

Resource Crisis?

Don't
Look **DOWN**

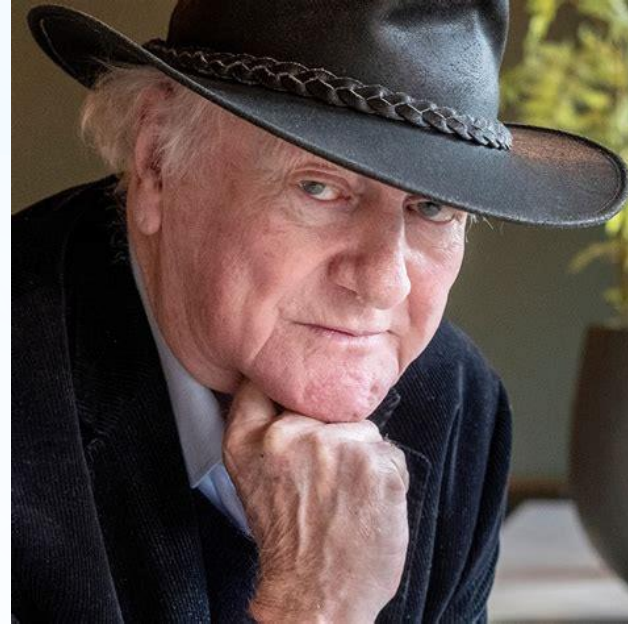
Dutch
Sustainability
Congres
23-11-2023



Introduction

Wouter van Dieren

- * Member Club of Rome
- * Initiator Resource Wende



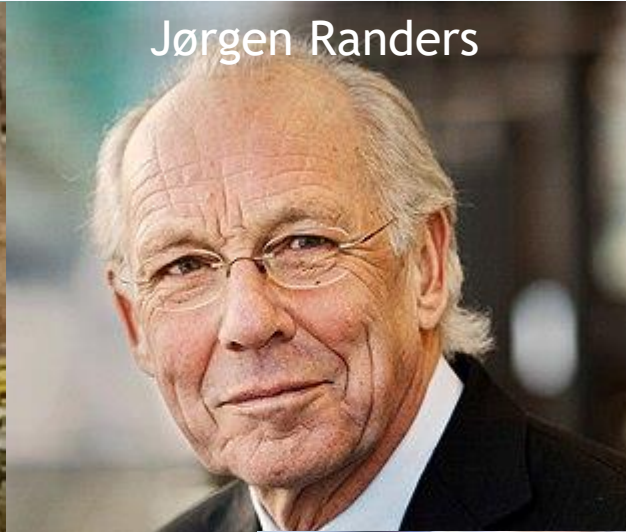
Marcel Vester

- * Project Manager Resource Wende

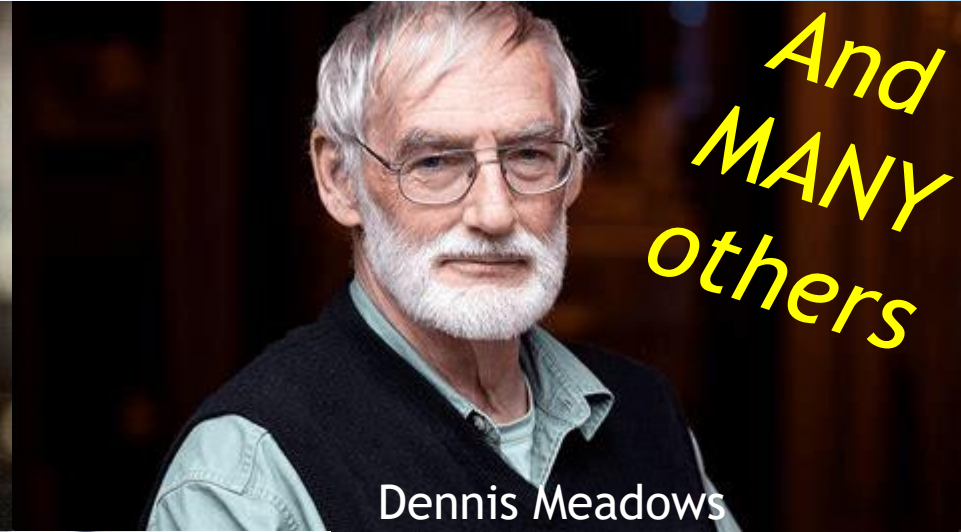
We're standing on the shoulders of giants



Donella Meadows



Jørgen Randers



Dennis Meadows

*And
MANY
others*



Markus Reuter



Ernst Ulrich von Weizsäcker



Harald Sverdrup



Simon Michaux

Definition resources



- * **Broad definition:**

All sources (in & on the ground, in the air & oceans) to sustain life on earth, our economy, society and wellbeing.

- * **In the context of RW: *Raw materials in earth crust***

Structure

1. Why do resources get scarce?
2. What is the impact of excessive resource usage?
3. What are solution areas?
4. (Why is it so hard to reduce our footprint?)
5. The Resource Wende

Resource Crisis?



1. Why do resources get scarce?

1. Why - Exponential growth

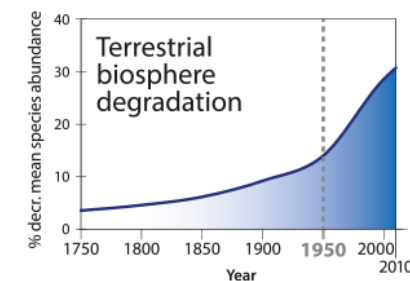
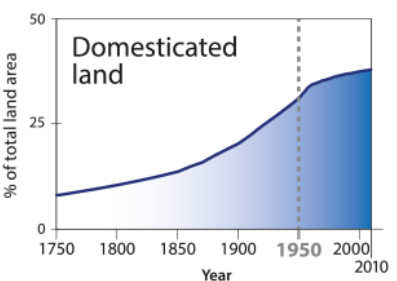
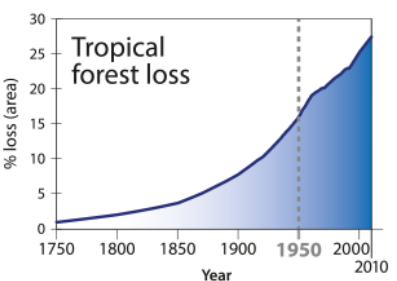
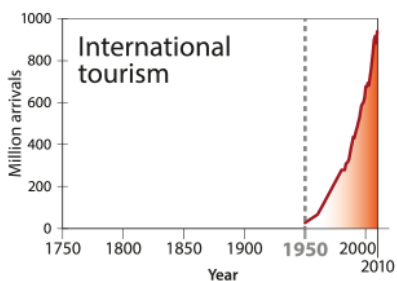
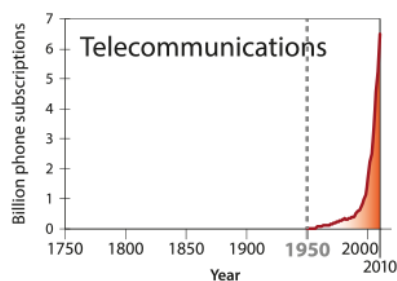
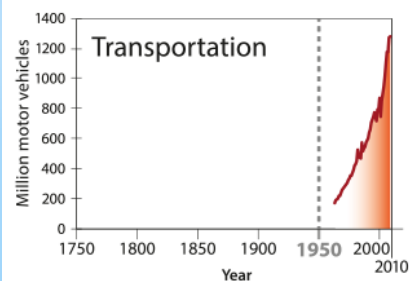
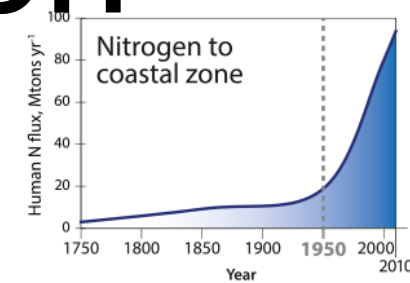
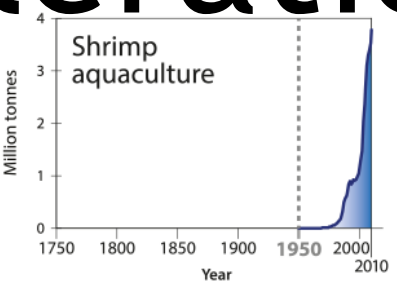
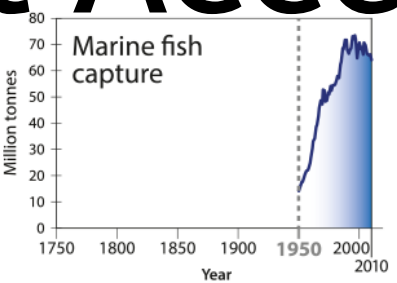
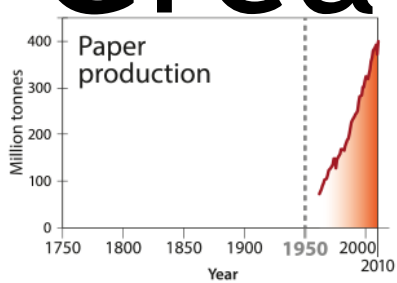
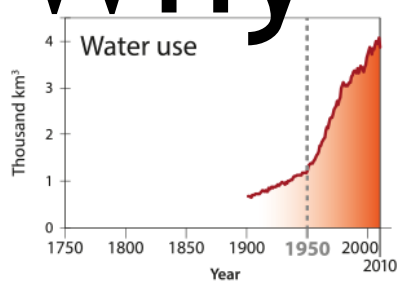
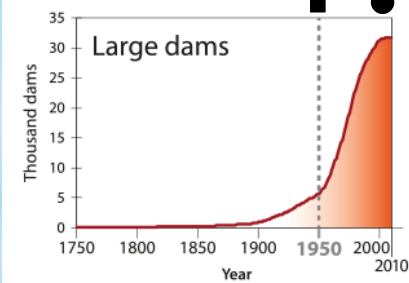
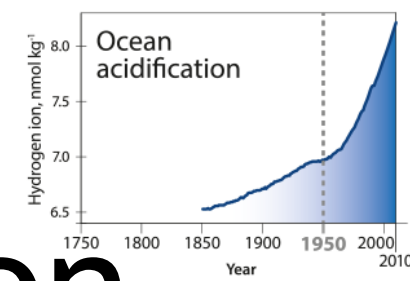
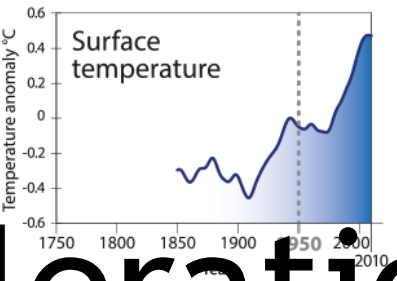
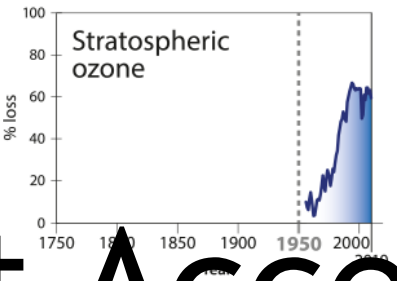
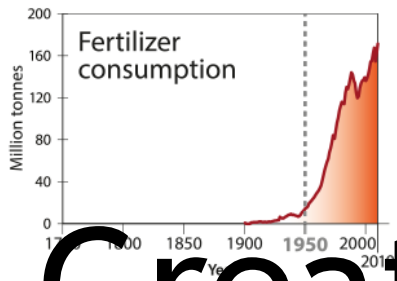
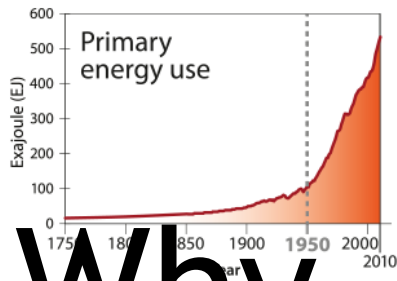
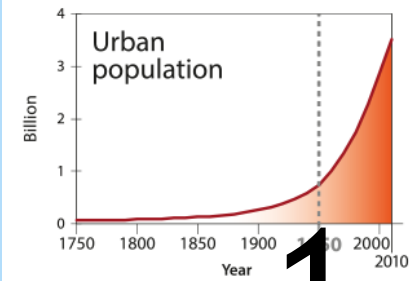
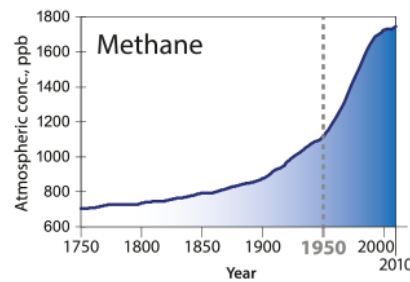
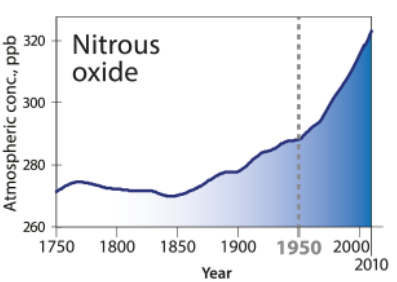
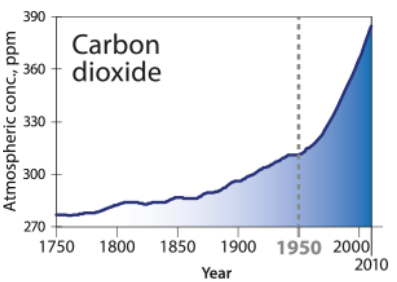
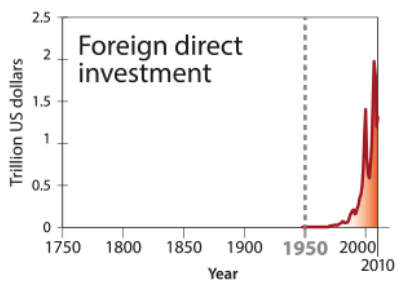
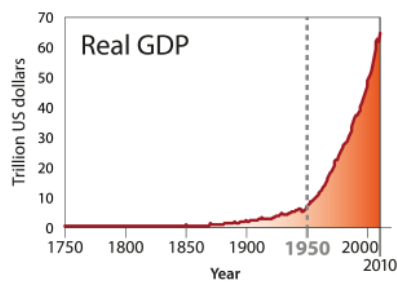
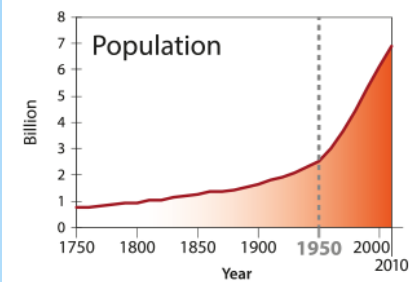


$2^{64} - 1$ grains =
18.446.744.073.709.551.615 grains =
922.000.000.000 tons =

2000x worldwide production in '20/'21

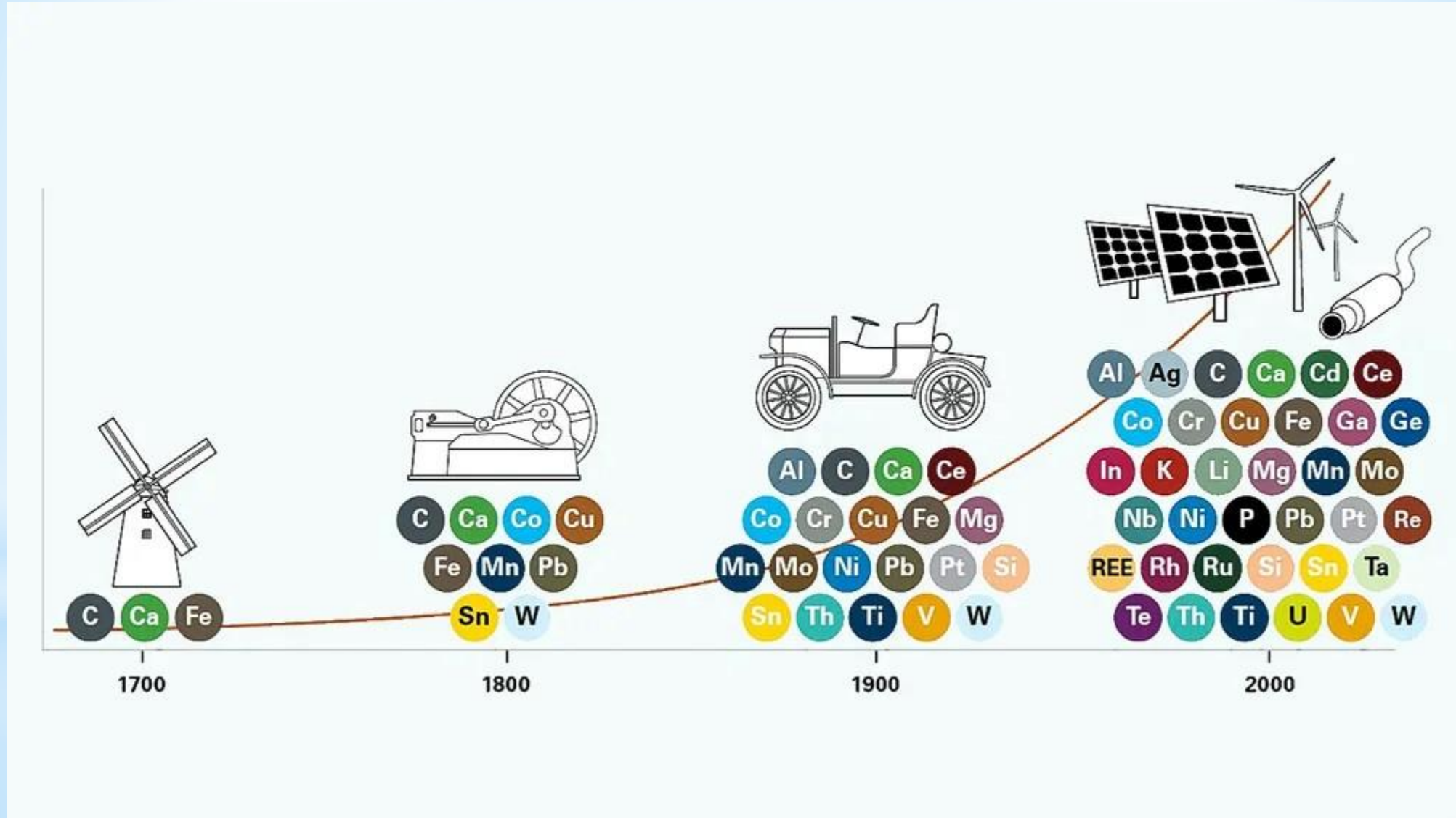
Legend of Sissa & Indian King Shahram

Source: <http://www.igbp.net/news/pressreleases/pressreleases/planetarydashboardshowsgreataccelerationinhumanactivitysince1950.5.950c2fa1495db7081eb42.html>



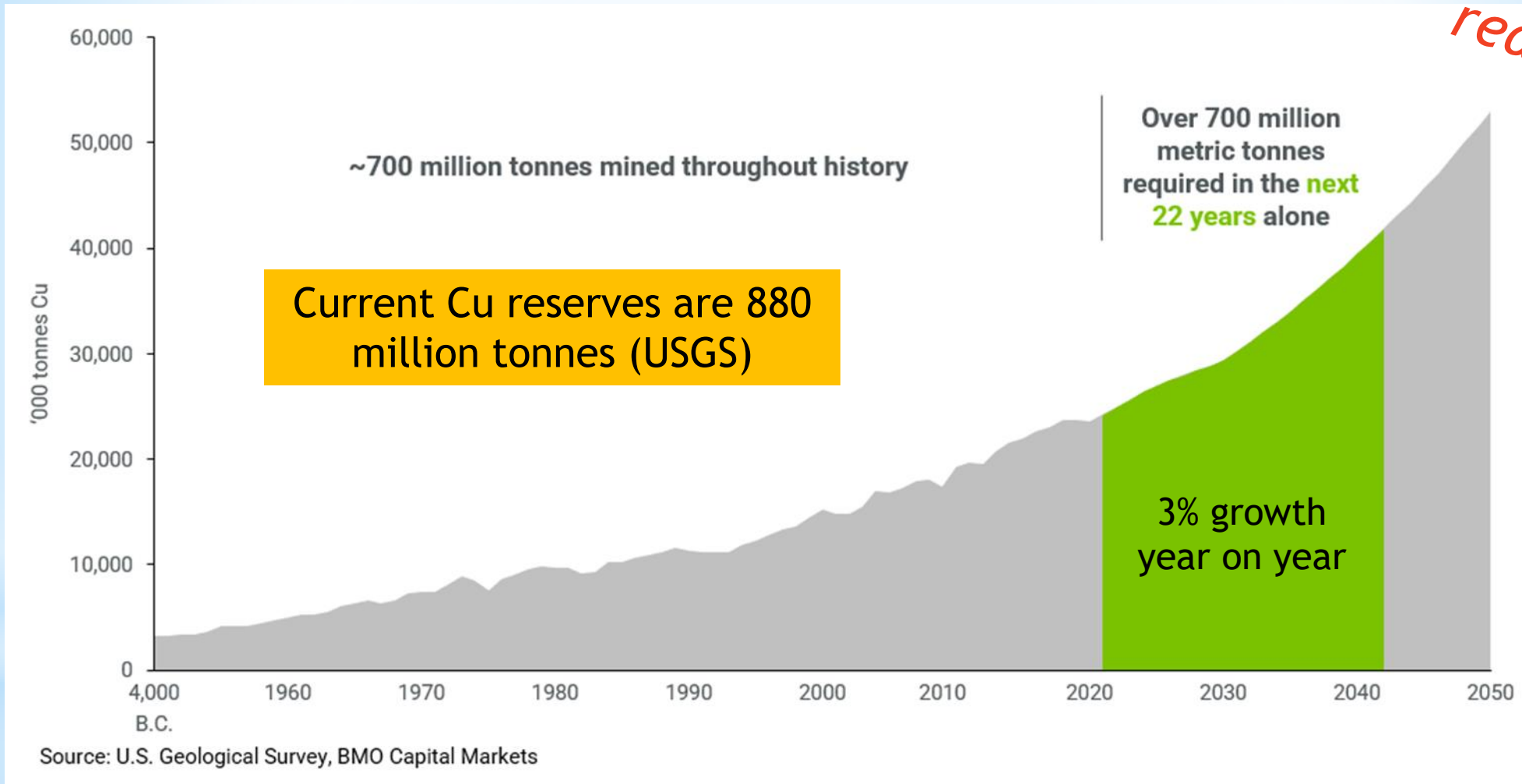
1. Why - Great Acceleration

1. Why - Resources used in economy



1. Why - Growing copper demand

Are we reality blind?



We want 4.730 million tonnes of Cu, just to manufacture one generation of renewable technology (6,75 x historical Cu mining)

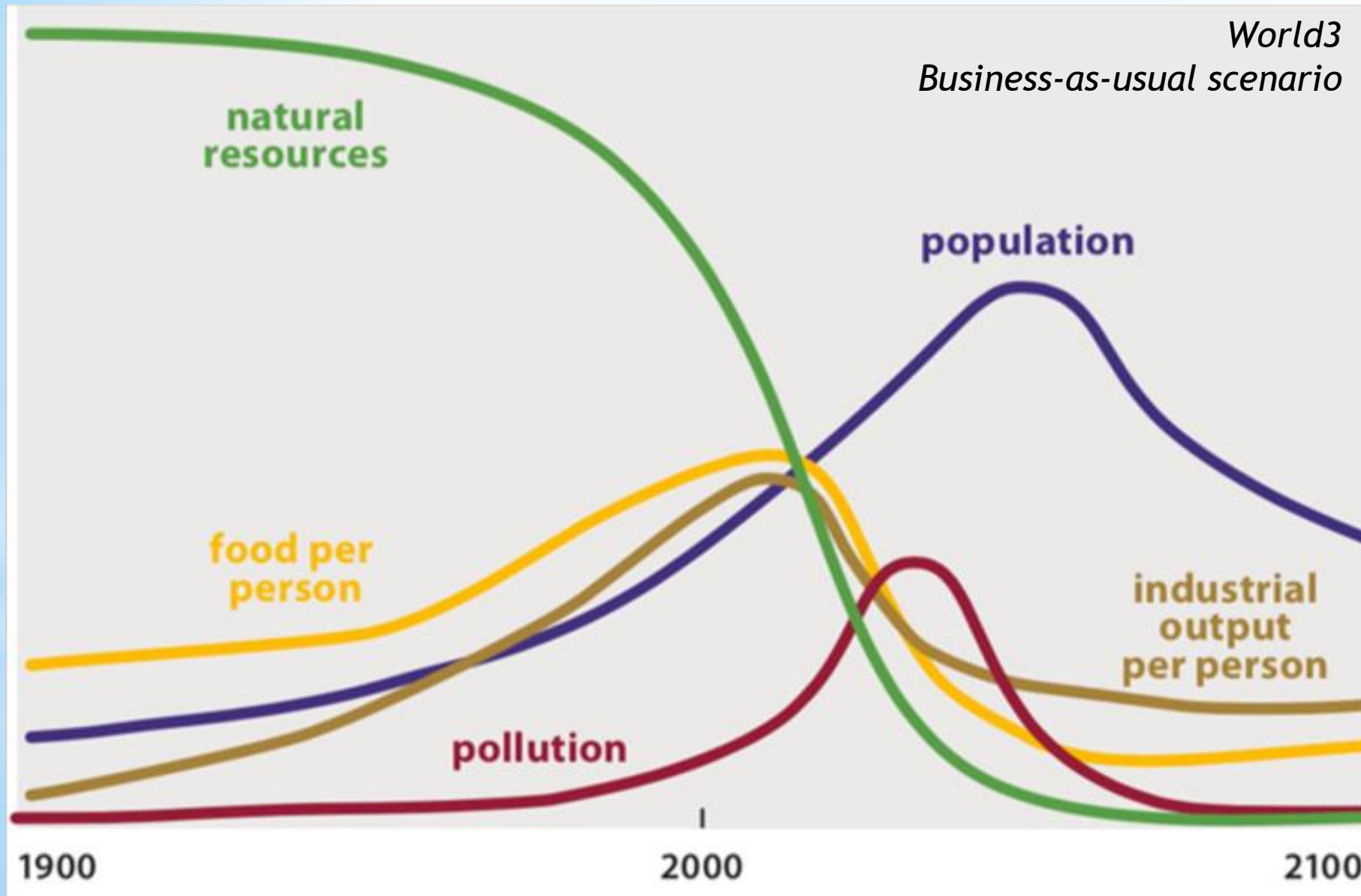
1. Why - Energy transition

*We solve one problem,
but create another one*

Lead time to produce raw materials needed for the *first generation of renewable energy infrastructure*, taking into account current technologies and 2019 production levels.

Raw Material	Production time (years)
Copper (conductor)	195
Nickel (steel, batteries)	413
Cobalt (batteries, magnets, semi-conductors)	1.791
Vanadium (steel, superconductors, magnets)	6.748
Lithium (batteries)	10.258
Germanium (semi-conductors, solar panels)	19.113

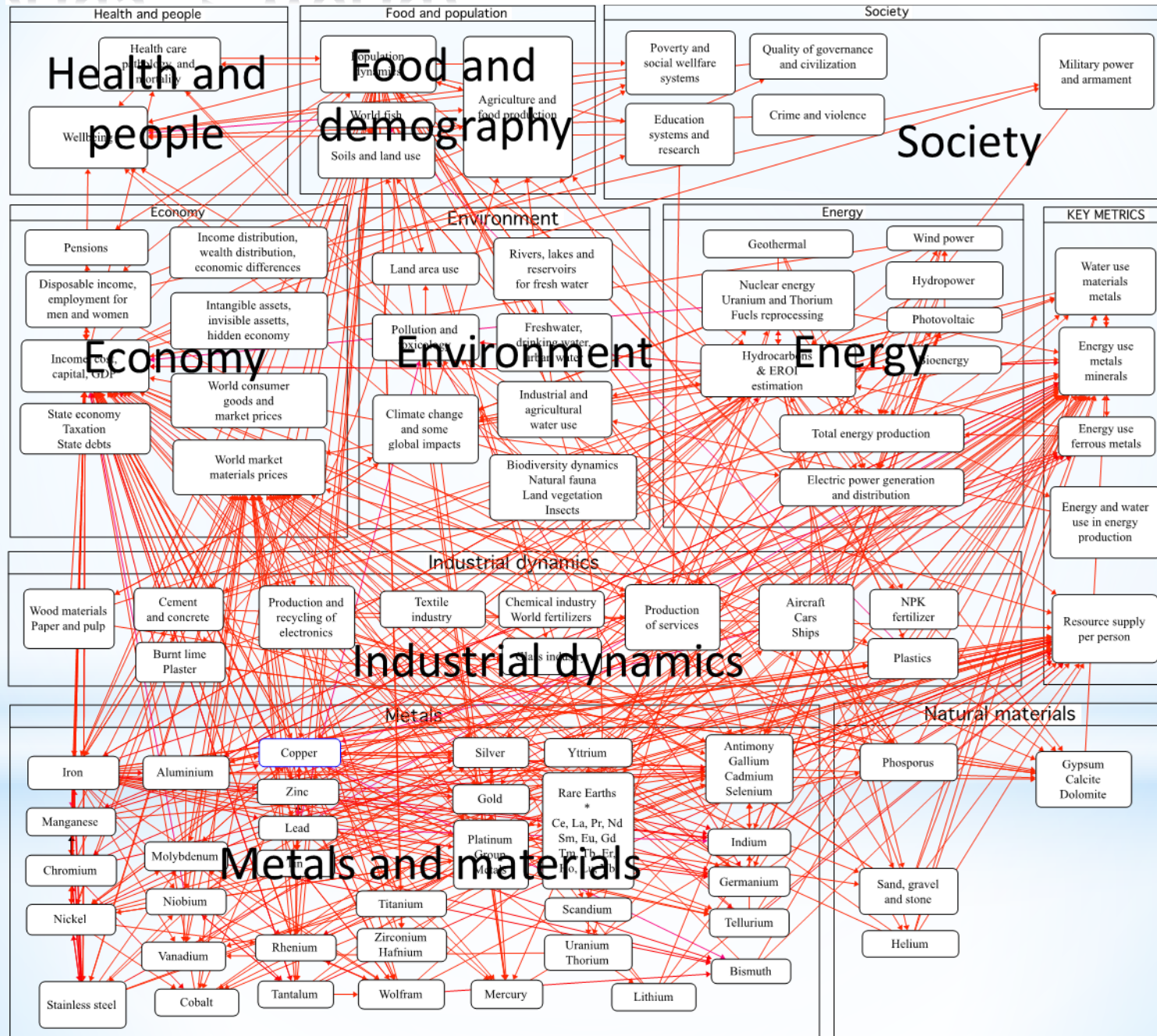
1. Why: CoR Limits to Growth 1972



According to
KPMG Director
Gaya Herrington
in 2021:

“Still on track for
business-as-usual
scenario”

1. Why: World3 -> World7





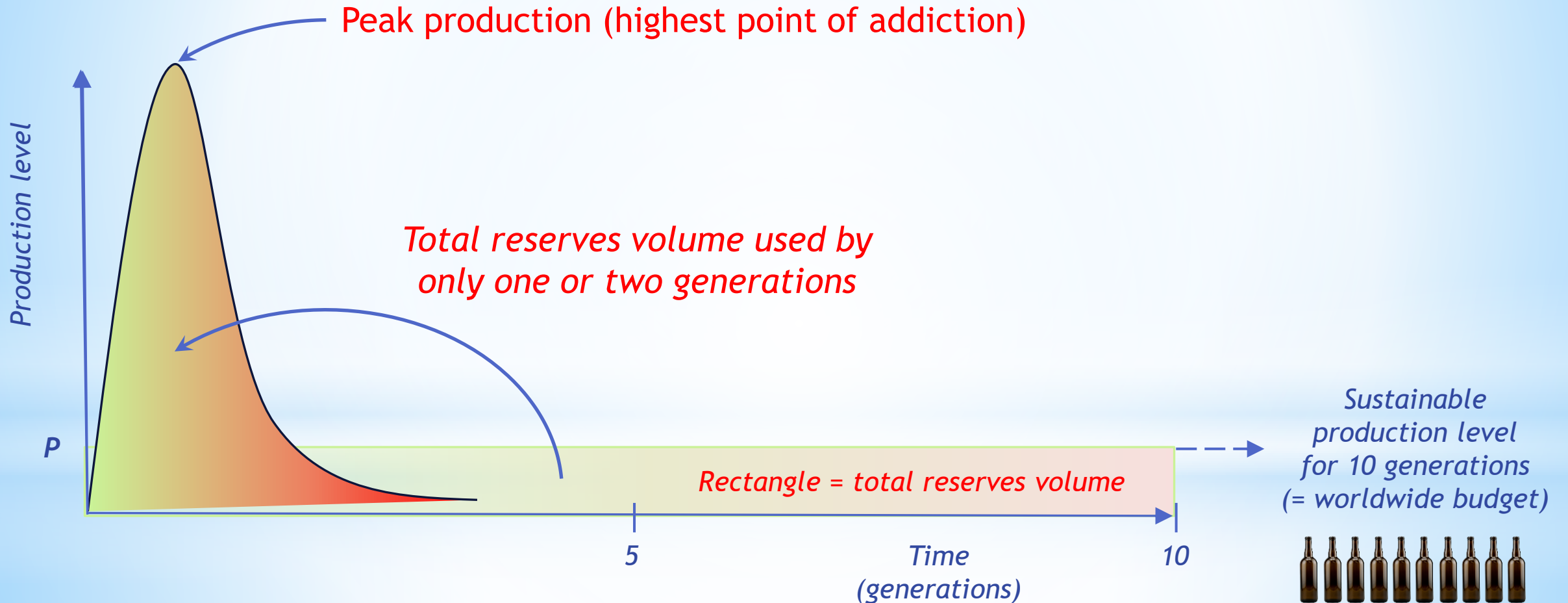
Houston, we have a problem

Resource Crisis?



2. Impact excessive resource usage

2. Impact - Overshoot & Collapse



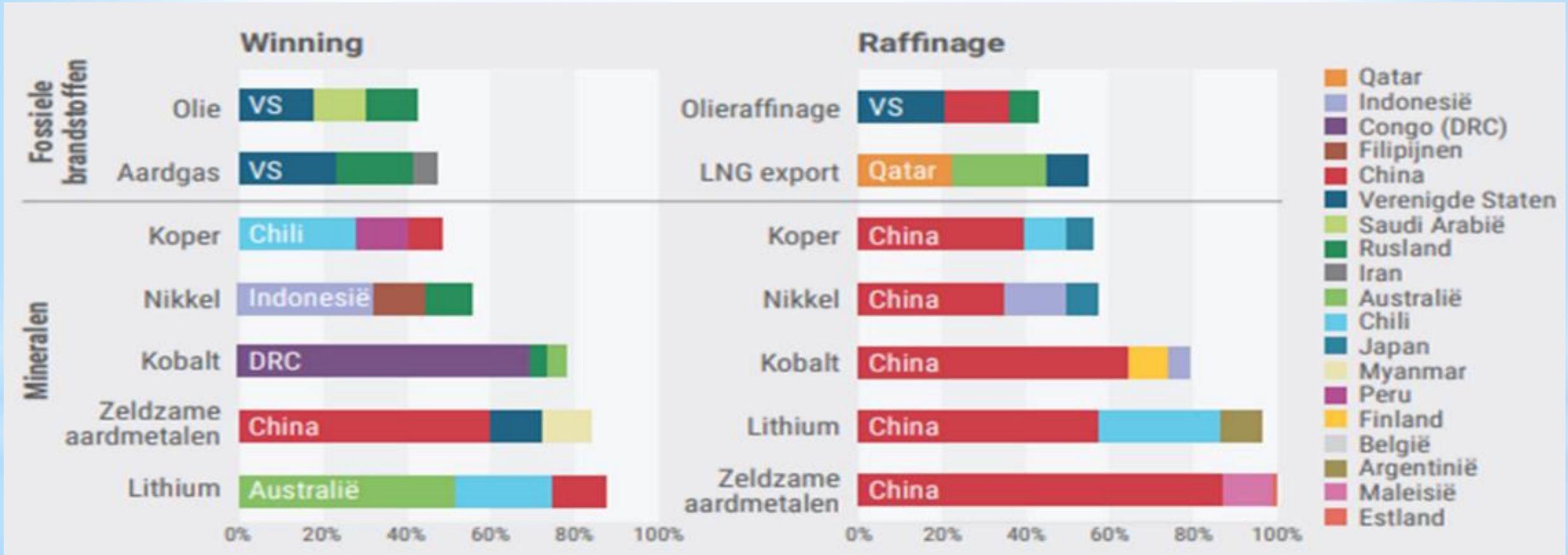
2. Impact - Peak production calculations *

Metal	Pessimistic	Average	Optimistic	Comments
All ready peaked (The problem is here and now)				
Palladium	2010	2015	2025	Partly dependent on nickel. Serious challenge. Scarcity prevailing.
Rhodium	2010	2015	2025	Partly dependent on nickel and platinum mining. Serious challenge. Scarcity prevailing.
Gold	2012	2013	2017	The only real money, well conserved. Partly dependent on silver, copper and platinum.
Coming within the next 10 years (we own the problem, no escapes).				
Lead	2013	2018	2023	Limited by political action, target is 2010.
Niobium	2014	2018	2023	
Indium	2018	2020	2025	Dependent on copper-zinc mining.
Gallium	2018	2020	2022	Dependent on copper-zinc mining.
Manganese	2018	2021	2025	
From 10 to 20 years from now (we own the problem).				
Selenium	2022	2025	2035	Dependent on zinc.
Chromium	2022	2025	2035	
Zinc	2018	2025	2028	This is a serious challenge!
Cobalt	2020	2025	2030	Dependent on copper, nickel and platinum mining.
Nickel	2022	2026	2028	This is a serious challenge!
Iron	2025	2040	2080	This is a serious challenge!
From 20 to 30 years from now (escape possible; next generation gets the problem)				
Silver	2028	2034	2040	Partly dependent on copper and zinc.
Rhenium	2030	2035	2040	Dependent on molybdenum.
Copper	2032	2038	2042	This is a serious challenge!
Phosphorus	2025	2040	2100	This is a very serious challenge! Size of URR is disputed (16-60 billion tonnes) but it only shifts the peale by some centuries.

2. Impact - “Collateral damage”

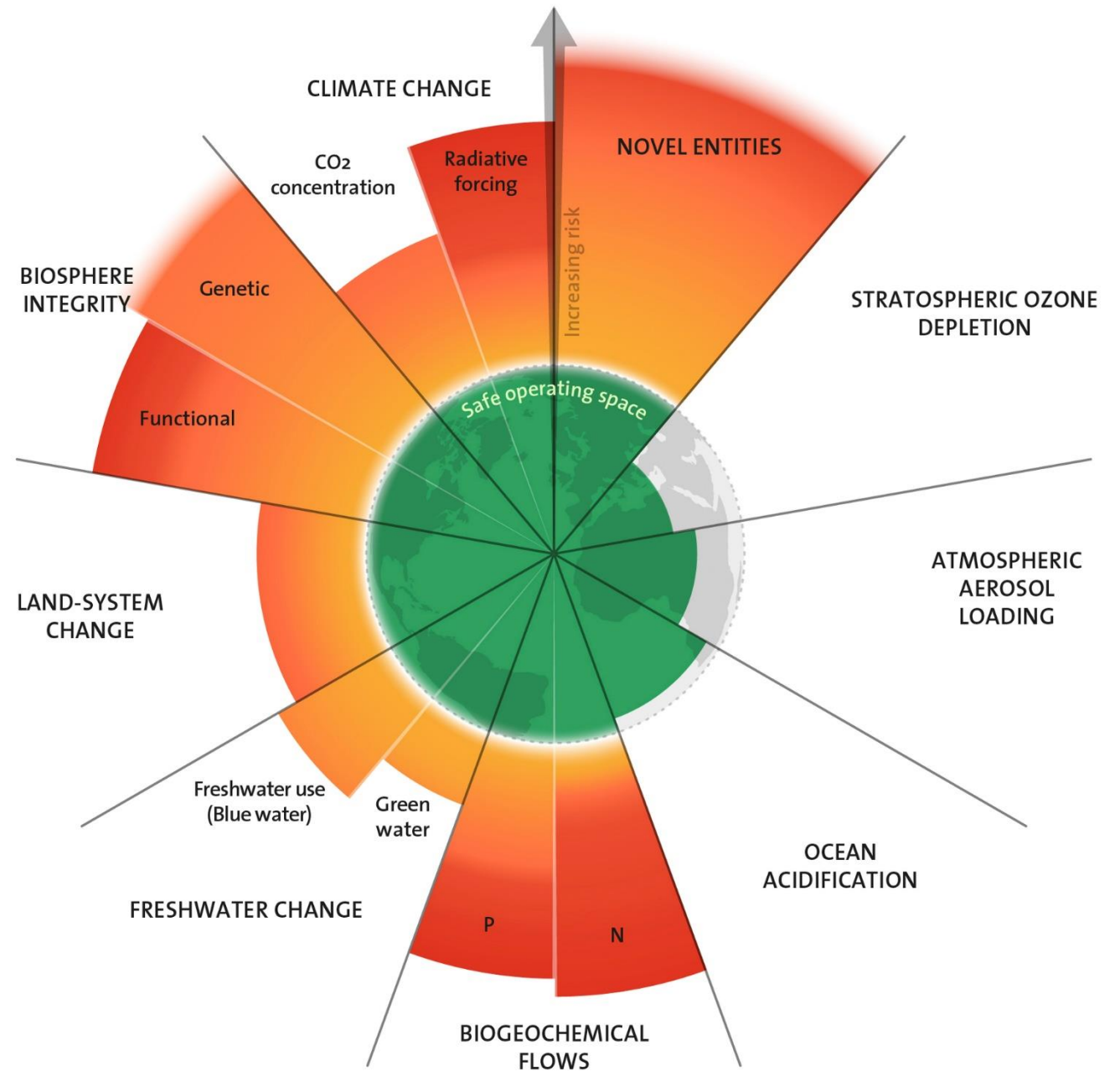


2. Impact - Geopolitical risks

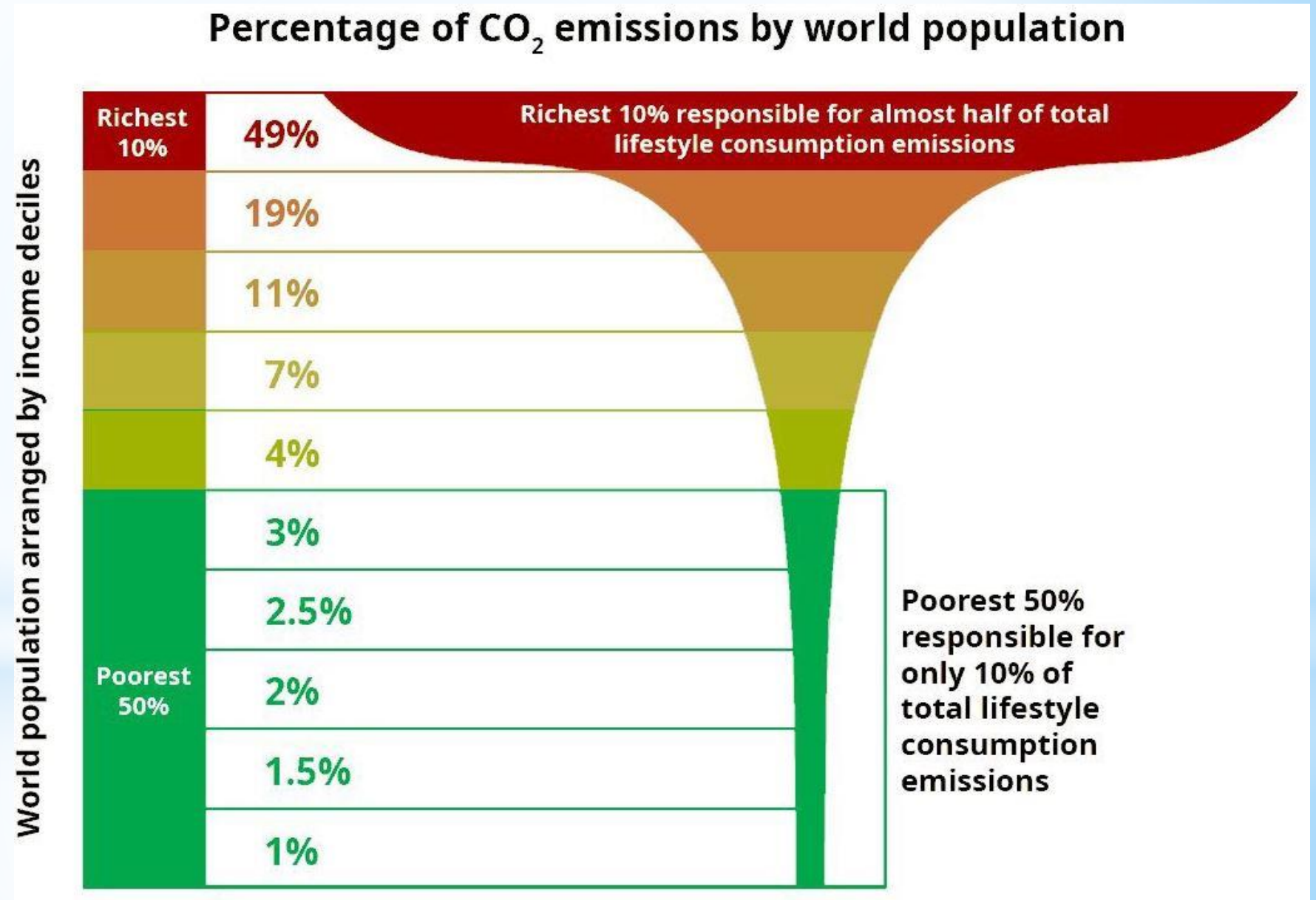


2. Impact -

In 2023:
Crossing
six out of nine
planetary
boundaries



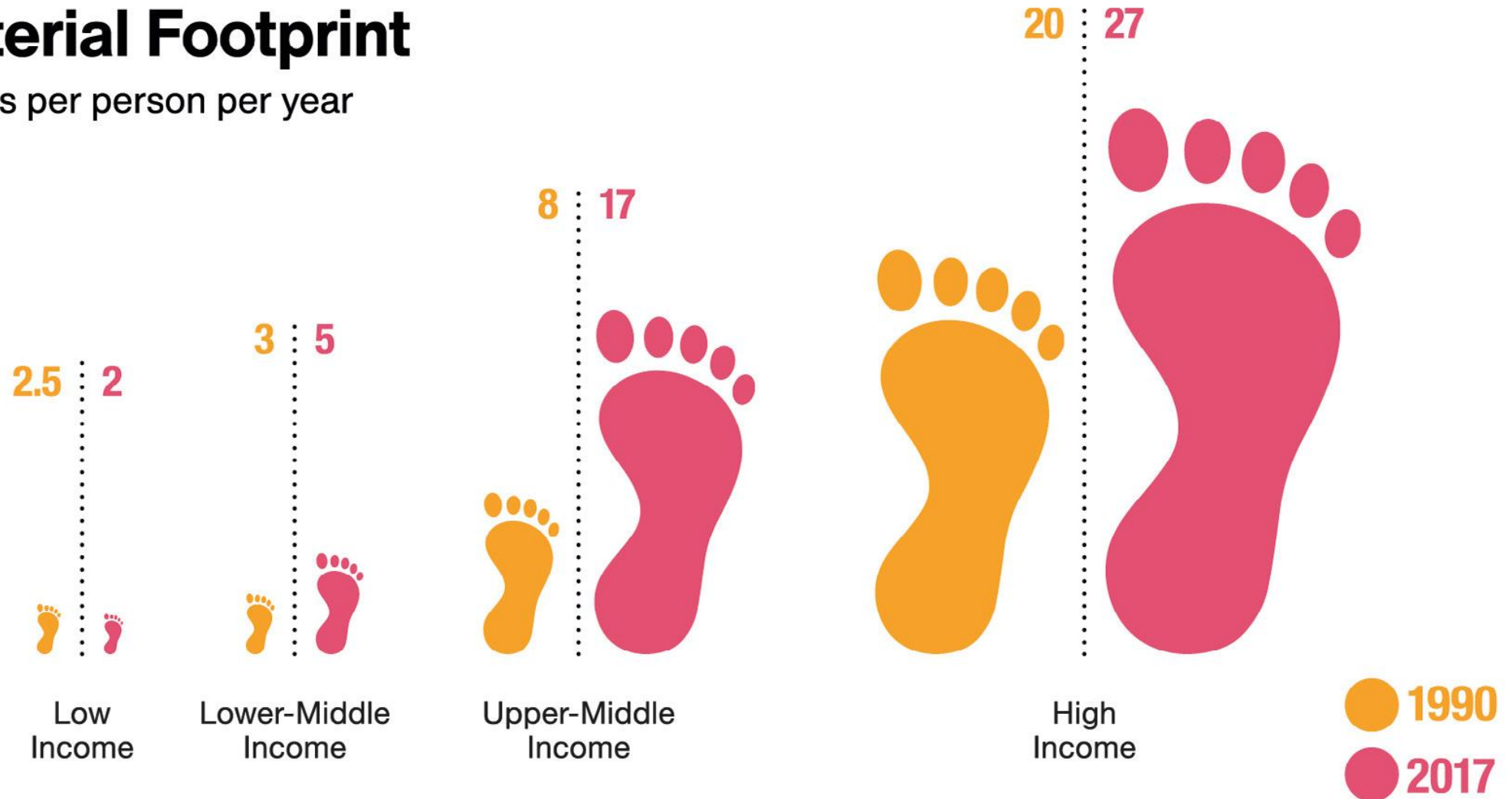
2. Impact - Social inequality



2. Impact - Footprint & inequality

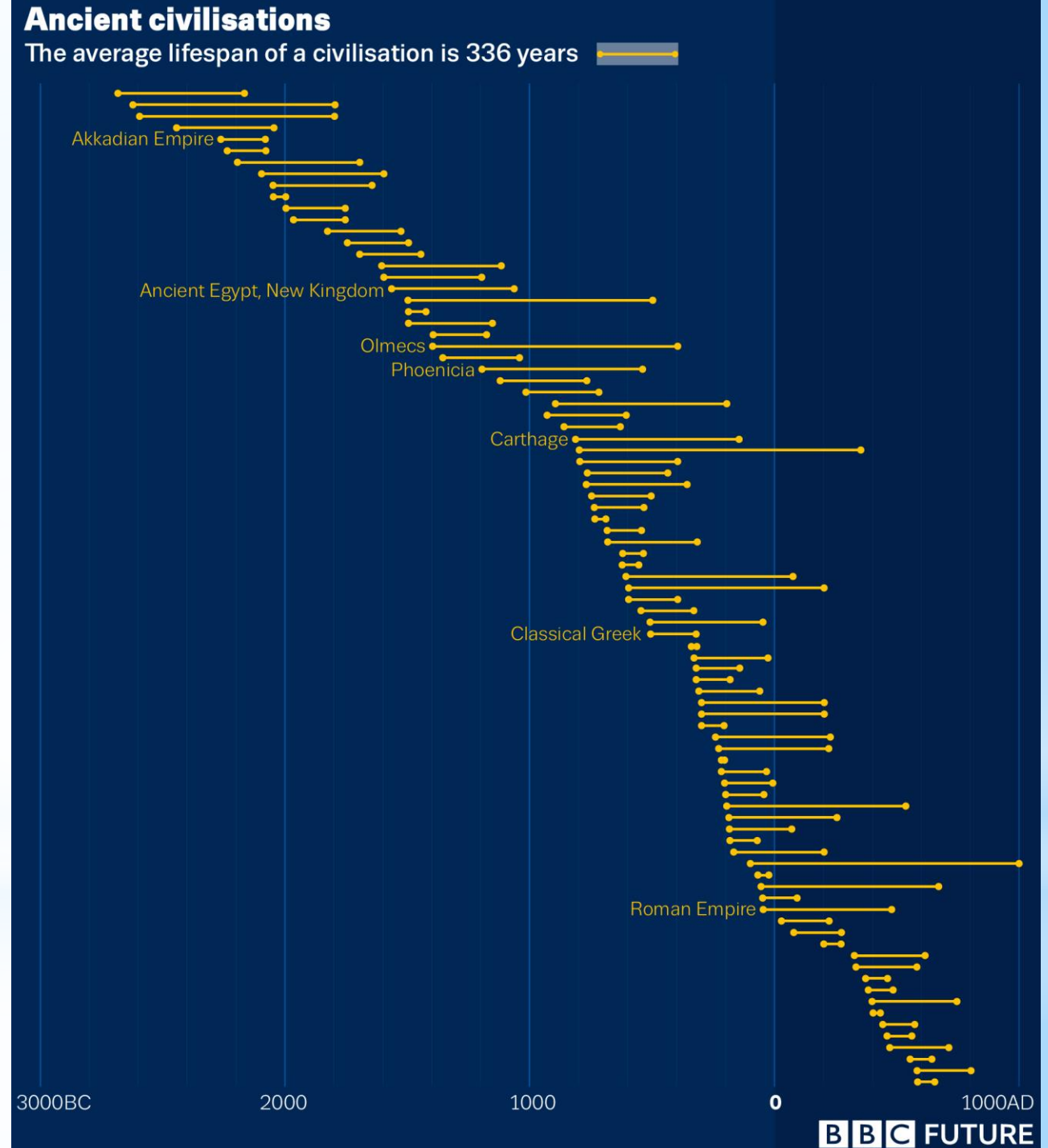
Material Footprint

Tonnes per person per year



2. Impact - Society collapse

- * **Past societies have collapsed** because their desire for growth increased the organisational complexity and corresponding resource demand beyond boundaries
([Tainter-diminishing marginal returns](#); [BBC Future](#))



Resource Crisis?



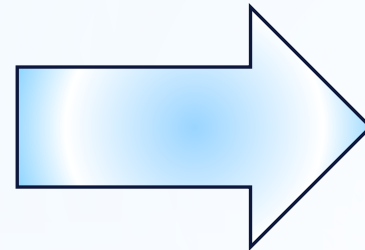
**3. Solution areas -
How to treat an addictive society**

3. Solution areas - The options

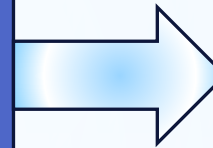
A. Business as usual

B. Managed transition

Increasing Supply
(primary & secondary)



Reserves



Reducing Demand

*Resources will become scarce anyway,
The only question that remains: Are we prepared?*

3. Solution areas - The options

Source: <https://www.upstreampodcast.org>



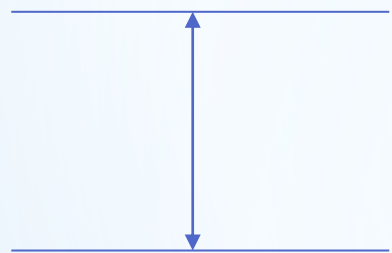
3A. Winner takes it all



3B. Our Common Future

3B. Global level: Resource budgets & Equal distribution

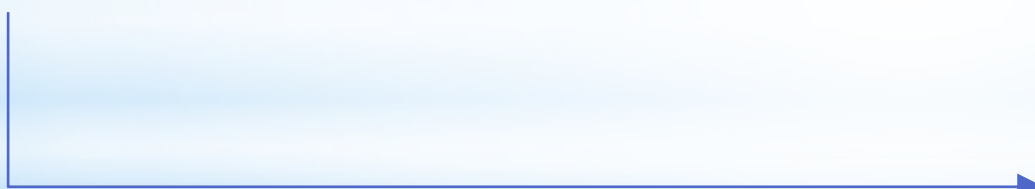
Existing production levels



Production Gap closure ->

- Reduction of global supply
- Redistribution of supply

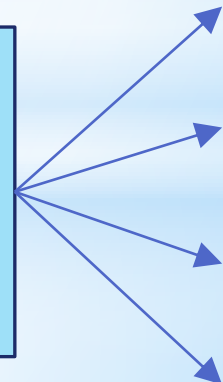
Sustainable production levels



INPUT



Governance
Global Resource
Distribution



National
Economies

As we've done many times before

3B. Solution areas @ National level

1. Strategic Resource budget allocation
2. Reduce individual & organisational consumption - Factor 10
(primary process, client side, supplier side)
3. Reorganise Economy & Society

Resource Crisis?

A group of seven people are shown in a chaotic, fiery environment. In the foreground, a woman with red hair points directly at the viewer. Behind her, a man in a suit looks on with a concerned expression. To the right, a man with glasses and a beard looks forward. In the background, a man in a suit and a woman in a red dress are visible. The scene is filled with smoke and fire, suggesting a crisis or emergency situation.

4. Why is it so hard to change?

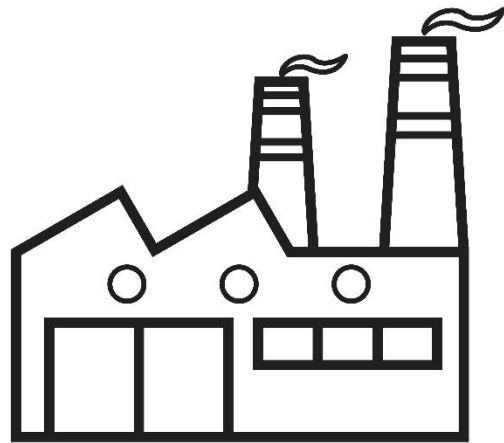
Key challenges - Caught in the system

Growth paradigm

Vested interests



Power & Financial structures



Businesses

Consumer

Greed & misunderstanding



Resource Crisis?



5. Conclusions & Next steps

5. Conclusion: Resources will get scarce

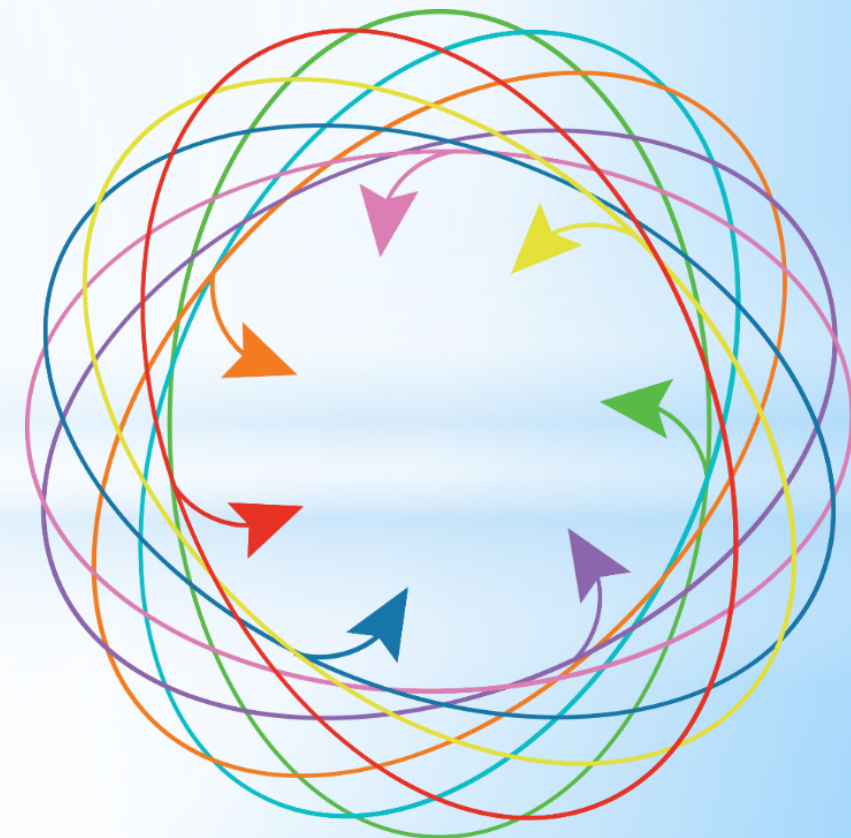
- * Due to population and welfare growth, demand for resources has exponentially grown during the last two centuries;
- * Resources will become scarce, either due to depletion and collateral damage **OR** due to unsustainable supply
- * We're running out of easy solutions, we need to change **OR** change will be forced upon us (collapse).

The key question: Are we prepared?



5. What can you do?

- * **Look DOWN!:** Take resource scarcity into account as part of your sustainability solutions (e.g. where are the risks for your organisation?)
- * Look for science facts, not science fiction
- * **Contribute to the Resource Wende programme** (science, ambassador, partner, friend)



*Sufficiency:
Focus on what
humans need
instead of greed.*

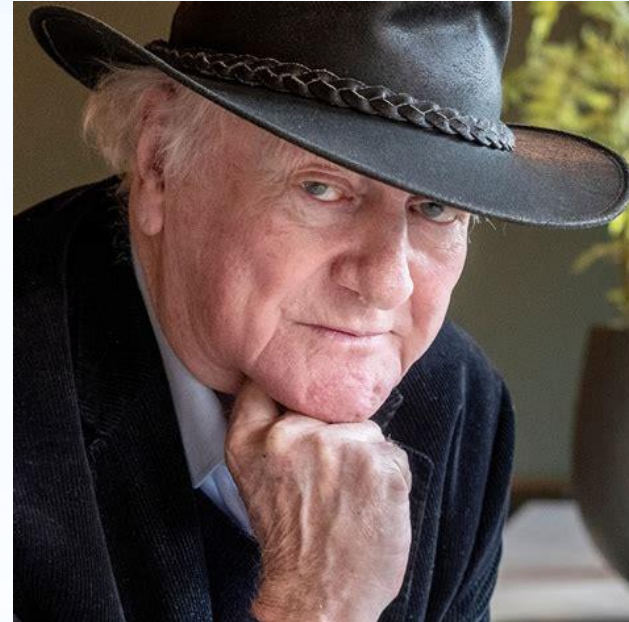
Resource Crisis?



5. Questions??

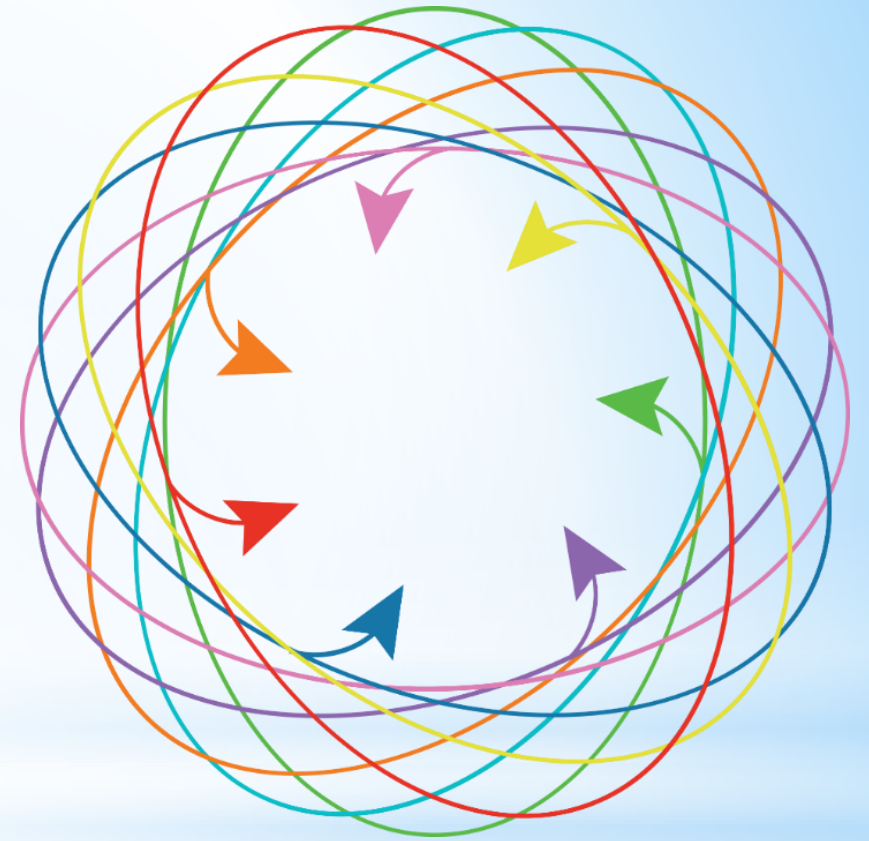
Thanks for your attention!

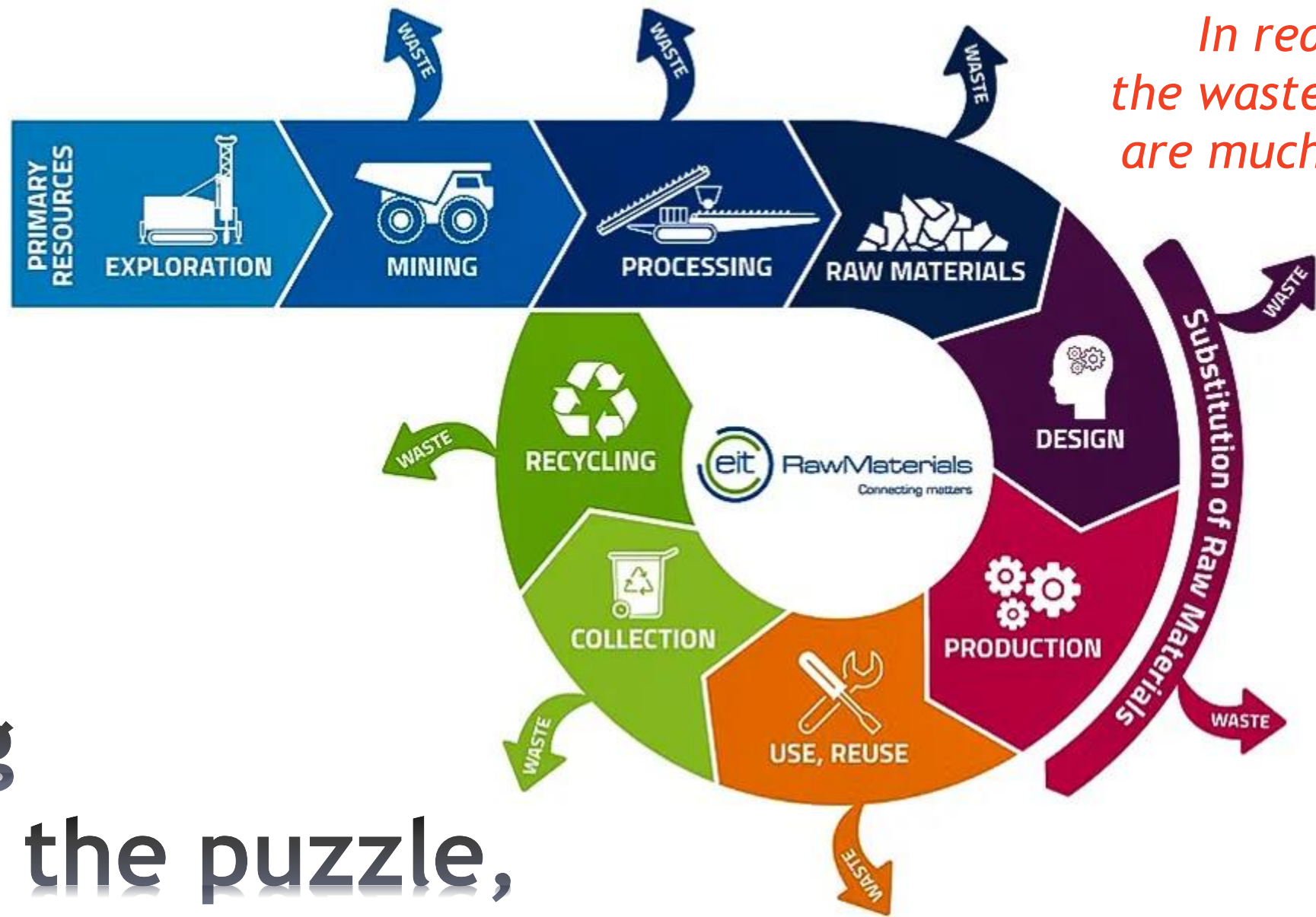
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Marcel.Vester@inisvitrin.nl

Backup slides





*In reality
the waste arrows
are much bigger*

**Recycling
is part of the puzzle,
but NOT the silver bullet**

Imbalance in Recycling

