

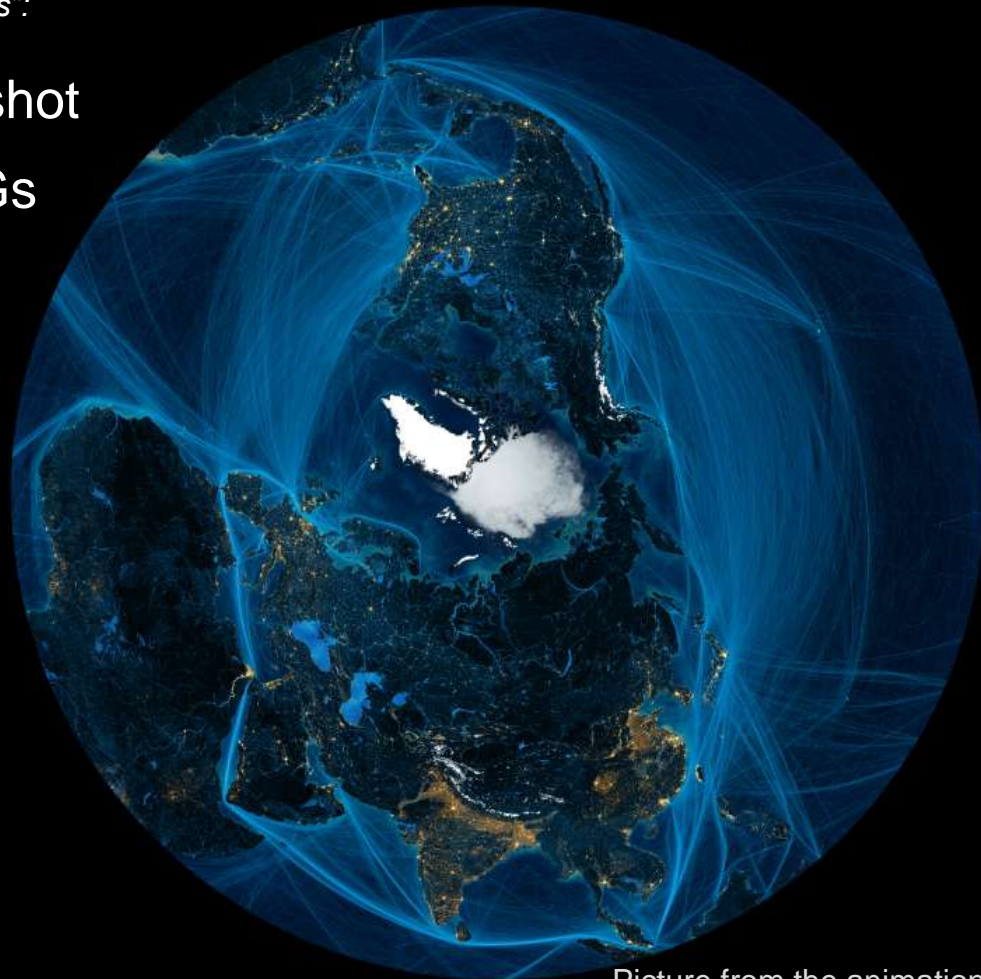
Aiming for multiple goals with one shot - the Paris Agreement and the SDGs

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Director of the Global Hub in Paris

futureearth
research for global sustainability



Picture from the animation:
Welcome to the Anthropocene

futureearth

research for global sustainability

*Accelerating transformations to
global sustainability through
research and innovation*



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UNIVERSITY



WMO



Paris Agreement – a new North Star for research





SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY

2 ZERO HUNGER

3 GOOD HEALTH

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

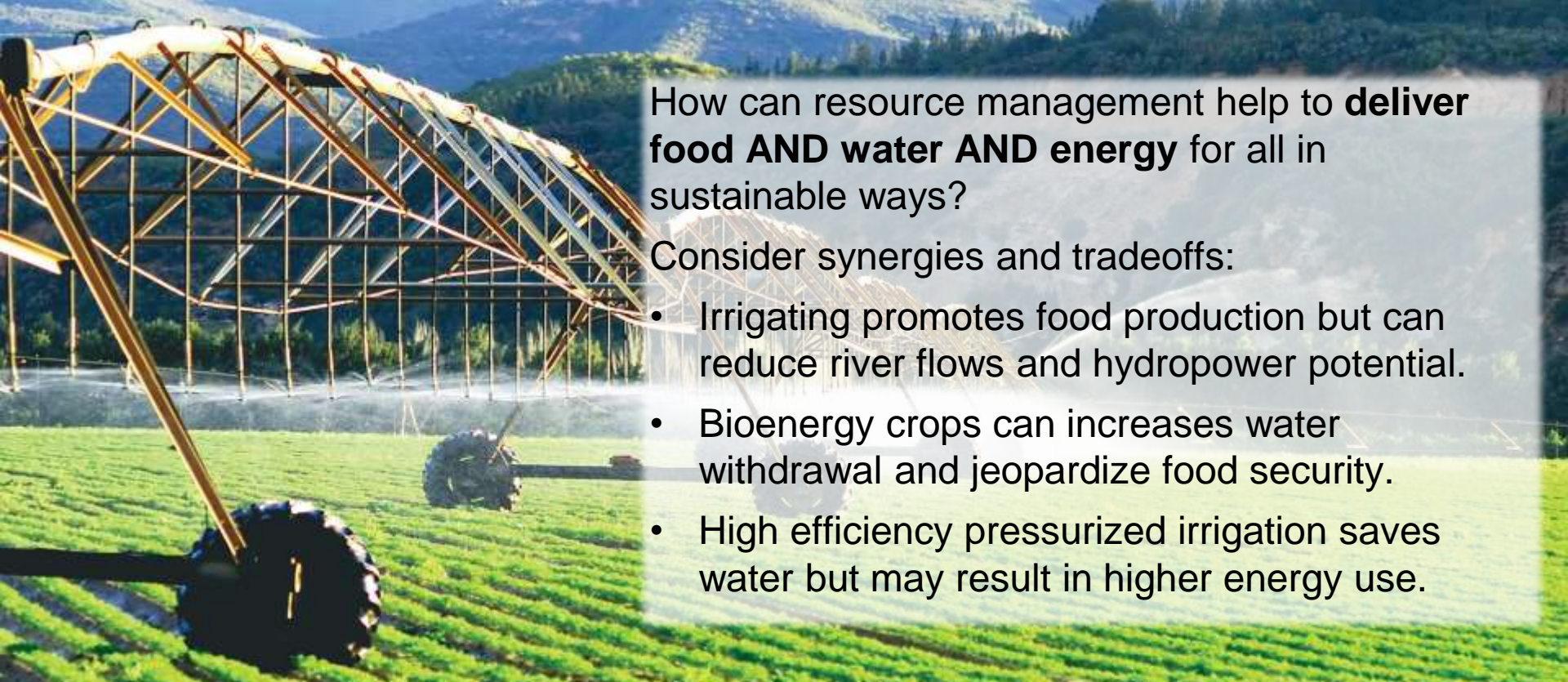
16 PEACE AND JUSTICE

17 PARTNERSHIPS FOR THE GOALS


SUSTAINABLE DEVELOPMENT GOALS



Knowledge-Action Network: Water-Energy-Food Nexus

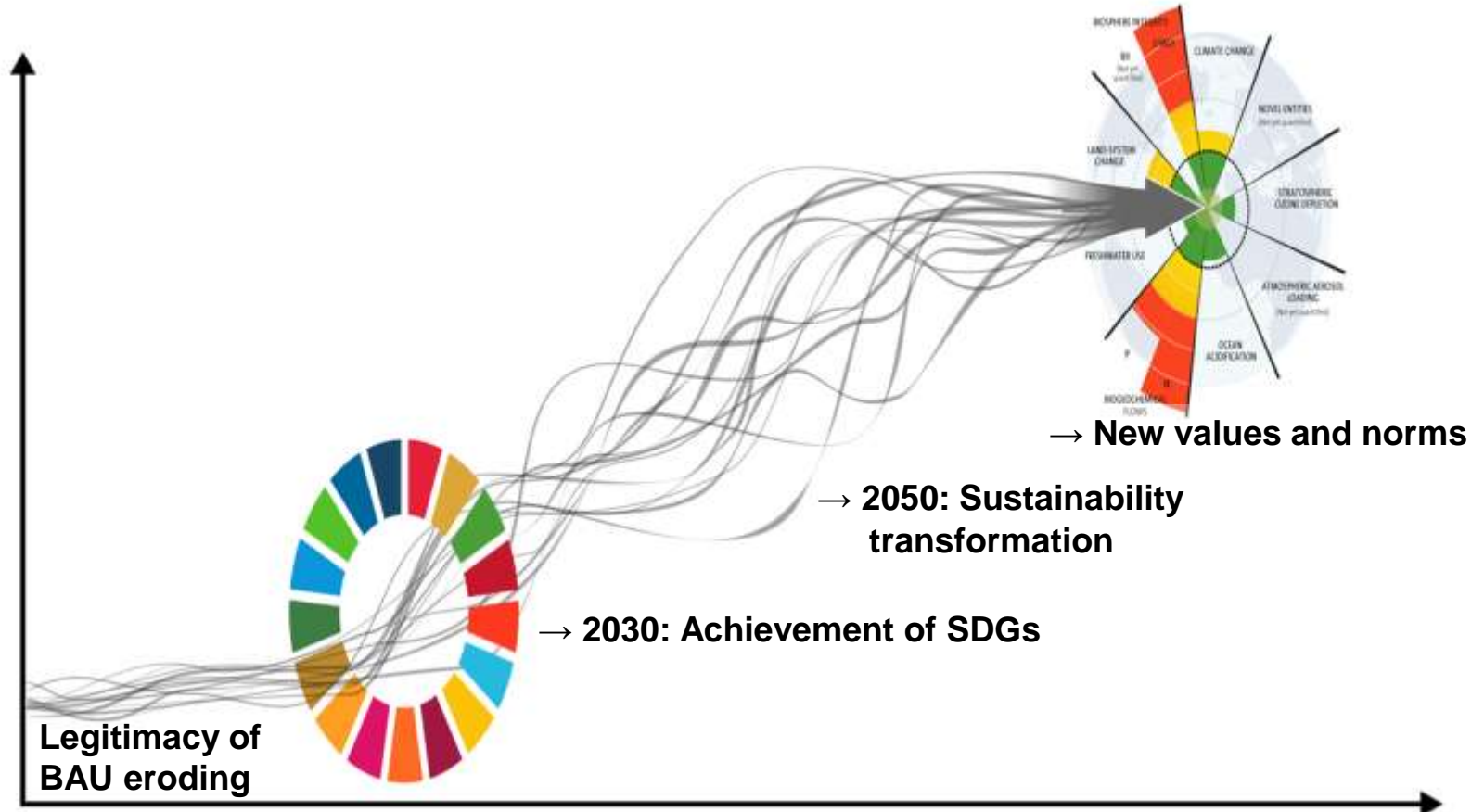


How can resource management help to **deliver food AND water AND energy** for all in sustainable ways?

Consider synergies and tradeoffs:

- Irrigating promotes food production but can reduce river flows and hydropower potential.
- Bioenergy crops can increase water withdrawal and jeopardize food security.
- High efficiency pressurized irrigation saves water but may result in higher energy use.

Reducing SDGs-complexity through integrated pathways modelling: The World in 2050 approach



Reducing SDGs-complexity by qualitative scoring: The ICSU-Guide approach



A GUIDE TO
SDG INTERACTIONS:
FROM SCIENCE
TO IMPLEMENTATION



GOALS SCORING

INDIVISIBLE

The strongest form of positive interaction in which one objective is inextricably linked to the achievement of another. Reduction of air pollution (3.6) is indivisible from improved health and reducing non-communicable diseases (3.6).

+3

REINFORCING

One objective directly enables conditions that lead to the achievement of another objective. Increasing economic benefits from sustainable marine resources use (8.7) reinforces the creation of decent jobs and small enterprise in e.g. tourism (8.3 and 8.9).

+2

ENABLING

The pursuit of one objective enables the achievement of another objective. Developing infrastructure for transport (9.1) enables participation of women in the work force and in political life (5.5).

+1

CONSISTENT

A neutral relationship where one objective does not significantly interact with another or where interactions are deemed to be neither positive nor negative. By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution (14.1) is consistent with target 3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.

0

CONSTRAINING

A mild form of negative interaction when the pursuit of one objective sets a condition or a constraint on the achievement of another. Conserving coastal areas (14.5) and development of safe affordable housing and basic services (11.1) may constrain each other.

-1

COUNTERACTING

The pursuit of one objective counteracts another objective. Ensuring access to safe, nutritious and sufficient food can counteract sustainable water withdrawals (6.4) and reduction of chemicals releases (12.4).

-2

CANCELLING

The most negative interaction is where progress in one goal makes it impossible to track another goal and possibly leads to a deteriorating state of the second. A choice has to be made between the two. Developing infrastructure (9.1) could be cancelling the reduction of degradation of natural habitats in terrestrial ecosystems (15.1).

-3

Outdoor and indoor air pollution is responsible for 7 million deaths annually, as well as respiratory and cardiovascular disease but also increases in perinatal deaths. In 2012, ambient outdoor air pollution was responsible for 3 million deaths, representing 5.4% of the total deaths. Worldwide, ambient air pollution is estimated to cause about 25% of the lung cancer deaths. Major urban centers in low and middle-income countries are the most exposed to this burden. (WHO, 2016).

Sustainable and diversified strategies for using the marine resource base open up opportunities for small enterprises in fisheries or other harvesting and associated value-added activities, as well as activities related to tourism. Many SIDS and LDCs that are rich in these resources also have poor, vulnerable and marginalized coastal communities.

Affordable public transport promotes social inclusion, more equal access to different parts of the city, and enabling employment for marginalized groups. In many places, women do not have access to a car and depend on public transport, walking or bicycling to get around, to work places and to social or political activities (UNICE, 2016; GSDR, 2016).

There is no significant interaction between the two targets.

Establishing protection areas in the coastal zone and expanding urbanisation, infrastructure or transport risks spatial competition especially in densely populated areas. Integrated coastal zone management and marine spatial planning tools are readily available to mitigate spatial competition.

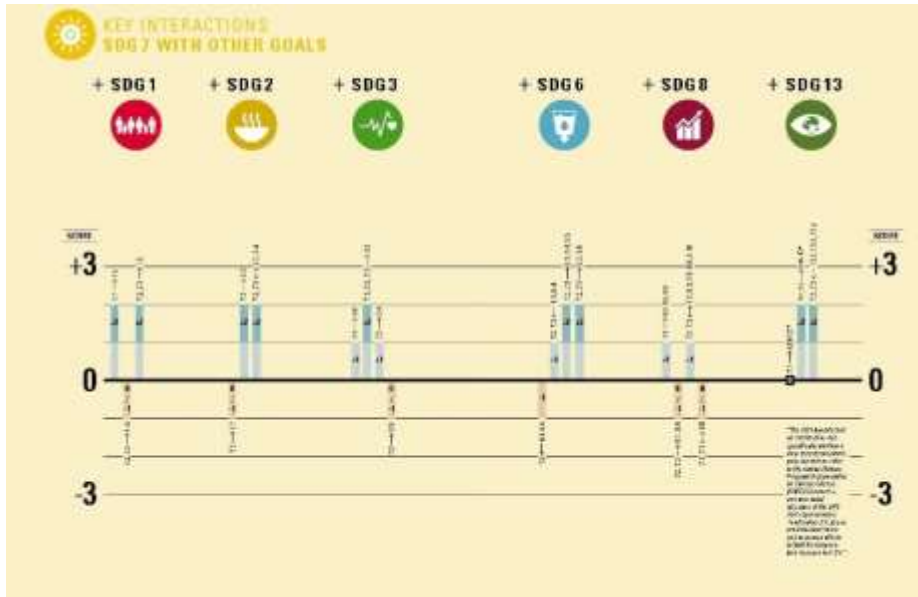
Increasing productivity in agriculture is a necessary (but not sufficient) condition to improve food security. In many places, this might entail increased and/or better irrigation as well as increased use of agricultural inputs.

In underdeveloped regions, developing roads, dams, and power grids might be a high priority, although it will cause some unavoidable fragmentation of habitats and compromising the integrity of the natural ecosystem, leading to risks to biodiversity as well as social risks.

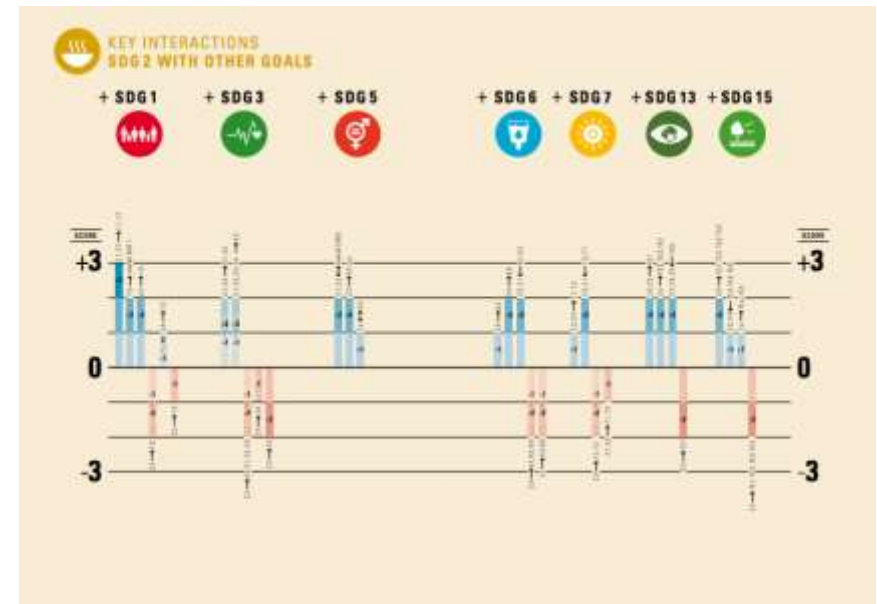
Reducing SDGs-complexity by qualitative scoring:

The ICSU-Guide approach

Interactions of SDG7 “Affordable and clean energy” with poverty, food, health, water, economy, & climate



Interactions of SDG2 “Zero hunger” with poverty, health, equality, water, energy, climate & land



Interaction matrix of selected Sustainable Development Goals

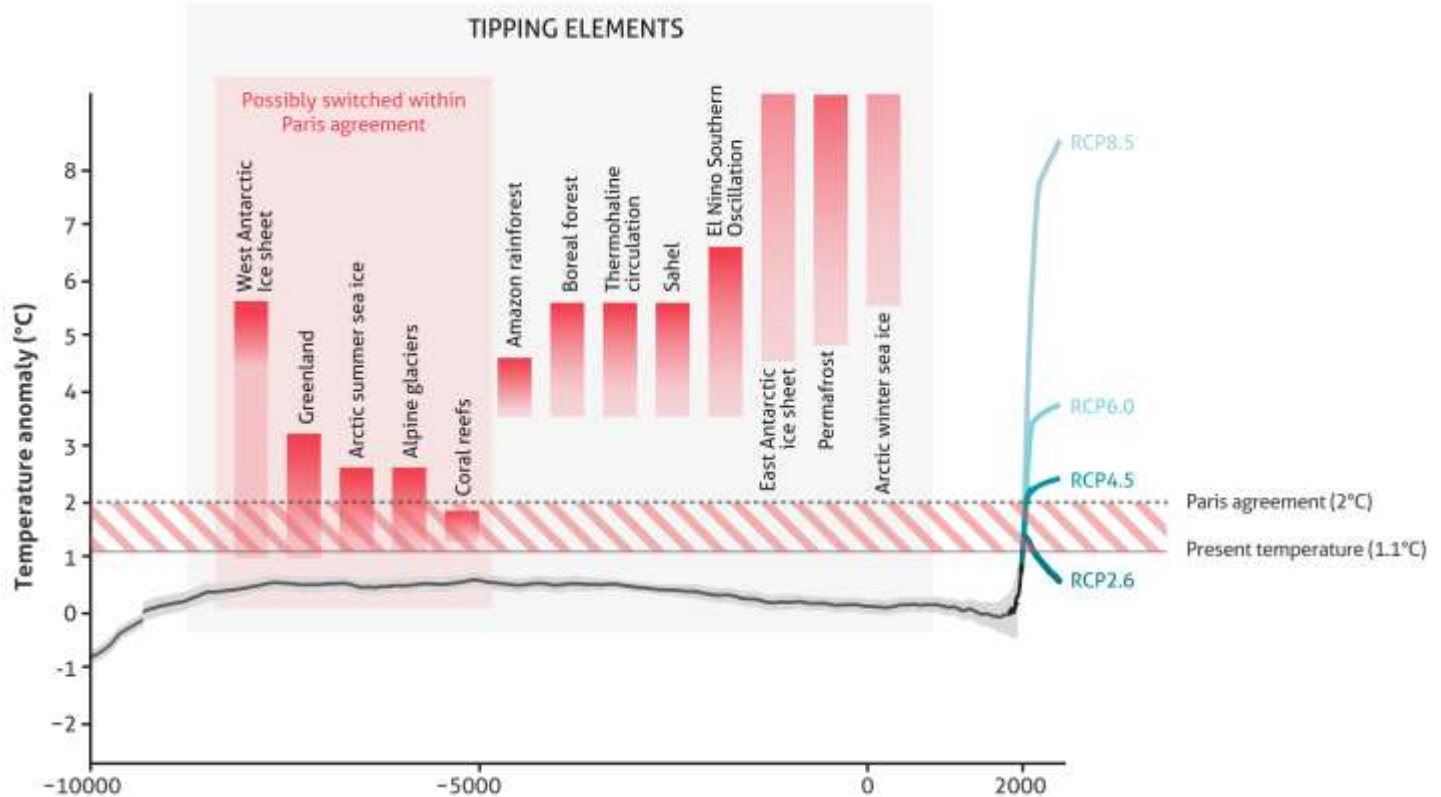
Synergies outweigh trade-offs

Selected SDG targets (influenced targets)

	1.3	1.5	2.2	2.4	3.4	3.8	4.1	4.4	5.4	5.5	6.5	6.6	7.2	7.3	8.4	8.5	9.4	9.5	10.1	10.7	11.1	11.2	12.1	12.5	13.1	13.2	14.1	14.4	15.2	15.5	16.4	16.6	17.11	17.13	SUM		
1.3																																			25		
1.5																																					26
2.2																																					13
2.4																																					23
3.4																																					4
3.8																																					11
4.1																																					17
4.4																																					30
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9.5																																					29
10.1																																					11
10.7																																					15
11.1																																					13
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15.5																																					16
16.4																																					19
16.6																																					51
17.11																																					-9
17.13																																					11
SUM	26	37	16	32	21	14	15	24	15	15	20	20	4	15	26	27	25	17	28	22	17	21	29	18	30	29	21	13	20	28	11	17	-2	21			

The climate / decarbonisation challenge

Earth is approaching TIPPING POINTS due to human pressures



Global average surface temperatures during the last 10,000 years have been remarkably stable. The tipping elements at risk within the Paris range of 1.5-2 °C global warming are shown within the inset.



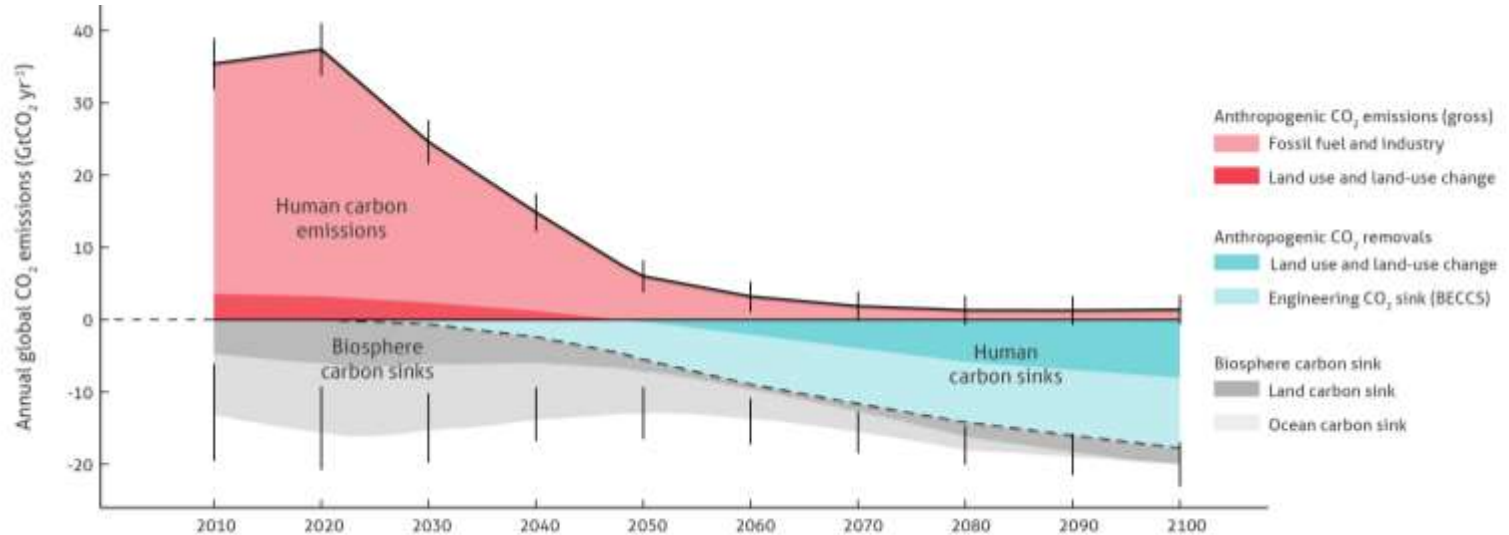
In 2020 the remaining global carbon budget for greater than 66% of remaining below 2°C...

circa **640** GtCO₂

The world emits about **41** GtCO₂ every year (all sources)

At these rates, in 2020, the world will have **16** years carbon budget for humanity's remaining time on Earth.

The world needs to act faster: deeper cuts are needed to reduce risk of global average temperature rising 2 °C above pre-industrial levels. A pathway of halving global emissions every decade is consistent with this goal.

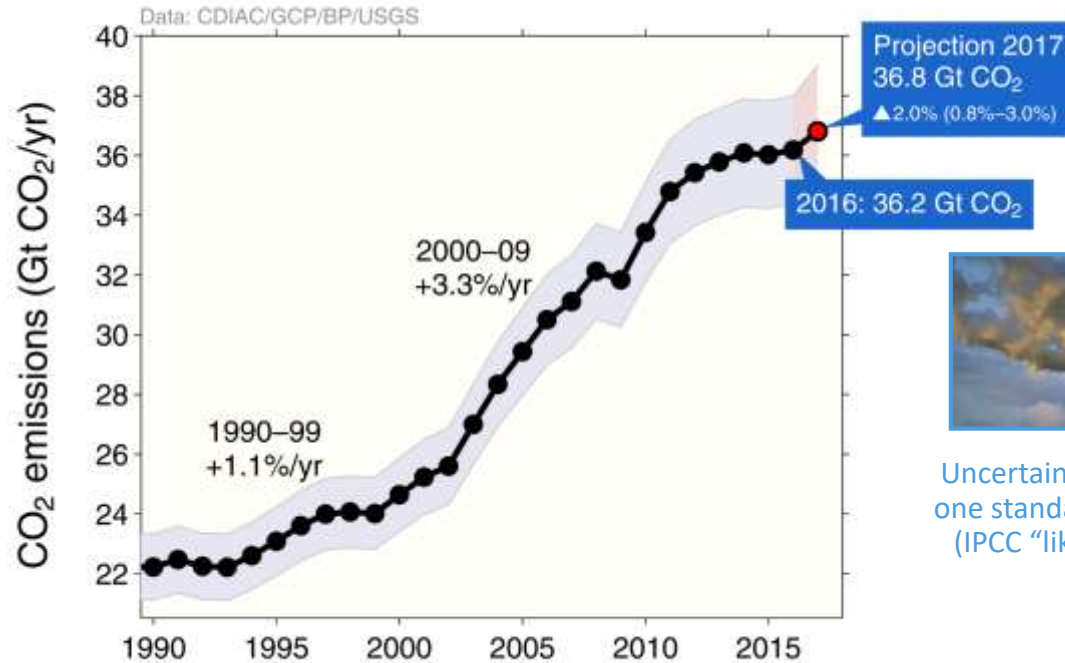


A representative pathway to stabilise global average temperature at around 1.5 °C with 50% probability. Such pathways assume large-scale "negative emissions" to achieve this goal, which have been untried at scale.

Emissions from fossil fuel use and industry

Global emissions from fossil fuel and industry: 36.2 ± 2 GtCO₂ in 2016, 62% over 1990

● Projection for 2017: 36.8 ± 2 GtCO₂, 2.0% higher than 2016



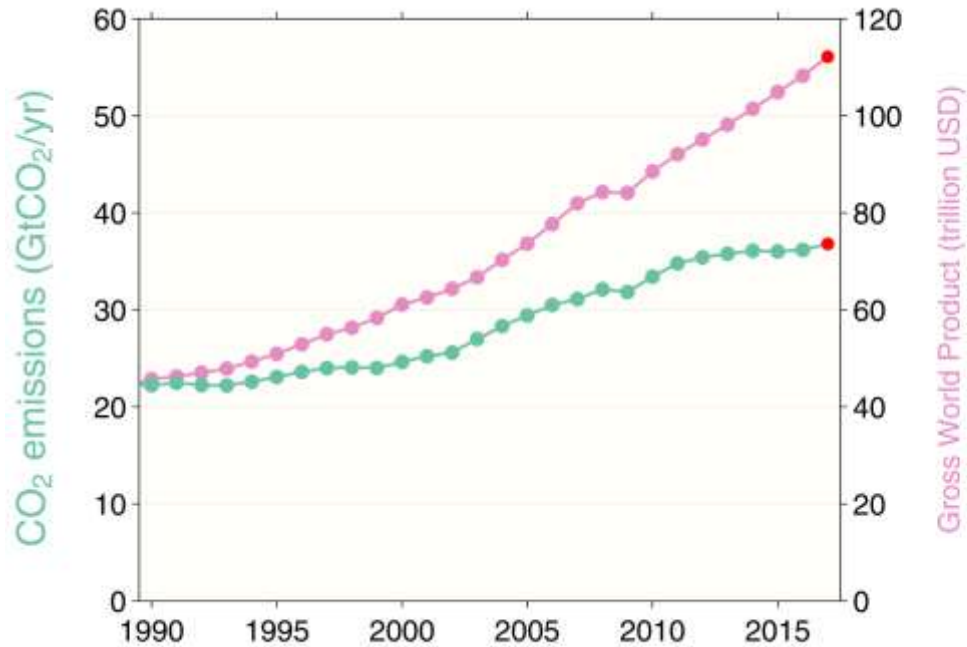
Uncertainty is $\pm 5\%$ for one standard deviation (IPCC “likely” range)

Estimates for 2015 and 2016 are preliminary. Growth rate is adjusted for the leap year in 2016.

Source: [CDIAC](#); [Le Quéré et al 2017](#); [Global Carbon Budget 2017](#)

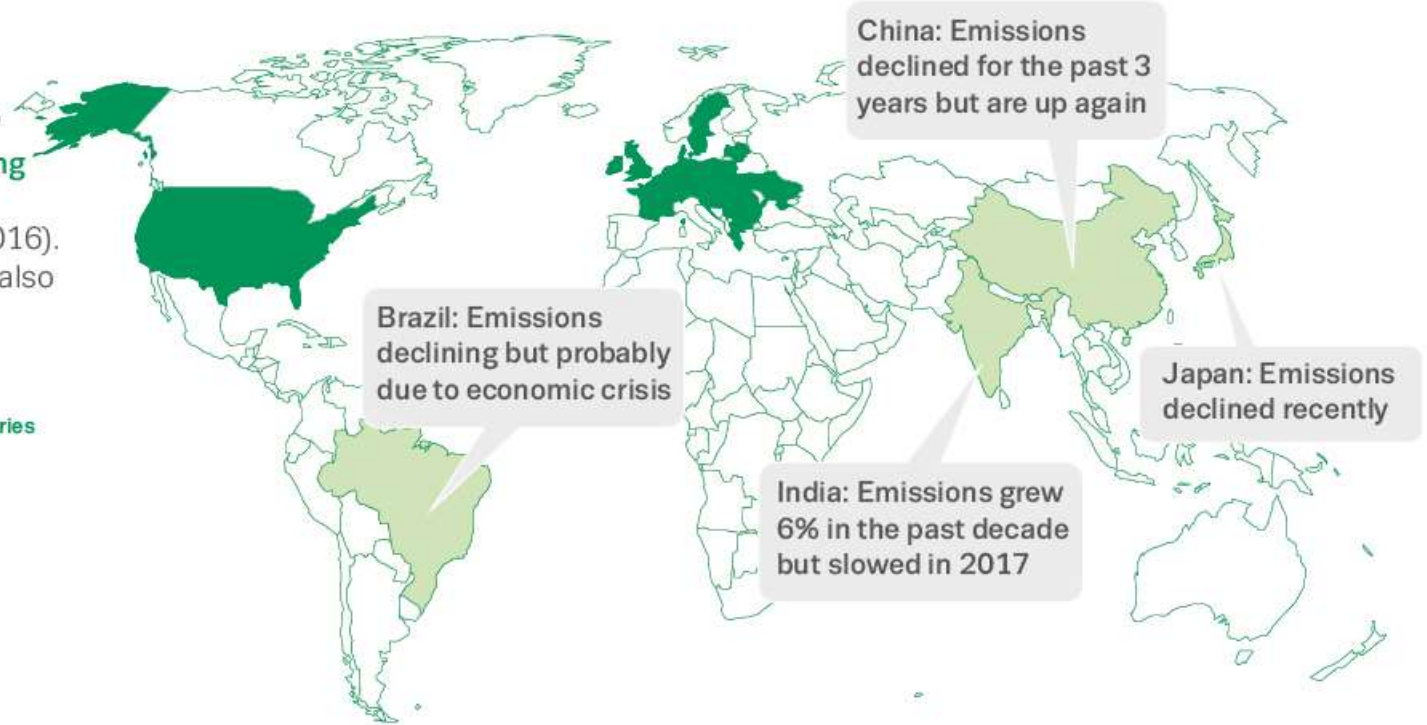
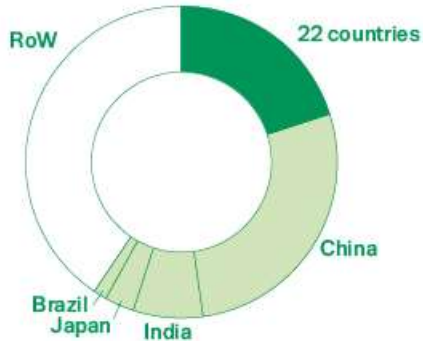
CO₂ emissions and economic activity

In recent years, CO₂ emissions have been almost flat despite continued economic growth

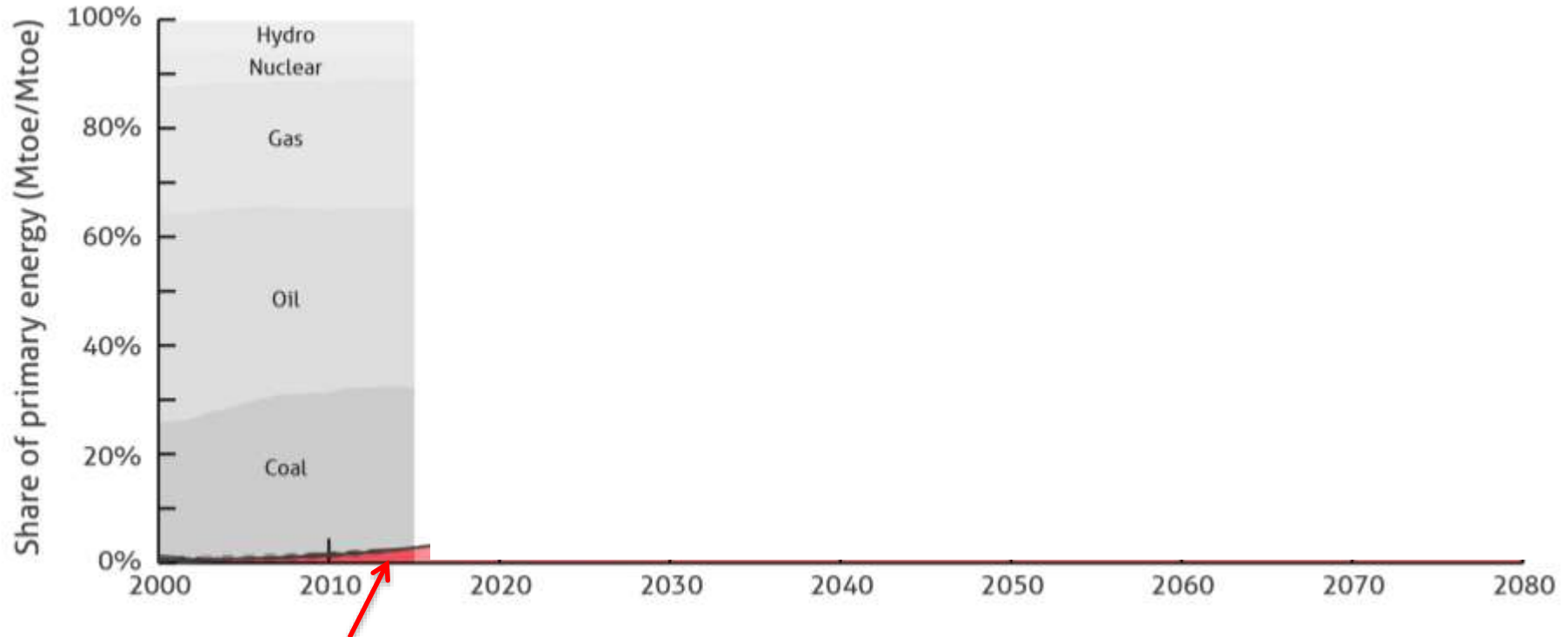


22 countries have decoupled GDP growth from CO2 emissions

Emissions **decreased** significantly in the presence of a growing GDP in **22 countries (representing 20% of global emissions)** in the last decade (2007-2016). Other **notable changes** are also shown



The world needs to act faster: deeper cuts are needed to reduce risk of global average temperature rising 2 °C above pre-industrial levels.



Renewable energy's share of primary energy is growing exponentially – doubling around every 5-6 years, albeit from a very low baseline.

**Examples for
smart and
scalable solution
ideas**

**Taken from
Anthropocene,
Future Earth's
digital, print and
live magazine.**



Construction

Building with wood instead of cement

—

turning cities into Carbon sinks



From *Anthropocene*, Vol 2, 2017



Photo: Canada Green Building Council:

University of British Columbia tall wood building “Brock Commons”

Energy:

Instead of Trump's Wall, let's build a border of solar panels

- Carbon emission-free energy
- Civilising effect in a dangerous area
- High-tech construction and technology jobs along the border
- Potential to connect to desalination to have agriculture instead of desert

Food production: in-vitro meat

Compared to livestock:

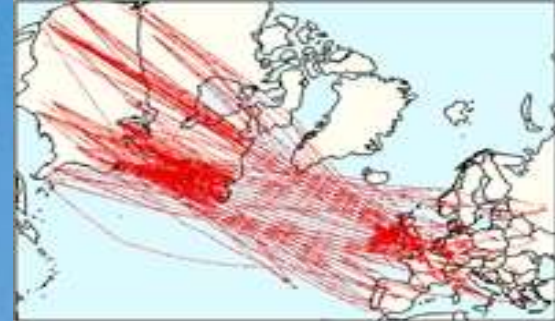
- 82-96% lower water use
- 7-45% lower energy use
- 78-96% lower emissions



Mobility:

Small changes to flight routes could deliver big climate savings

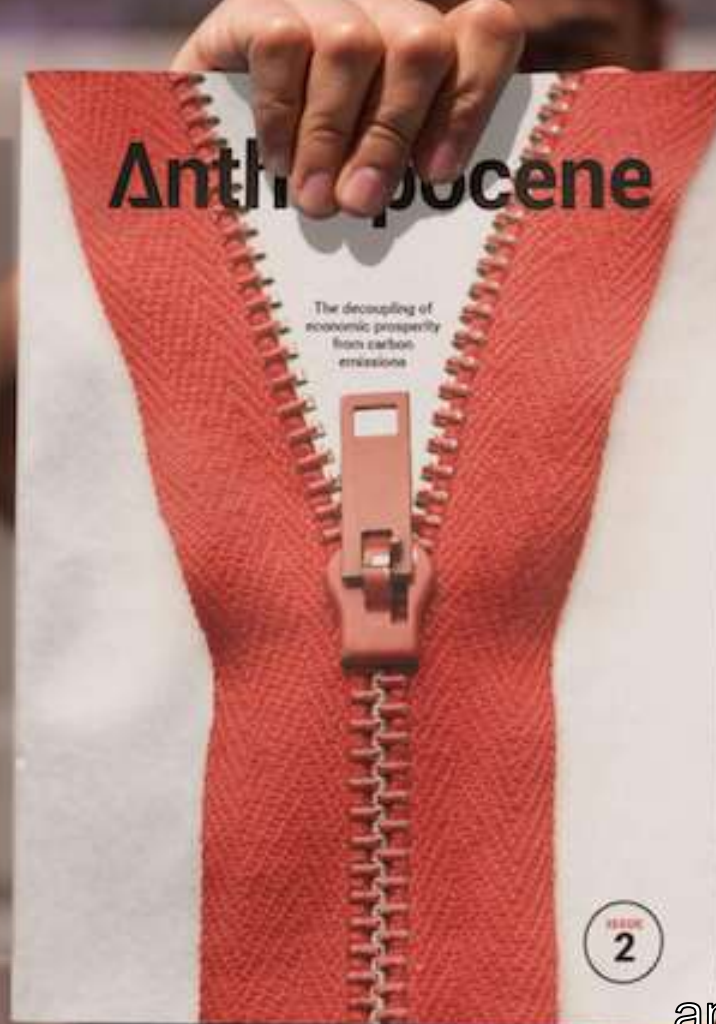
Reduction of climate impact (by ~10%)
at low costs (~1%)



Grewe et al 2017 Environ. Res. Lett.

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**Asking how do
we build a
sustainable
human age we
actually want to
live in?**

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High-level challenges (and ways to approach them)

Analyse interlinkages between sustainability targets and measures

- amplifying synergetic measures, while avoiding major trade-offs

Work on exponential growth of transitional actions

- such as expanding the renewable energy sector

Turn ideas of sustainability and decarbonisation into a movement

- scale up the good seeds of innovative ideas

- stimulate the left side of the people's brain (e.g. through art)

