Bend the Trend

Resource Management for the Future we Need

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Co-Chair International Resource Panel - IRP
Partner SYSTEMIQ
Member Club of Rome

Marseille, 18th June 2024

International Resource Panel

Panel Co-Chairs:
Janez Potočnik and Izabella Teixeira

Steering Committee Co-Chairs:
Astrid Schomaker and Steven Stone

SCIENTIFIC PANEL

Internationally recognized experts on sustainable resource management;

Scientific assessments and advice, networks

Science-Policy interface

Head of Secretariat: *Merlyn van Voore*

UNE SECRETARIAT

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

STEERING COMMITTEE

Governments from developing and industrialized countries;

Strategic guidance, political support, regional synergies

Strategic Partners

One planet handle with care

World Business Council for Sustainable Development

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

International Science Council

SCIENCE POLICY BUSINESS FORUM

WORLD RESOURCES INSTITUTE

WORLD ECONOMIC FORUM

WORLD RESOURCES FORUM

PBL Netherlands Environmental Assessment Agency

SUN

UNITED NATIONS ECLAC

ELLEN MACARTHUR FOUNDATION

EARTH COMMISSION

OECD

International Science Council

ICC

YEE! YOUTH AND ENVIRONMENT EUROPE

PACE
PLATFORM FOR ACCELERATING THE CIRCULAR ECONOMY

IUCN

Main Challenges

The diagnosis and context of the problem

Let's start this story in my home country Slovenia

Slavoj Žižek

"It is clear that we are approaching the ecological and digital apocalypse … but we should not loose nerves."

"Everything under heaven is in utter chaos; the situation is excellent."

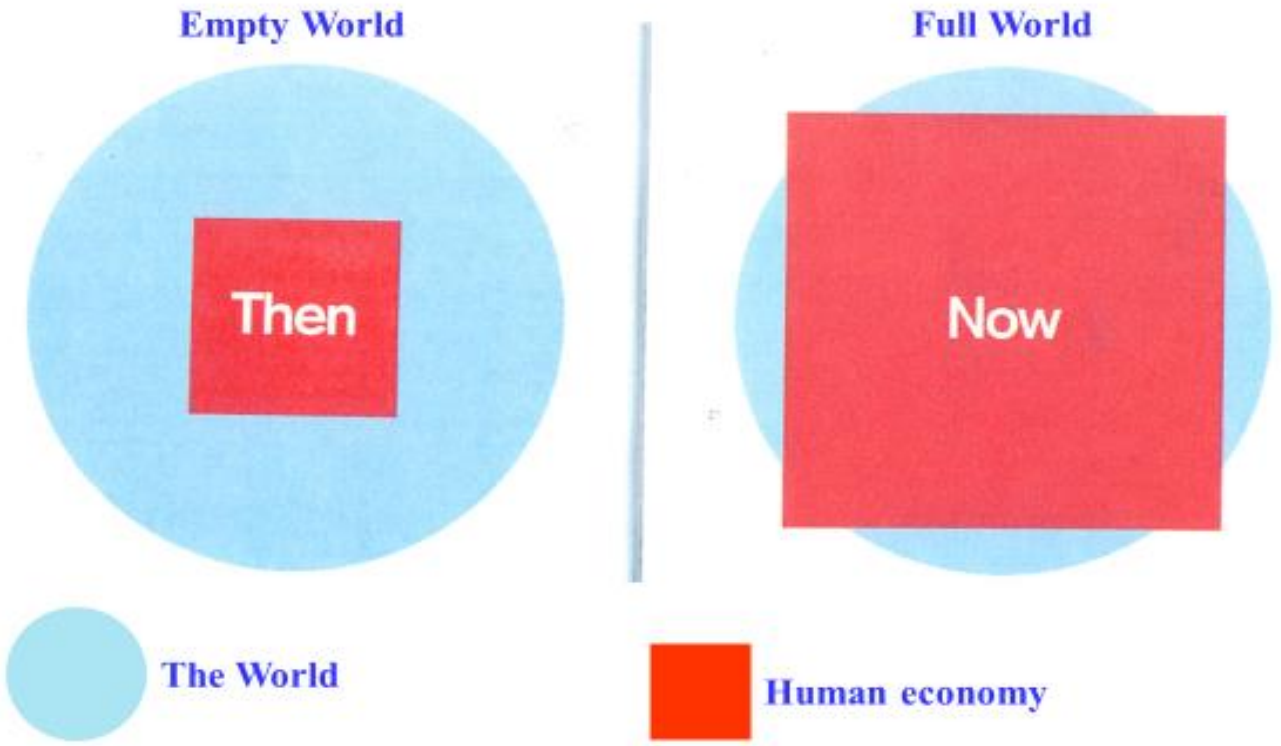
"It is easier to imagine the end of the world than the end of capitalism."

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.

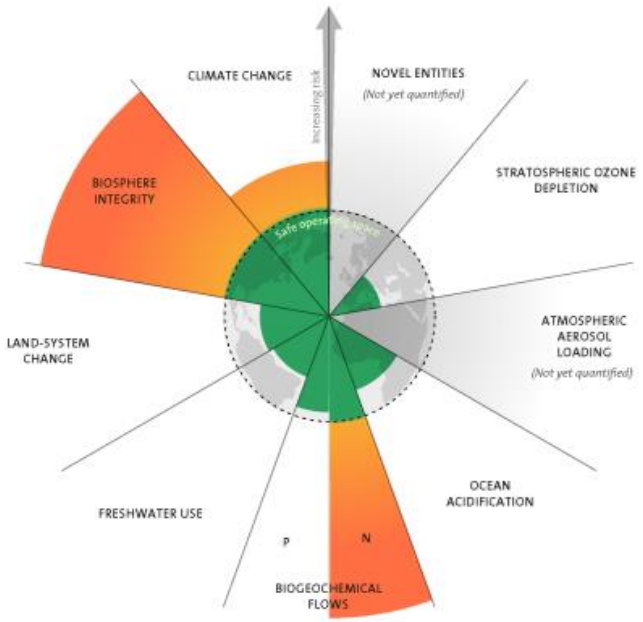
From "Empty" World to "Full" World



Source: Club of Rome: Simplified after Herman Daly

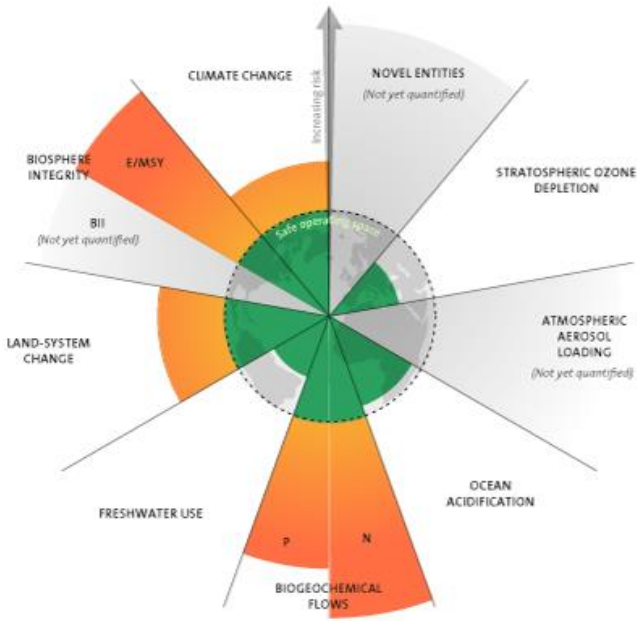
Labour and Infrastructure limiting factors of human wellbeing → *Natural resources and Environmental sinks limiting factors of human wellbeing*

2009



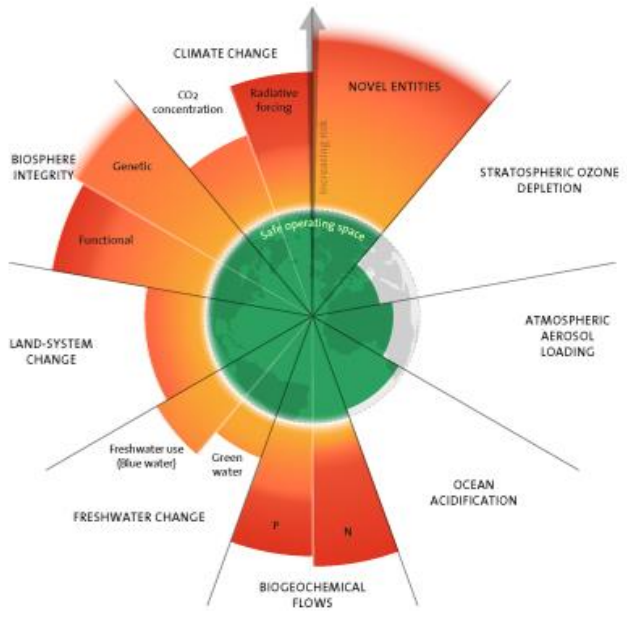
3 boundaries crossed

2015



4 boundaries crossed

2023



6 boundaries crossed

Source: Azote for Stockholm Resilience Centre, based on analysis in Richardson et al 2023

The concept of growth

Key challenge is how to shift from an economic system based on the notion of unlimited growth to one that is both ecologically sustainable and socially just.

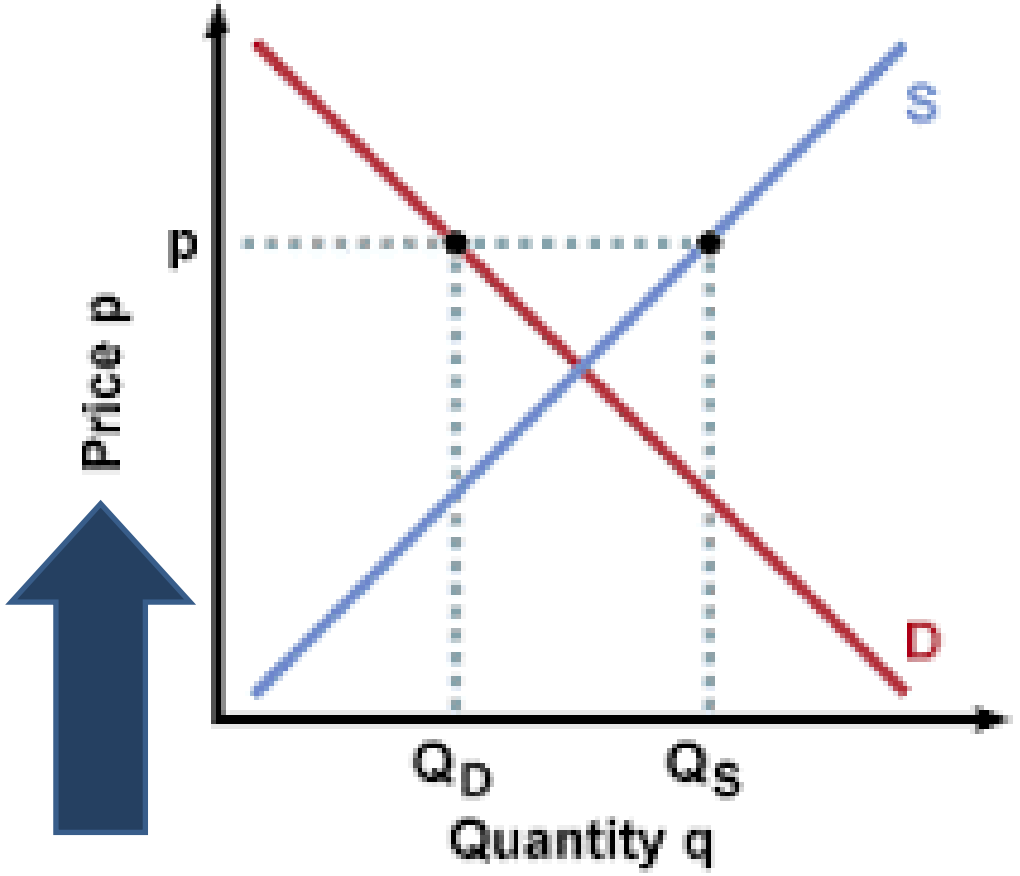
'No growth' is not the answer. Growth is a central characteristic of all life; a society, or economy, that does not grow will die sooner or later. Growth in nature, however, is not linear and unlimited. While certain parts of organisms, or ecosystems, grow, others decline, releasing and recycling their components which become resources for new growth.

The concept of growth

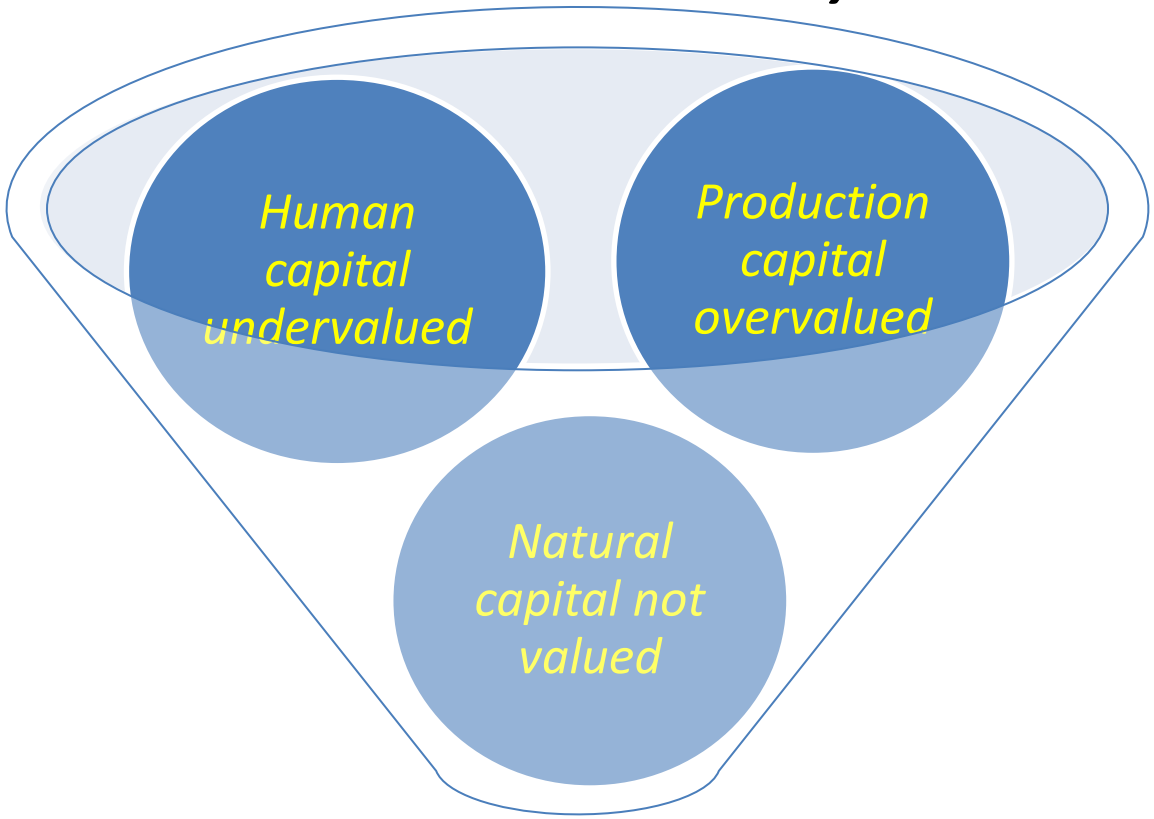
The linear view of economic development, as used by most mainstream and corporate economists and politicians, corresponds to the narrow quantitative concept of economic growth (GDP), while the biological and ecological sense of development corresponds to the notion of qualitative growth, to the wellbeing.

The role of Markets: Confusing market Signals

Producers/Consumers Rational Behaviour



Market Economy



Economic, social and environmental (in)balance

Main Blind-Spots preventing us to move faster and deeper

Lack of Holistic System approach

Public leaders and others 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

Lack of Drivers and Pressures Perspective

Policy attention does not focus on the roots of the problem and address the drivers and pressures. It lack focus on natural resource use and management, as well as on market signals leading consumers and producers' behaviour.

Lack of Demand Side Focus

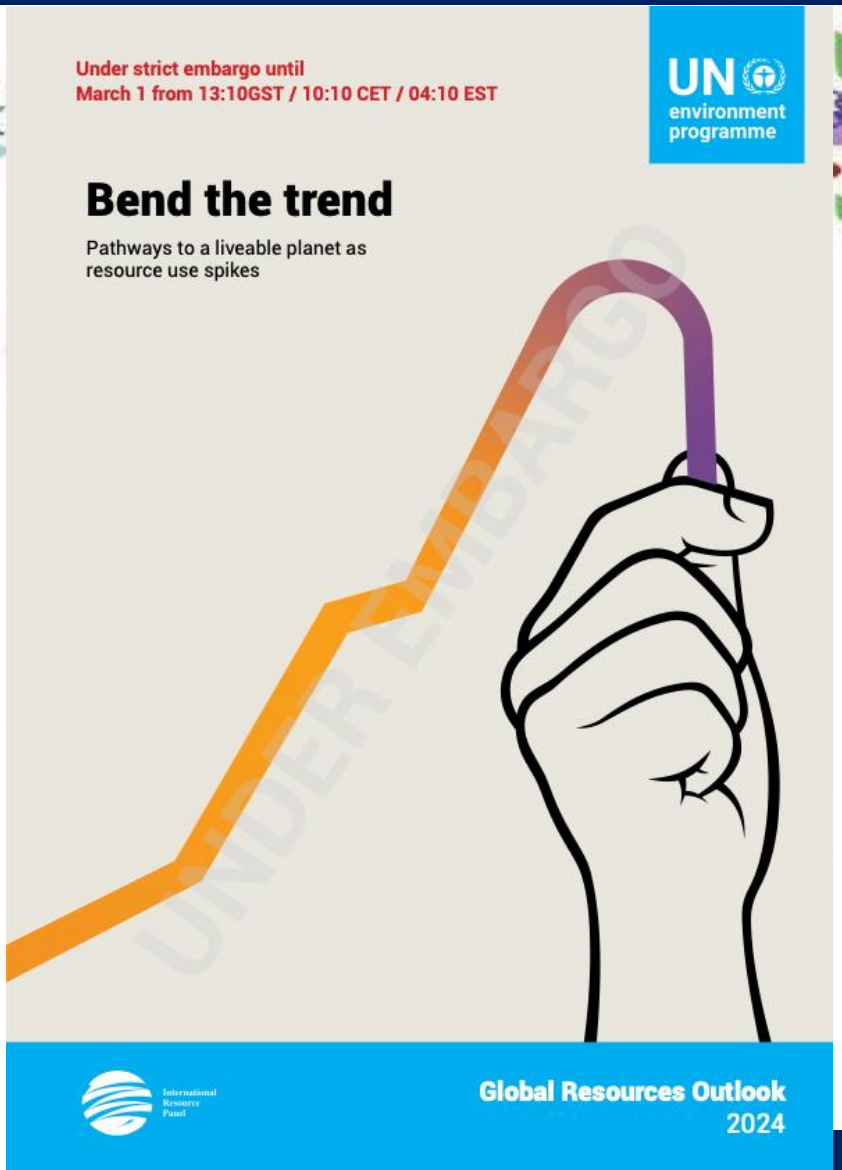
Policy attention is mainly given to the supply side of the economy, to the cleaning of the existing economic system - lacking the attention to the demand side which is leaving out an important solutions potential and questions of responsibility and equity.

If we want to avoid extinction of elephants in nature …

we must extinct elephants in our rooms

Source: Hop distance - The elephant in the room ...blogs.bmj.com

Global Resources Outlook 2024

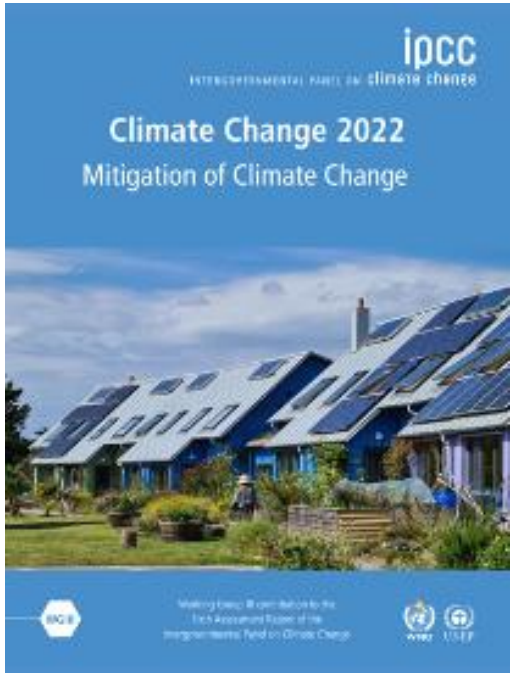


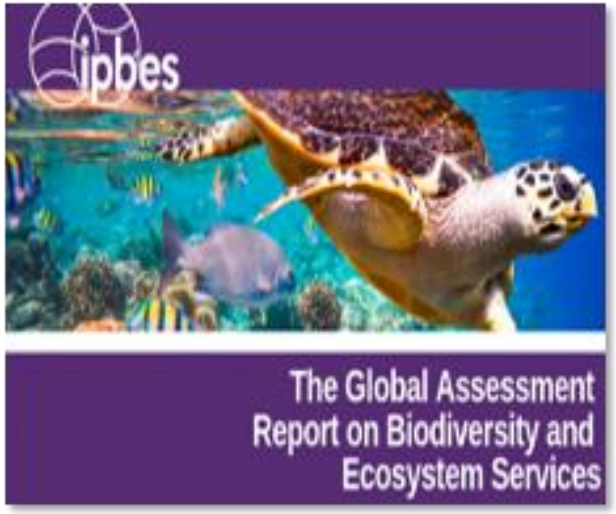
Resources - The Missing Link

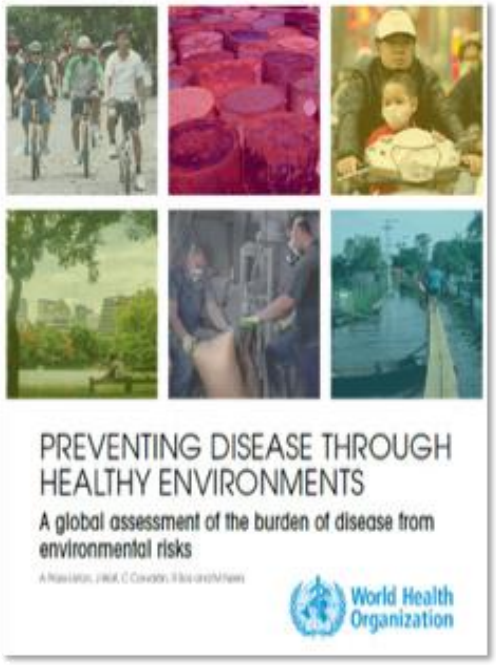
UN environment programme

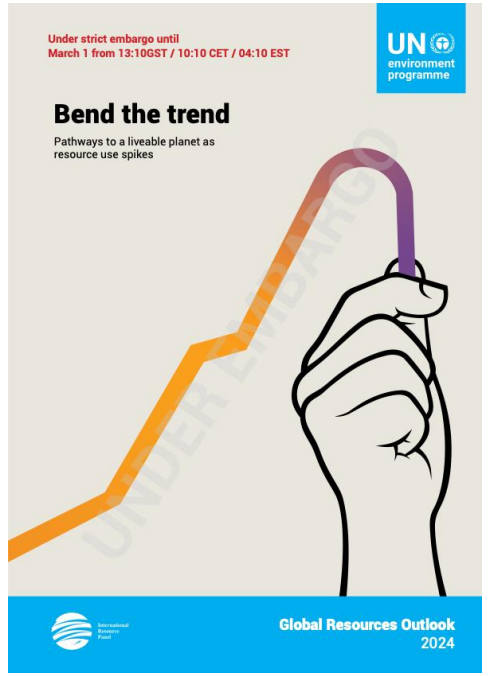
International Resource Panel

IPCC	*IPBES*	*WHO*	*IRP*
Climate Change	*Biodiversity loss and Ecosystem Services*	*Environment and Health*	*Unsustainable Resource Use*

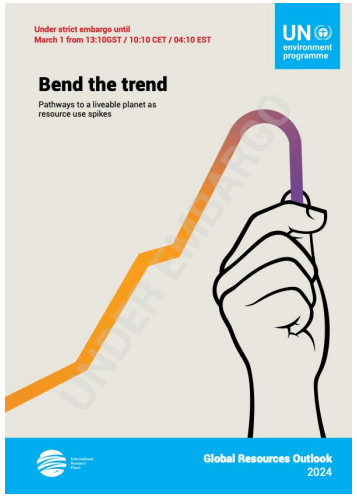








Definition: Materials and Resources



***Biomass**: crops for food, energy and bio- based materials, wood for energy and industrial uses*

***Fossil fuels**: covering coal, gas and oil, among other*

***Metals**: such as iron, aluminum and cooper, among other*

***Non-metallic minerals:** sand, gravel, limestone and minerals used for industrial applications*

Land

Water

Materials:
Everything extracted from the Earth

Resources:
Materials + Land and Water

Economy championed by industrialised nations is wasteful and unjust

We must shift away from the prevailing resource wasteful economic approach based on maximising the output of sectors, simplistically defined by GDP, towards an economy that is efficiently meeting human needs and optimise human wellbeing. The current logic is both ethically and ecologically unsustainable.

Major novelty

We are simply setting the order right. Economy was invented to serve humans and our needs, and not the opposite. We acknowledge the usefulness of GDP, but we should be guided by wellbeing.

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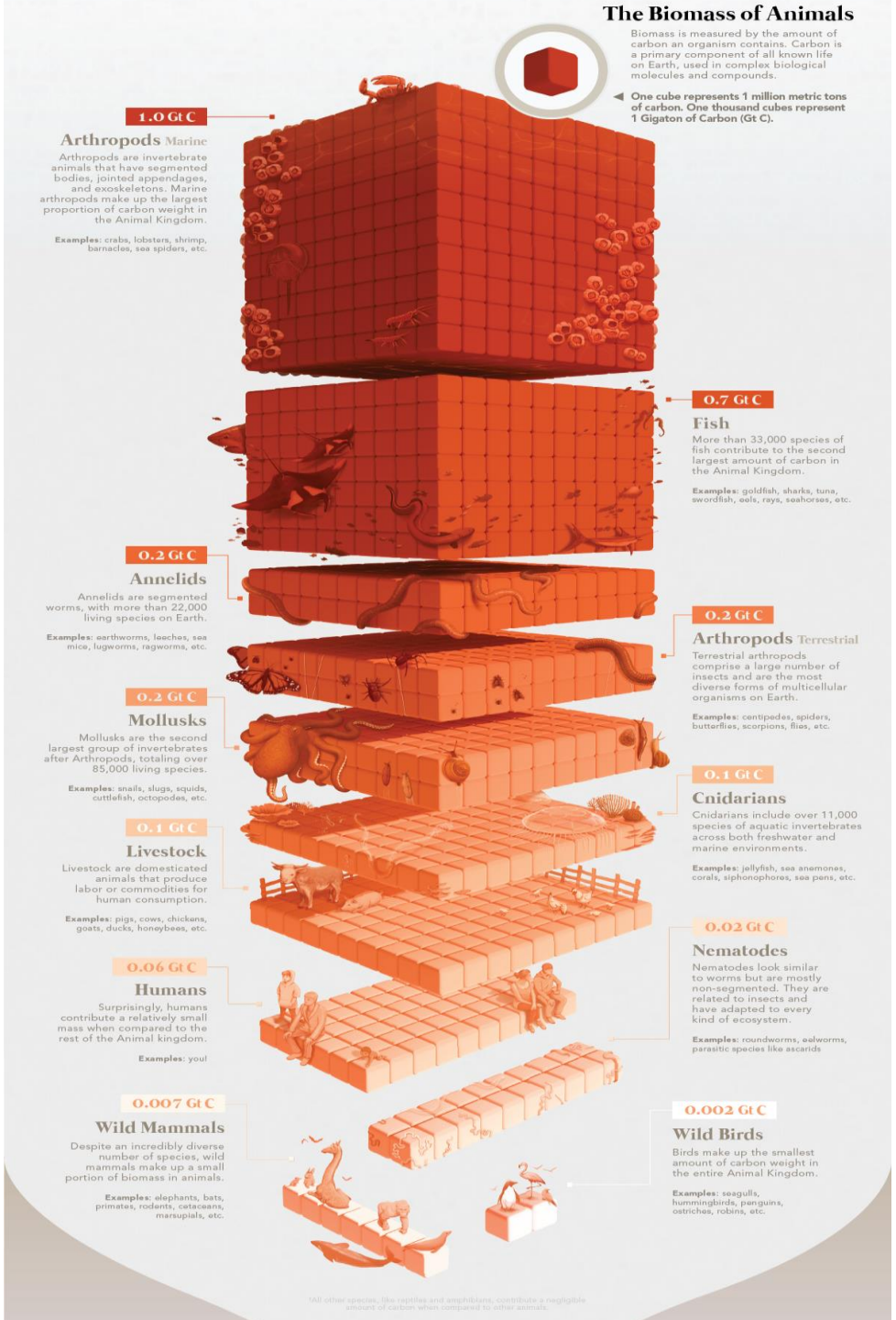
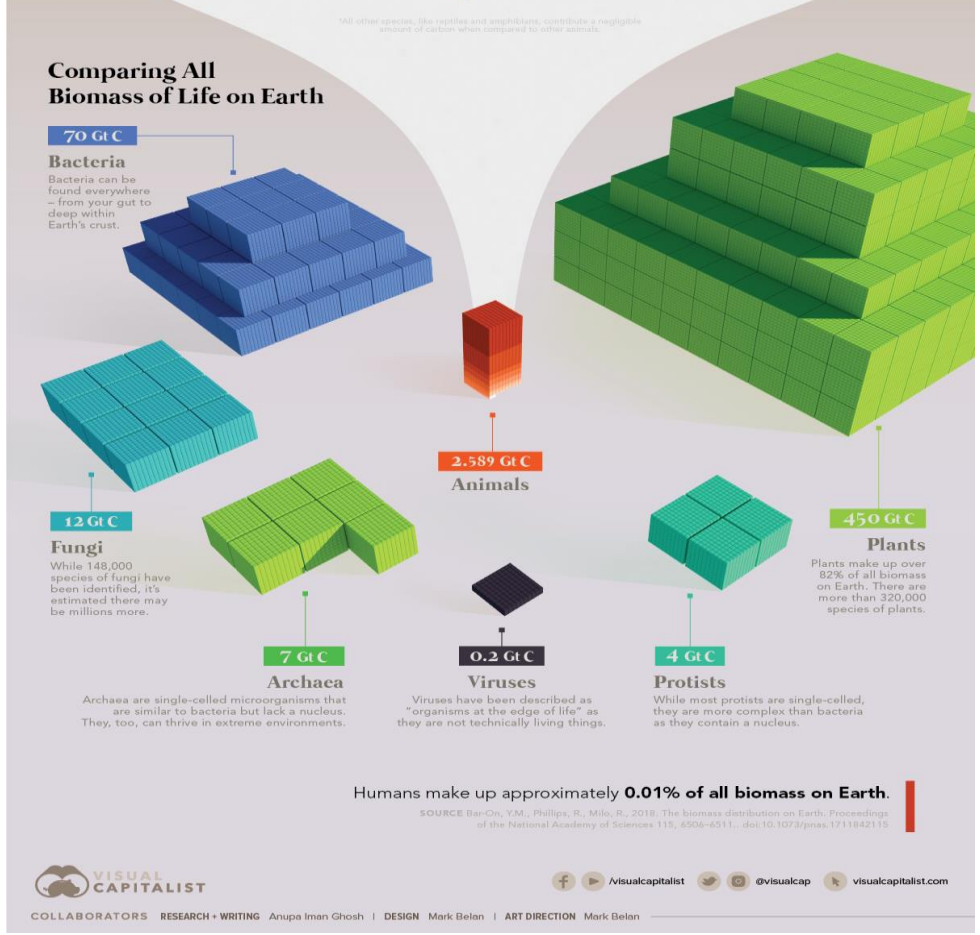
Drivers, pressures, and natural resource use trends

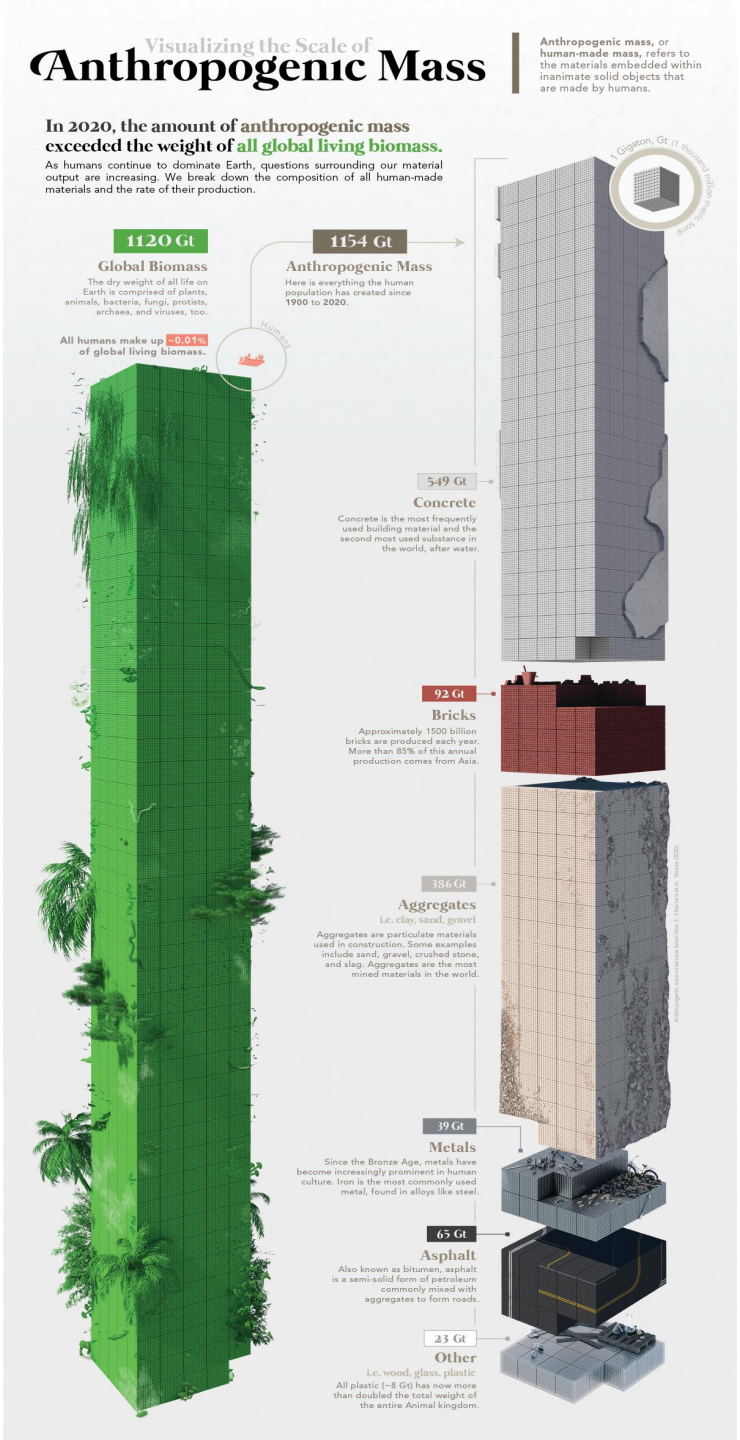


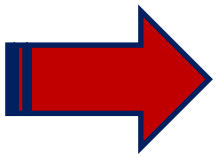


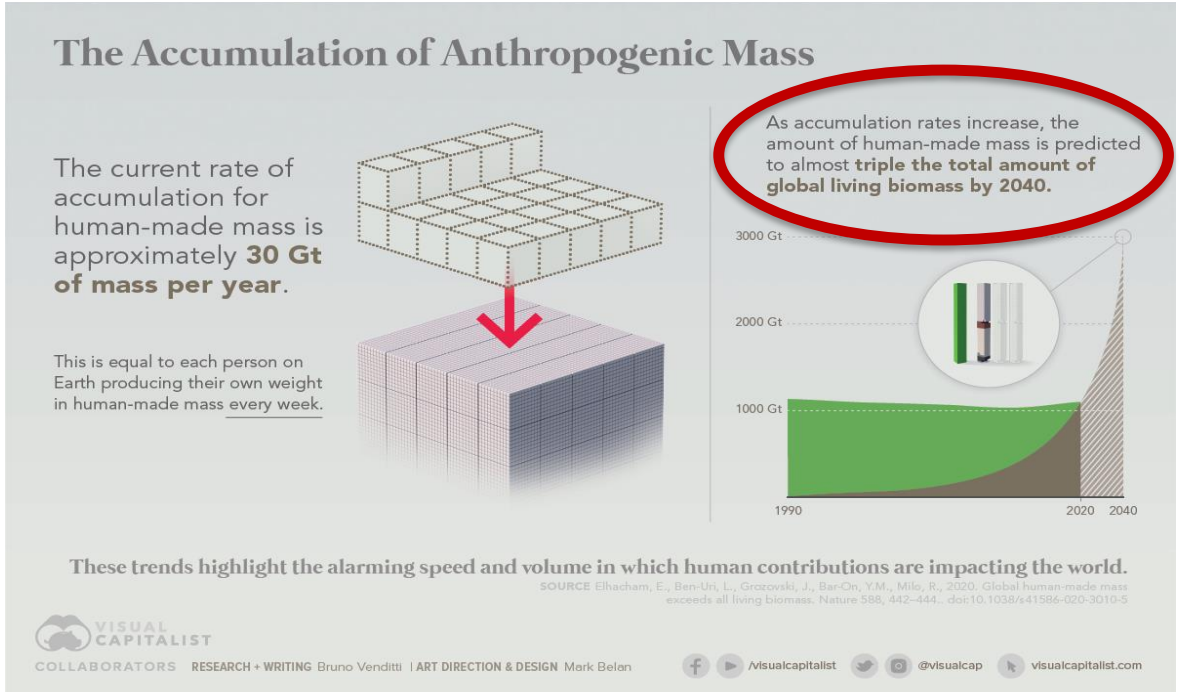
Biomass of Life

Humans in Perspective

Source: Visualcapitalist.com



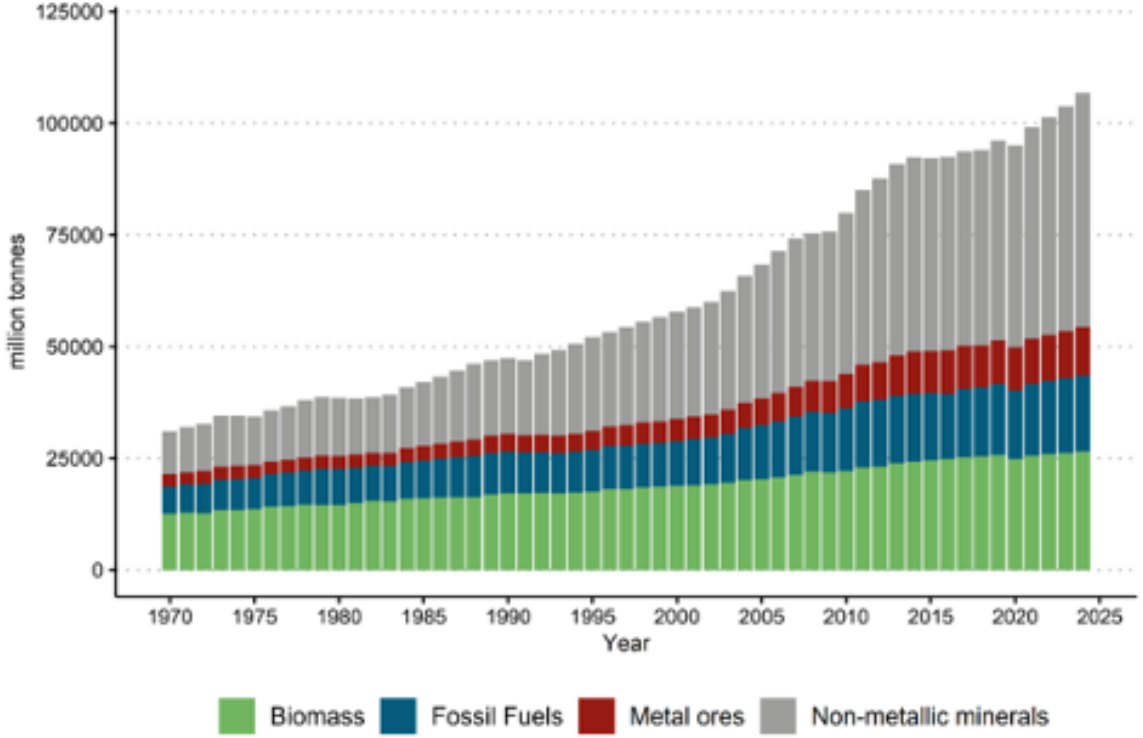




Source: Visualcapitalist.com

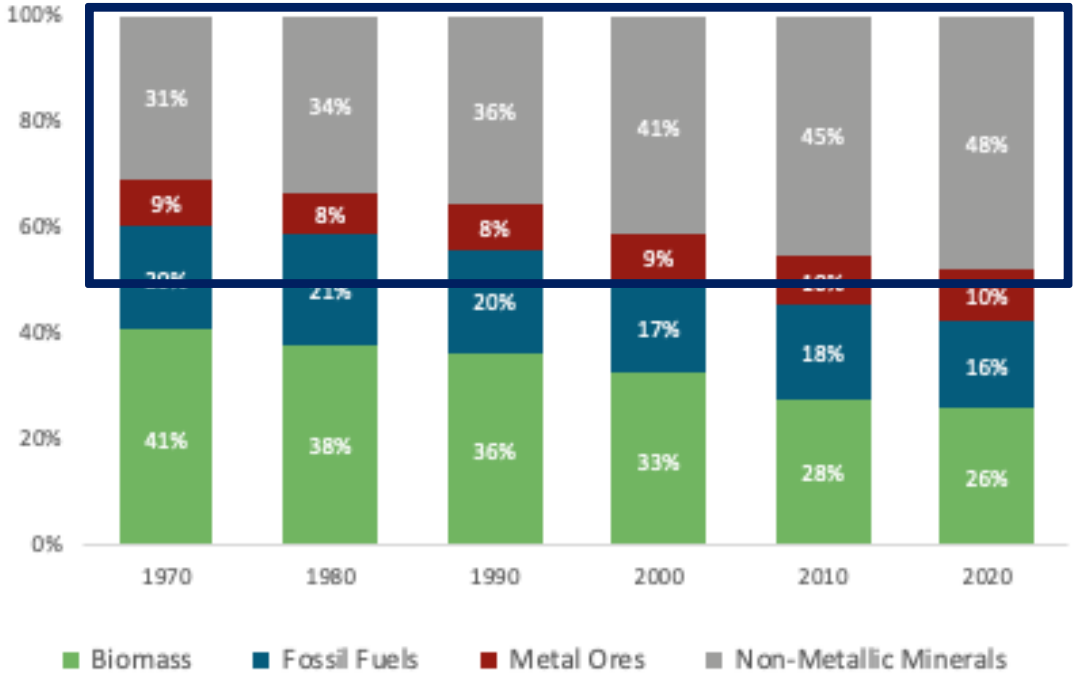
Trends: Global Material Use and Share in 1970-2023

Global Material Use has increased for more than a factor of 3 since 1970 due to urbanisation and industrialisation (and population growth) - 2.3% per year



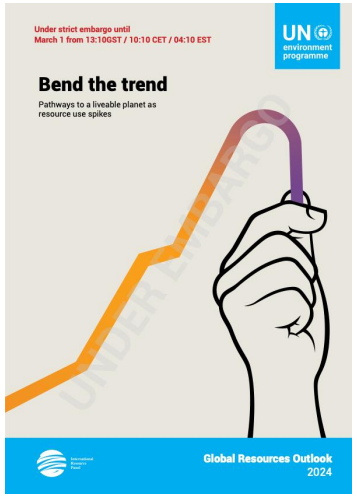
Global material extraction, four main material categories, 1970 – 2024, million tones.

… which is increasing also the share of Non-Metallic Minerals in Global Material Use



Global material extraction, four main material categories, 1970-2020, shares

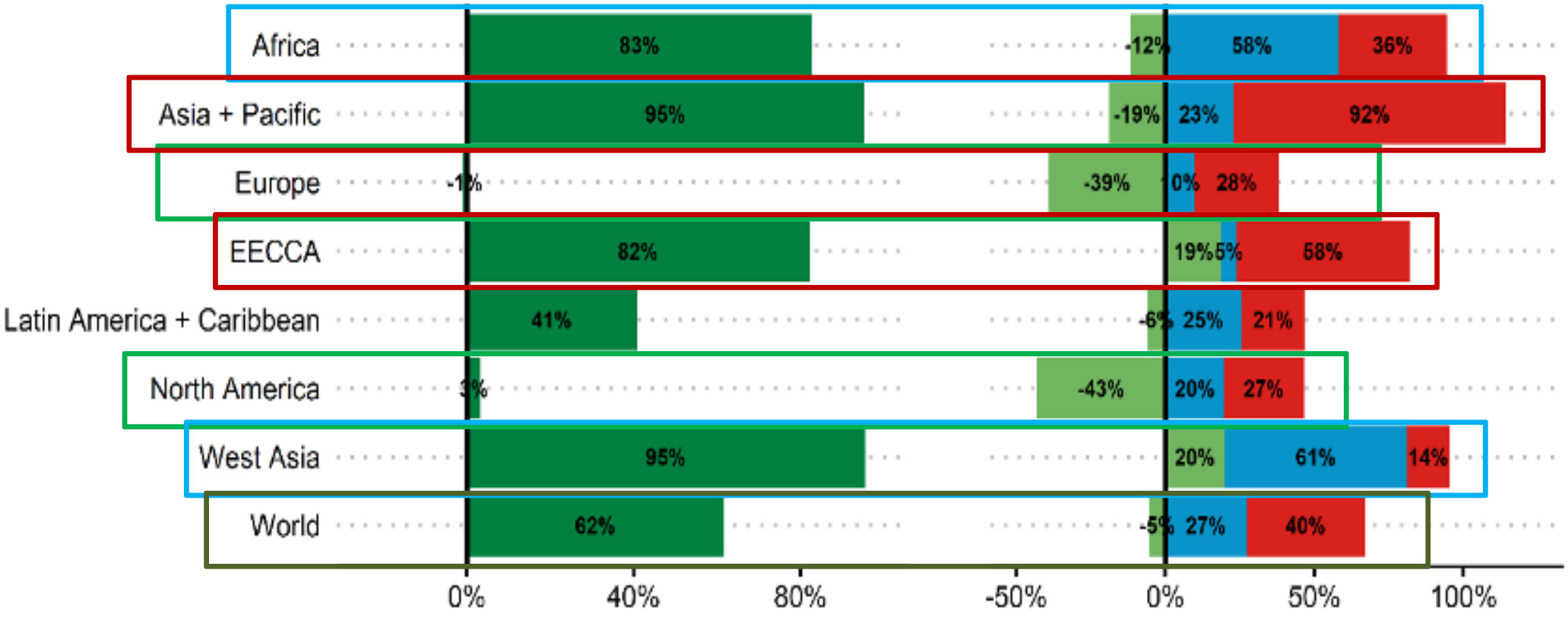
Definition: Material footprint



Primary materials associated with final demand, independently of where they are sourced (domestically or abroad)
Material Footprint = Domestic Extraction + Raw Material Trade Balance

Domestic Extraction = Material harvested (agriculture, forestry and fisheries) or extracted (mining and quarrying) domestically
Raw Material Trade Balance = Import minus exports of raw materials required to produce materials and consumer goods

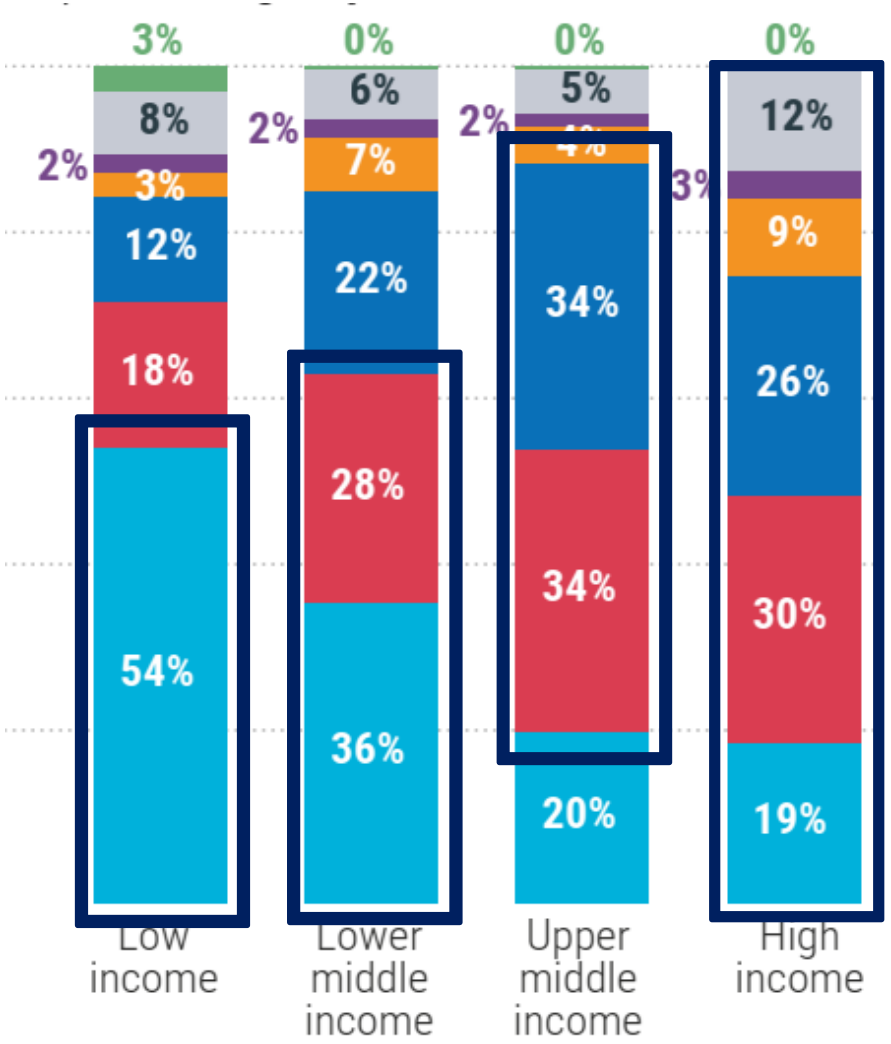
Trends: Drivers of Material Footprint 2000-2022, % by world regions



Tons per capita - 2020
5
13
17
18
12
30
13
13

Net change % DE Material Footprint | Affluence | Population | Technology

Trends: The material needs for provisioning systems (built environment, mobility, energy and food) by country income groups (2020)



Food
Mobility
Built environment
Energy
Communication
Other
Waste Management and Resource Recovery

Energy includes household energy consumption
All other provisioning systems include their embodied energy

Built environment and mobility: *(construction, transport sector&infrastructure): 59 billion tonnes*

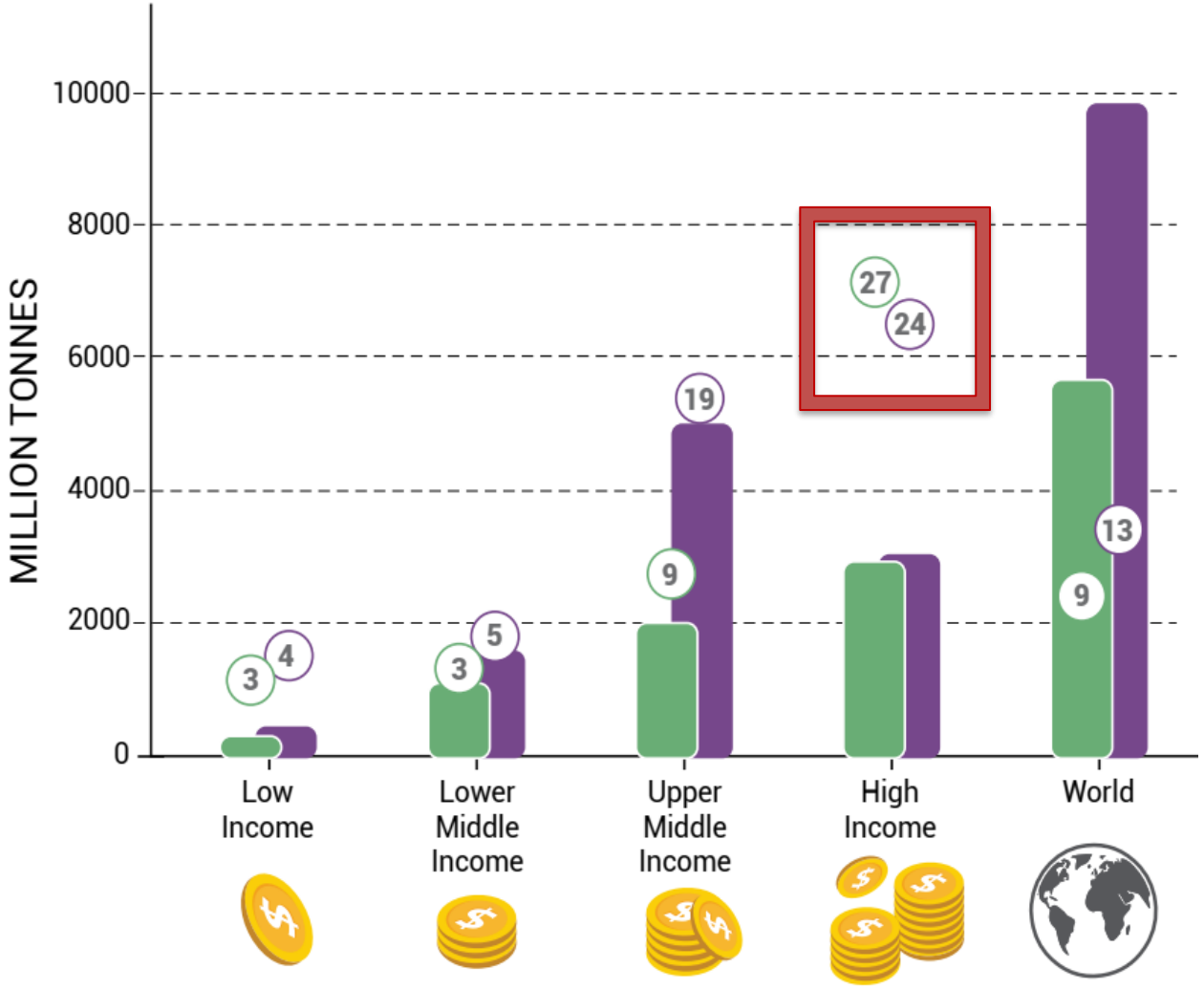
Food*: 23.6 billion tonnes*

Energy: *(electricity, power, heat): 6.1 billion tonnes*

Together = 90% of total global material demand, but differ in importance by income group

Source: Global Material Flows Database (UNEP 2023a)

Trends: High-income countries use six times more materials per capita and are responsible for ten times more climate impacts per capita than low-income countries.



Since 2000 …

- *High-income: Highest material footprint of all groups, relatively constant. Climate impact per capita = 10 x low-income group.*
- *Middle-income: material footprint more than doubled, approaching high-income levels. Climate impact per capita = roughly 50% of high-income group; 6 x low-income group.*
- *Low-income: Remain comparatively low, and mostly unchanged.*

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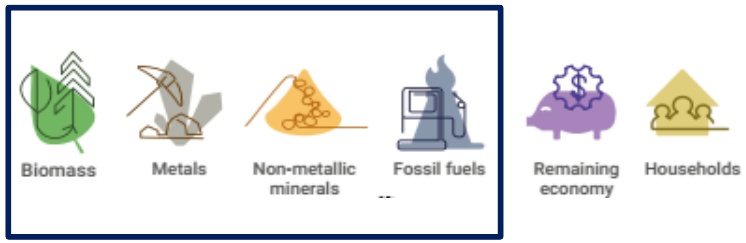
Resource use is driving the triple planetary crisis

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

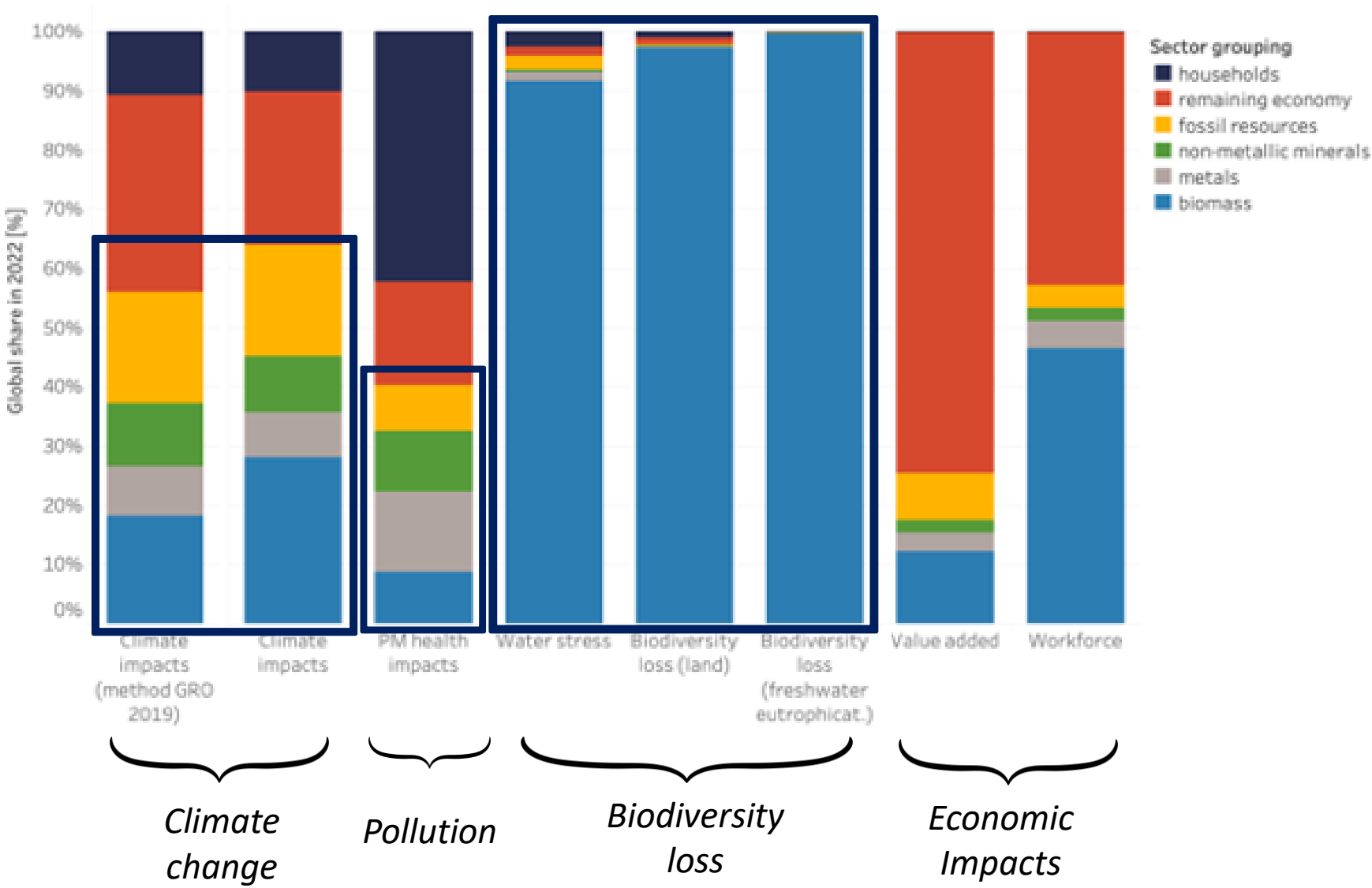
Environmental impacts of materials in the value chain in extraction and processing phase

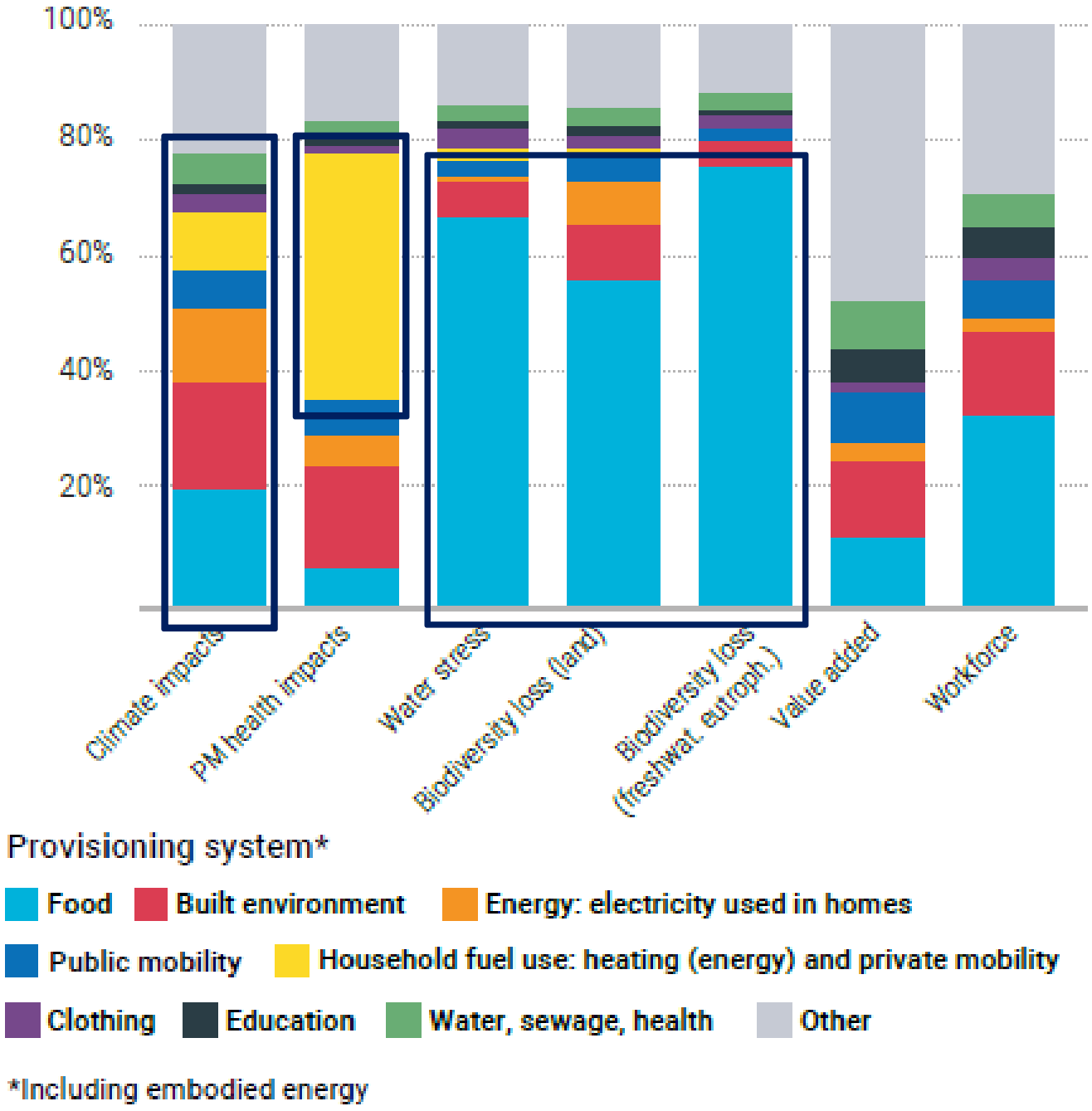


60% of global climate change impacts including land use change

40% of air pollution health impacts

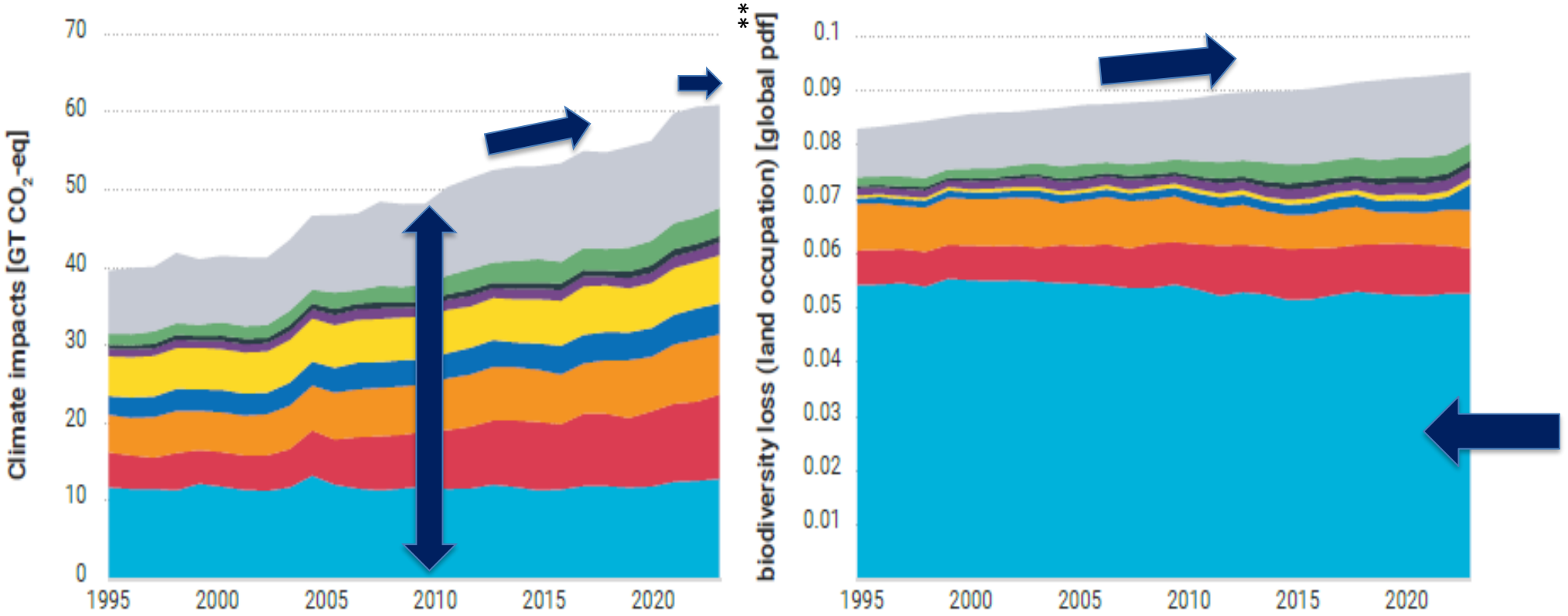
More than 90% of water stress and global land and water eutrophication related biodiversity loss





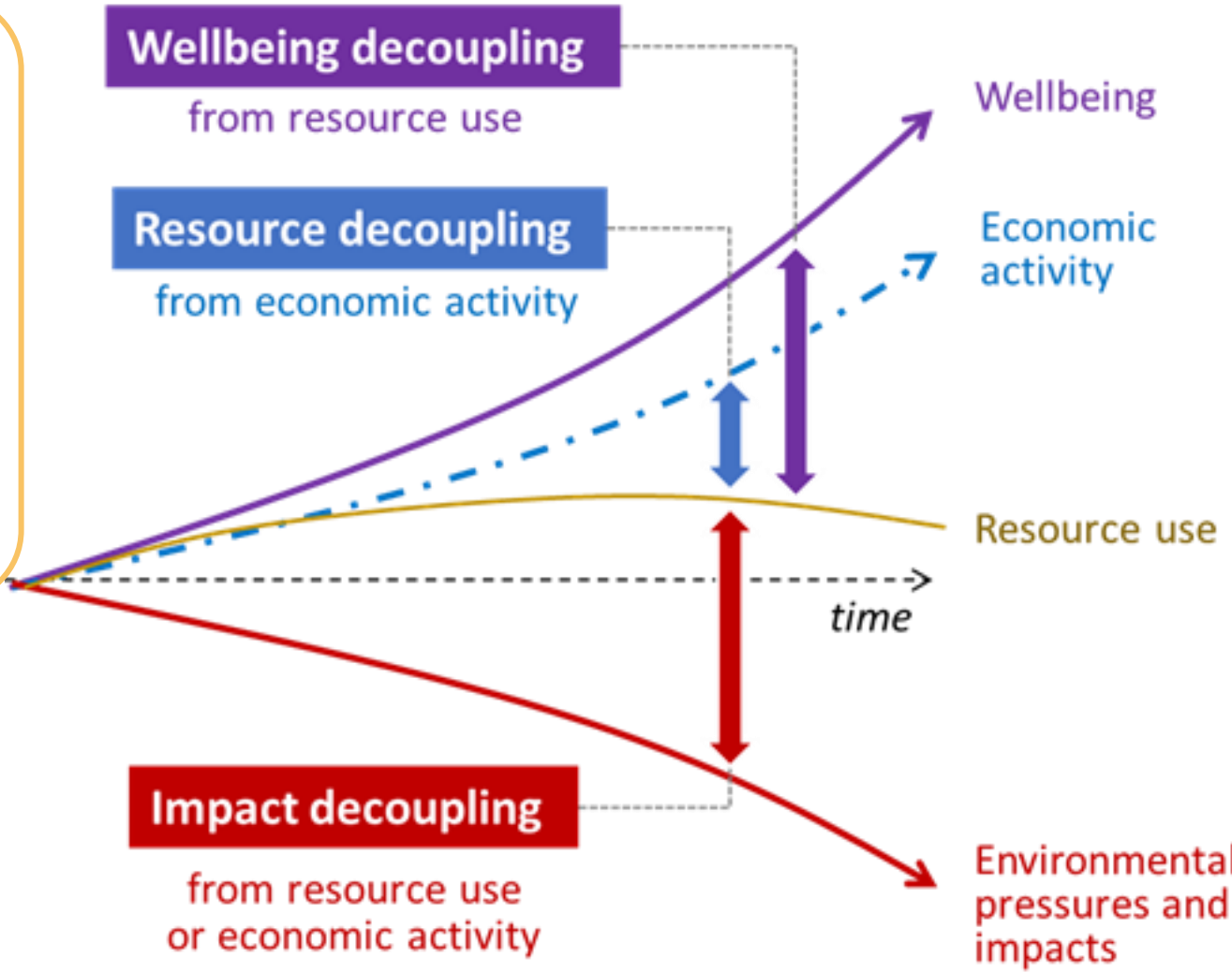
Impacts: "Provisioning Systems Human Needs in the Year 2022

Impacts: "Provisioning systems" - human needs with most environmental impacts requesting our focus



** Global pdf: Global potentially disappeared fraction of species

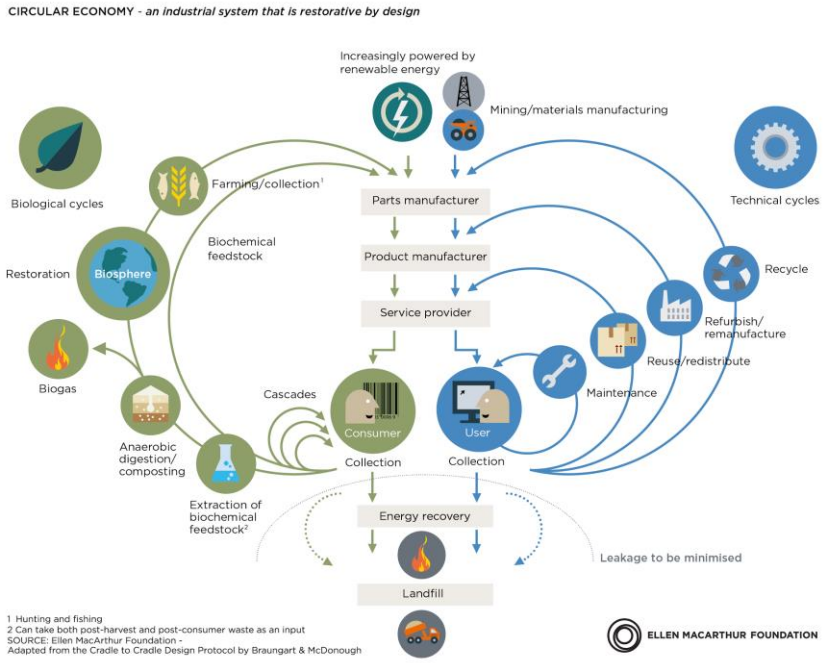
If current trends would continue, global material consumption is predicted to increase for 60% by 2060 comparing to 2020 levels



Decoupling

UN environment programme

International Resource Panel



Circular economy should be seen as an instrument for delivering decoupling of economic growth from resource use and environmental impacts in practice, as well as a part of the bigger picture of economic, societal and cultural transformation needed to deliver the SDGs

Circular Bio-Economy is just using common sense

Circular bio-economy is the oldest concept on planet Earth. All nature is based on the principles of a circular economy: nothing is lost, and everything has its purpose. We humans, as part of nature, should abide by the same principles. Unfortunately, what seems logical in theory isn't so clear in practice.

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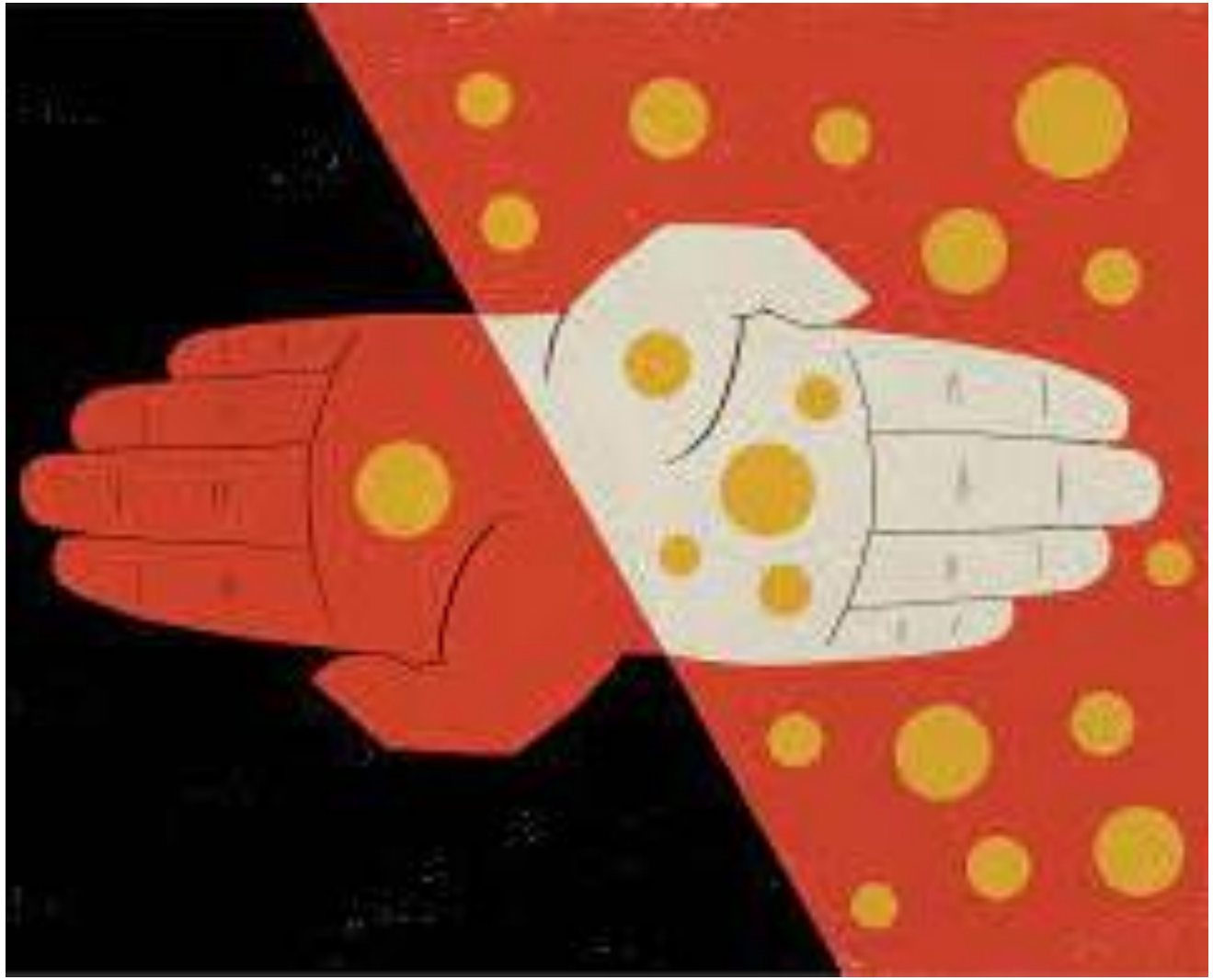
Equity in Focus - Environmental and Social Efforts are two sides of the same Coin

Bruce M. Boghosian: Is Inequality Inevitable?

SCIENTIFIC AMERICAN, November 1st, 2023

- *"In fact, these mathematical models demonstrate that (in market economies) far from wealth trickling down to the poor, the natural inclination of wealth is to flow upward, so that the "natural" wealth distribution in a free-market economy is one of complete oligarchy. It is only redistribution that sets limits on inequality."*



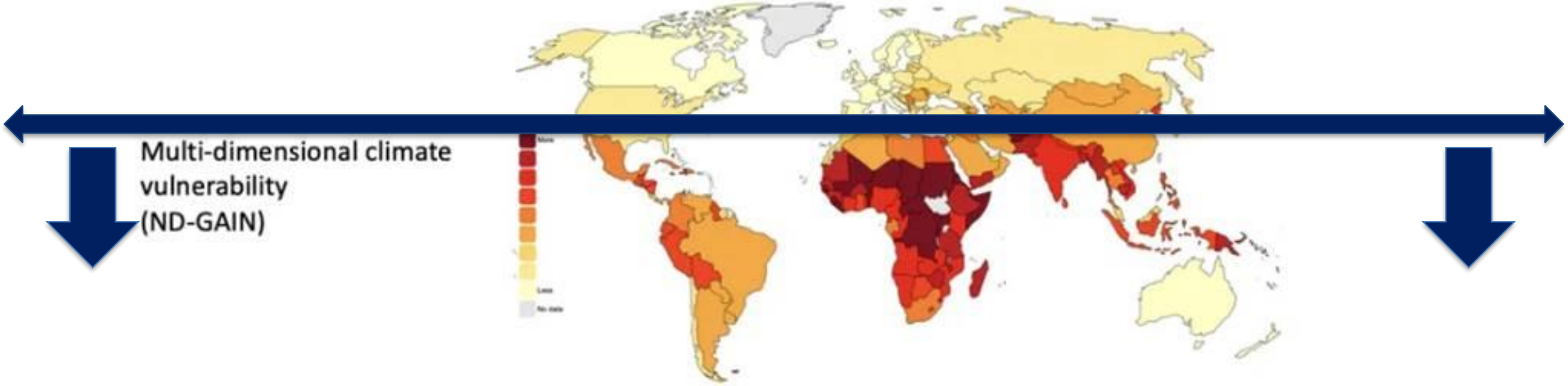
Two *scenarios:*

Too Little, Too Late*: continue our current destructive path and* ***The Giant Leap****: the fastest economic transformation in history.*

The key outcome *is that we will see negative social tipping before severe environmental tipping points and that equality and poverty alleviation is key if we want people to be concerned about regenerative economics and decarbonisation.*

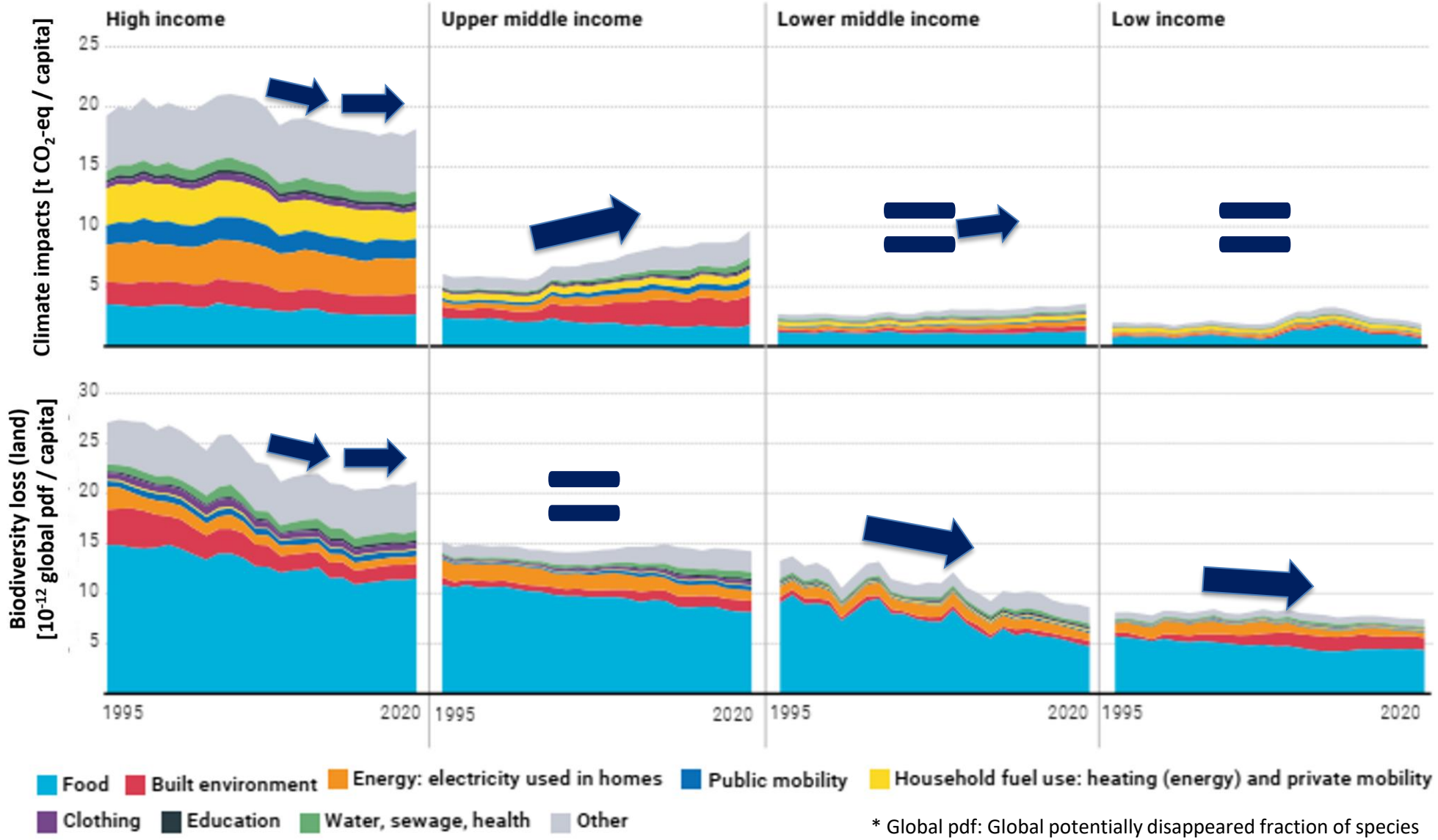
Those Benefiting Most, and Those Facing Worst Climate Consequences

Overshoot emissions
(Lancet Planetary Health)



Multi-dimensional climate
vulnerability
(ND-GAIN)

Impacts: "Provisioning systems" - human needs by income groups 1995-2020



* Global pdf: Global potentially disappeared fraction of species

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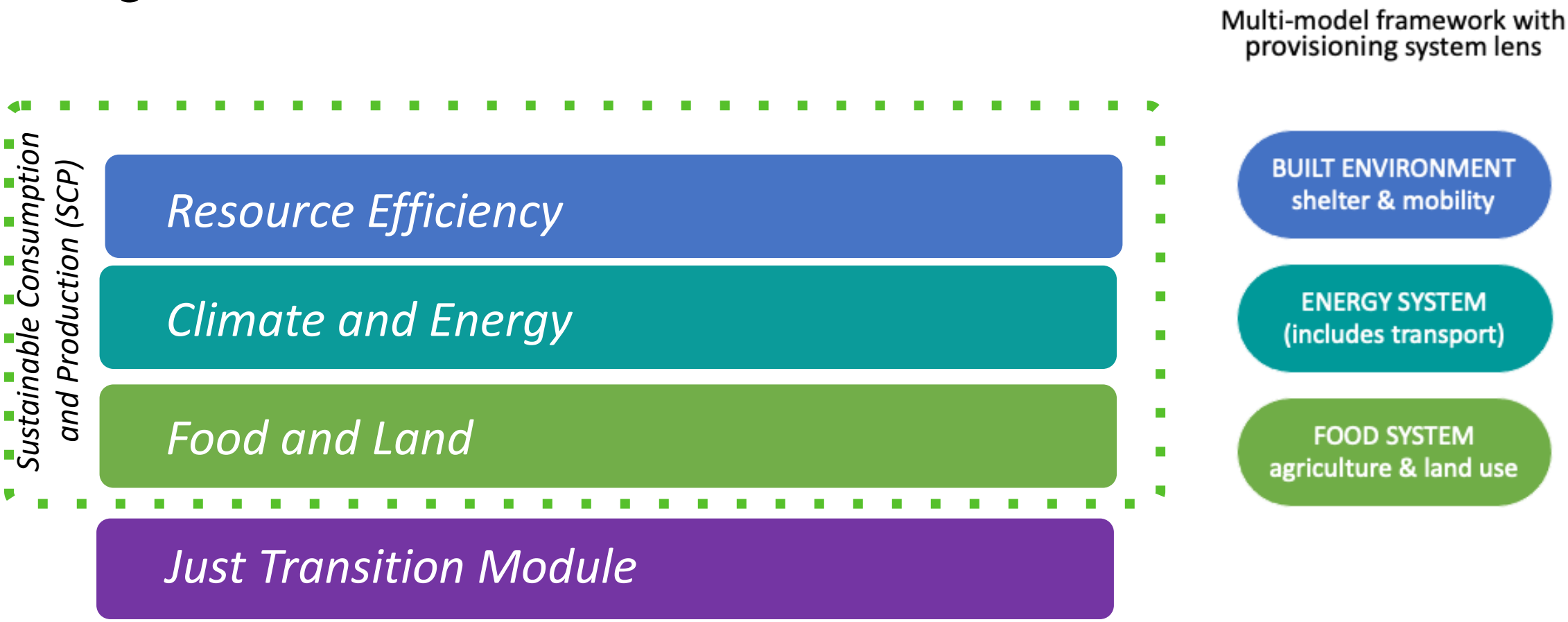
Scenario Outlook

Scenario outlook: Scenario is built up as three 'shifts' plus measures to support Just Transition contrasted against Historical Trends

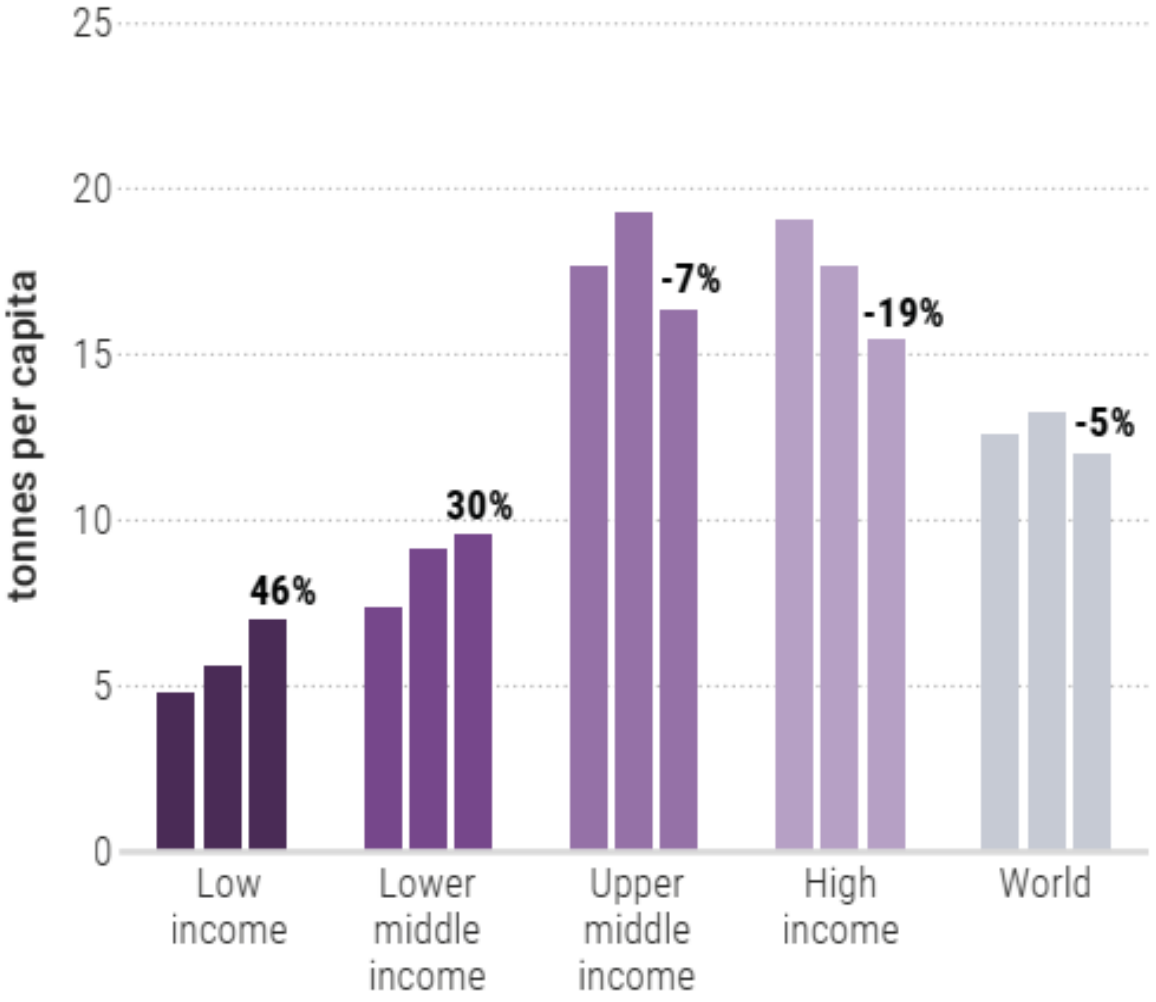


Scenario outlook: Sustainability Transition compared to Historical Trends Scenario (2060)

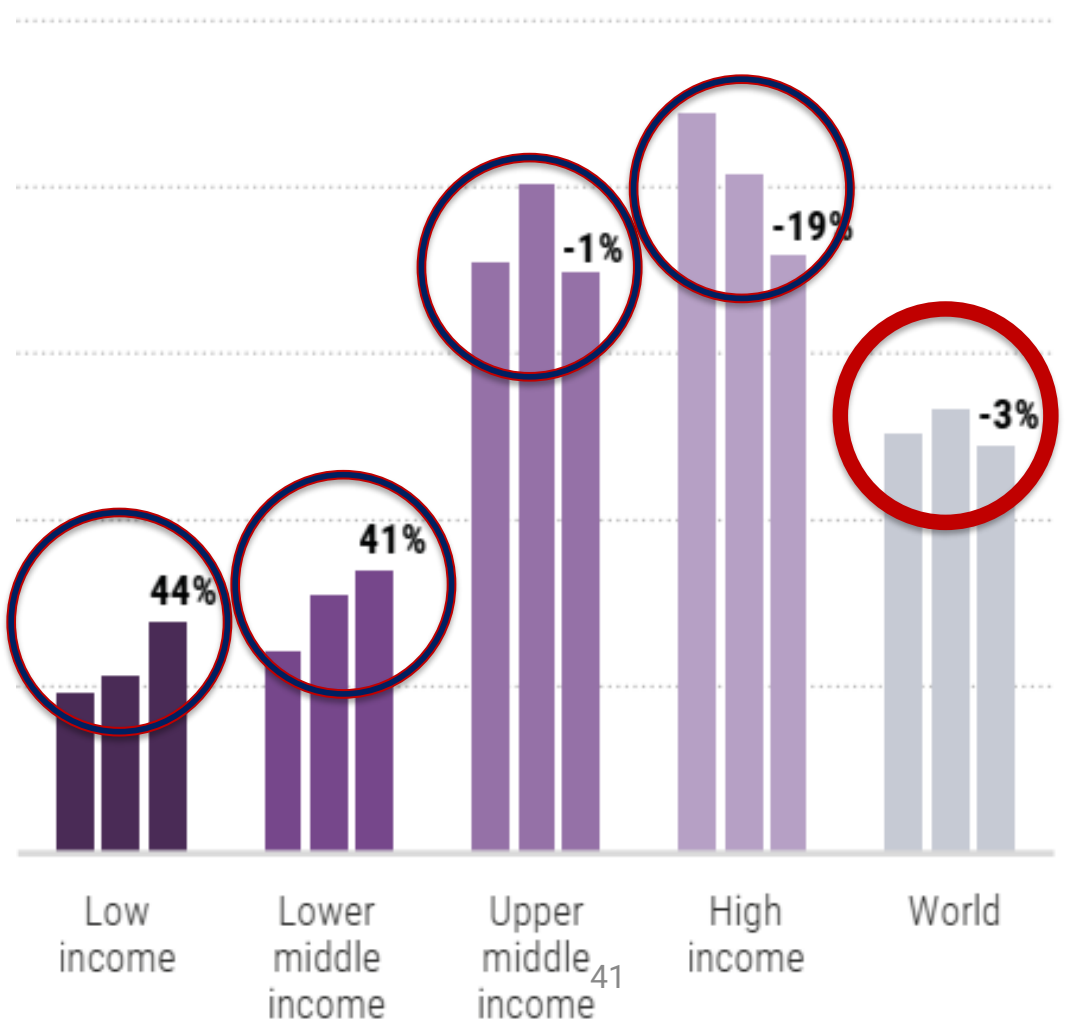
Growing Economy:	*+ 3%*
Reduced inequality:	*Lower income group Material Footprint gap*
Improved wellbeing:	*Higher HDI all income groups*
Reduced growth in resource use:	*By 30%*
Reduced environmental impacts:	*GHG emissions - 83%*
	Energy demand - 27%
	Agricultural land area - 5%

Impacts: Reductions in high consumption contexts means that resource use grows where it is most needed

Resource extraction (DE) per capita by income group, 2020, 2040 and 2060



Material footprint (MF) per capita by income group, 2020, 2040 and 2060



Source: Pixabay

A pathway towards sustainable resource use, which maintains and even enhances human wellbeing, while prevent planetary boundaries to be crossed is possible, but we urgently must change the direction and fix the broken compass.

Solutions pathway is getting narrower and steeper, and there are less, and more urgent options on our policy menu then decades ago.

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Main recommendation leading to sustainable resource use

The world has enough for everyone's need, but not for everyone's greed"

Mahatma Gandhi

Main question often-overlooked to be addressed

How to meet human needs in most energy and resource efficient way?

https://edistaffing.com

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*

Dematerialisation, Rethinking Ownership, Efficiency should be Complemented with Sufficiency

Supply-side (production) must be complemented with Demand-side (consumption) measures

Efficiency should be complemented by Sufficiency policies

Sufficiency could be addressed from consumption side through reducing consumption and optimising what is sufficient to meet human needs and/or from the production side by meeting human needs using less energy & materials.

Consumers behaviour is important, but even more is the consumption system, which is very much impacted by producers.

Solutions: Main Recommendations for implementing the Just Sustainability Transition scenario

Institutionalizing resource governance** and defining **resource use paths

- *Global and national institutionalization of natural resource use within global sustainability agendas and action on environmental agreements*
- *Definition of global and national resource use paths*

***Directing finance** towards sustainable resource use*

- *Internalizing the environmental and social costs of resource extraction*
- *Redirecting, repurposing and reforming public subsidies for sustainable resource*
- *Channeling private finance towards sustainable resource use*
- *Incorporating resource-related risk into Public and Central Bank mandates*

*Making **trade** an **engine** of **sustainable resource use***

- *Trade governance for fairness and sustainable resource use*
- *Enabling local resource value retention in producer countries*

***Mainstreaming sustainable consumption** options*

- *Developing action plans to improve access to sustainable goods and services*
- *Regulating marketing practices leading to over-consumption, and raising awareness*

Creating circular, resource-efficient** and **low-impact solutions** and **business models

- *Setting up monitoring systems to identify priorities and develop ambitious circular economy action plans*
- *Developing and reinforcing regulation to boost circular economy business models*
- *Building circular economy capacity and coalitions*

Decoupling in Practice

Why it is Critical in our quest for Sustainable Future?

Climate Change Example

Receiving attention with good reasons, but limited success.

Why is circular economy important part of solution?

Some Climate Change Related Facts

- *Global CO_2 emissions in billion metric tonnes 37.55 (Source: Statista 2023)*
- *Global surface temperature increase above pre-industrial level 1.48 degrees Celsious (Source Copernicus 2023)*
- *Fossil fuel subsidies $7 trillion or 7.1 percent of GDP (Source: IMF 2022)*

All obove data are the highest in the history for the last recorded year

Climate related costs are reality
The case of Slovenia

- *Slovenia was last year during summer hit by extreme weather events, floods in particular. We are called "The country on the sunny side of the Alps". Lesson is clear: The costs are here and there are no more safe places*
- *Few days ago, Slovenian government adopted decision related to covering the costs of last year's extreme weather events. The amount agreed to cover the costs was 2,33 billion Euros (to be released in 5 years)*
- *The overall estimated budget revenues for 2024 are 13,795 Euros*
- *In short: the cost of only one extreme climate summer were 16.9% of this years estimated budget revenues … which means less money for health, education, innovation etc.*

The Economic Commitment Of Climate Change

Maximilian Kotz, Anders Levermann, Leonie Wenz, Nature, Potsdam Institute, 17. April 2024

Permanent average loss of income worldwide will be 19% by 2049. In the United States and Europe, the reduction will be about 11%, while in Africa and south Asia it will be 22%, with some individual countries much higher than this.

The economic hit predicted by the paper is more than twice as high as any previous analysis. The overall costs related to climate change are estimated to be app. 6-times higher than all the funding needed for energy transition.

The Macroeconomic Impact of Climate Change:

Global vs. Local Temperature

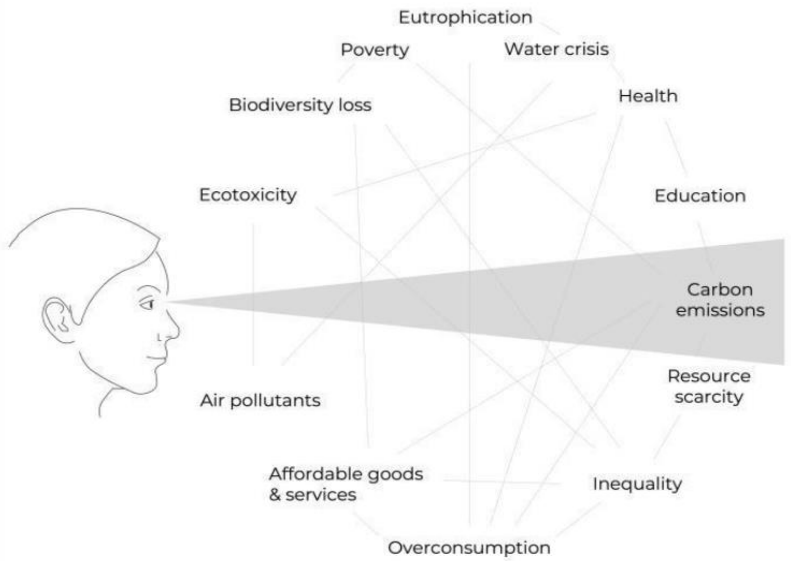
Adrien Bilal, Diego R. Känzig, NBER Working Paper Series, Cambridge, May 2024

This paper estimates that the macroeconomic damages from climate change are six times larger than previously thought. They exploit natural variability in global temperature and rely on timeseries variation. A 1°C increase in global temperature leads to a 12% decline in world GDP. Global temperature shocks correlate much more strongly with extreme climatic events than the country-level temperature shocks commonly used in the panel literature, explaining why their estimate is substantially larger. Their results imply a Social Cost of Carbon of $1,056 per ton of carbon dioxide. A business-as-usual warming scenario leads to a present value welfare loss of 31%. Both are multiple orders of magnitude above previous estimates and imply that unilateral decarbonization policy is cost-effective for large countries such as the United States.

Education
What are we teaching at our universities?

Norwegian Institute of International Affairs (NUPI) reviewed 18,400 universities in 196 countries and found that 68% of the world's energy educational degrees are focused on fossil fuels, and only 32% on renewable energy.

Because of carbon lock-in, many universities continue to prioritise education in fossil fuels and are failing to meet the growing demand for a clean energy workforce. Renewable energy education remains greatly underfinanced at the global level compared to education in fossil fuels.



Sustainability transition

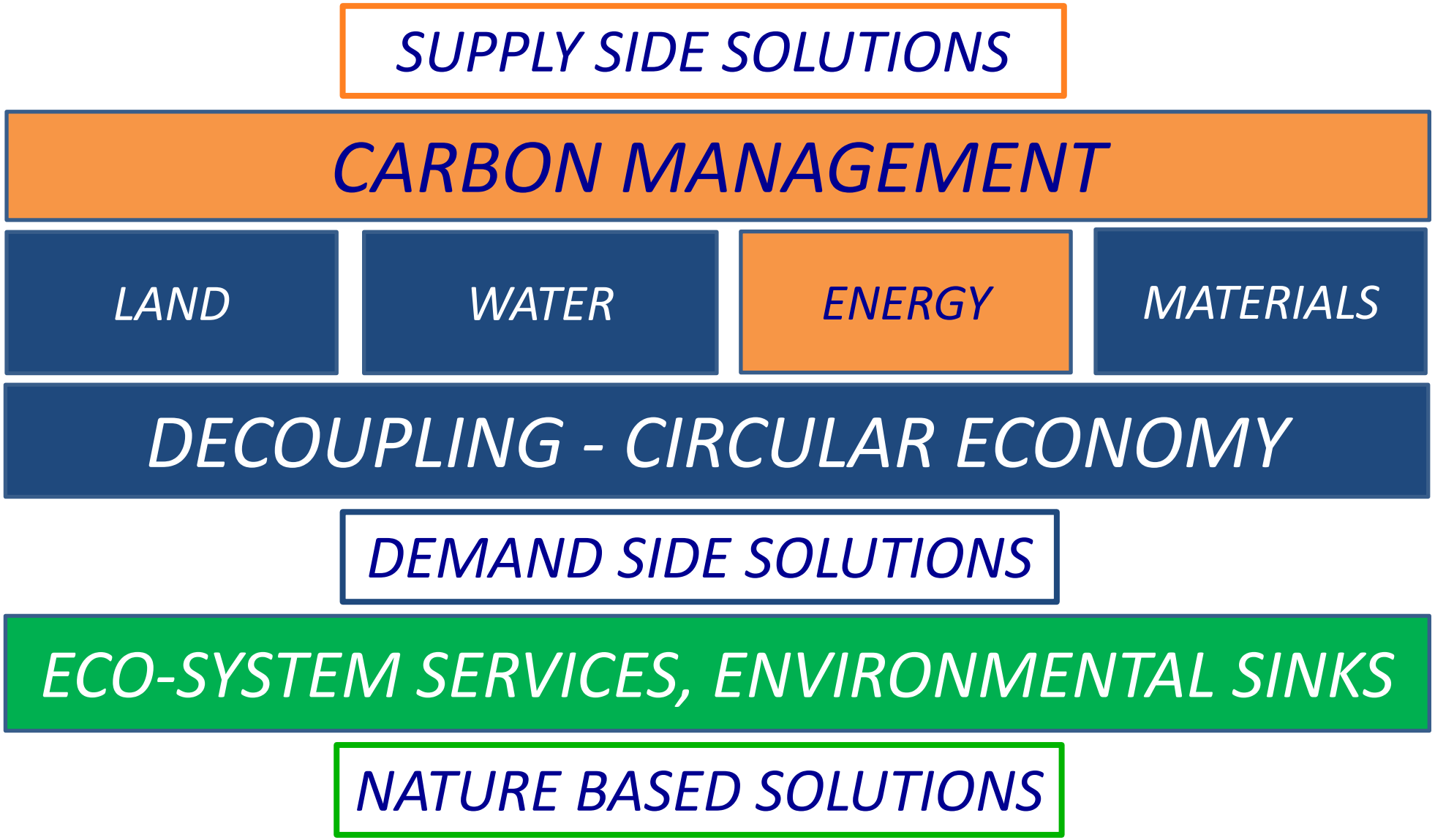
Climate breakdown is a symptom of ecological overshoot, which is caused by the deliberate exploitation of human behaviour.

The material footprint is dangerously underdiscussed. Most climate "solutions" lack focus on the root cause of the crisis. Where discussion of climate often centres on carbon emissions, which is of course important, while a focus on overshoot highlights the materials usage, waste output and growth of human society, all of which affect the Earth's biosphere.

Source: YouTube

Hart Hagan, *environmental journalist, nicely summarised the problem by saying:*
“Species causing the extinction of 150 species per day does not need more energy to do more of what it does”.

Climate Change can only be effectively addressed by combining

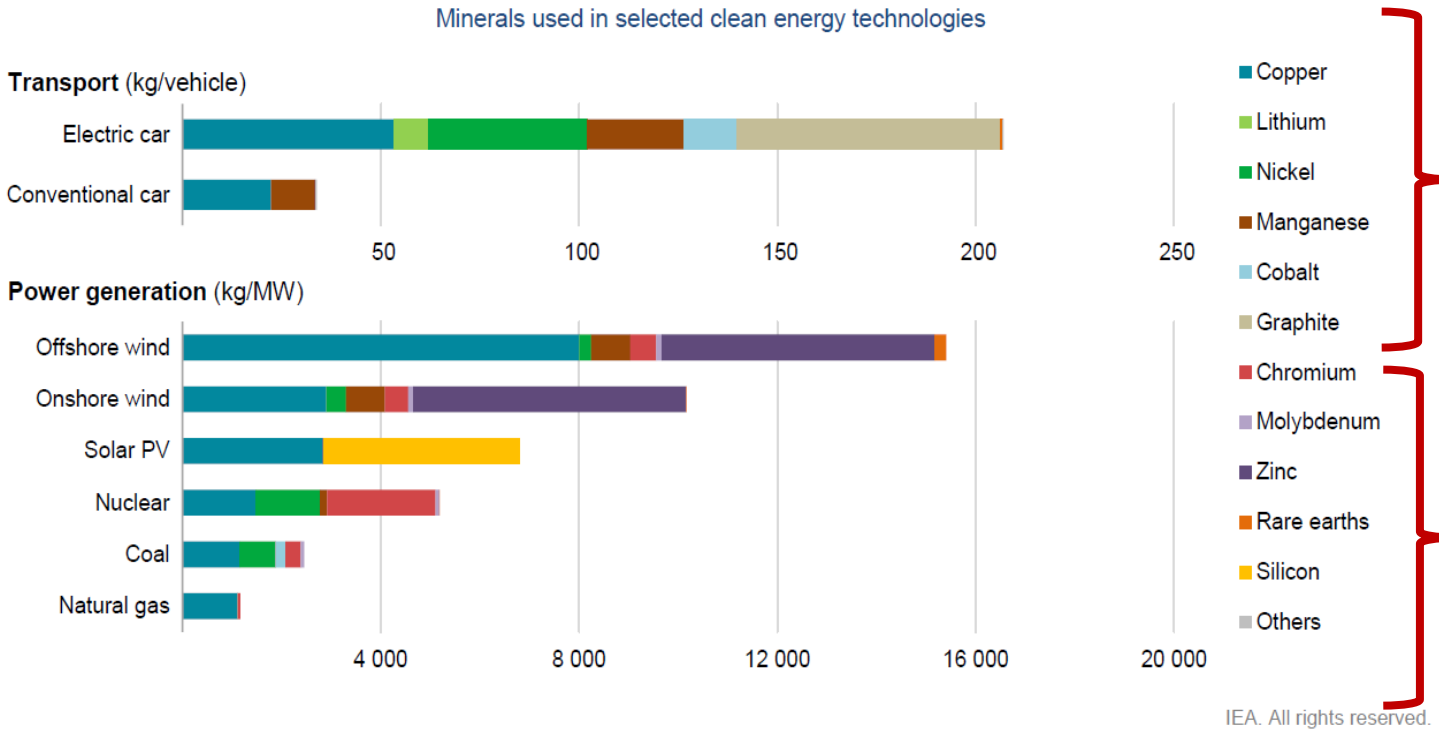


Energy Transition

Critical Raw Materials and the role of Circular Economy

Key Critical Raw Materials (Transition Materials)

Transition to net zero GHG target is materials demanding on the supply (energy production), and on demand (energy use) side



Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

Source: International Energy Agency

Electric vehicles use close to ten times the material of conventional cars – using at least eight different critical material types, compared to just three for conventional cars.

Reaching net zero by 2050 will require about six times today's critical mineral use in 2040. And even meeting today's under-ambitious national climate plans would require more than doubling of critical minerals we are using today.

Indispensable Pillars for Material Resilience

1

Supply Transition Materials with highest environmental and social standards

***Securing enough supply**: ensuring supply is sufficient to power the energy transition*

*Aligning expanded supply with **sustainable development***

*Improving **supply resilience** by improving TM **geographic diversification***

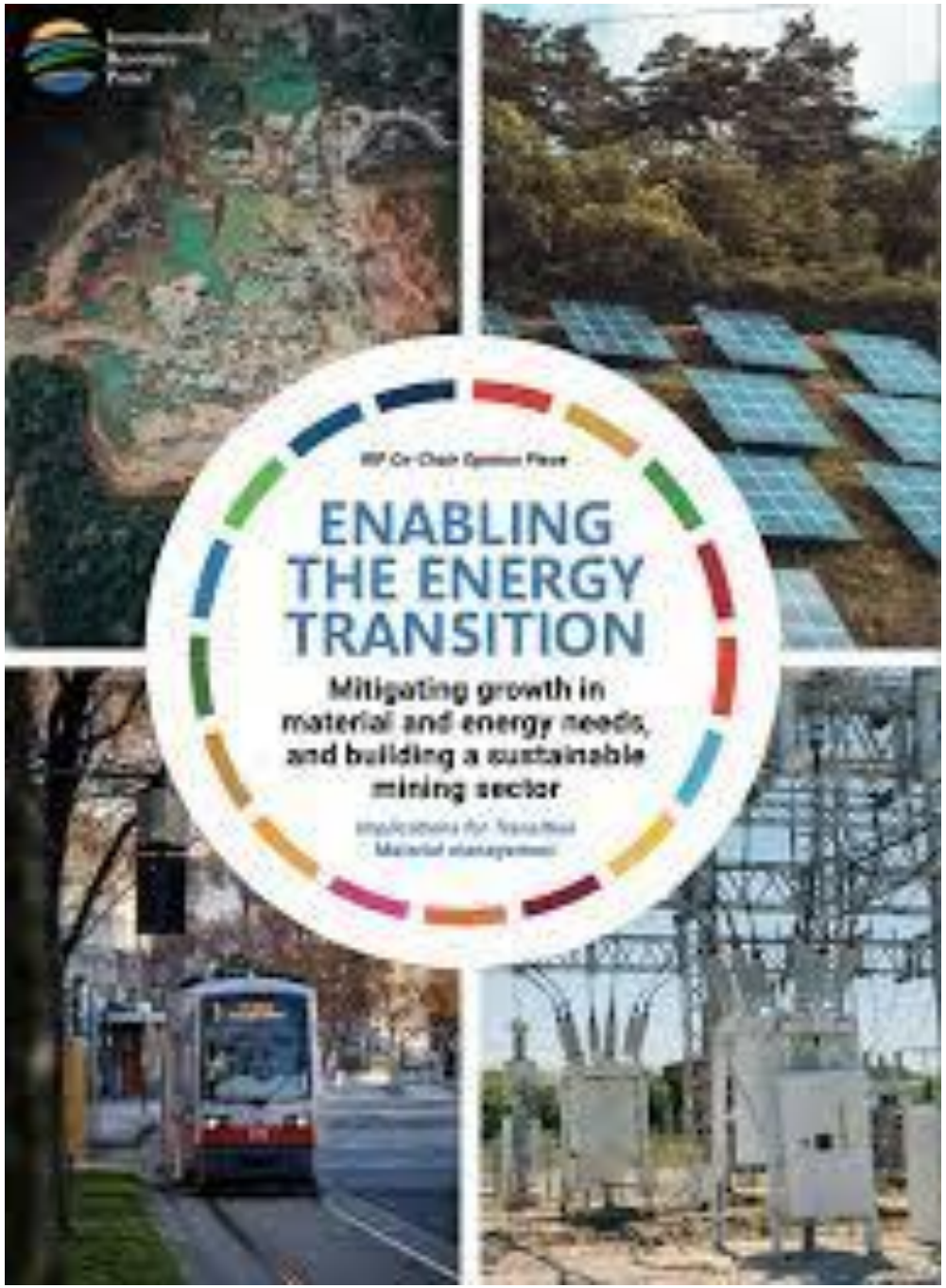
2

Activate policies which encourage all circularity levers

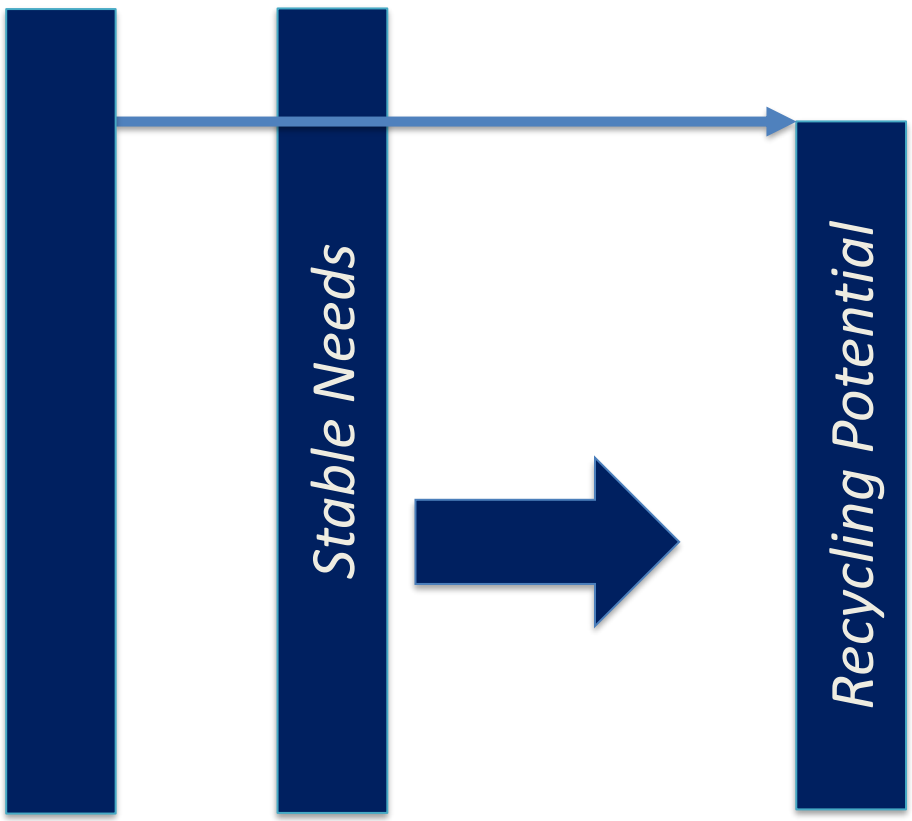
***Recycling:** Capturing future secondary Transition Materials*

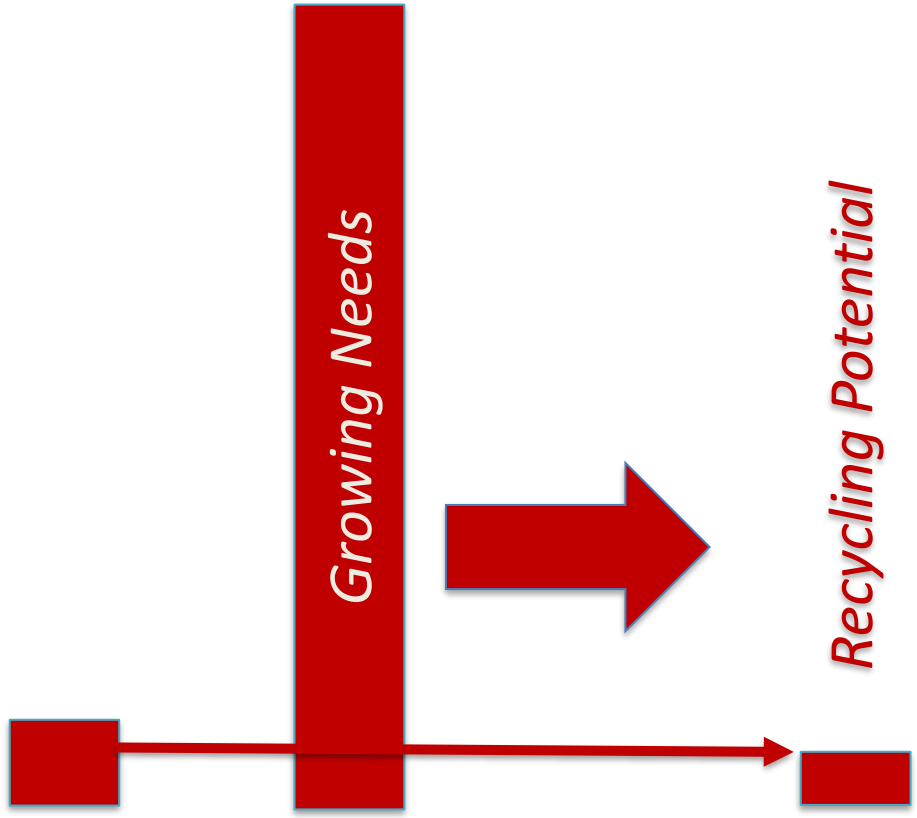
Transition materials (CRMs) are meeting two criteria:

- *They are materials which are essential to key energy transition technologies (eg., the electrification of mobility needs powerful lithium batteries, while the expansion of electricity grids requires extensive copper cabling); and*
- *They are either projected to see significant growth in demand or likely to experience supply-demand gaps in the next decade or so. In particular, we focus on materials for which supply at scale is a new challenge. These include lithium and copper, for which demand is expected to exceed supply by 2030.*



Pilar 2: Recycling Potential: Stable and Growing Needs





Indispensable Pillars for Material Resilience

International Resource Panel

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***Recycling:** Capturing future secondary Transition Materials*

***More intensive use:** Using products that contain transition materials more intensively*

***Light weighting:** Reducing the weight of products that contain transition materials*

***Lifetime extension:** Increasing the lifetime of products that contain transition materials*

3

Optimize delivery of human needs in energy and material intensive systems

Most energy and material intensive systems (GRO24)

***Mobility**: reduced need for travel through work from home, balanced urban design; communal and active transport*

***Buildings**: better utilisation of buildings; space-efficient, balanced neighbourhoods*

Indispensable Pillars for Material Resilience

International Resource Panel

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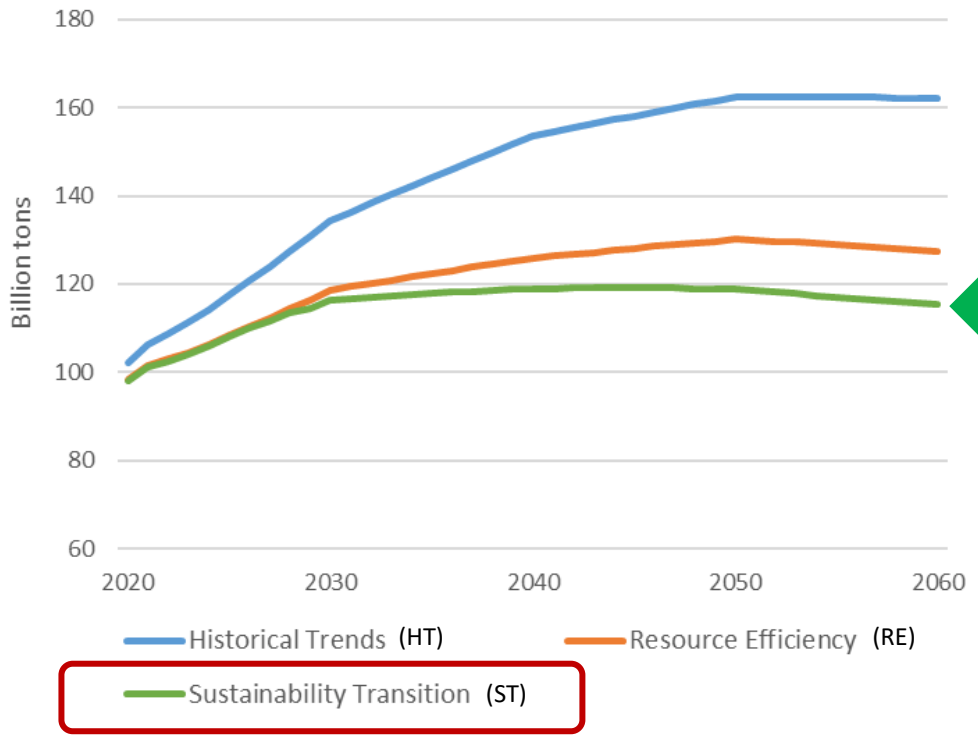
GRO24 IRP modelling:

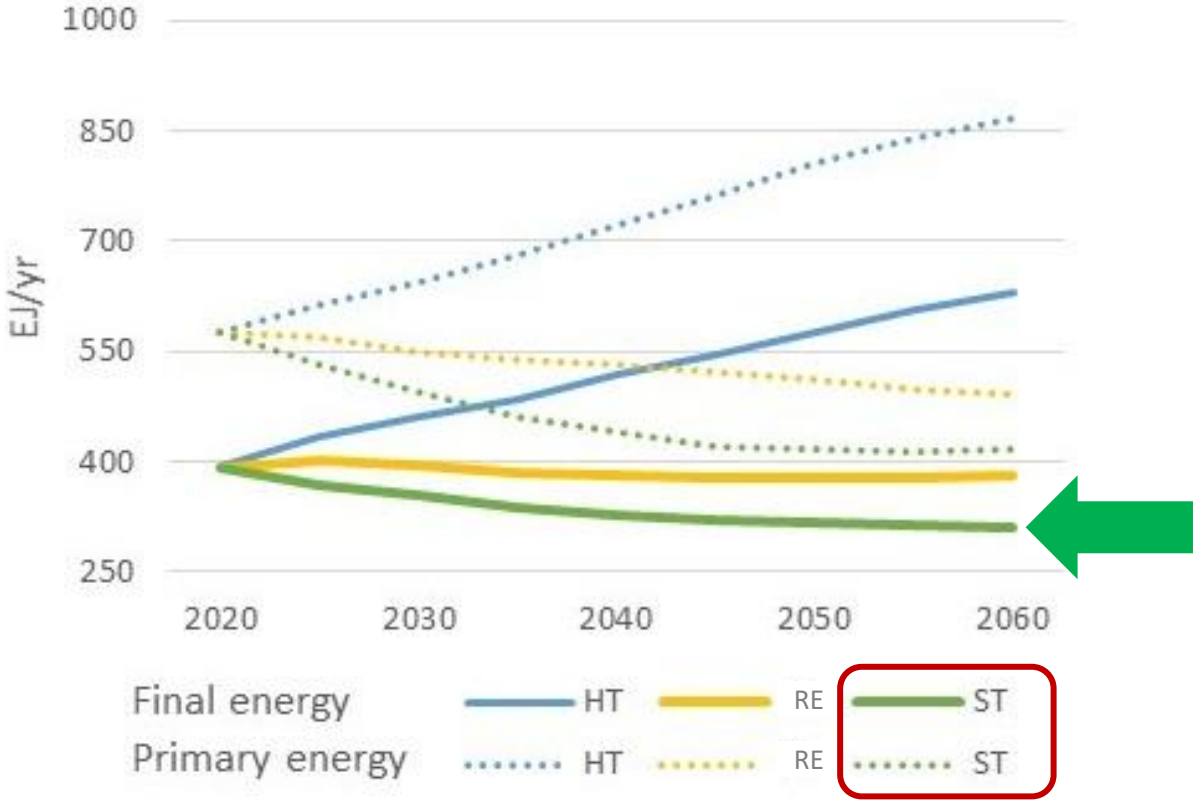
Decoupling is possible and benefits are important

Global material extraction



*We can **mitigate growth in material use** by **30%** by 2060, compared to continued historic trends…*

Global energy demand



*… and **reduce energy demand by 25%** by 2060, compared to 2020 levels.*

And European Union

Some of the Dilemmas currently in the air

EU Quo-Vadis: "European Green Deal"

- *To continue with the policy designed by European Green Deal is wrong question to ask. We need a competitive and forward-looking Europe keeping the bold vision designed by the European Green Deal.*
- *We should consider where it needs to be strengthened and deepened, and what is needed to make it better implementable. Equality and poverty alleviation are key if we want people to be concerned about regenerative economics and decarbonization. We need a systemic shift in how we use resources. European and global geopolitical reality is changing. Increasing number of emerging conflicts and security threats should be considered, but in a broader perspective.*

EU Quo-Vadis: "Strategic Power"

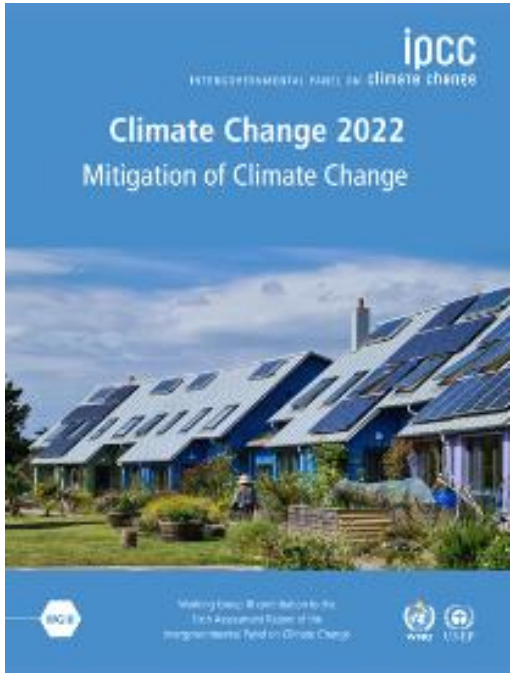
- *Two basic possible options: "Go Defens(ive)" or "Strategic Power"*
- *Go Defens(ive): Focusing on security policy, speeding up the enlargement process to strengthen a safety belt around existing EU*
- *Strategic Power: EU is a major economic power and highest donor not adequately recognised as a geo-strategical political player. What would be needed is developing a common European Tax Policy, Foreign Policy and Defence Policy.*

To Conclude

It is not easy being green

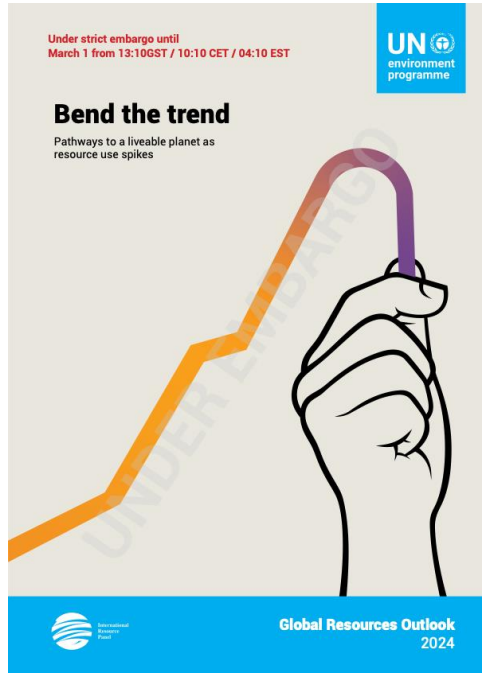
Science is Clear and Change is Unavoidable

IPCC
Climate Change



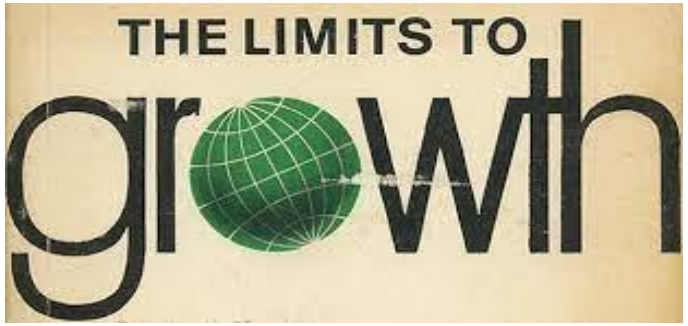
The strong alignment in messages coming from IPCC, IPBES, IRP, GEO, and other scientific interfaces, all based on the most comprehensive assessments, must be considered as a statement of urgency from the scientific community.

IRP
Unsustainable Resource Use



The World has Changed

1972



Population on the Planet
3.8 billion

2022

*The **Growth of Limits***
Climate Change,
Pandemics, Biodiversity
Loss, Security Threats …

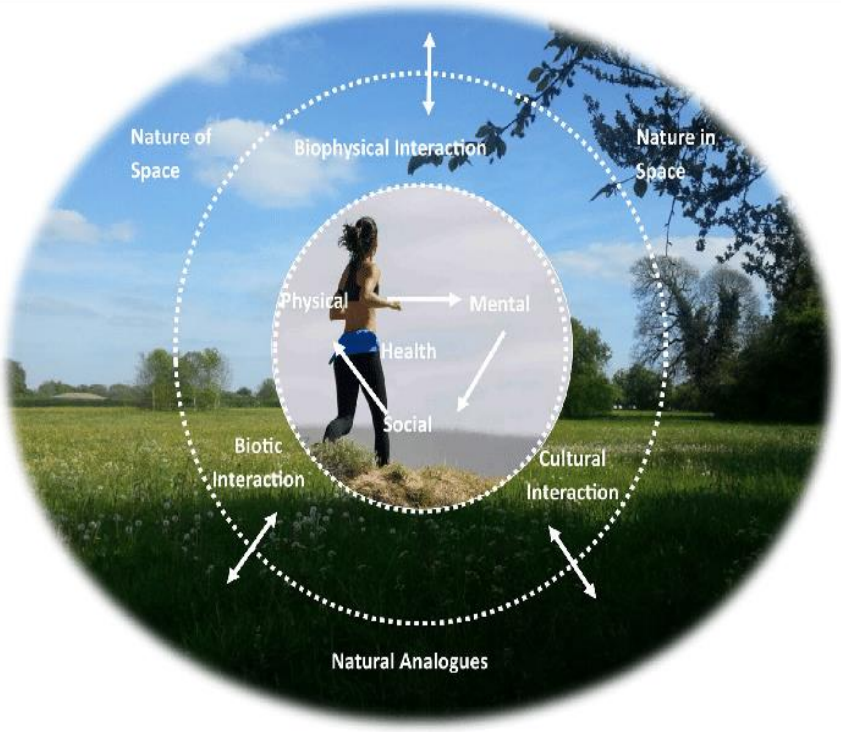
Population on the Planet
8 billion

To make our future sustainable
some basic shifts would be needed:

1

From Humans in function of economic success and development to an economy in function of delivering human needs

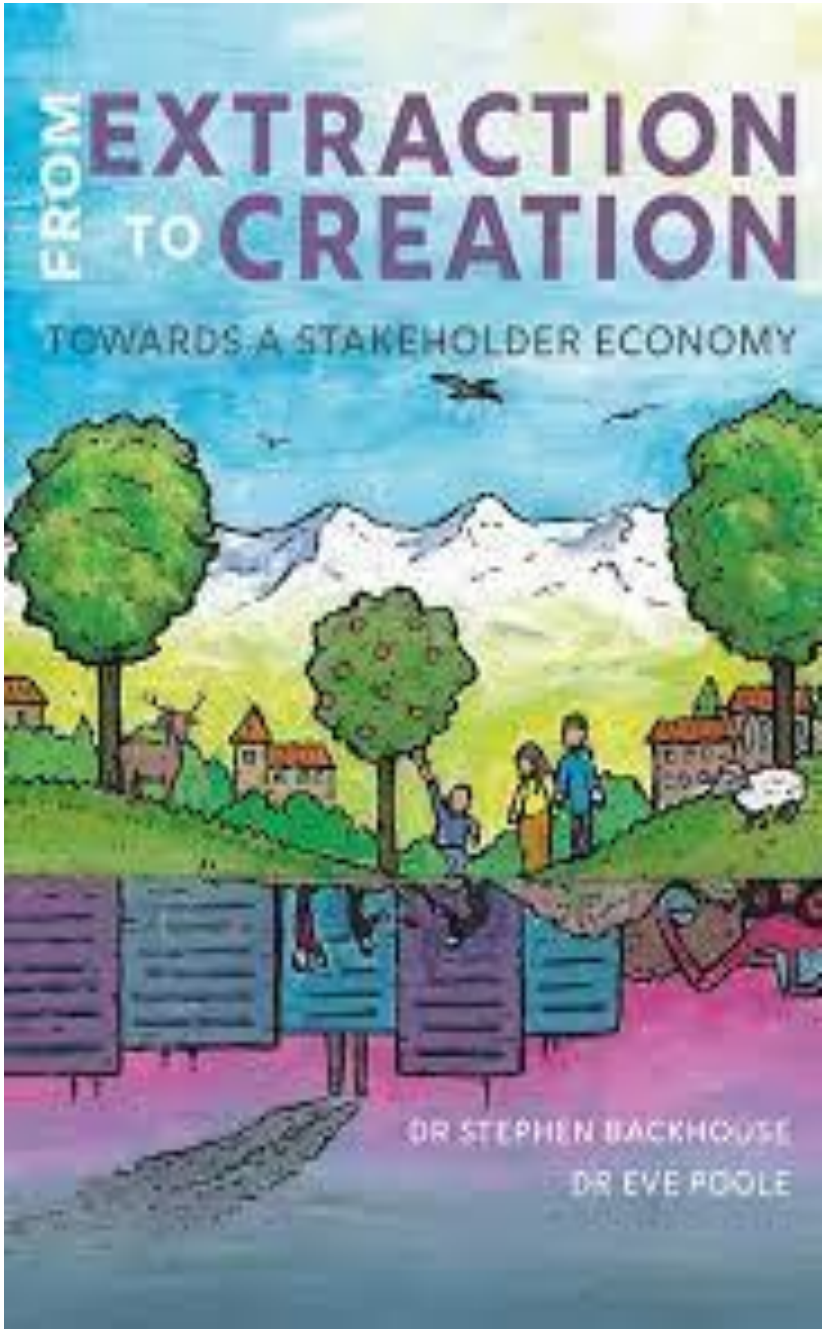
We must set the order right!



2

From economy considering Humans as external/superior to Nature
to an economy acknowledging that we are embedded with Nature

Destroying Nature is destroying ourselves!



3

From extraction-based production to a creation-based production

We should stop stimulating extraction based economic success and reward responsible, innovative, creative ways of meeting human needs!

4

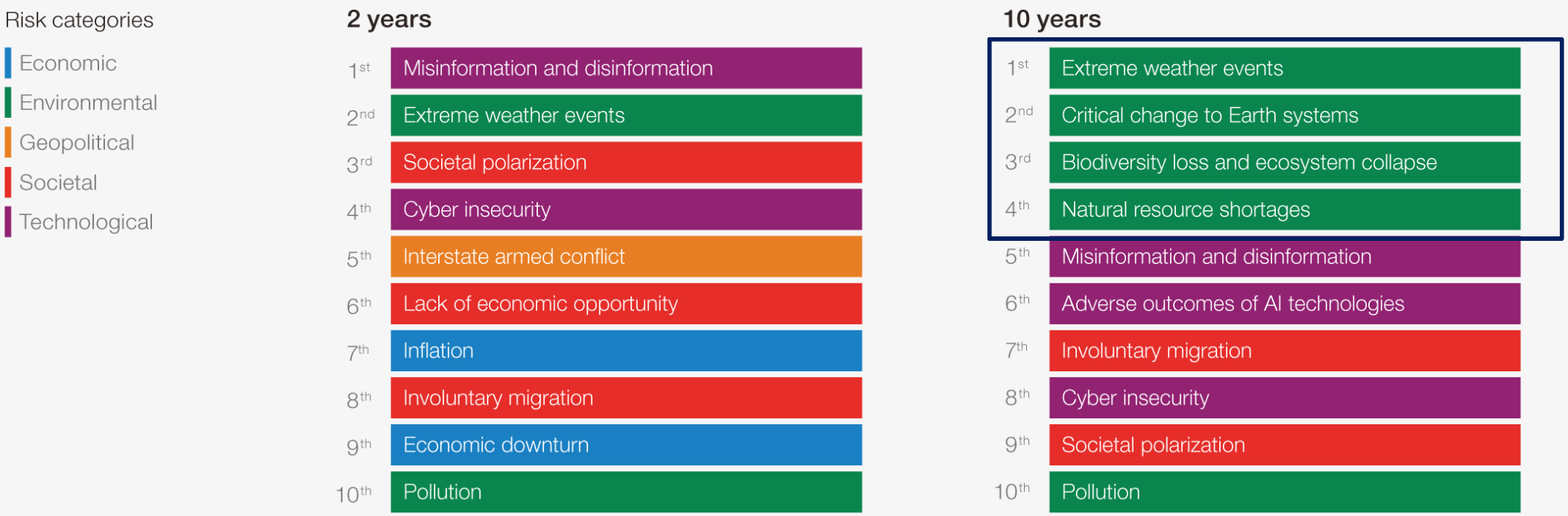
From an egoistic, short-term based interests' governance structures and logic to cooperation and sharing sovereignty.

We must improve our collective resilience. We need a convincing intergenerational pact, and all governments should nominate Minister for Future Generations.

This System Change Transformation is also in the Interest of the Business

FIGURE C **Global risks ranked by severity over the short and long term**

"Please estimate the likely impact (severity) of the following risks over a 2-year and 10-year period."



Source

World Economic Forum Global Risks Perception Survey 2023-2024.

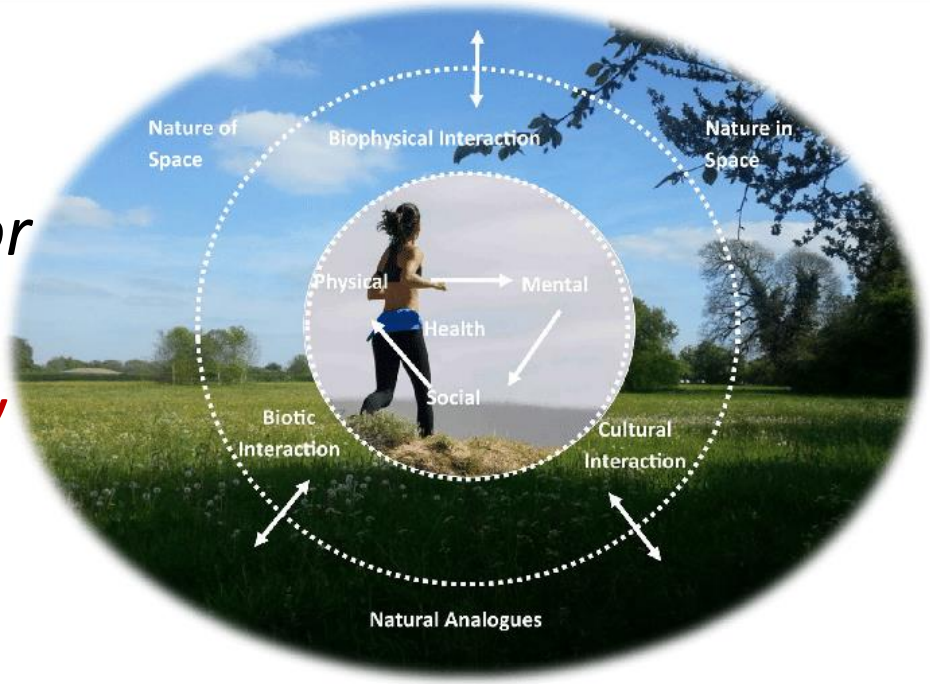
This Transformation is not only about Environmental Sustainability

Access to and use of natural resources have been in the human history closely related to the level of the achieved wellbeing, but also to stability, security, conflicts, wars (Access to Land, Water, Oil and Gas, Minerals, Precious Metals …)

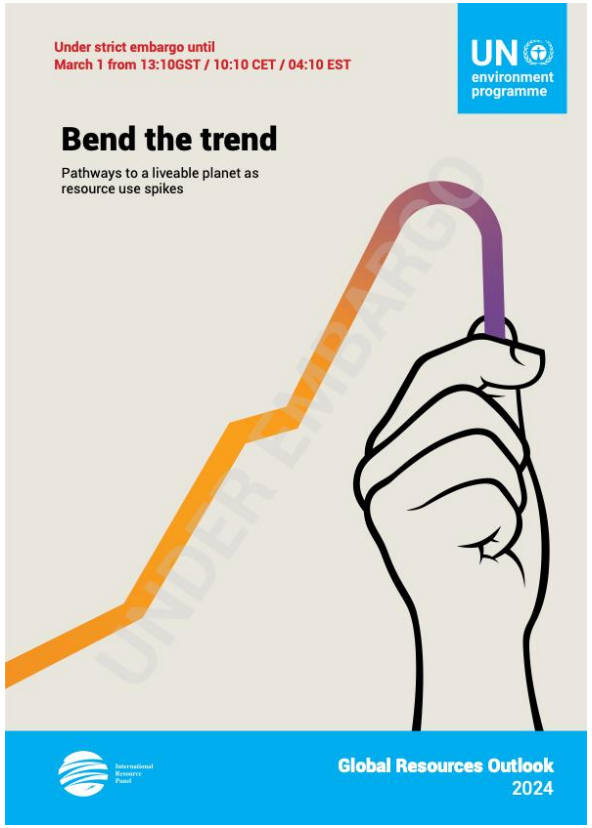
And the whole history of the colonialisation of nature, is also central to fairness and equity.

Changing our Relationship with (the rest of) Nature, is ultimately an Economic, Equity and Security Imperative to strengthen collective Resilience

The lessons learned recently (war, pandemic, the hottest summer) are more than convincing to understood that. This relationship is not stable, nor balanced, and it will be resolved either with collective wisdom and effort, or in a hard and very painful way (conflicts, pandemics, migration …)



The future will be green … or there will be no future.



We are indebting future generations, financially and by depleting the Nature. This is simply wrong.

Apparently, we humans are the most intelligent spices on this planet. It is high time to prove it.

More than an economic or a technological choice, this is a moral choice.

To end with the wisdom from my former country …

Source: Diplomacy and commerce exhibition-alan-ford-running-a-lap-of-honor-in-the-museum-of-yugoslavia

Quote from Alan Ford, most famous comics from Ex-Yugoslavia, explaining well where the current rules and the established practice of the economic system are leading us …

It is not the problem to drive withouth the breaks …
The problem is to stop.

And finally, with the most important advice from the famous Belgian

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 me, it is very important to establish a healthy distance to himself.

THANK YOU

for helping us delivering the future we want!