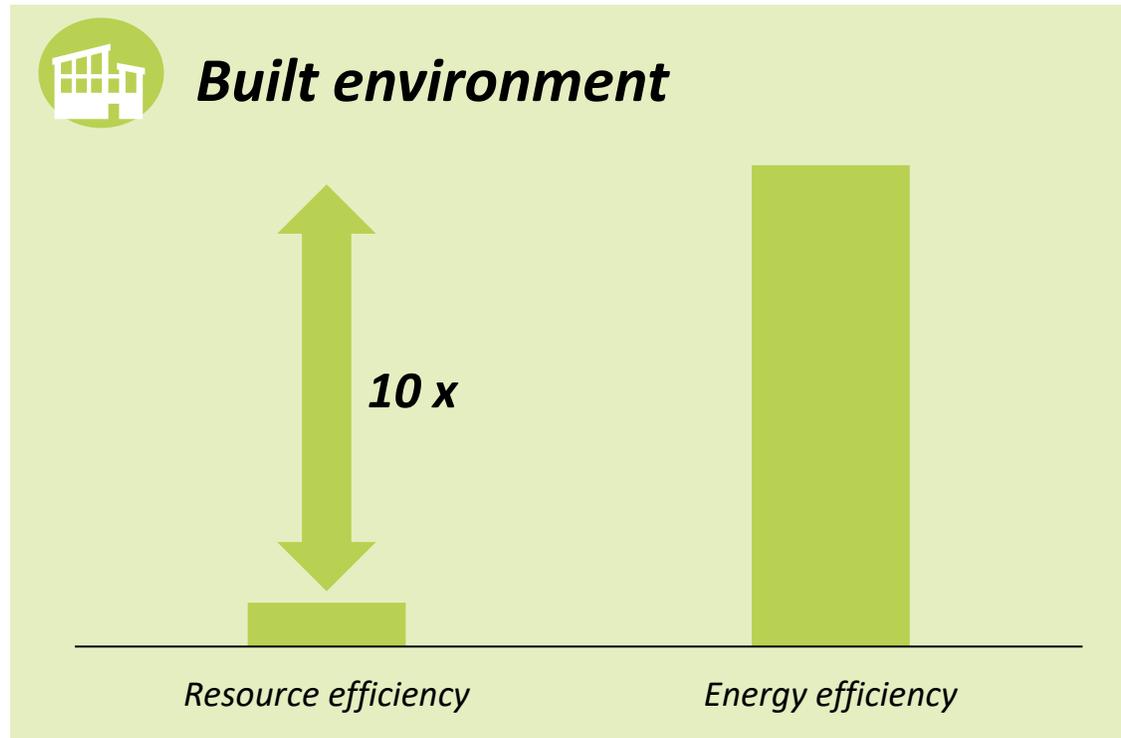


Most climate policies still neglect systemic resource efficiency solutions, and thus miss major opportunities for climate and society

Examples - non exhaustive

G20 Nationally Determined Contributions and Long-term Climate Plans focus on energy efficiency and miss out on more systemic resource efficiency opportunities.

Number of policies with quantified targets, illustrative



SUPPLY SIDE SOLUTIONS

CARBON MANAGEMENT

LAND

WATER

ENERGY

MATERIALS

DECOUPLING - CIRCULAR ECONOMY

DEMAND SIDE SOLUTIONS

ECO-SYSTEM SERVICES, ENVIRONMENTAL SINKS

NATURE BASED SOLUTIONS

Main Blind-spots in Policy Making

Demand side focus

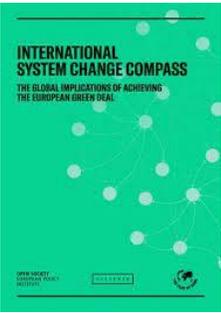
Policy attention is mainly given to the supply side of the economy, to the cleaning of the existing economic system - lacking the attention to the demand side which is leaving out an important solutions potential and questions of responsibility and equity.

Focusing only on cleaning a supply side will not be enough, nor will lead to a fairer and more equal world

- *Our international efforts, also to fight the climate crisis, remain focused on, and driven by, the supply side. This will not be enough to deliver the targets set. IRP is frequently repeating that message, but also recent IPCC report is clear about that.*
- *We must stop ignoring the inherent wastefulness of our production and consumption. For example, it would be in vain to decarbonize the production of steel, if it is used to produce under-used cars and houses, which contribute to traffic and property market bubbles, but not to real social prosperity.*
- *More fundamentally, demand-side measures get us closer to the essential questions of responsibility and equity.*
- *NDCs and other national climate commitments should consider including also footprint based indicators and targets*

Some Important Conclusions
International System Change Compass

The problem primarily lies in our economic model not valuing natural resources



- *Economic theory is based on the rational behaviour of consumers and producers: the more we produce at the lowest possible price, the higher the capital returns and GDP growth.*
- *Undervalued labour and, in many cases, not valued nature by our markets, are leading to systemic social and environmental imbalances - Food shopping centre example. Our short-term rational behaviour is leading to a long-term irrational “Charming mass suicide” (Arto Paasilinna novel title).*
- *Ambitious policies face an uphill battle to implement incentives and regulations to change our production and consumption patterns. Sending policy signals one way, and market signals the other, is creating confusion (not to mention intense lobbying by companies that fear the loss of profitable markets). It’s time to stop signalling to producers that destroying natural capital is free of charge. Time to stop contradictory messages to consumers, who still routinely pay more for food with a low environmental impact, instead of the reverse.*

We need a systemic approach aligned with SDGs and countries most responsible for the current situation should take the lead



- The map of resource use still shows the shadows of an imperialist world, where wealthy nations pursue their ambitions at the expense of others. Making our economies and societies more resilient and fair is **our best defence against any future crises**.*
- In the longer term any security and stability related issues are not about opening a new economic front. They are, first of all, about **reassessing our values, rethinking our economies and reducing overconsumption and resource use**.*
- Standards and behaviour patterns linked to the current economic model were set by high-income countries**. They are ethically bound to show the world that they are willing and able to change a reality we created, and to lead the essential transition – at home and globally. While the responsibility for the past is clear, responsibility for future is joined and common.*

To Conclude

Science is Clear and Change is Unavoidable



Source: amazon.in

- Glass is a *specific material*, giving you an opportunity and also responsibility to be among those who lead the sustainability transition ... which is according to all science data and analyses unavoidable.
- Efforts related to *your economic sector* to make it sustainable are thus needed and very welcomed! Do please consider also an important fact that in particular in high-income countries we must *reduce the use of natural resources*.
- But your role and responsibility also goes also beyond your current efforts. You must keep in mind the need for *closing the glass loop in the whole value chain* and show the way and leadership also in international field. The fact that you have invited some countries to share their reality and efforts is a good sign that you are aware of the responsibility you have in a more global context.
- And yes ... *Good luck !!!*

*For **The Future We Want** we must enter the untapped territories of the needed deep system transformation*

If we want to avoid extinction of elephants in nature, we must extinct elephants in the rooms



[Source: Hop distance - The elephant in the room ...blogs.bmj.com](https://blogs.bmj.com)



THANK YOU

for helping us delivering the future we want!