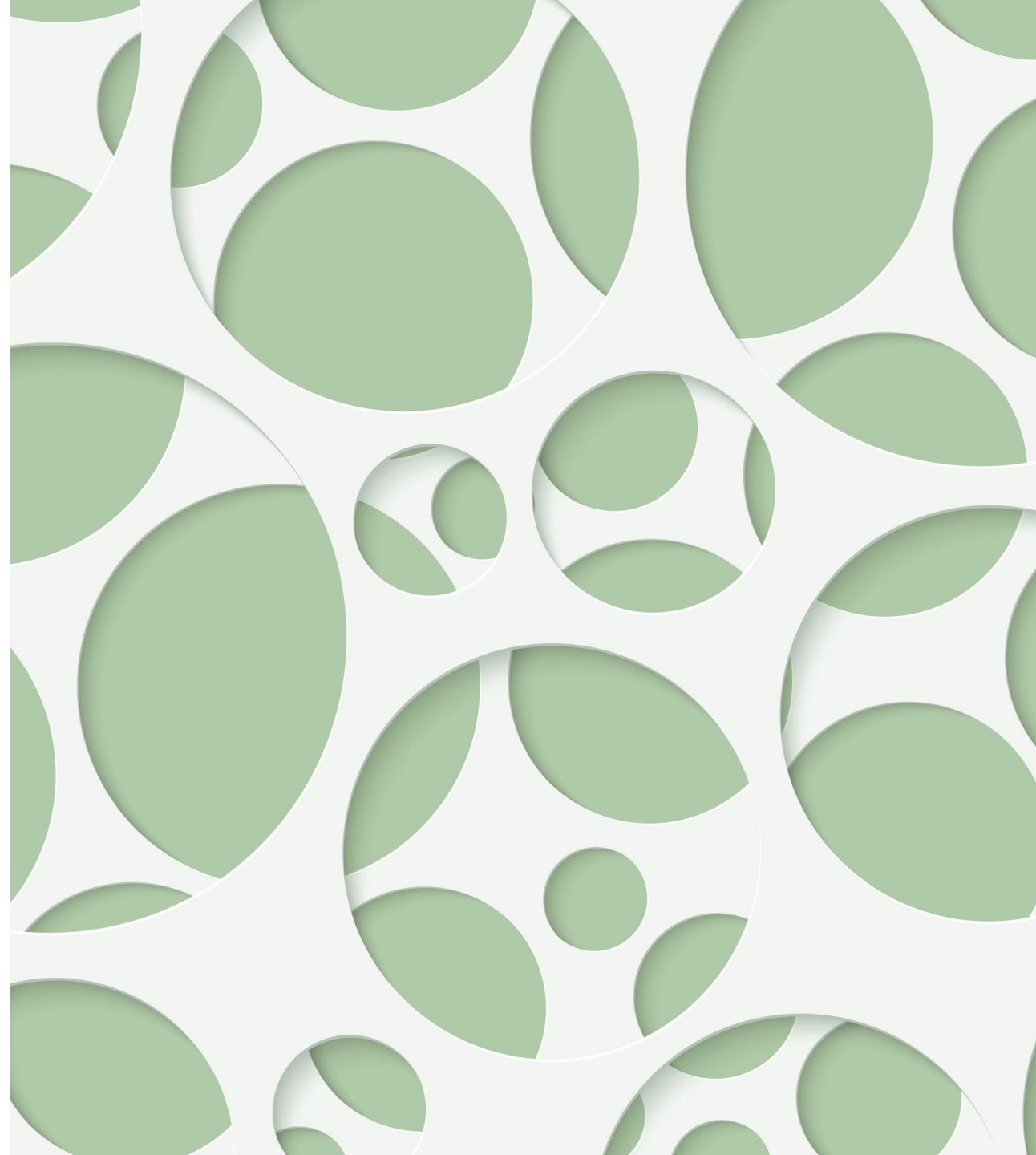
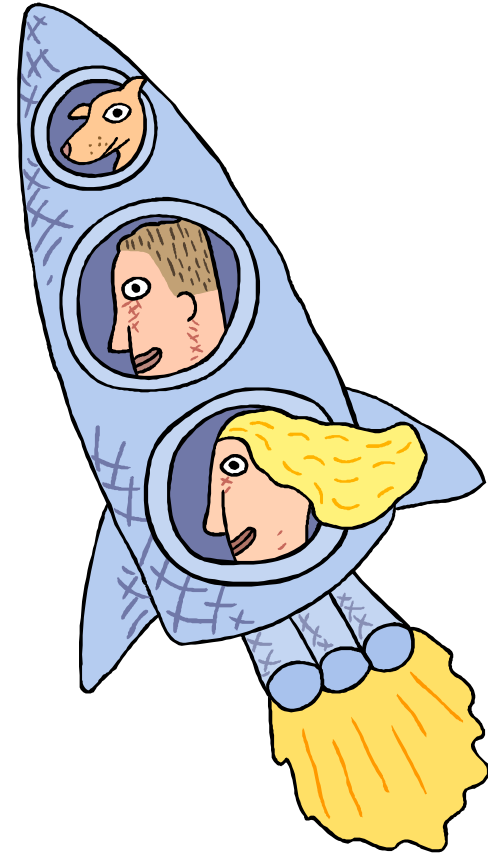


How much is enough?

Professor Andra Blumberga
Institute of Energy Systems and
Environment
Riga Technical university
21.03.2024.

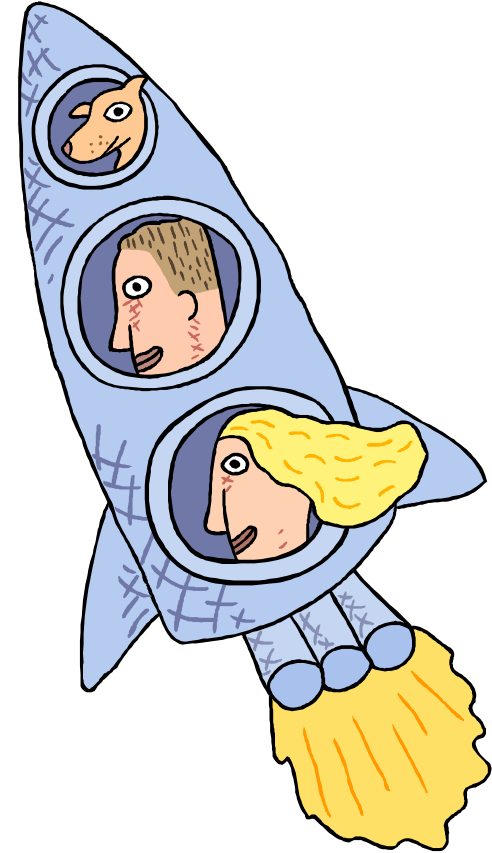


Spaceship



SPACESHIP

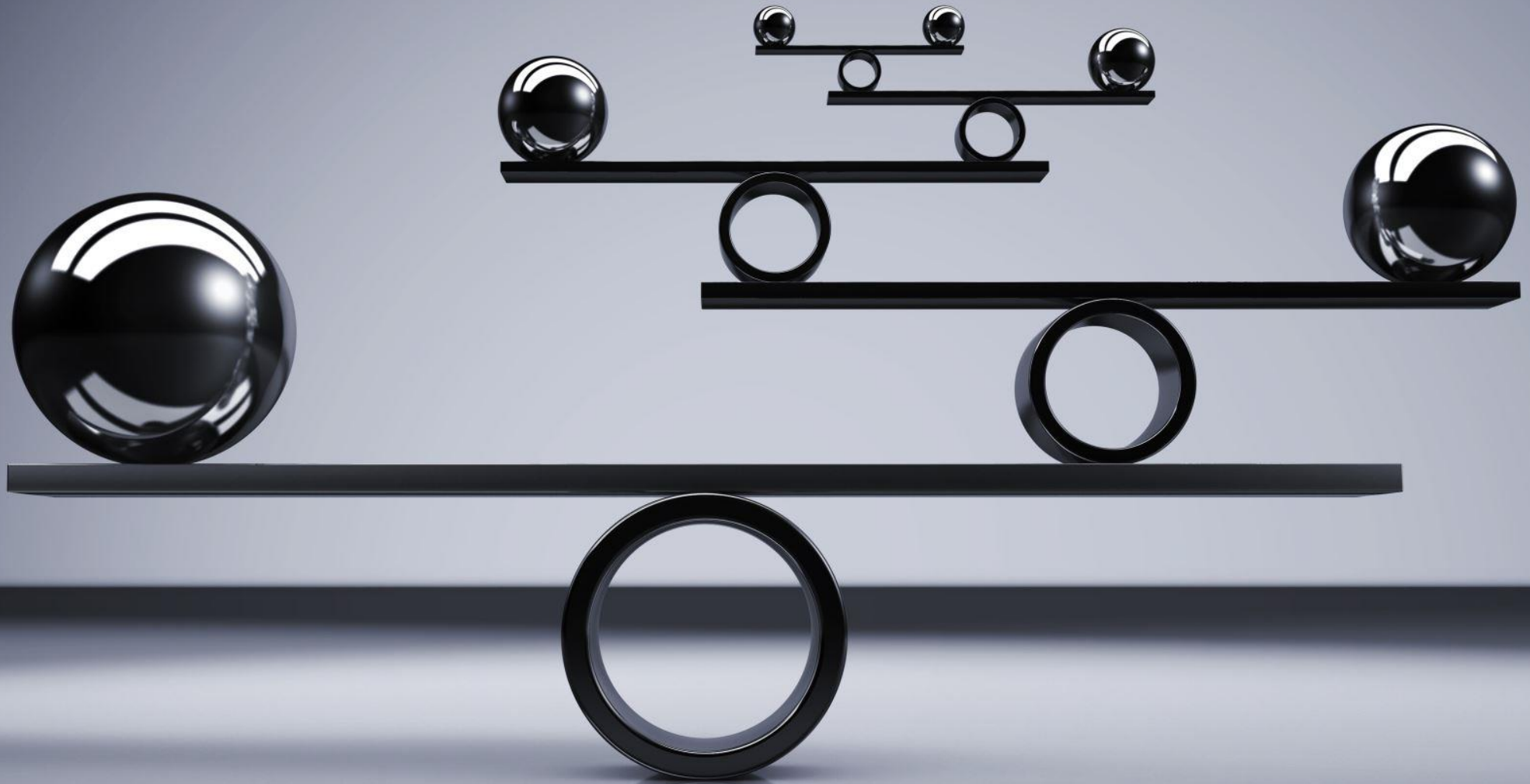
- Flight time 6000 years
- The spaceship can take 100 people
- Solar energy is available
- Waste cannot be disposed of from the spaceship
- WHAT WOULD YOU TAKE INTO A SPACESHIP?



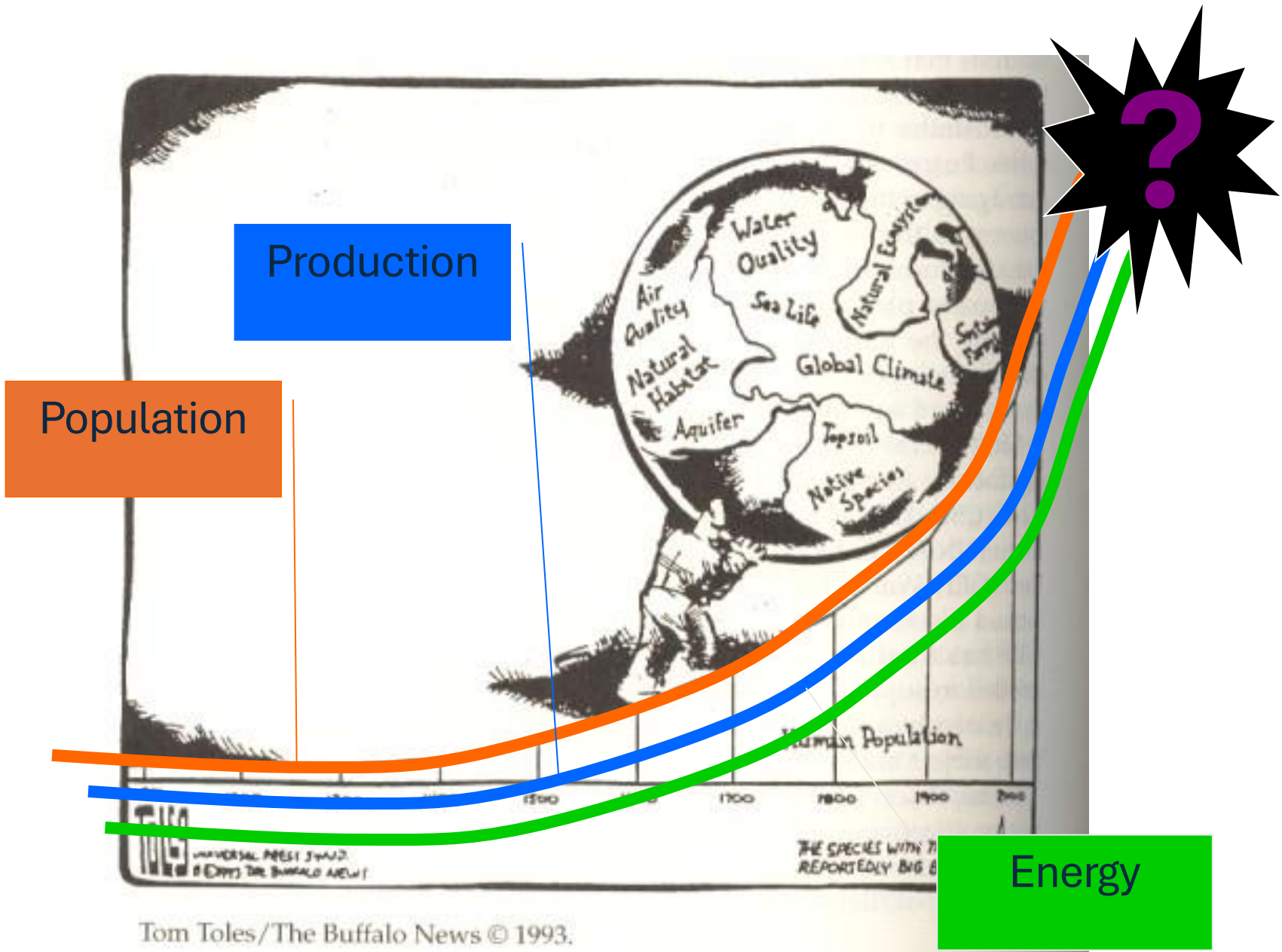


Anyone who thinks that you can have infinite growth in a finite environment is either a madman or an economist.

(Keneth Bouldings)



CAUSES



Production

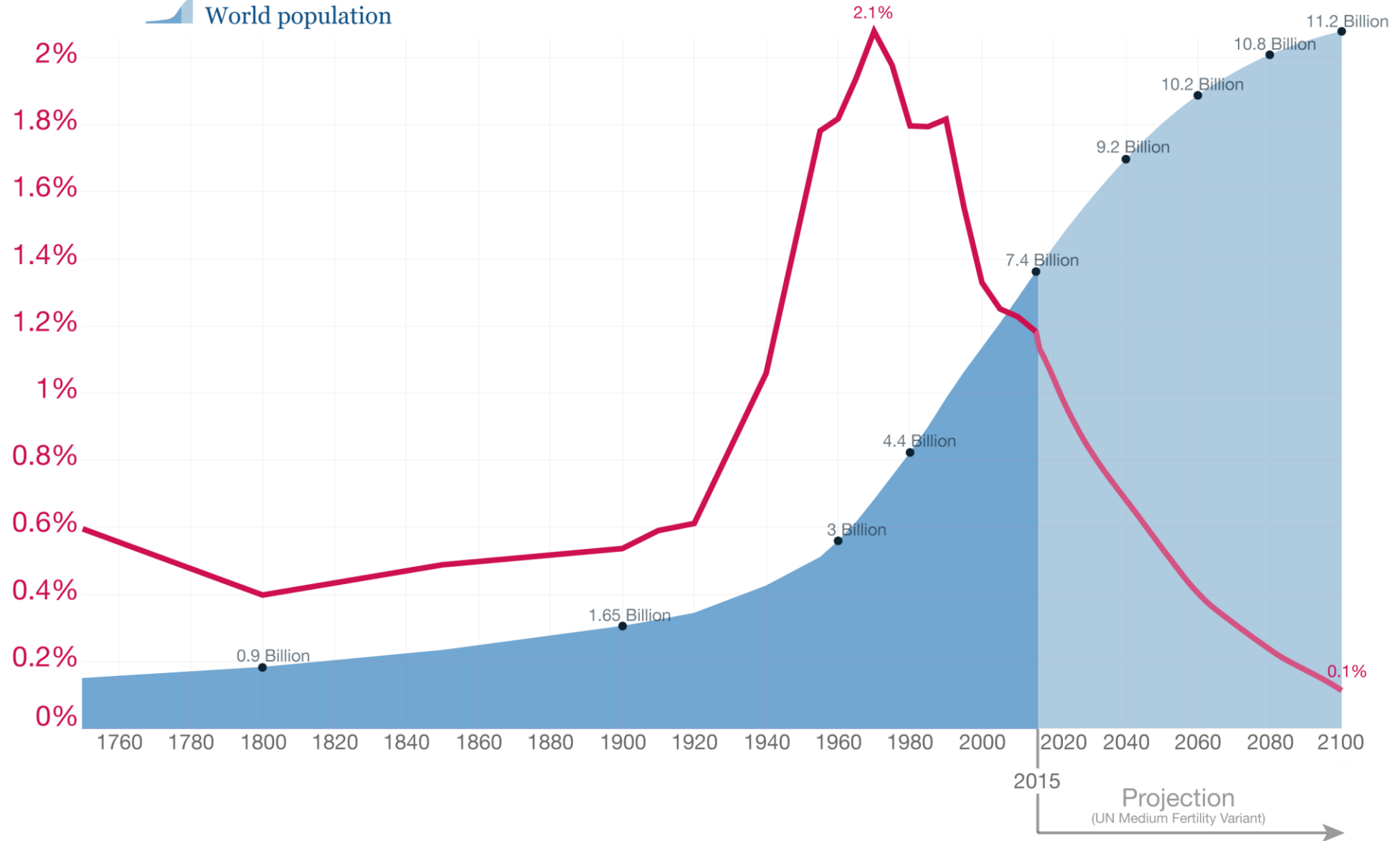
Population

Energy

Tom Toles/The Buffalo News © 1993.

World population growth, 1750-2100

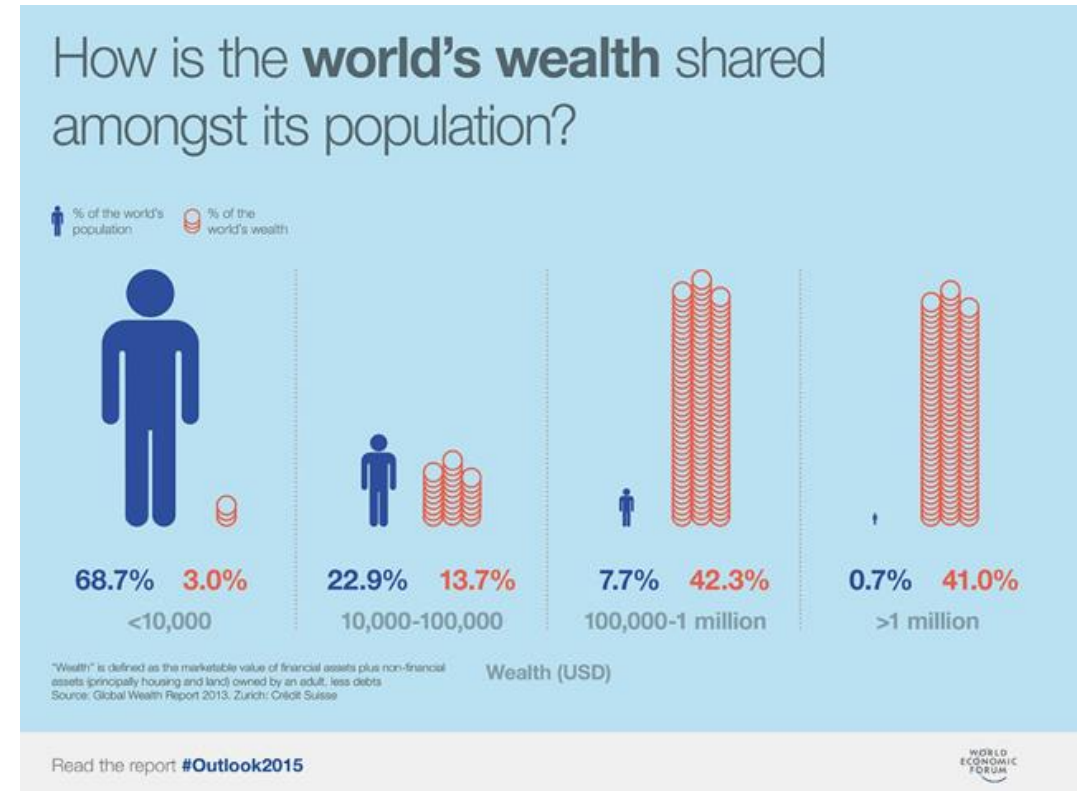
Annual growth rate of the world population
World population



Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant. The data visualization is taken from [OurWorldinData.org](https://ourworldindata.org). There you find the raw data and more visualizations on this topic.

The more people, the more poverty, the more people

- Perception – growth is necessary to reduce and eliminate poverty
- Reality:
 - the **current economic system** in the world
 - widens the gap between wealth and poverty
 - the elimination of poverty is impossible
 - because the privileged are given power and resources to receive even more privilege
- **The rich get richer, the poor get poorer**

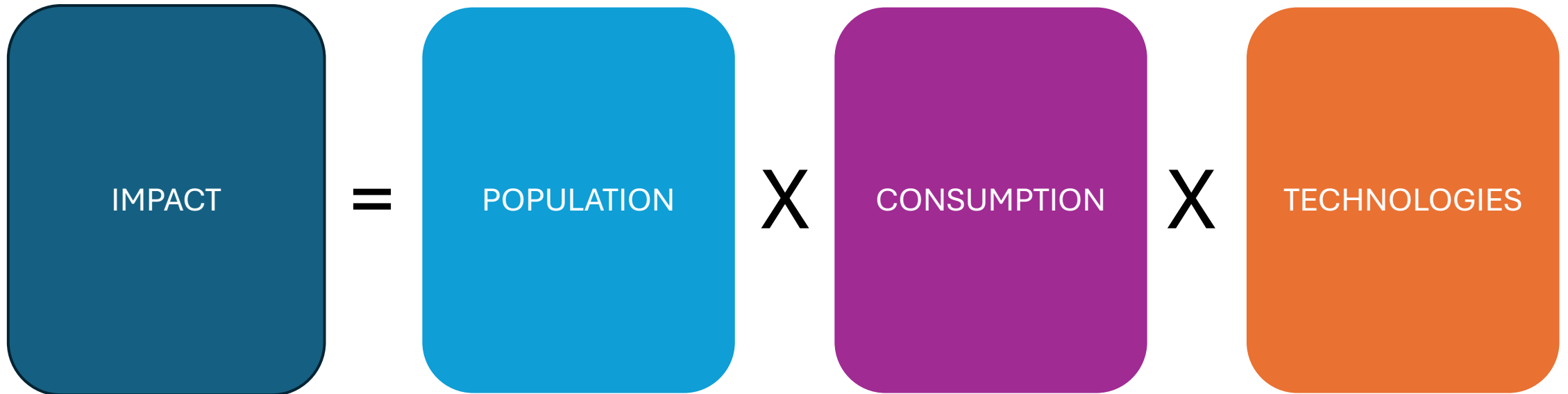


Consumerism

www.storyofstuff.com

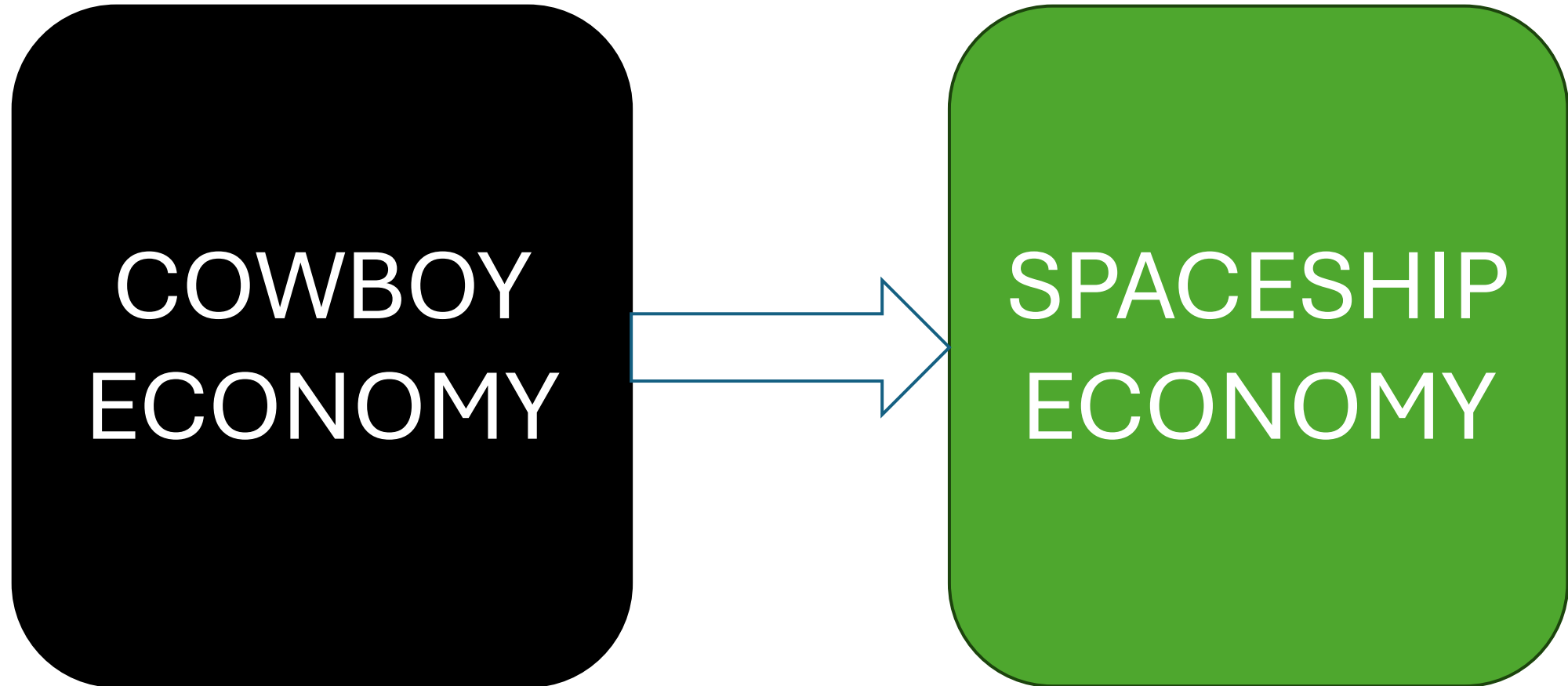
Movie «Story of Stuff» (2007)
and other movies

Human impact on environment



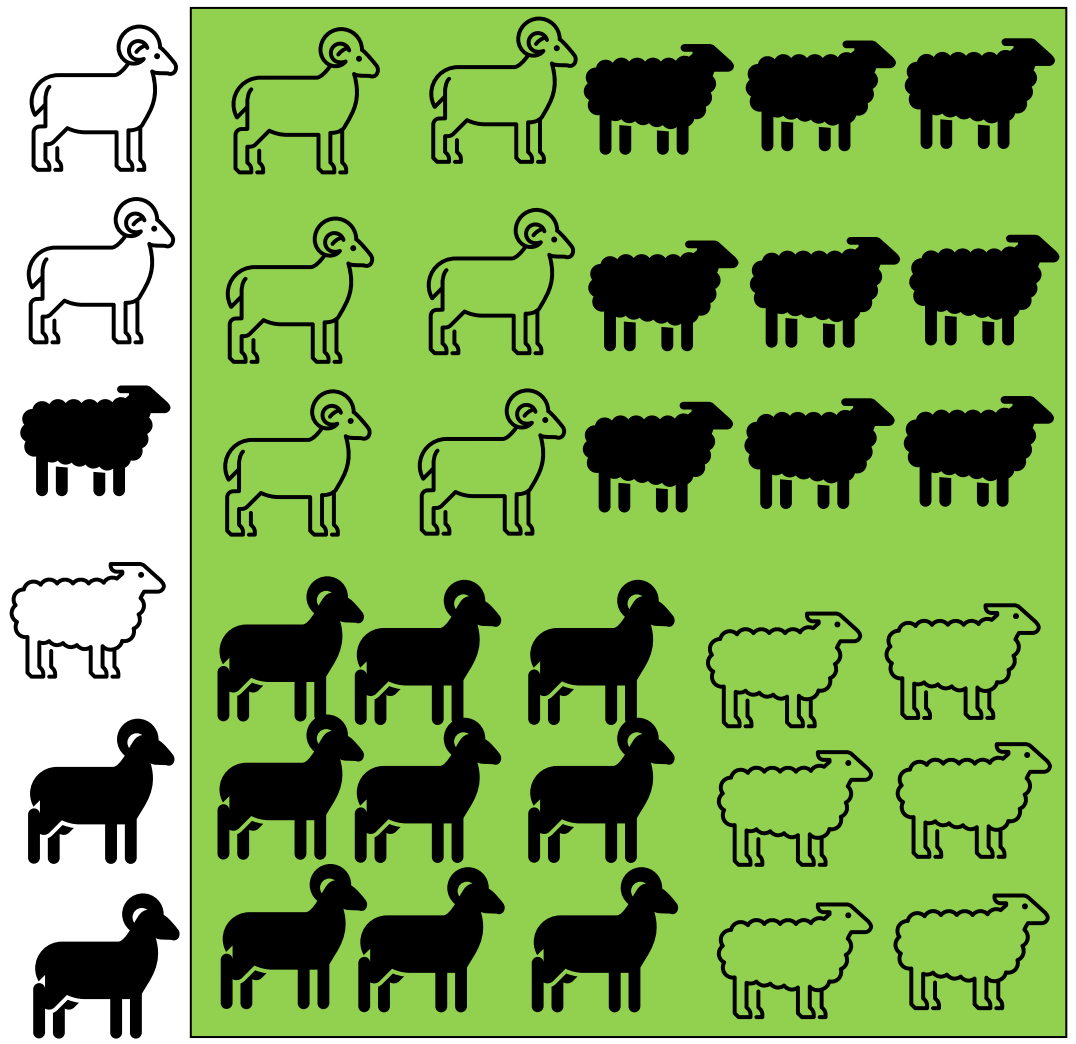
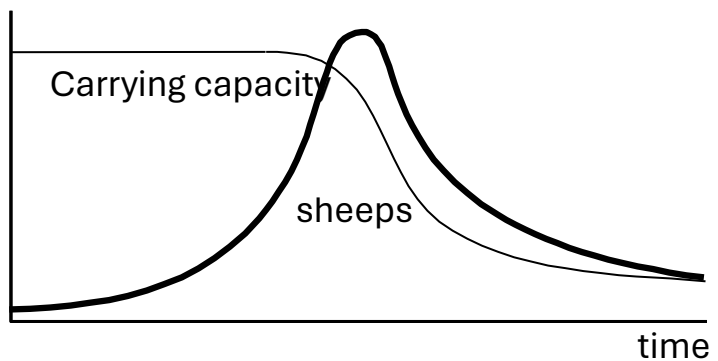
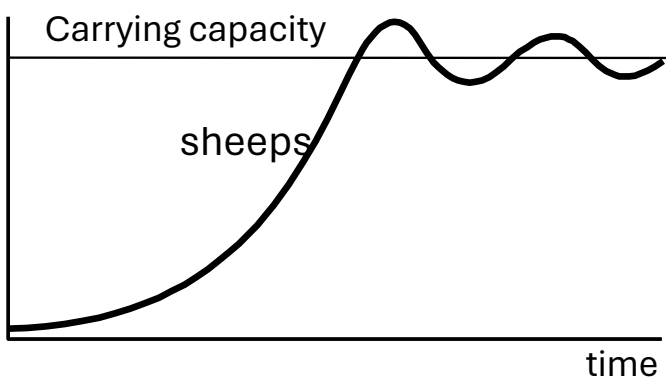
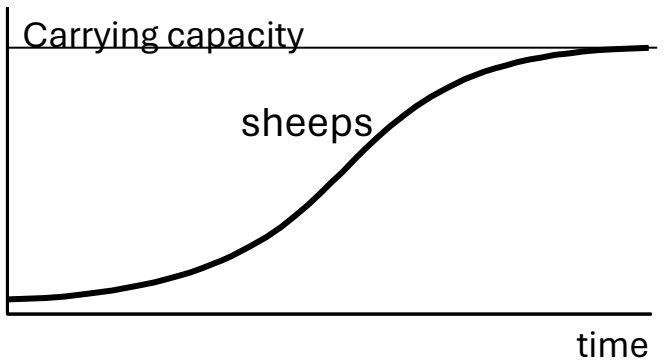
PERCEPTION OF REALITY

The Economics of the Coming Spaceship Earth (K.Boulding, 1966)



EFFECTS: ENVIRONMENTAL PROBLEMS





TYPES OF ENVIRONMENTAL PROBLEMS

COMMON RESOURCES – natural resources and essential services that ensure human life, which belong not to one country but to all of humanity (air, oceans, ozone layer, etc.)

SHARED NATURAL RESOURCES – physical or biological systems under the jurisdiction of two or more countries (oil fields, animal migration, rivers, etc.)

TRANSBOUNDARY DAMAGE – actions that take place in the territory of one country's jurisdiction, but the consequences of which affect the well-being of those under the jurisdiction of another country (Chernobyl NPP accident, Iceland volcano, Fukushima NPP, etc.)

LOCAL DAMAGE – actions that take place within the jurisdiction of one state/county/district

RELATED ISSUES – solving environmental issues has unexpected consequences for other regimes and vice versa (solving environmental issues and economic development)

World is on 'highway to climate hell', UN chief warns at Cop27 summit

António Guterres tells leaders 'global climate fight will be won or lost in this crucial decade - on our watch'

● [Cop27 live - latest news updates](#)



■◀ 'We are in the fight of our lives,' says UN chief at Cop27 climate summit - video

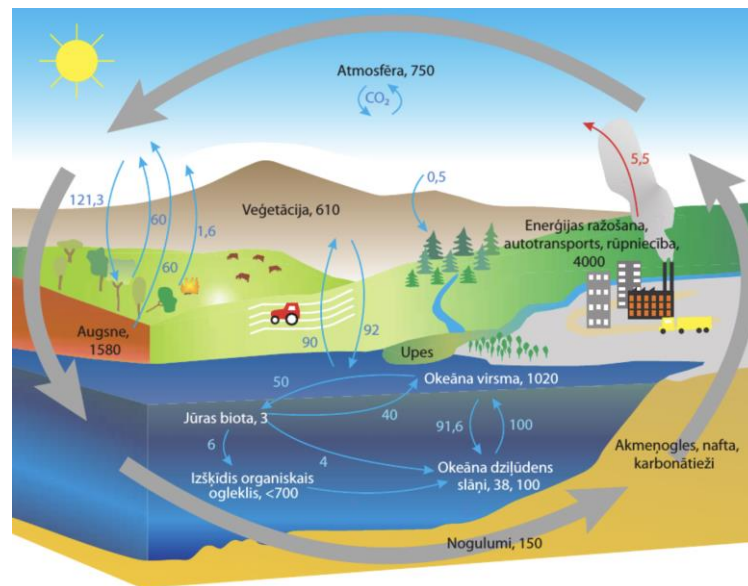
Humanity is on a “highway to climate hell”, the UN secretary general has warned, saying the fight for a liveable planet will be won or lost in this decade.

António Guterres told world leaders at the opening of the Cop27 UN climate summit in [Egypt](#) on Monday: “We are in the fight of our lives and we are losing ... And our planet is fast approaching tipping points that will make climate chaos irreversible.

“We are on a highway to climate hell with our foot on the accelerator.”

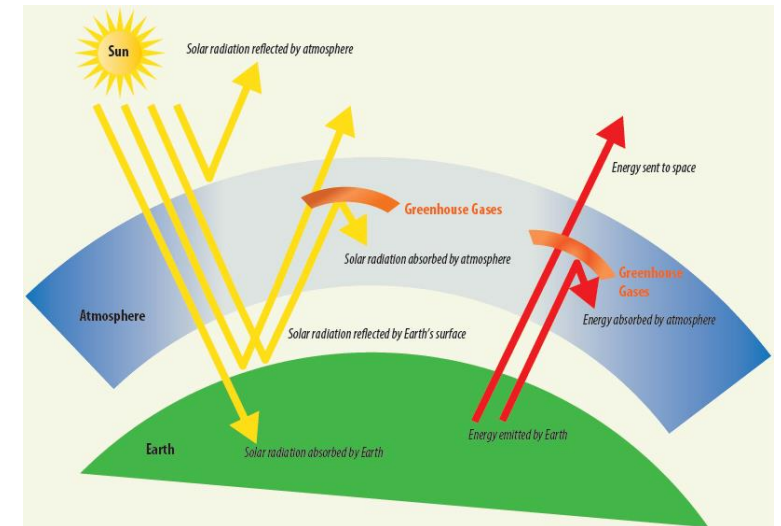
GLOBAL CLIMATE CHANGE

Carbon cycle



<https://edu.lu.lv/mod/book/tool/print/index.php?id=39523>

Greenhouse effect



<https://op.europa.eu/webpub/eca/lr-energy-and-climate/en/>

EXAMPLE:ARAL SEA





July - September, 1989



October 5, 2008

http://en.wikipedia.org/wiki/File:Aral_Sea_1989-2008.jpg





EYE VIEW
rest in question

*ants to clear 100 of the remaining 200 hectares of the forest to expand
of brown coal, which it says is necessary to meet its short-term energy,
DPA*



Hambach forest

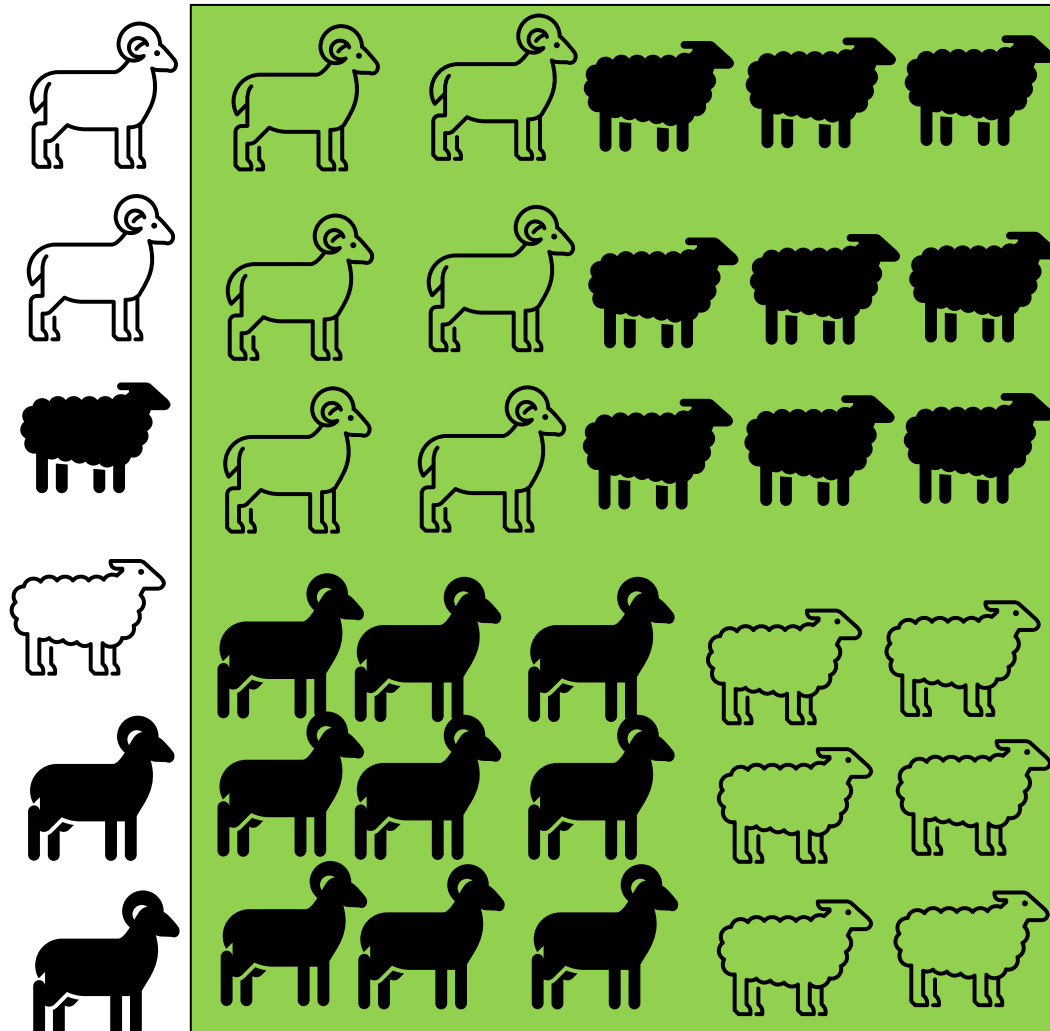
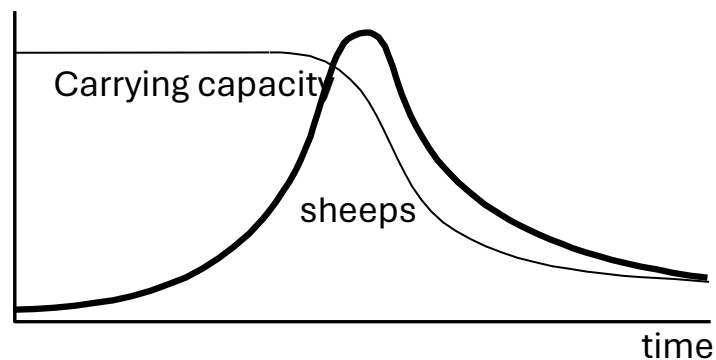
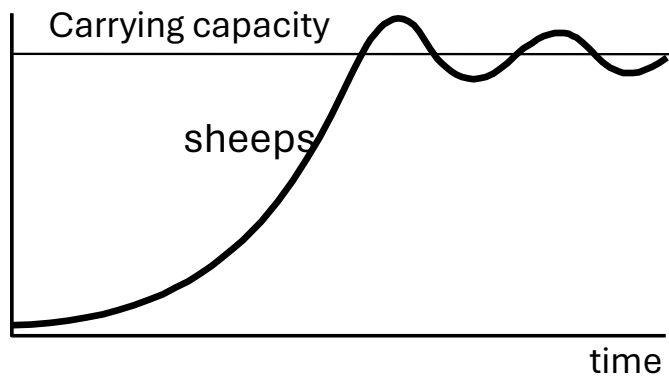
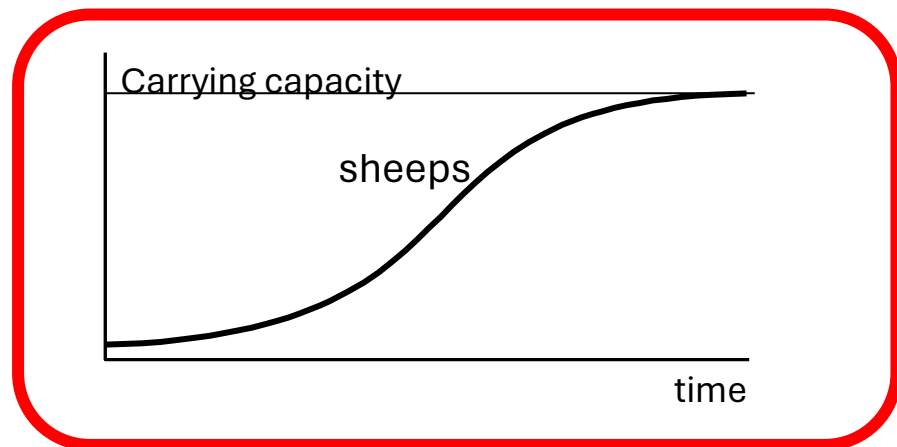
Hambachforest.org

<https://www.dw.com/en/police-clear-protesters-from-hambach-forest/a-45357153>



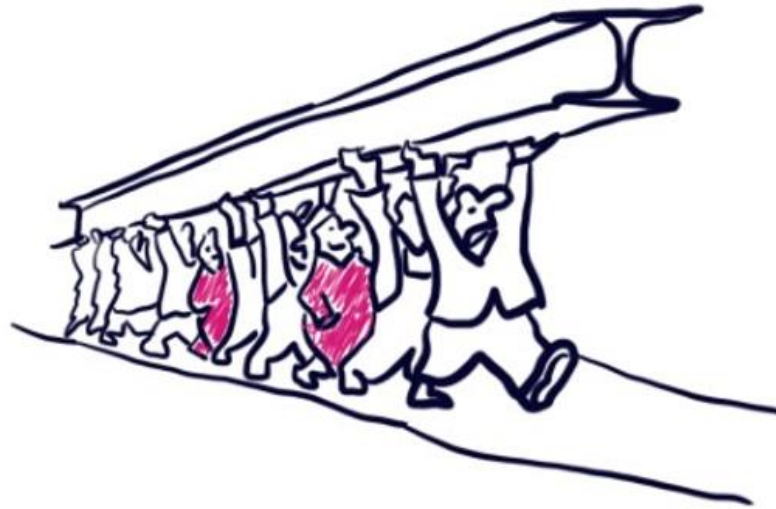
How to solve
environmental
problems?

Collective irrationality: the tragedy of commons



The problem of collective action arises when an individual's contribution to the solution of a problem is **only a small part of a larger whole.**

Paradox - cooperation is least possible when each of the participants can suffer the greatest losses



If there is a thing that belongs to society and it is possible to preserve it only through collective action, i.e. the cooperation of many individuals,

there will always be individuals who will have the desire to be a "**free rider**", i.e. to use things belonging to society without paying for them

Prisoner's dilemma

- Part of the Game Theory
- How do individuals act in a situation where it is not known how others will act
- Explains why individuals cannot agree even when the best solution for all is agreement or cooperation



PRISONER'S DILEMMA

Strategy of prisoner A \ Strategy of prisoner B	CONFESS	DO NOT CONFESS
CONFESS	2 YEARS, 2 YEARS	FREE, 5 YEARS
DO NOT CONFESS	5 YEARS, FREE	6 MONTHS, 6 MONTHS

Nash equilibrium point – the most likely outcome

The most socially optimal solution - often impossible, because **people do not rely on the promises and actions of others** (this is at the root of environmental problems)

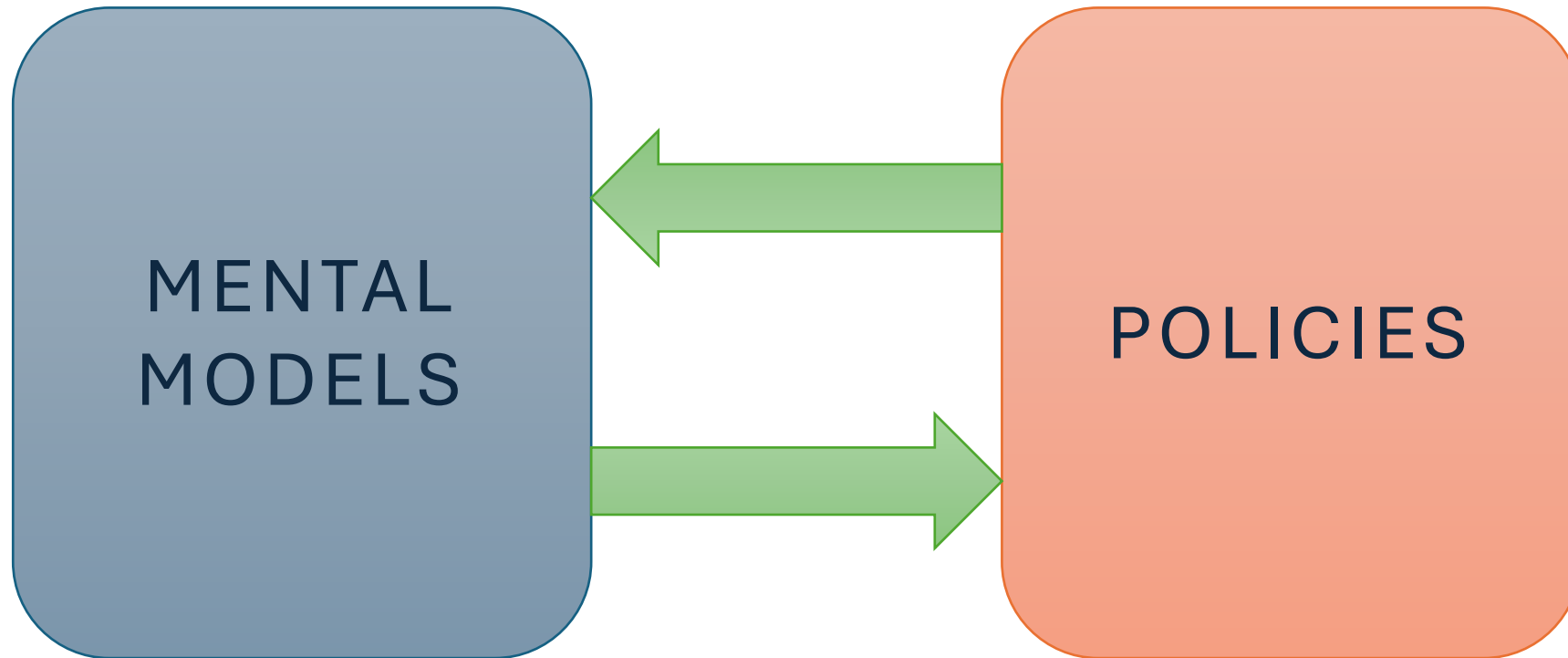
SOLUTIONS TO PROMOTE COOPERATION

Legislation,
regulations and
incentives created by
the government

Using morality, ethics
and religion to change
people's attitudes

Formation of informal
(non-governmental)
organizations in small
groups or communes

Education programs,
giving people
information and
changing attitudes



- In democratic societies – expressing the values and beliefs, the vision of the future and the quality of life of the voters (i.e., the majority of society)
- Policies are seen as positive tools, and laws punish those who act against policies.



Women Divided Men Baby Kids H&M HOME Sale Sustainability

Search products

Let's
innovate

Let's
clean up

Let's
change
Change is at our core. And now it's time to change fashion.

Let's
The short cut to sustainable choices? Shop Conscious.
→
be conscious

Let's
be for all

Let's
With us, it's super simple to find out where your clothes were made.
→
be transparent

Let's
be fair

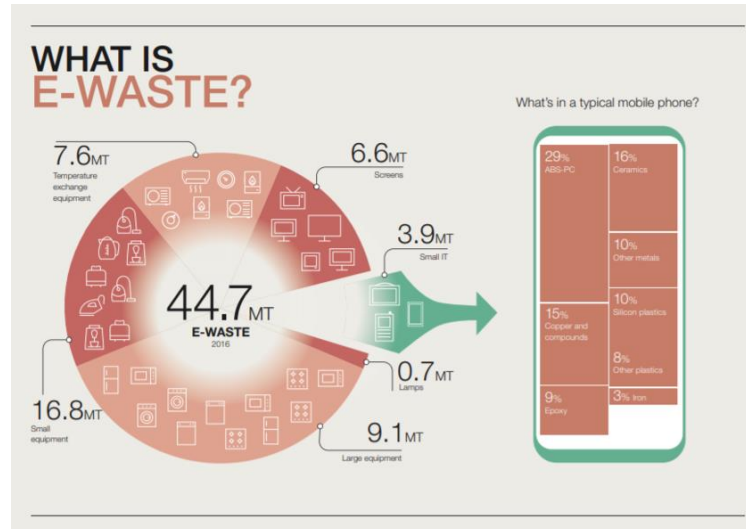
Let's
close the loop

Let's
Wash less, repair, recycle & repeat.
→
take care

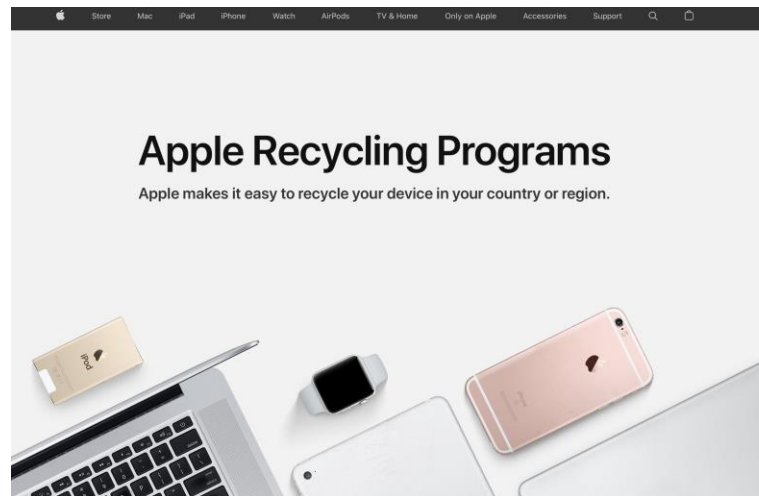
https://www2.hm.com/en_us/hm-sustainability/lets-change.html

CHANGES IN TEXTILE INDUSTRY

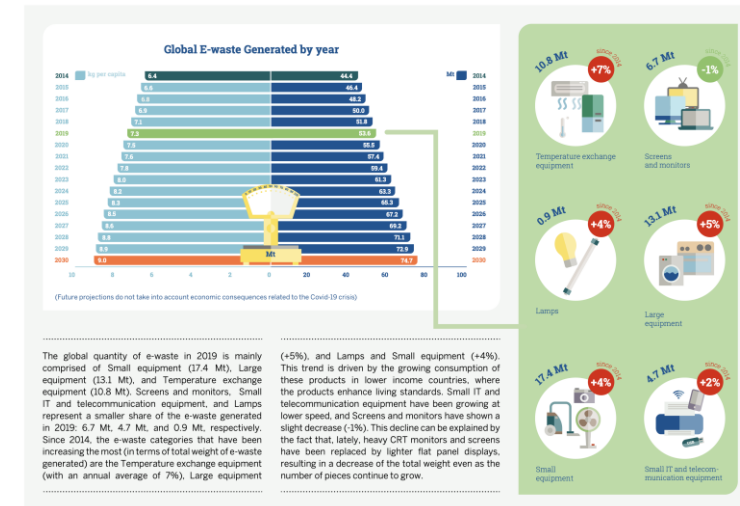
CHANGES IN ELECTRONICS INDUSTRY



<https://www.weforum.org/agenda/2021/10/2021-years-e-waste-outweigh-great-wall-of-china/>



<https://www.apple.com/recycling/nationalservices/>



https://ewastemonitor.info/wp-content/uploads/2020/11/GEM_2020_def_july

MAJOR OBSTACLES TO
SUSTAINABLE
ENVIRONMENTAL
POLICIES:

Short-term policies (elections every
4 years)

National policies vs global
environmental problems

Stakeholder inequality and «a glass
wall» between parties

Capitalism and the maximisation of
profits

Democracy and time needed for the
decision making

Subverting Climate Science in the Classroom

Oil and gas representatives influence the standards for courses and textbooks, from kindergarten to 12th grade

By Katie Worth

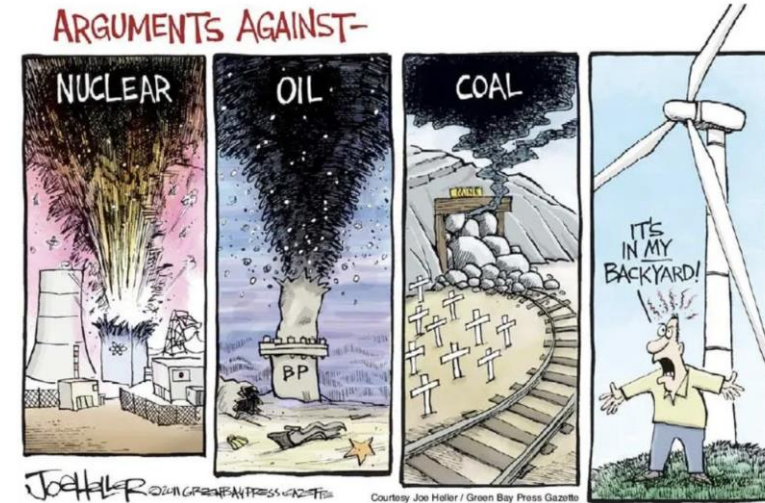


<https://www.scientificamerican.com/article/subverting-climate-science-in-the-classroom/>

NIMBY- not in my backyard

BANANA – build absolutely
nothing anywhere near
anything

CAVE - citizens against
virtually everything



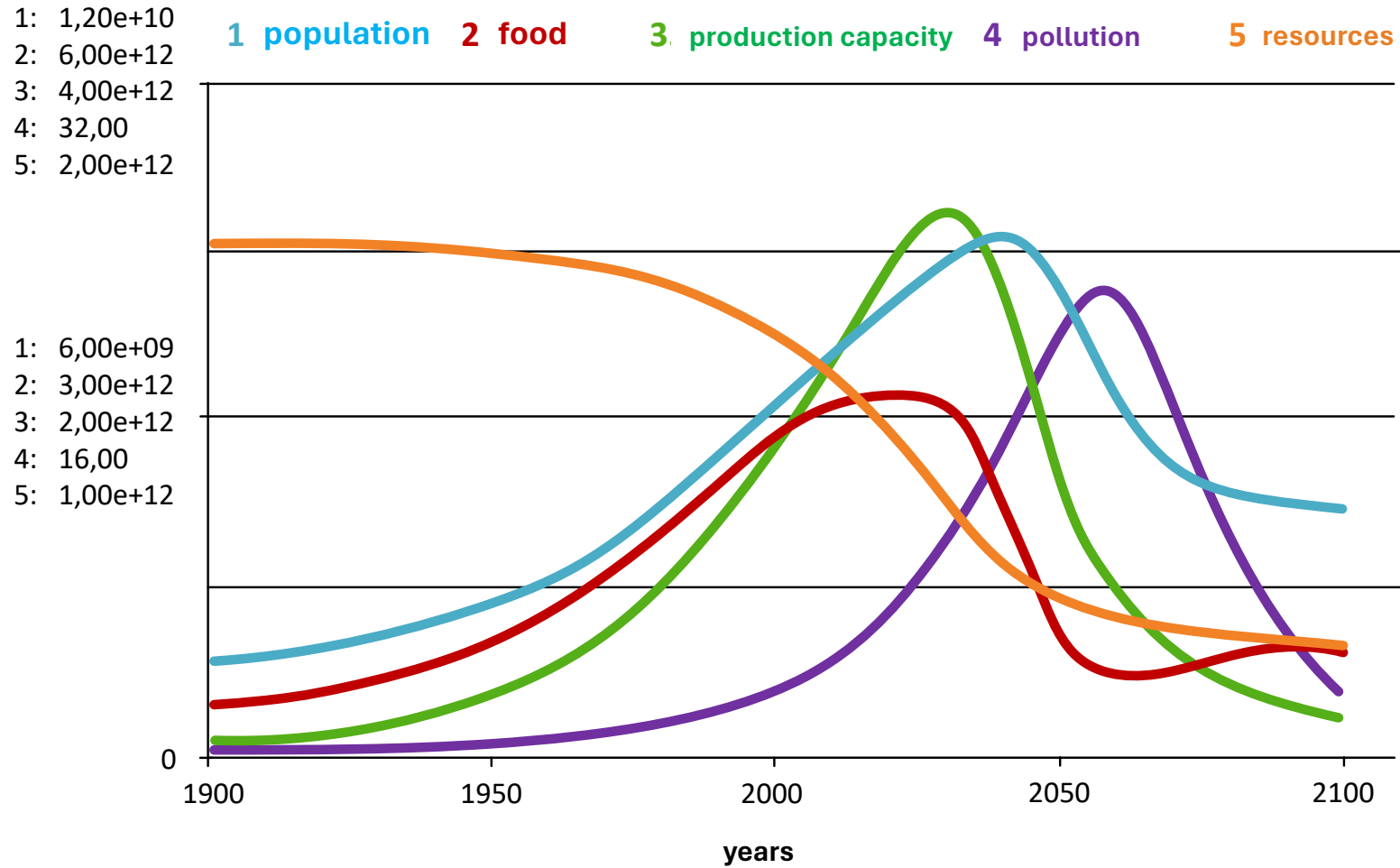
<https://mrmondialisation.org/pas-dans-mon-jardin/>



<https://politicaldictionary.com/words/nimby-2/>

Limits to Growth: 1972

resource crisis



EARTH FOR ALL: A SURVIVAL GUIDE FOR HUMANITY (2022)

5 TURNAROUNDS NEEDED TO INCREASE THE WELLBEING OF MAJORITY:

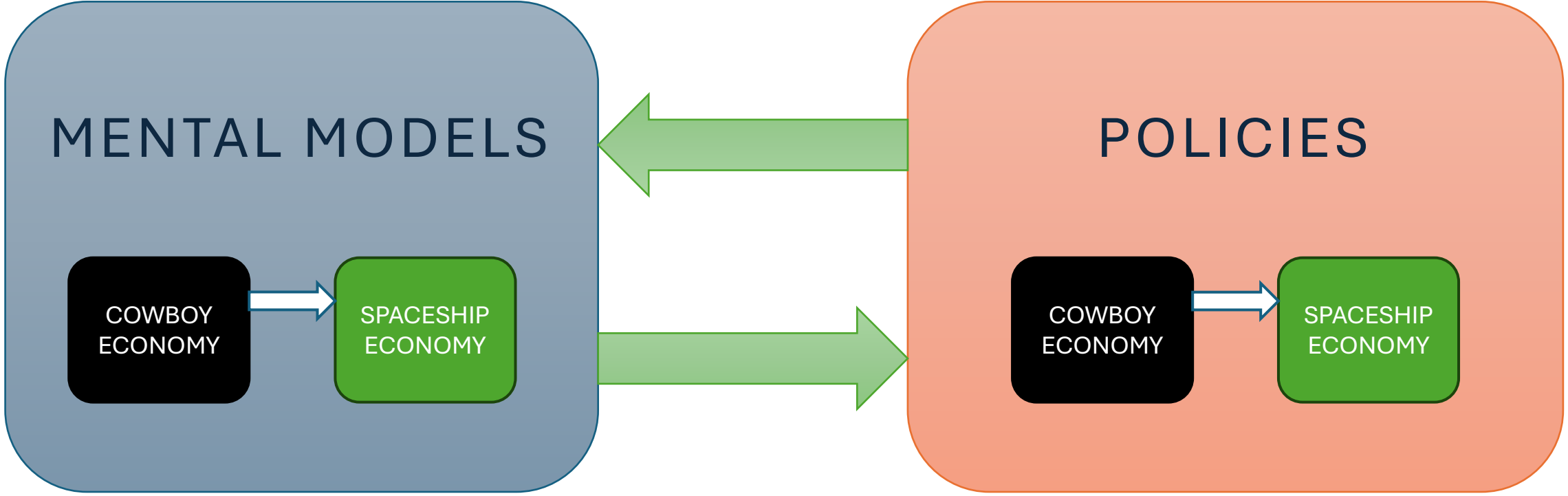
Eliminate global poverty: use new growth models: more plan, less market

Stop climate change: replace fossils with wind and sun, efficiency, CCS

Halt biodiversity decline: introduce regenerative agriculture to protect remaining forests

Stop population growth (=reduce consumption pressure): more education, health, contraception and opportunity to woman

Reduce inequality: make the rich pay for higher wellbeing for the working majority





Anyone who thinks that you can have infinite growth in a finite environment is either a madman or an economist.

(Keneth Bouldings)