

Climate Change: Risks, Costs and Challenges

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Dublin Castle, 28 February 2020



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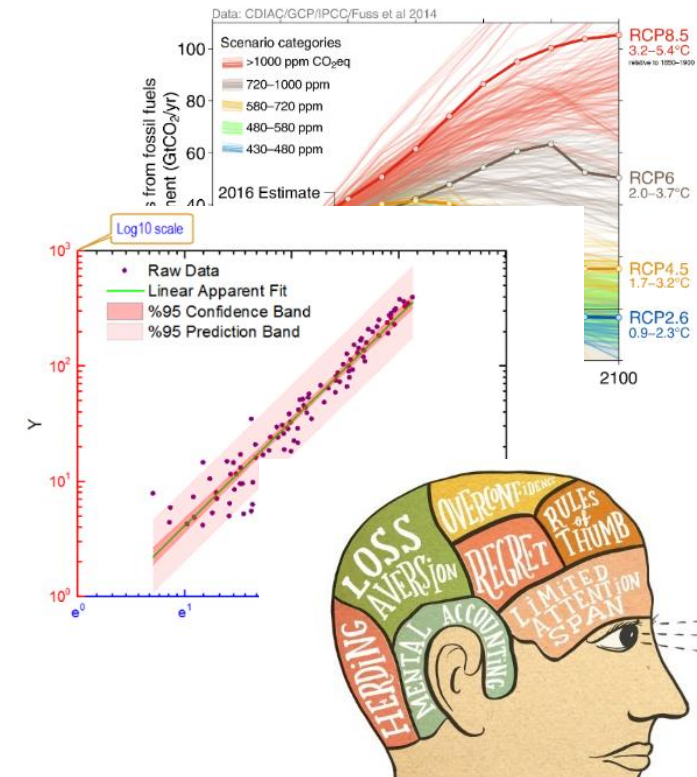
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Climate change

- What are we talking about? *Defining climate change*
- What is the problem? *Understanding the climate predicament*
- Is climate change anthropogenic? *The scientific consensus*
- What are the associated risks and costs? *Natural and economic systems*
- So what should we do? *Mitigation and climate policy*
- Are we all equally responsible? *Yesterday, today, tomorrow*
- Why should we start? *Reasons and options for action*



What are we talking about?

Defining climate change



What are we talking about?

When I use the term
“climate change”

I am specifically referring to **anthropogenic** climate change.

That is, **global climate warming and everything else that is affected by increasing GHG concentrations in the earth atmosphere**

Climate change is not the results of Earth's natural processes.
It is primarily due to greenhouse gases emitted by human activities

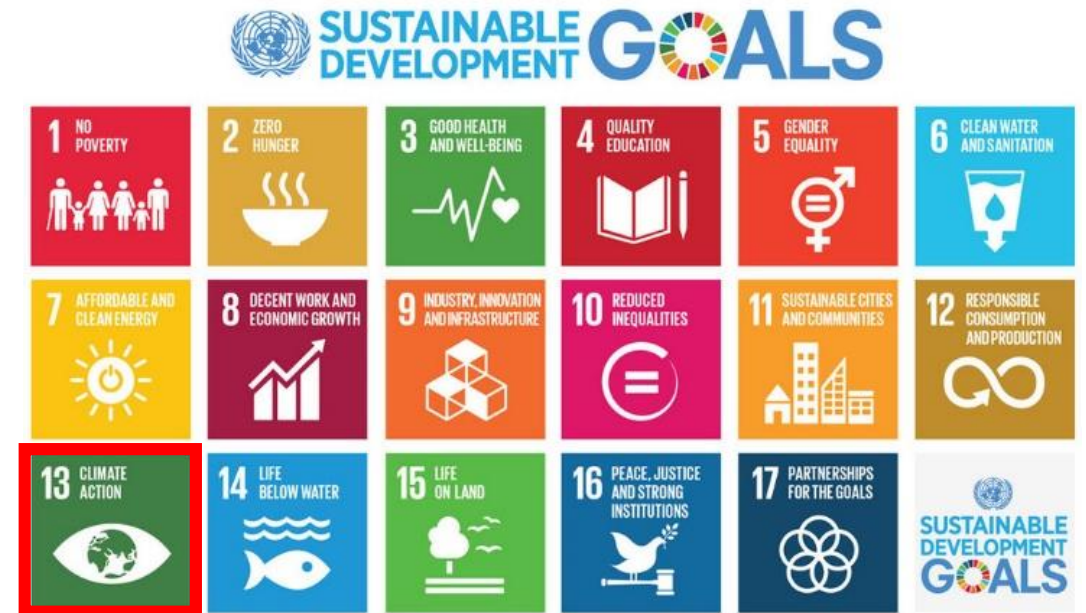


What are we NOT talking about?

- Local environmental pollution (in rivers, lakes, sea)
- Proliferation of plastics
- Biodiversity narrowly defined

Climate change should not be confused with “sustainability”

There are 17 sustainable development goals; climate action is but one of them.



What is the problem?

Understanding the climate predicament



What is the problem?

The problem is global climate warming

The earth mean surface temperature is increasing very rapidly

Says who?

Special Report 1.5

IPCC - Intergovernmental Panel on Climate Change



What is the problem?

IPCC - Intergovernmental Panel on Climate Change

intergovernmental body of the UN dedicated to providing the world with objective, scientific information on

The Physical Science Basis (WGI)

Impacts, Adaptation and Vulnerability (WGII)

Mitigation of Climate Change (WGIII)

The IPCC informs the United Nation Framework Convention on Climate Change.

UNFCCC aim: *"stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"*

5 Assessment Reports and several Special Reports, including SR1.5(2018)



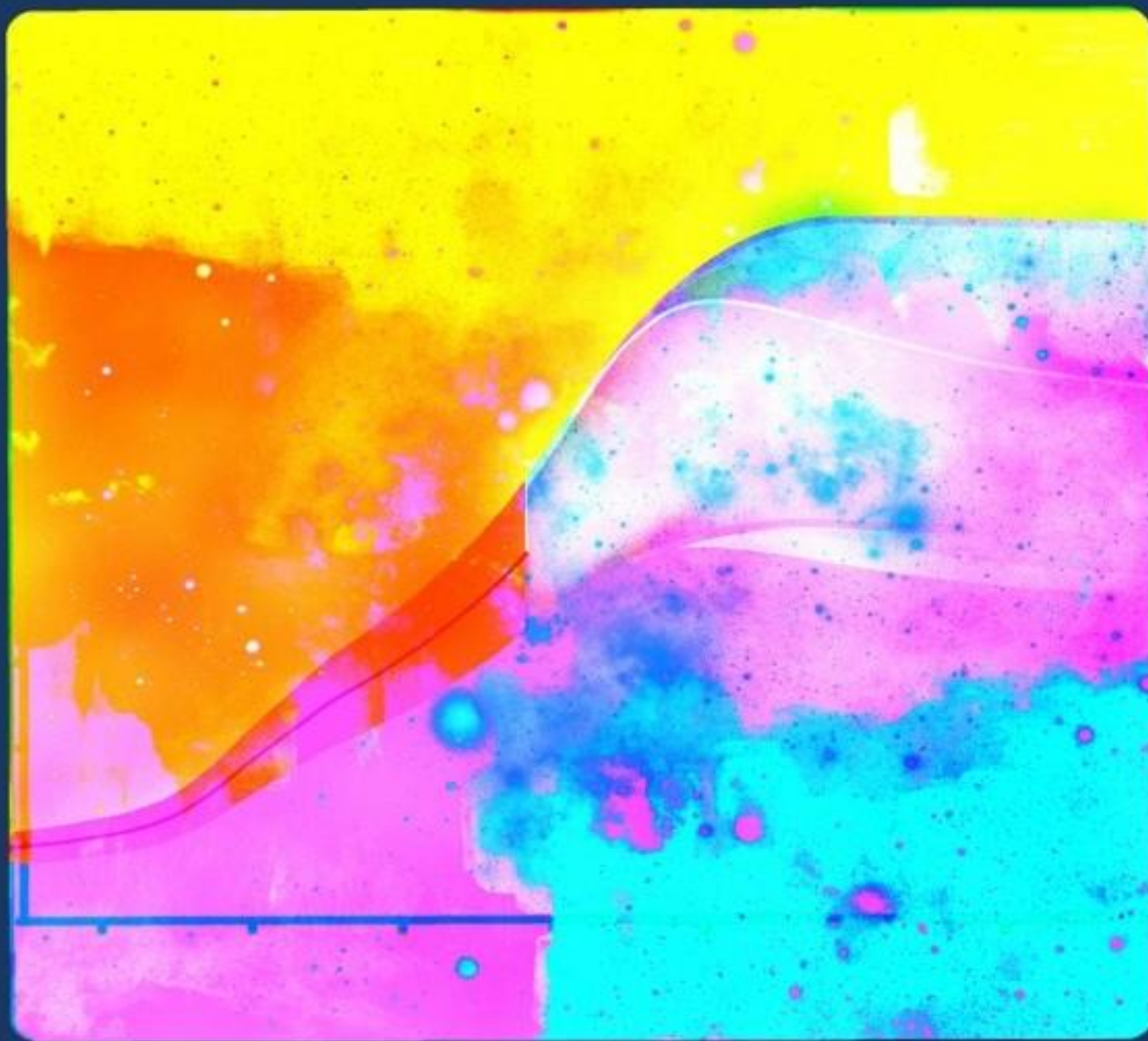
What is the problem?

The problem is global climate warming

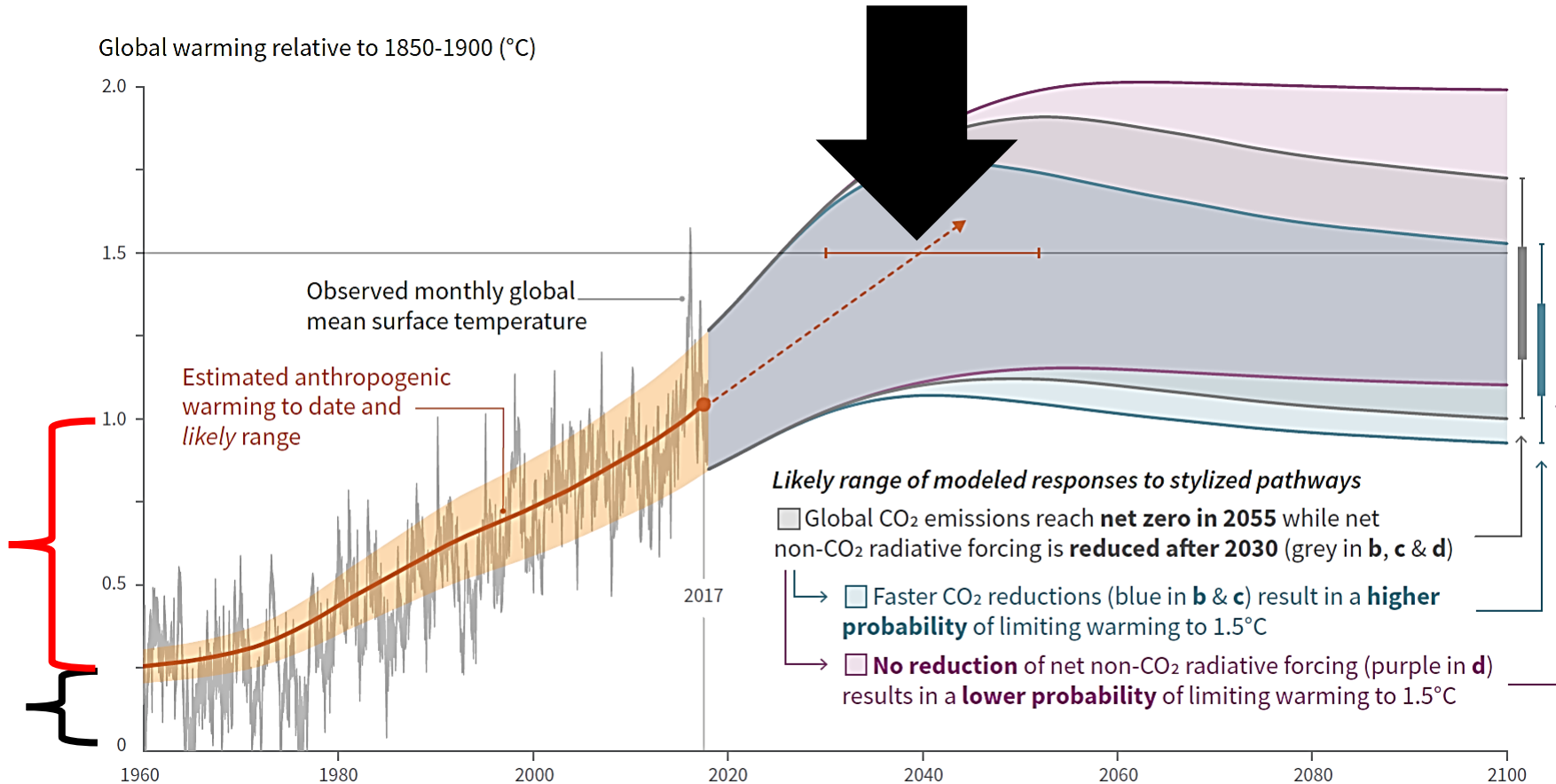
The earth mean surface temperature is increasing very rapidly

How rapidly?





What is the problem?



1850 – 1960:
+ 0.25°

1960 – 2017:
+ 0.75°

~ 2040
+ 1.50°



What is the problem?

The problem is global climate warming

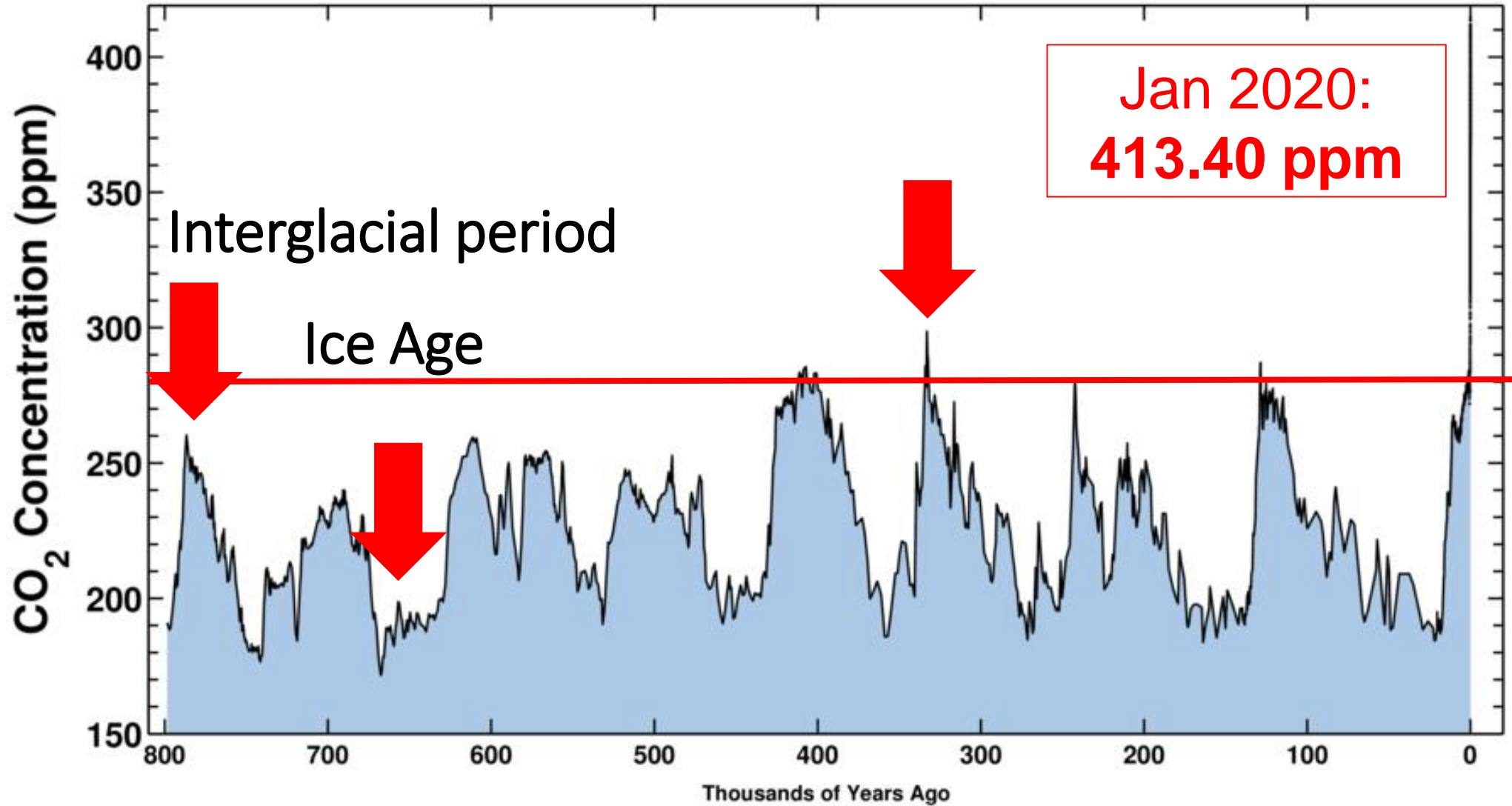
The earth mean surface temperature is increasing very rapidly

.... due to a very rapid increase in CO2 concentrations



February 15, 2020

Ice-core data before 1958. Mauna Loa data after 1958.

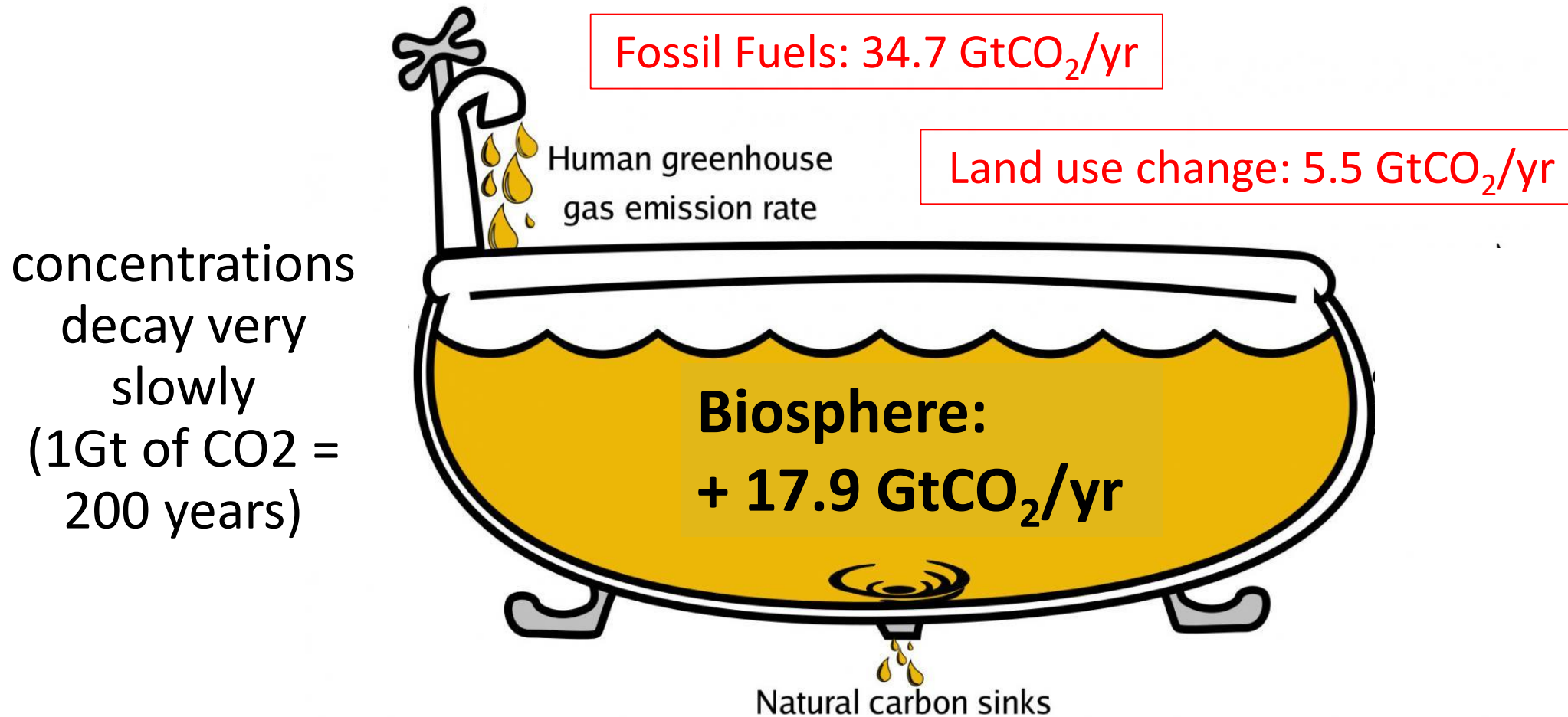


Is climate change anthropogenic?

The scientific consensus



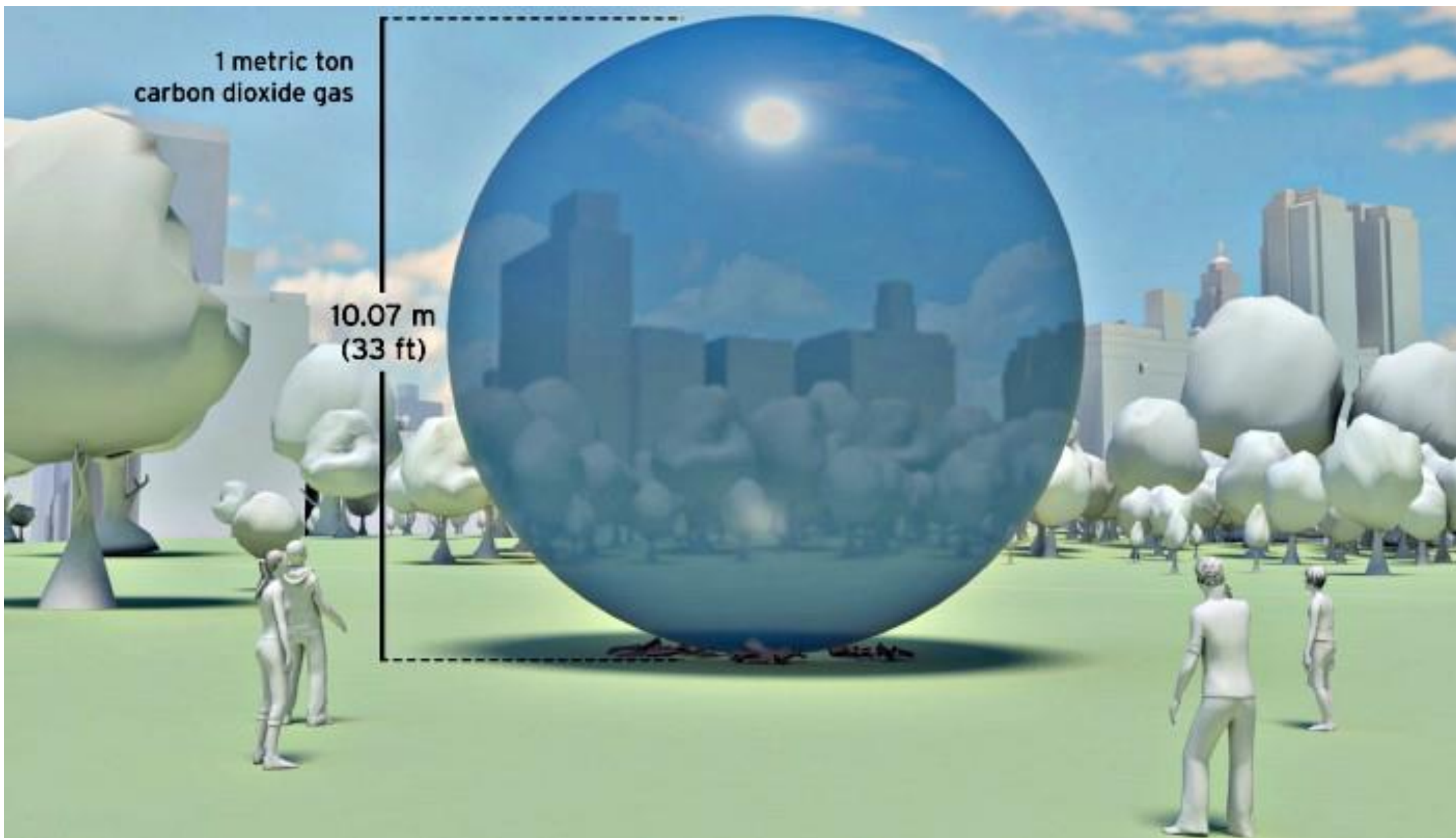
Is climate change anthropogenic?

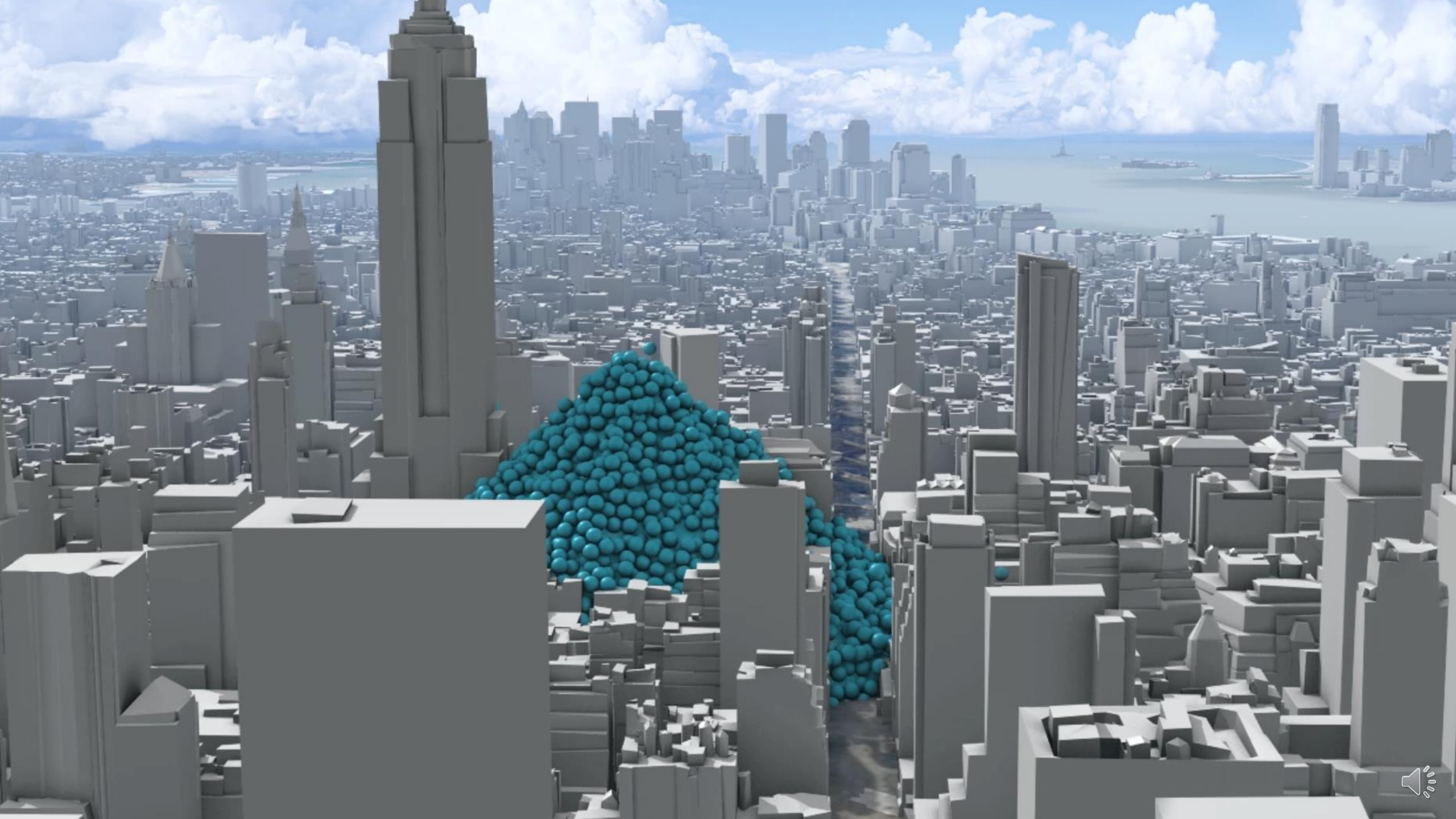


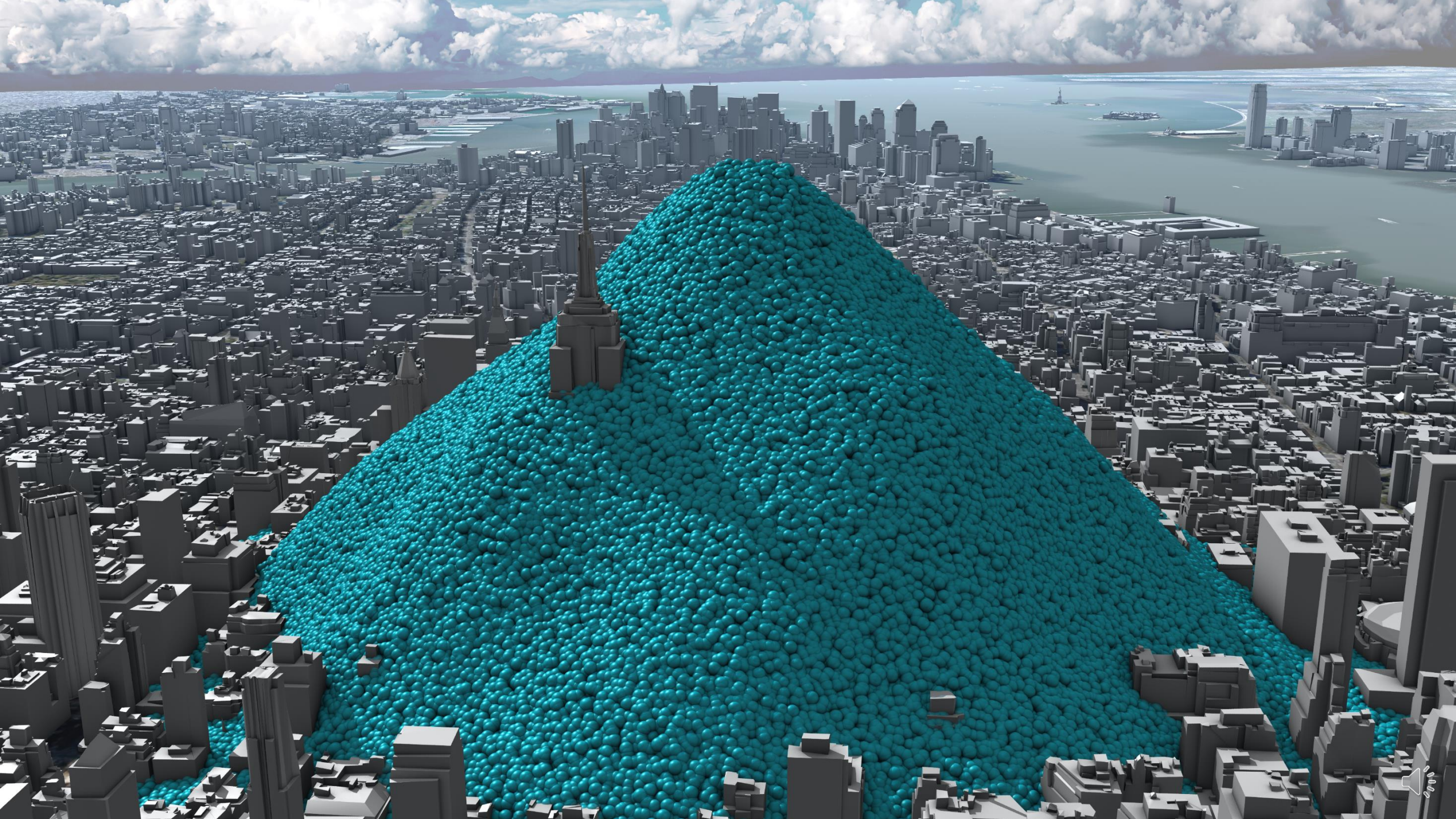
Is climate change anthropogenic?

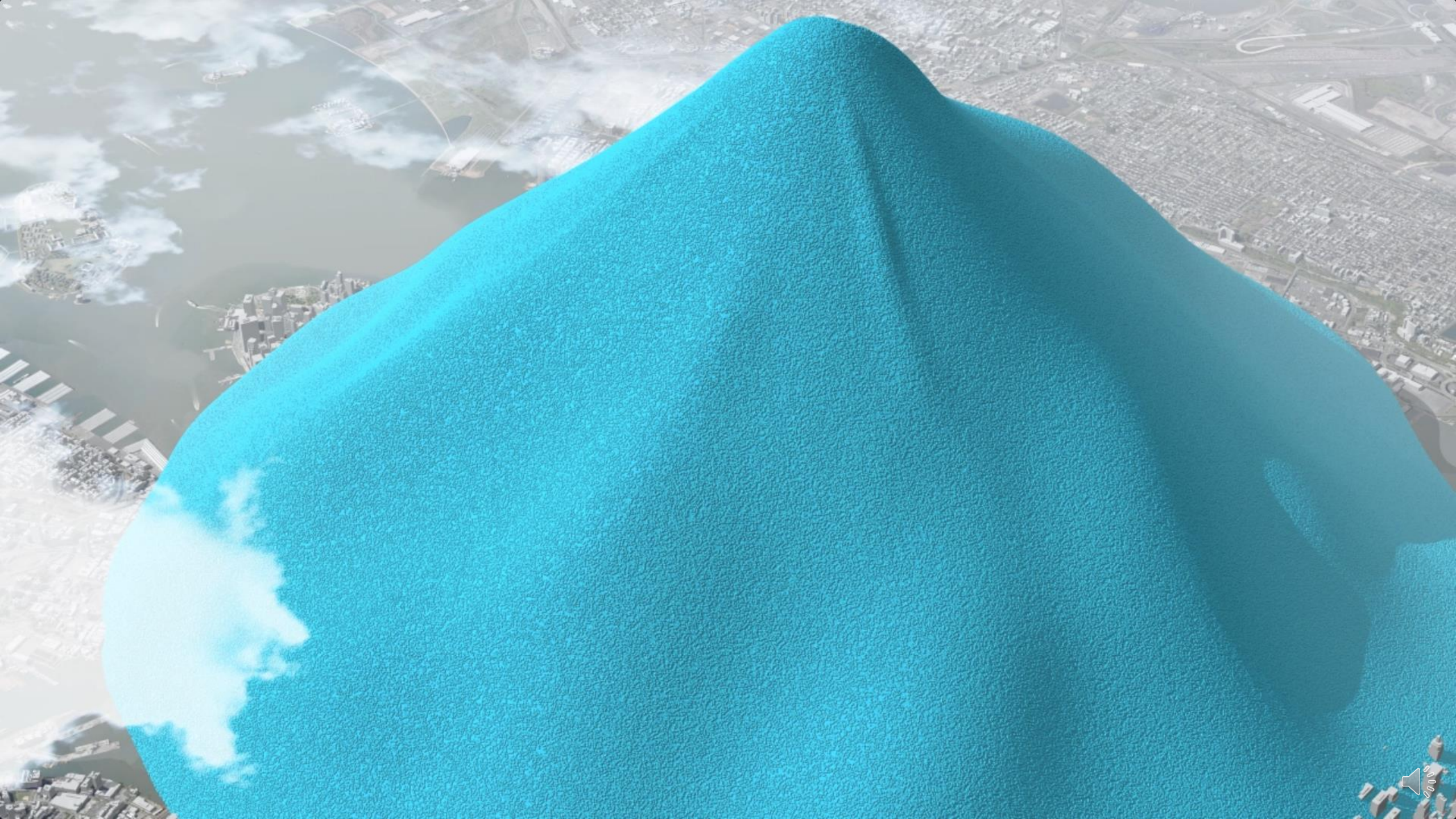
Let's try and visualize what this really means







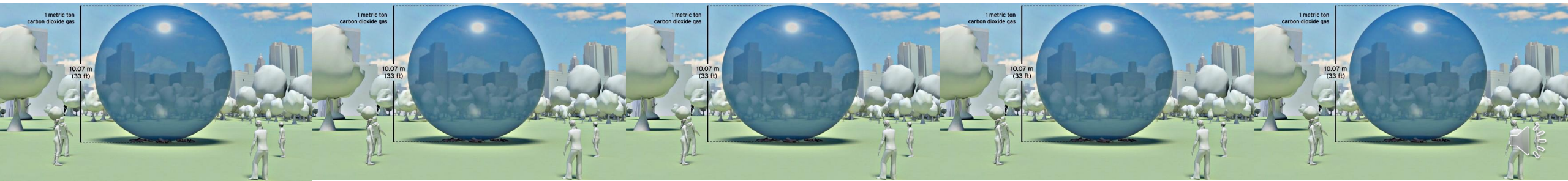




CO2 per capita:

World: ~5 t

(I will get back to this)



What are the associated risks and costs?

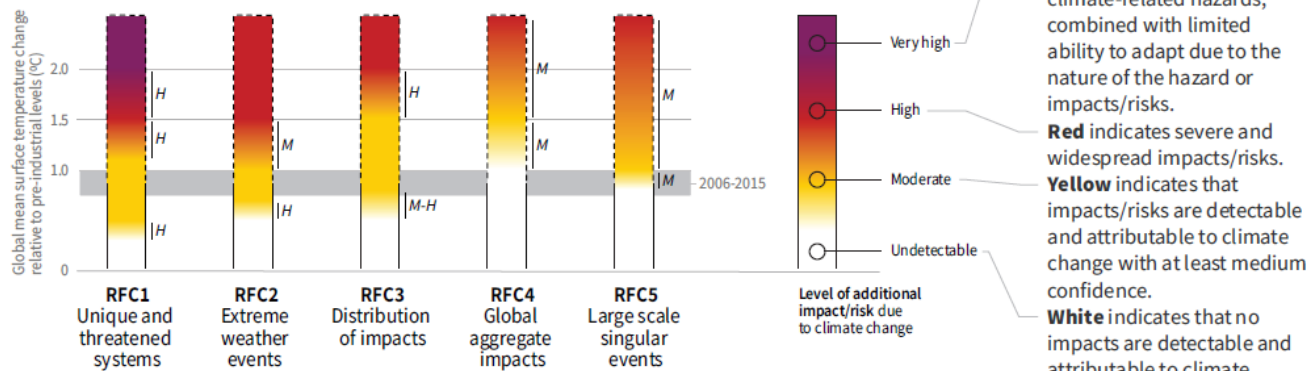
Natural and economic systems



What are the associated risks and costs?

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

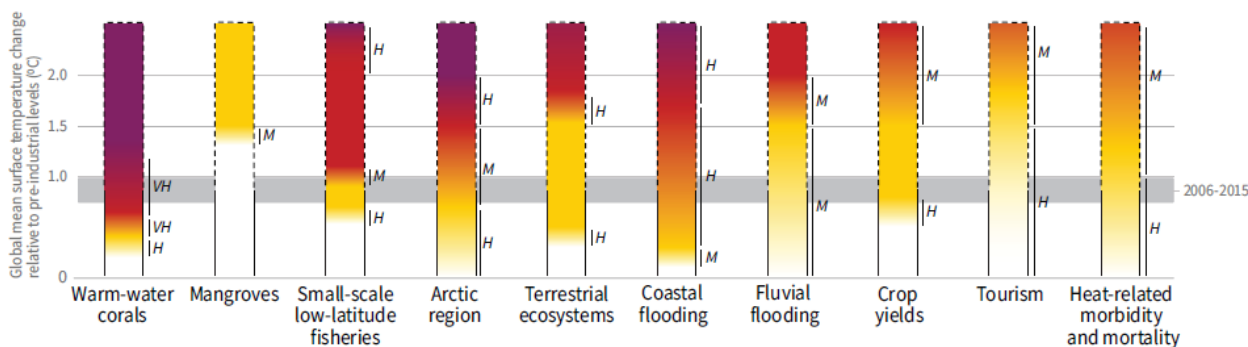
Impacts and risks associated with the Reasons for Concern (RFCs)



Increase in temperature results in significant risks for natural and human systems

Risks increase non-linearly: going from +1,5° to +2° they increase more than going from +1° to +1,5°

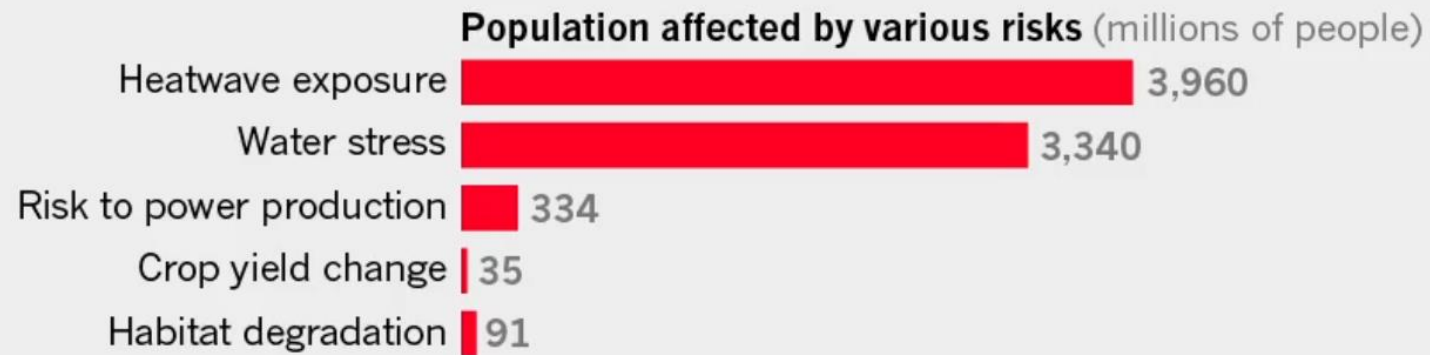
Impacts and risks for selected natural, managed and human systems



Economic and welfare losses are significant

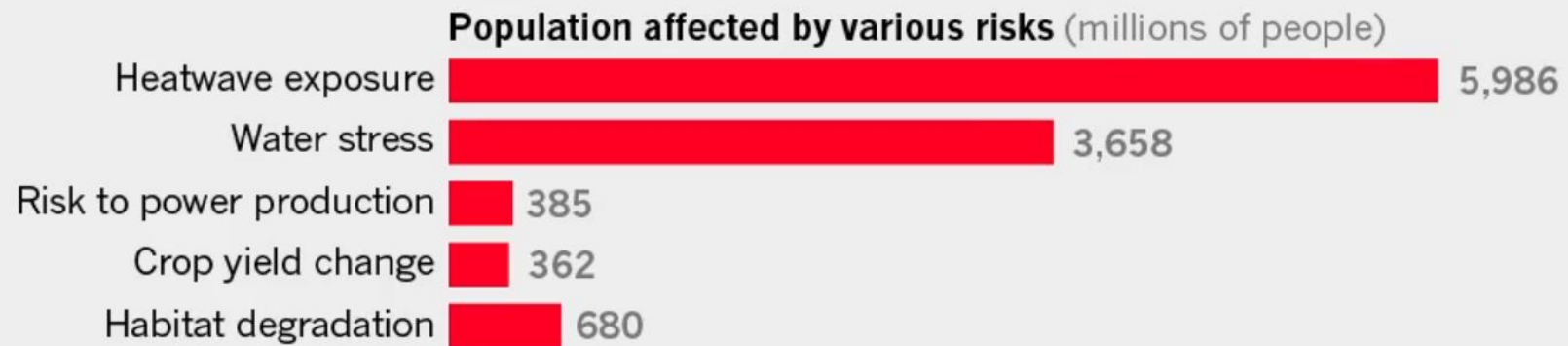


Cumulative risks of
1.5 °C
warming



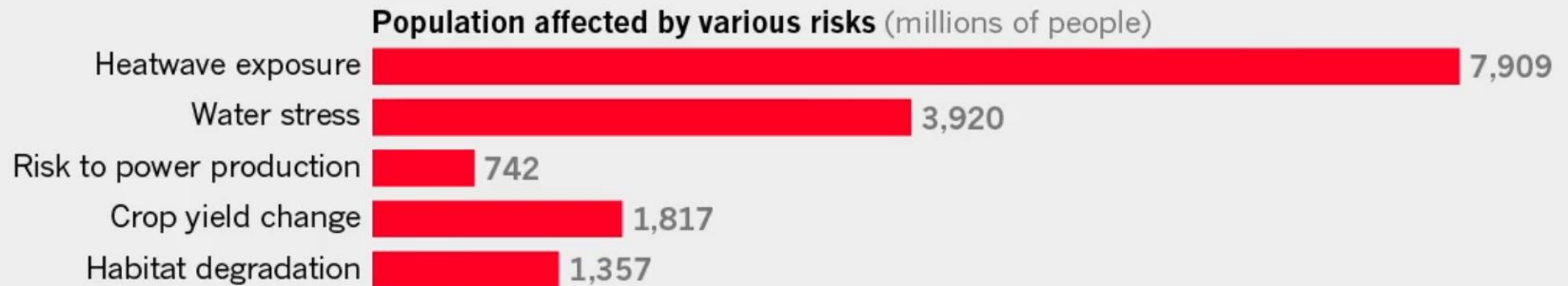
Source: IPCC/E. Byers et al. Environ. Res. Lett. 13, 055012 (2018).

Cumulative risks of
2°C
warming



Source: IPCC/E. Byers et al. Environ. Res. Lett. 13, 055012 (2018).

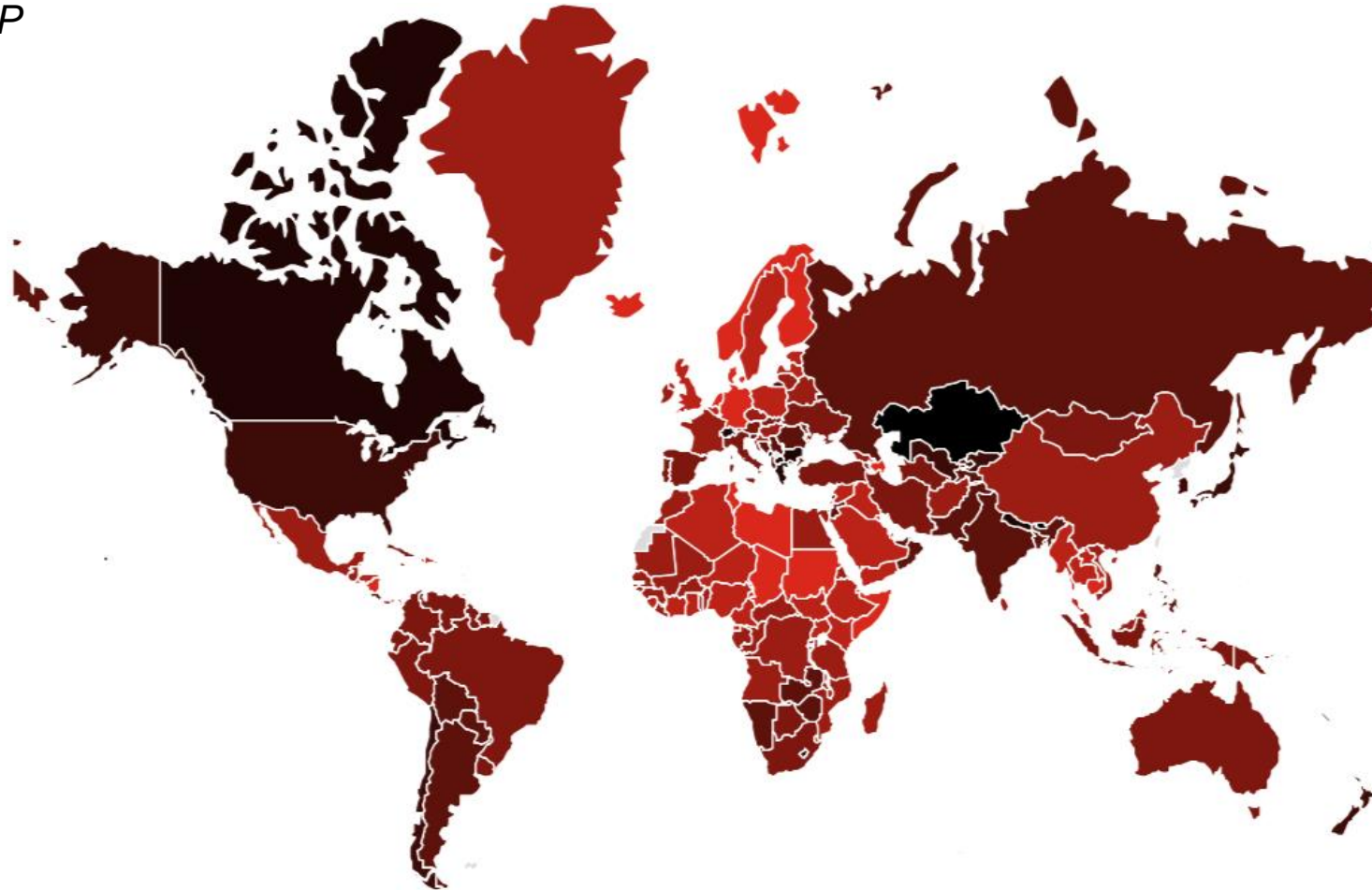
Cumulative risks of
3°C
warming



Source: IPCC/E. Byers et al. Environ. Res. Lett. 13, 055012 (2018).

What are the associated risks and costs?

*Percentage loss of GDP
per capita by 2100
in the absence of
climate policy
(RCP 8.5)*

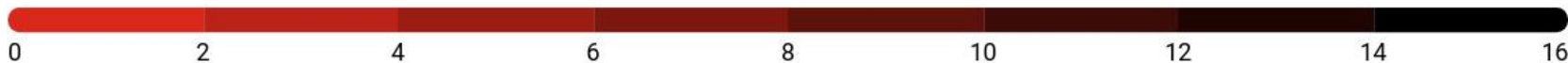


*RCP 2.6 – very high
emission reductions*

*RCP 4.5 stabilization
with strong reductions*

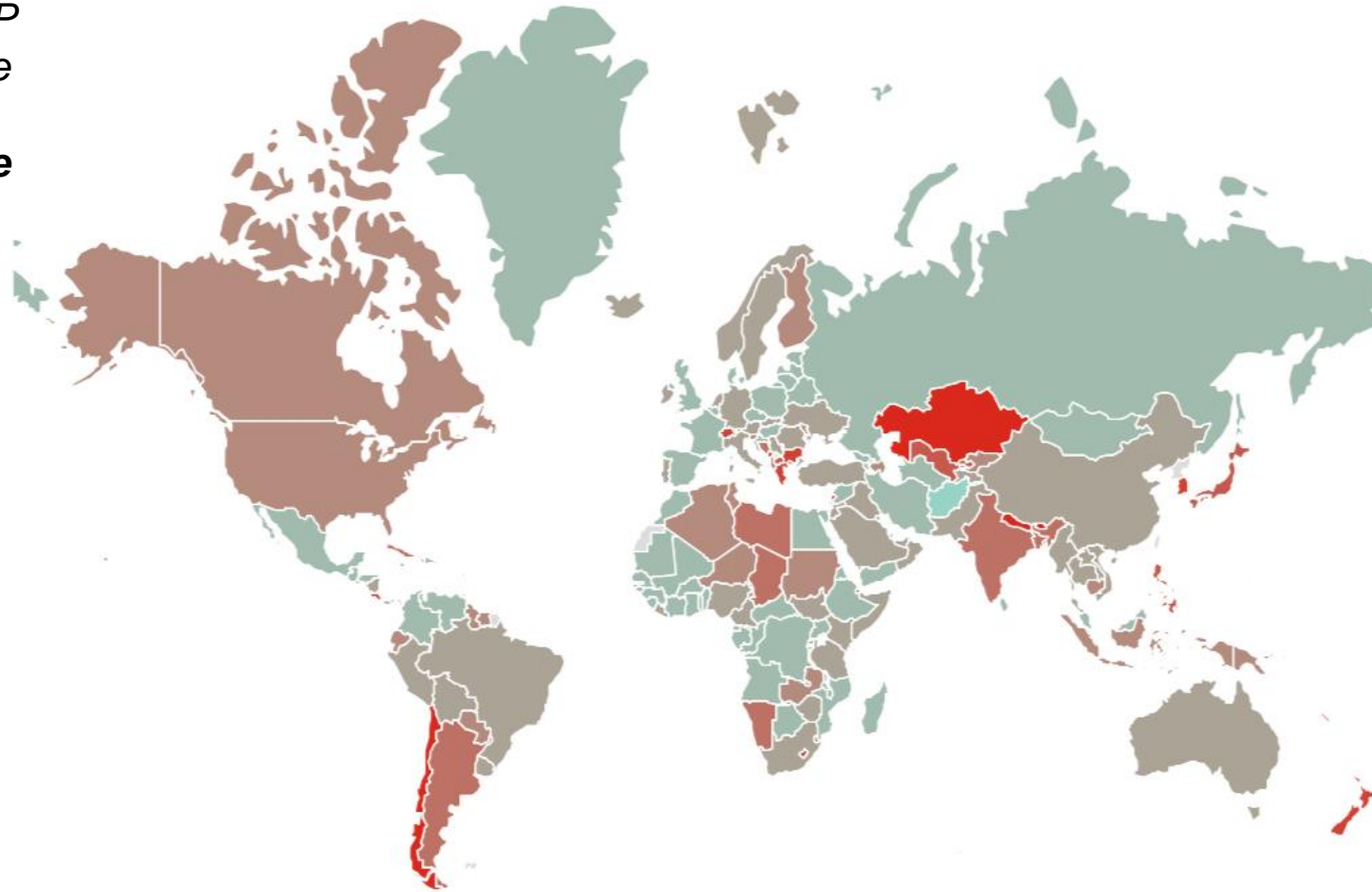
*RCP 6.0 stabilization
with weak reductions*

***RCP 8.0 «business as
usual»***



What are the associated risks and costs?

Percentage loss of GDP
per capita by 2100 if we
impose a 2 degree
targetn - **abiding to the
Paris Agreement**
(RCP 2.6)

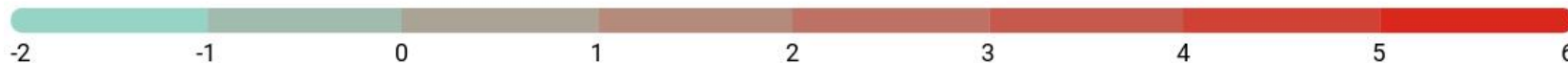


**RCP 2.6 – very high
emission reductions**

*RCP 4.5 stabilization
with strong reductions*

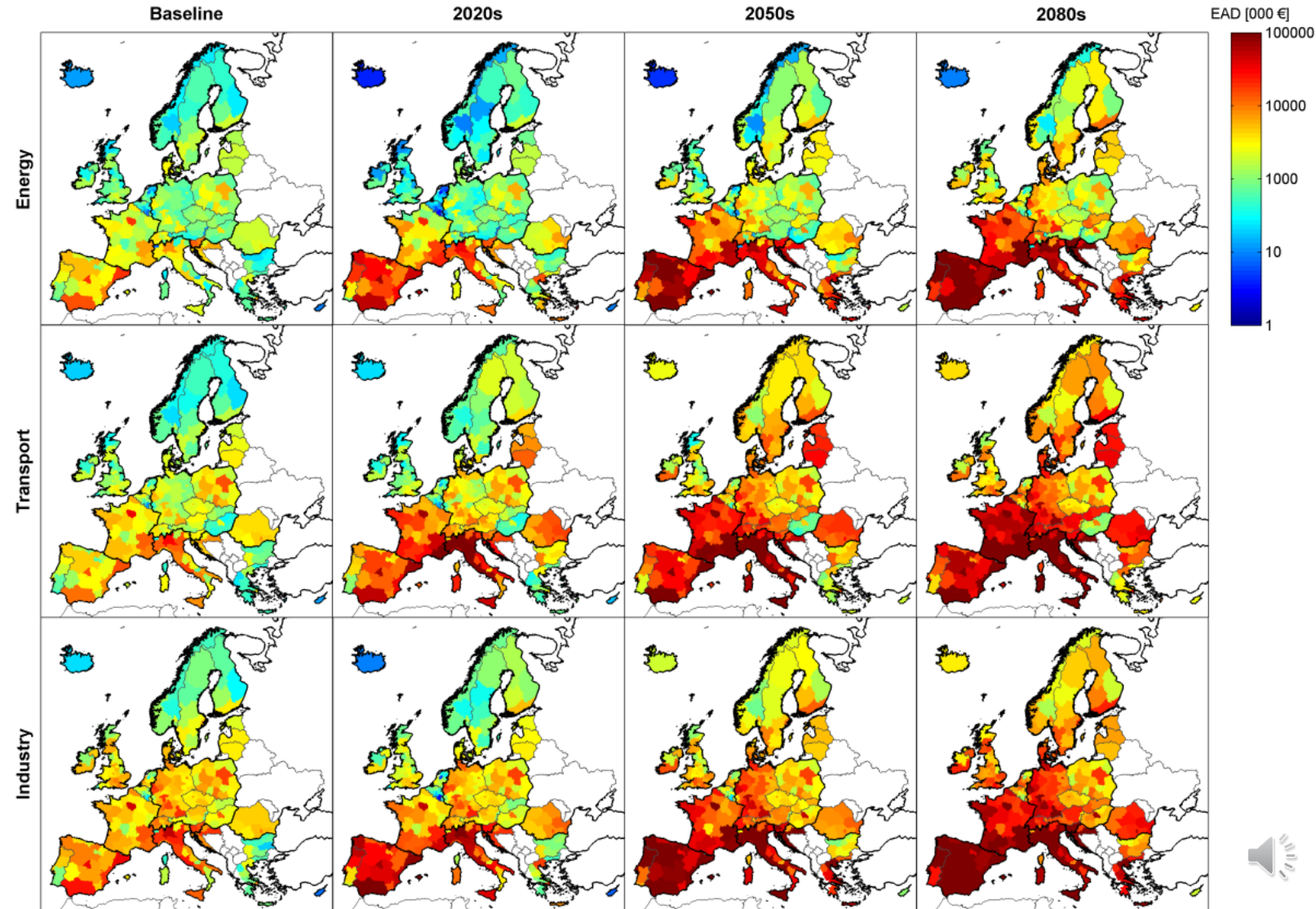
*RCP 6.0 stabilization
with weak reductions*

*RCP 8.0 «business as
usual»*



What are the associated risks and costs?

Multi-hazard risk
scenario for critical
infrastructure in Europe
(expected annual damages)



What are the associated risks and costs?



A report from The Economist Intelligence Unit.



Table 1 - Value at risk

VaR due to climate change	Mean (average)	5°C	6°C
Present value from the perspective of a private investor	US\$4.2trn	US\$7.2trn	US\$13.8trn
Present value from the perspective of a government	US\$13.9trn	US\$18.4trn	US\$43.0trn

Table 2 - Percentage reduction in risk should warming be kept within 2°C

VaR due to climate change	Mean (average)	5°C	6°C
The perspective of a private investor	50%	63%	76%
The perspective of a government	57%	71%	85%



What are the associated risks and costs?

Economic and welfare losses are significant

But also losses which are not easily quantifiable
– biodiversity, health, etc.

If we do not limit the damage, we will have to spend an increasing amount of money to pay for and adapt to climate change

It is also evident that the uncertainty that naturally characterizes estimates of impact does not justify inaction



So what should we do?

Mitigation and climate policy



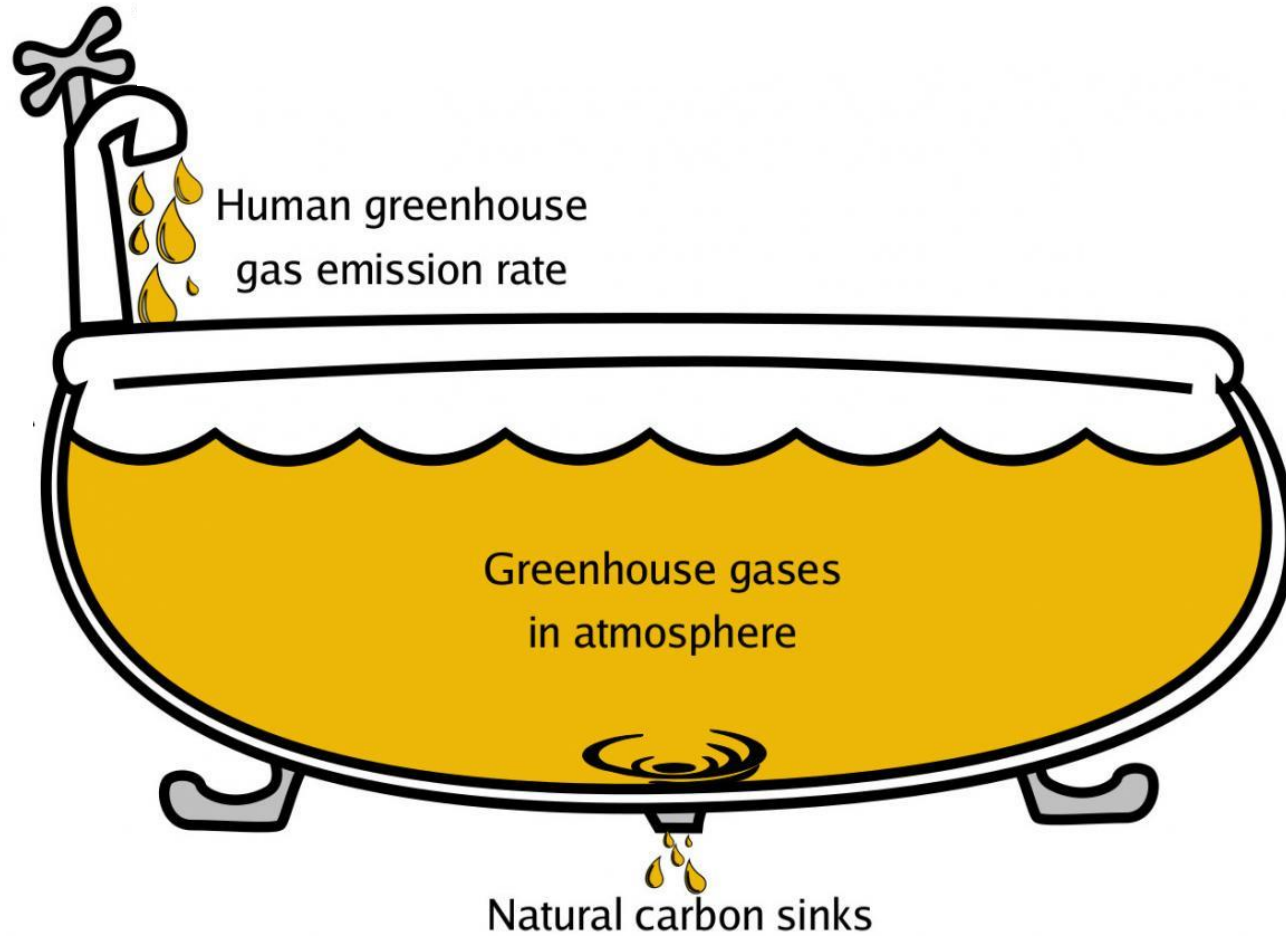
So what should we do?

“... strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. ”

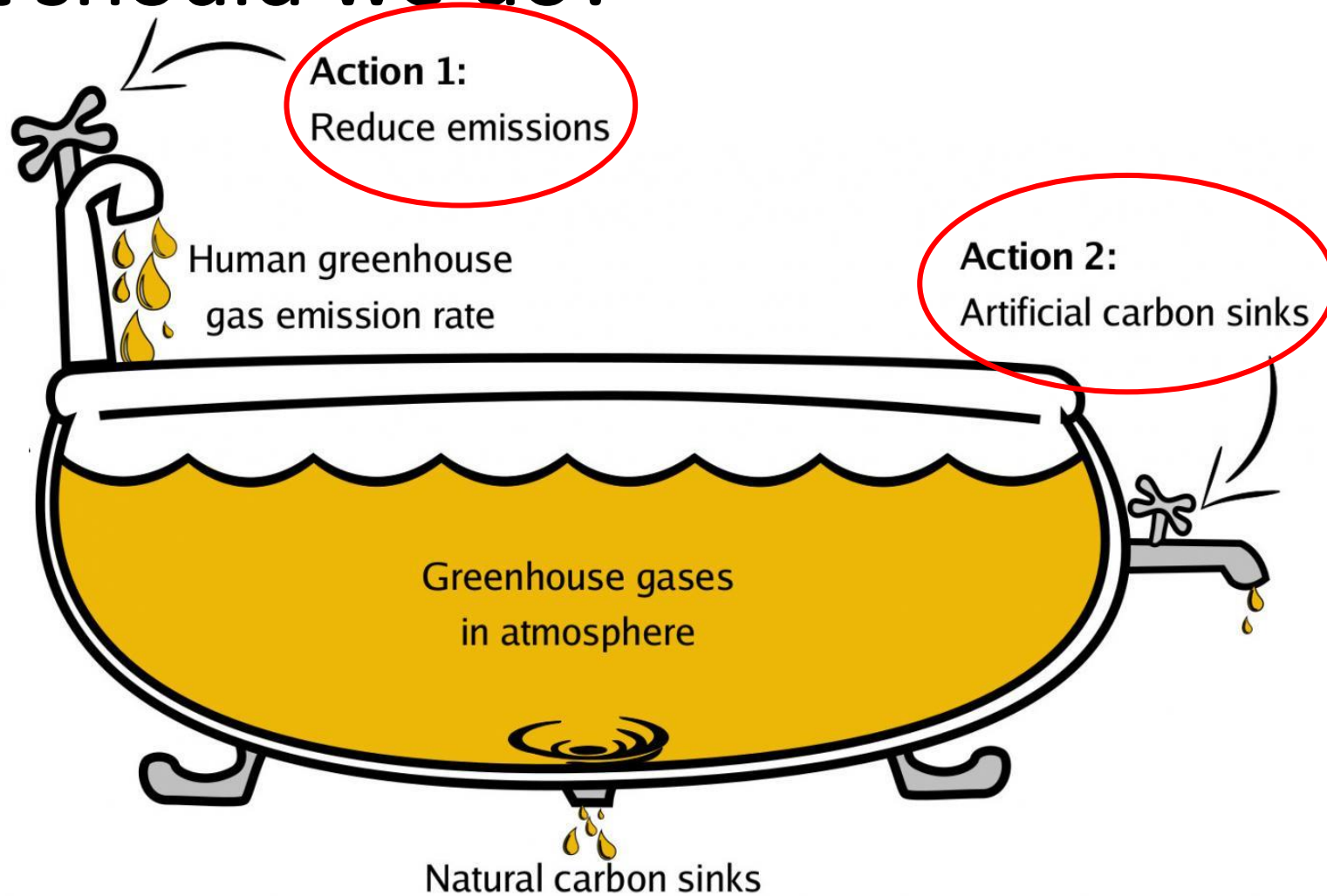
[The Paris Agreement, 2015]



So what should we do?



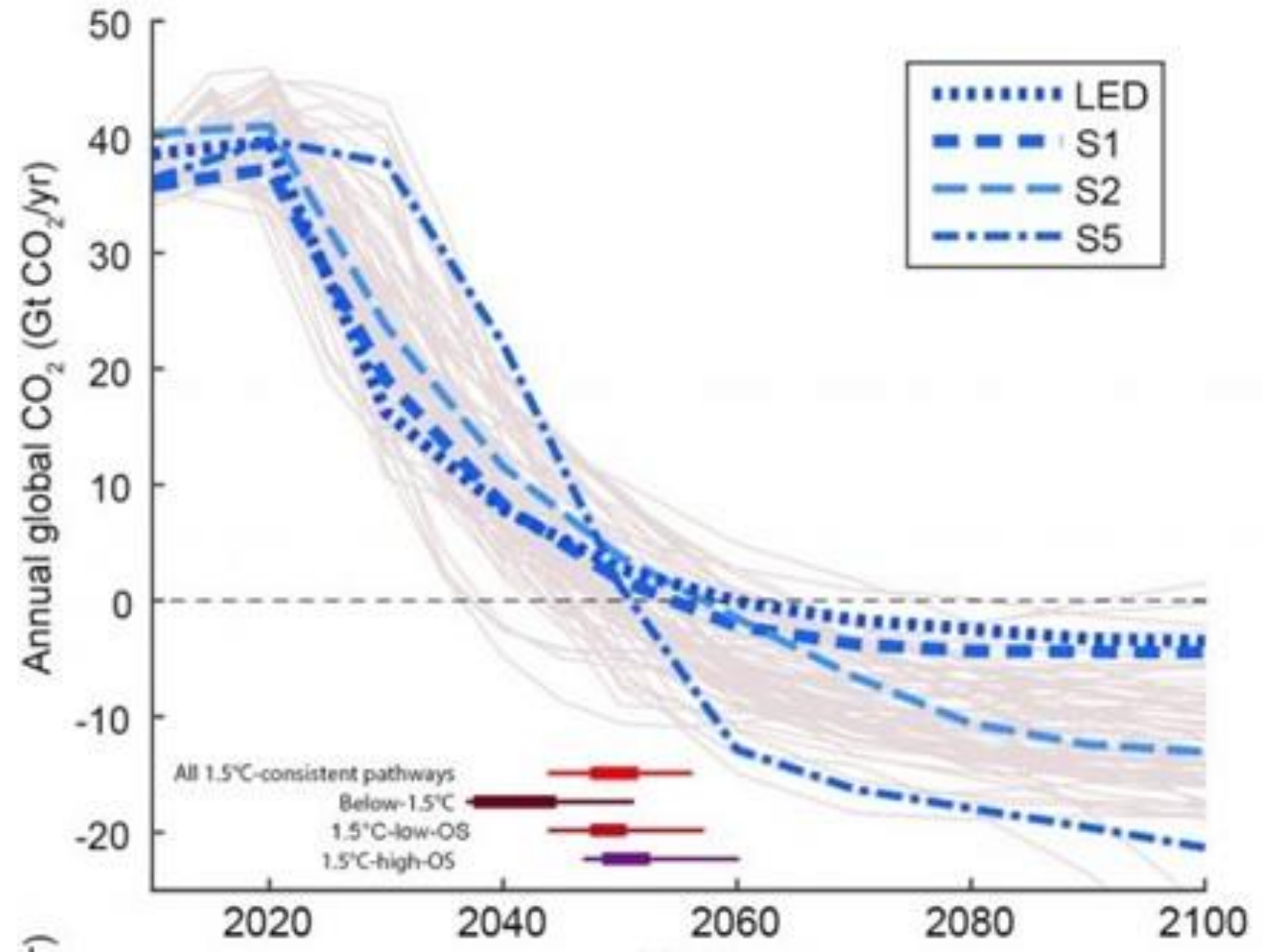
So what should we do?



So what should we do?

Different possible strategies to reduce emissions

The more we postpone action, the more we implicitly rely on (inexistent) negative emission technologies

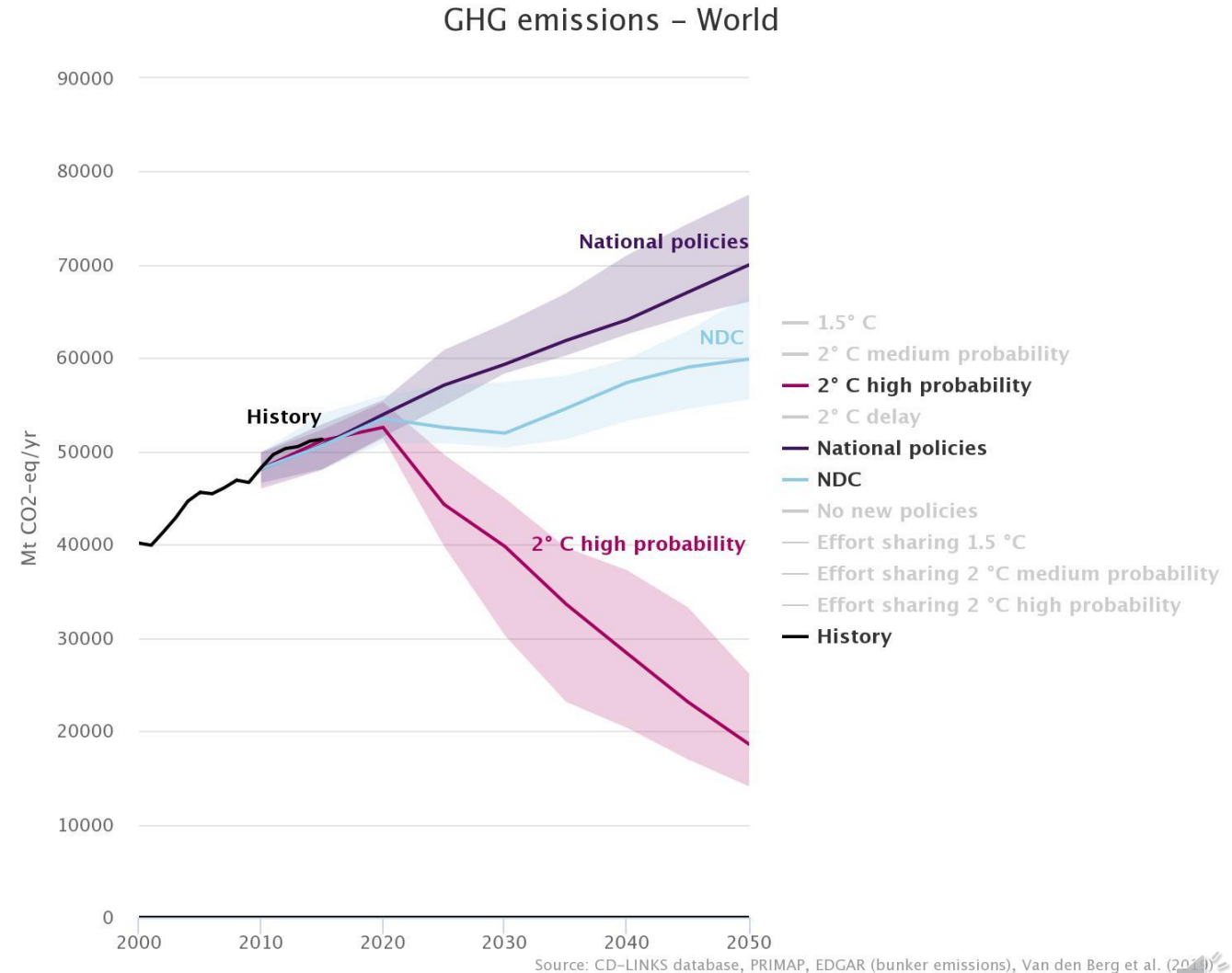


So? What should we do?

Different possible strategies to reduce emissions

...all of them require strengthening current efforts

- National Policies
- Paris Treaty and «NDCs»
- «Implementation gap»

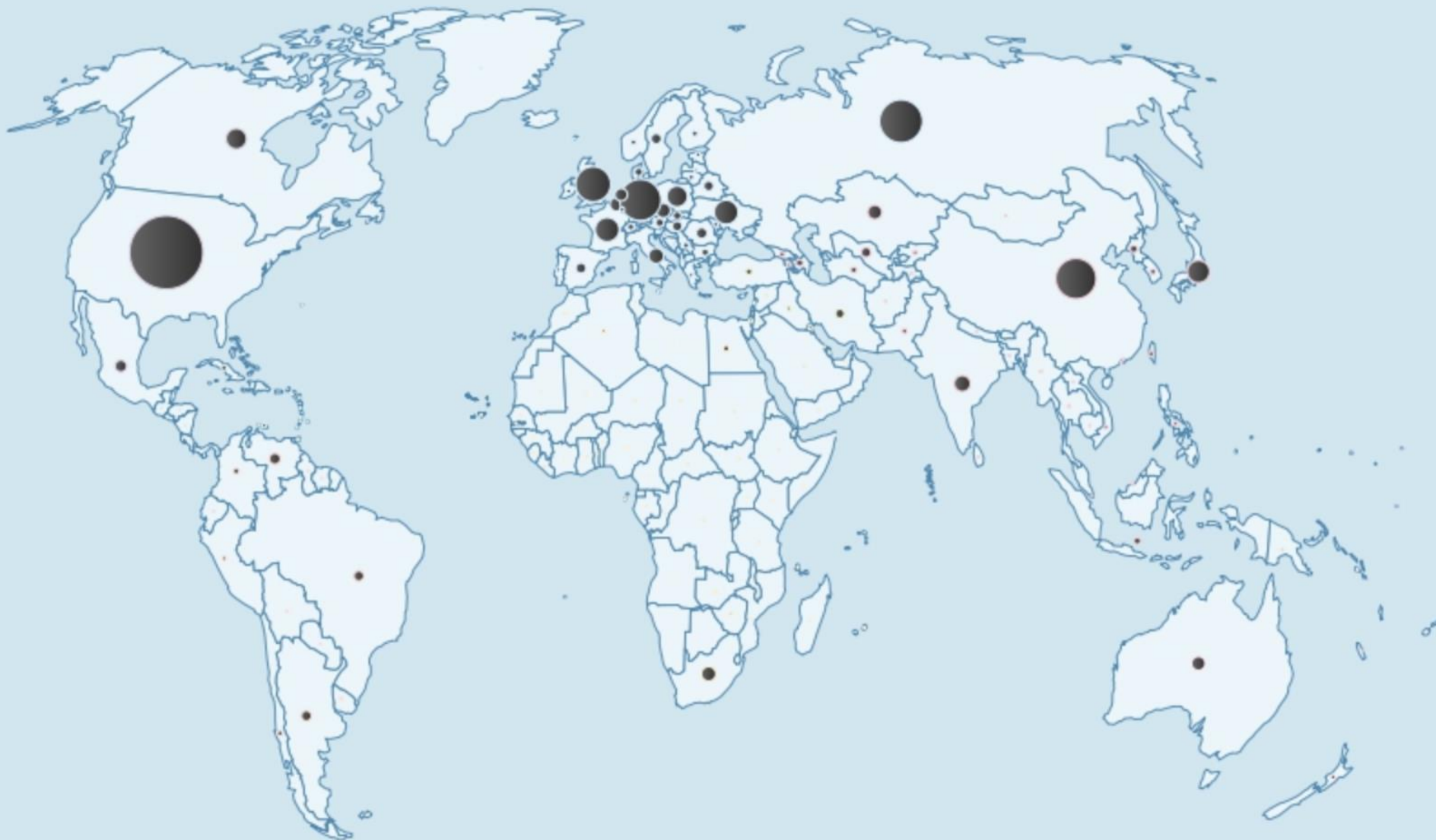


Are we all equally responsible?

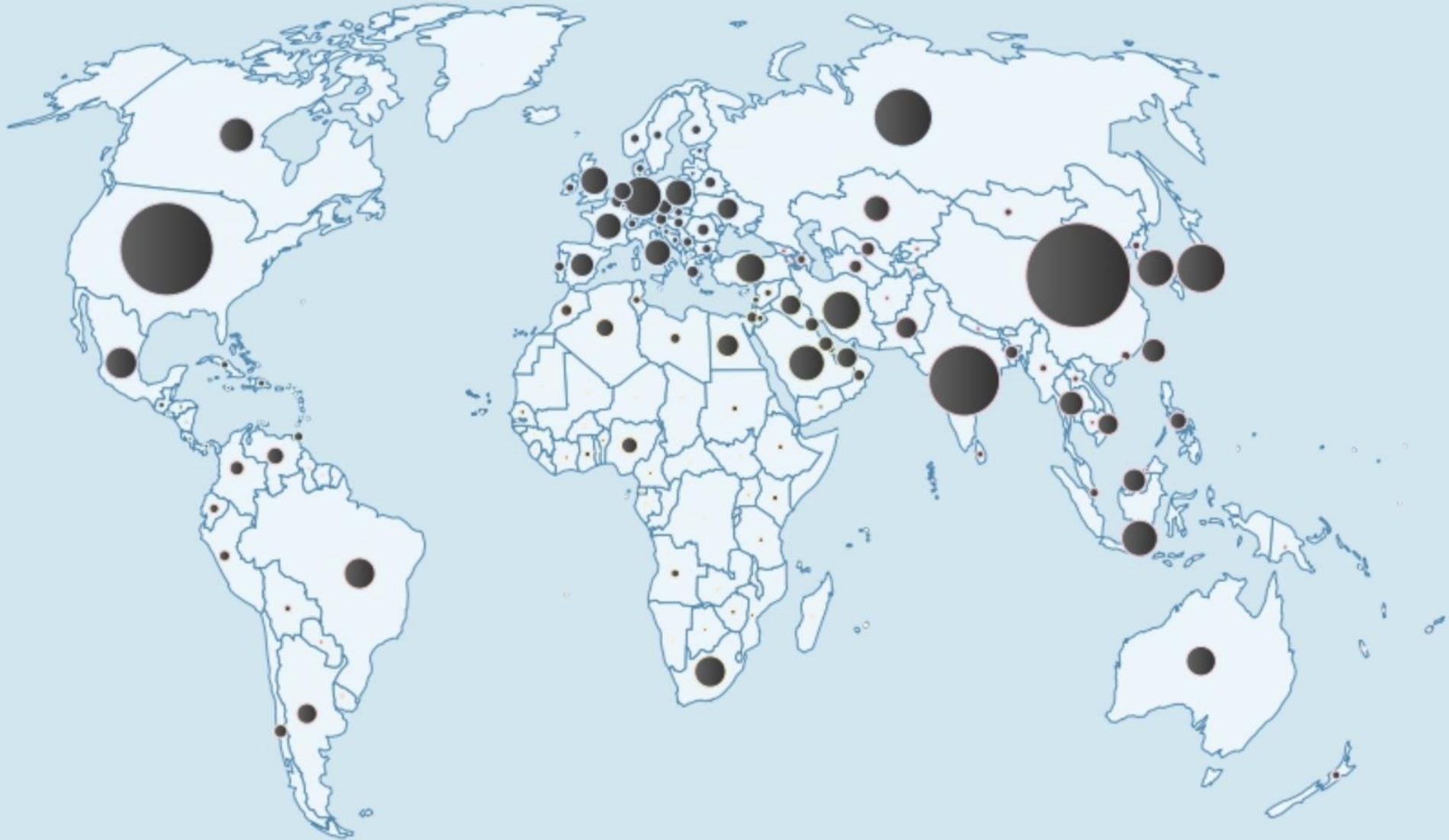
Yesterday, today, tomorrow



CO₂ Territorial emissions in 1960 (MtCO₂)



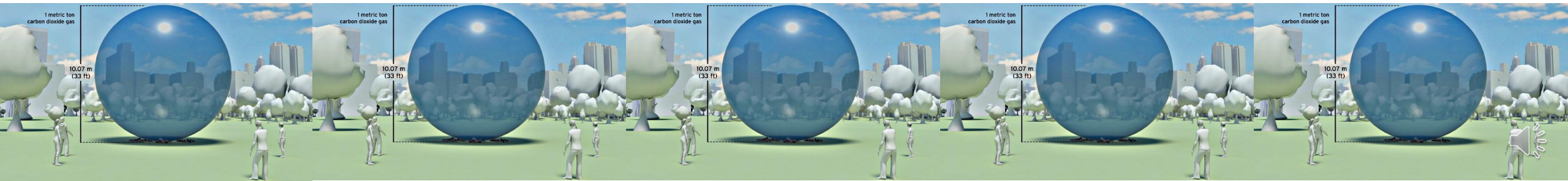
CO₂ Territorial emissions in 2018 (MtCO₂)



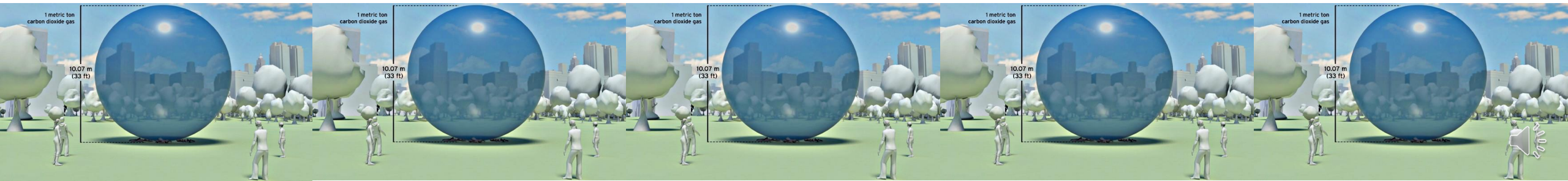




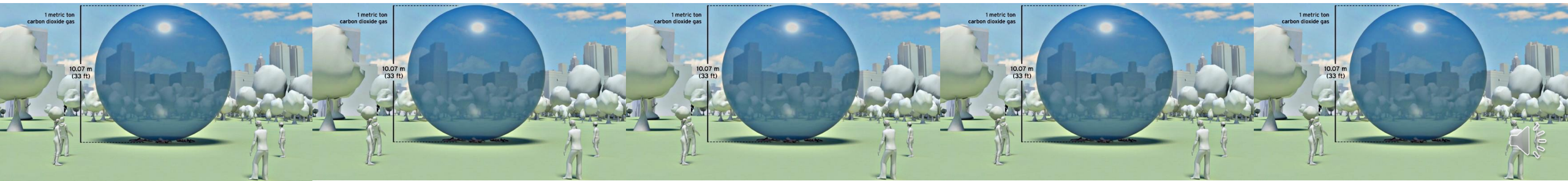
CO2 per capita:
World: ~5 t
(I got back to this)



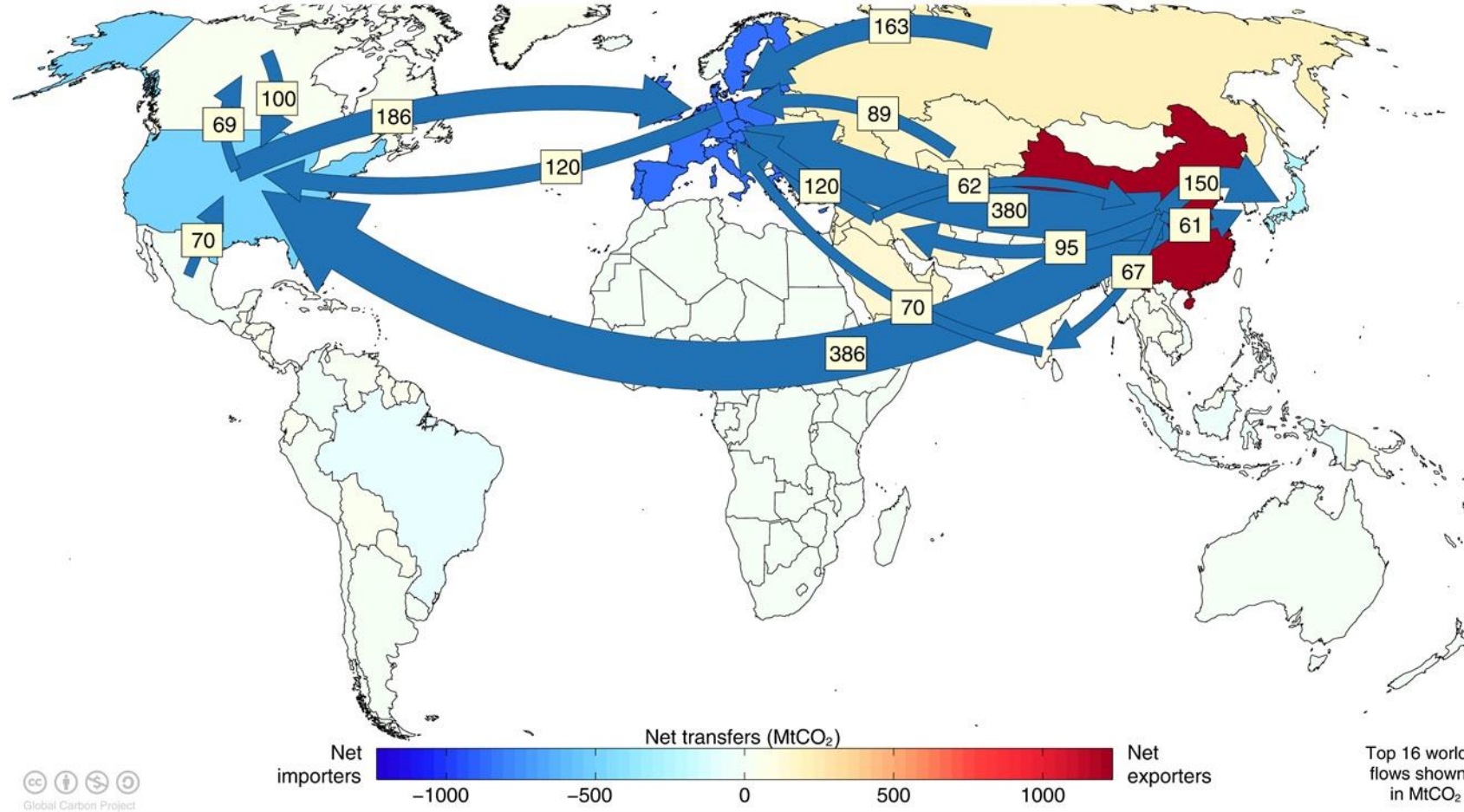
CO2 per capita:
Italy: ~6 t (~8 t)



CO2 per capita:
Italy: ~6 t (~8 t)
Ireland: ~8 t (~9 t)



Are we all equally responsible?



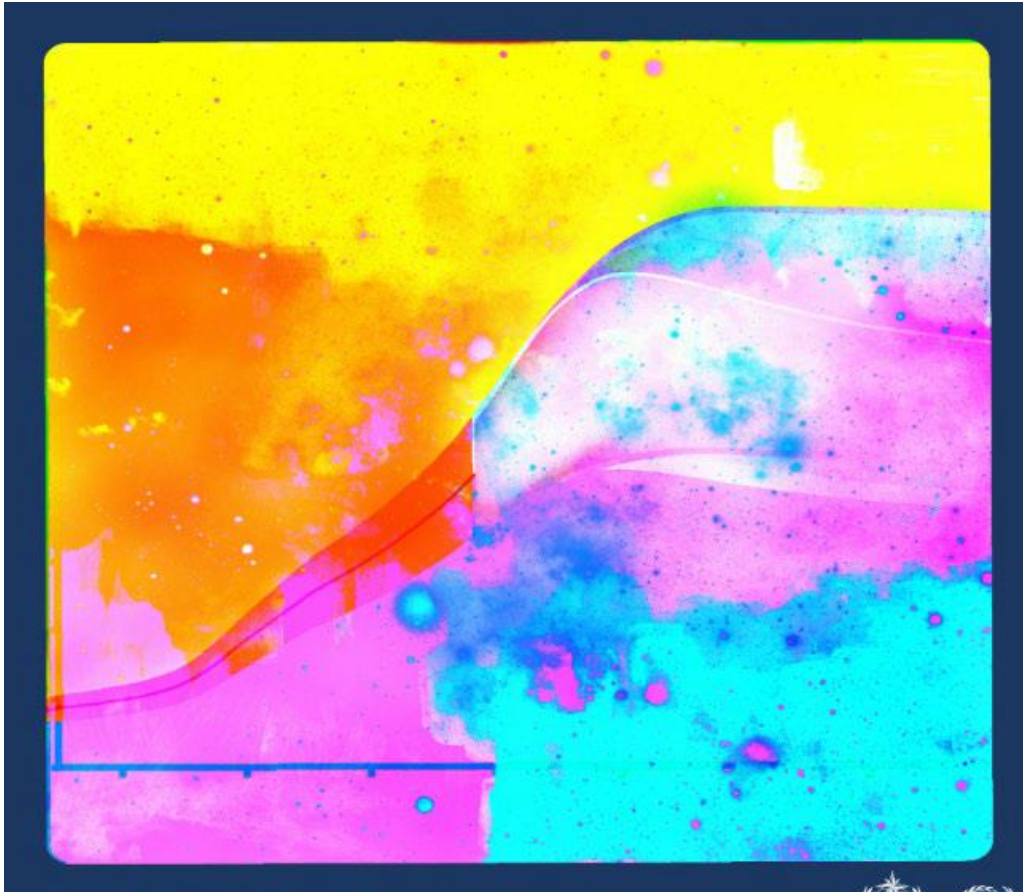
Values for 2011. EU is treated as one region. Units: MtCO₂
Source: [Peters et al 2012](#)

Why should we start?

Reasons and options for action



Why should we start?



Because everything counts

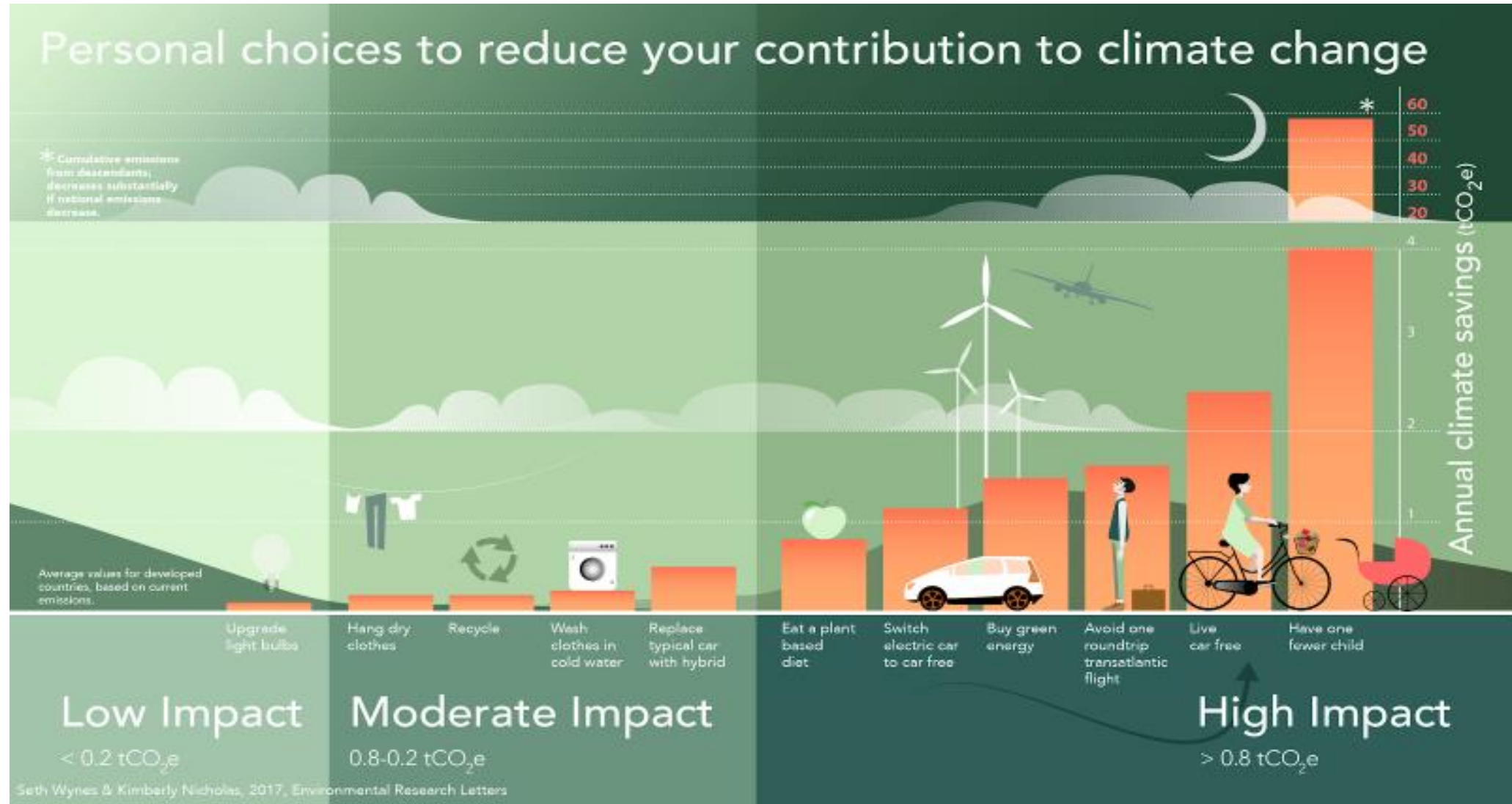
Every tenth of a degree counts

Every day counts

Every choice counts



Why should we start?



Why should we start?

Every time we travel we can choose...

One flight (Milan - New York and back)

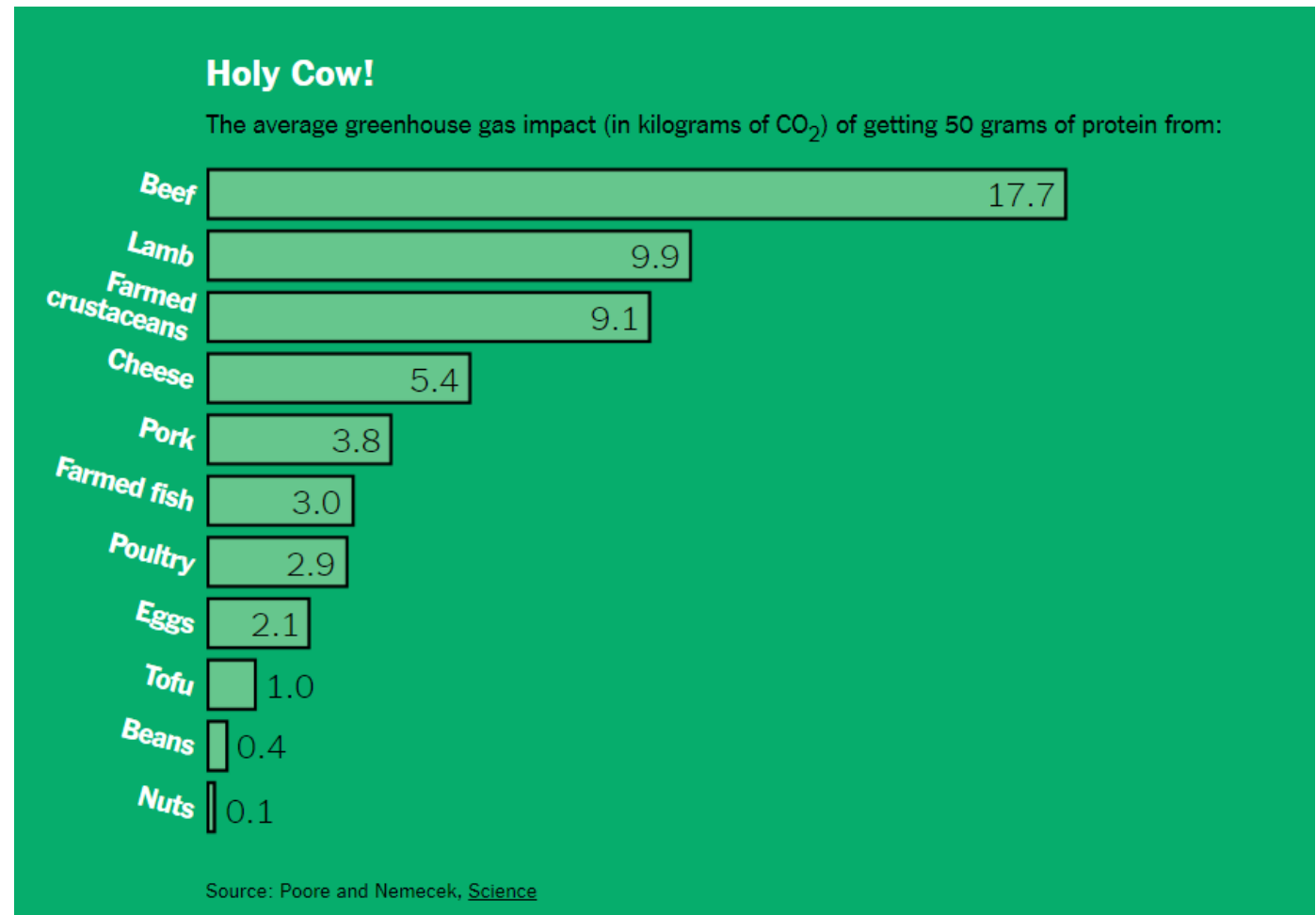
Reduces summer ice cap by 3 square meters



Why should we start?

Every time we eat we
can make a choice...

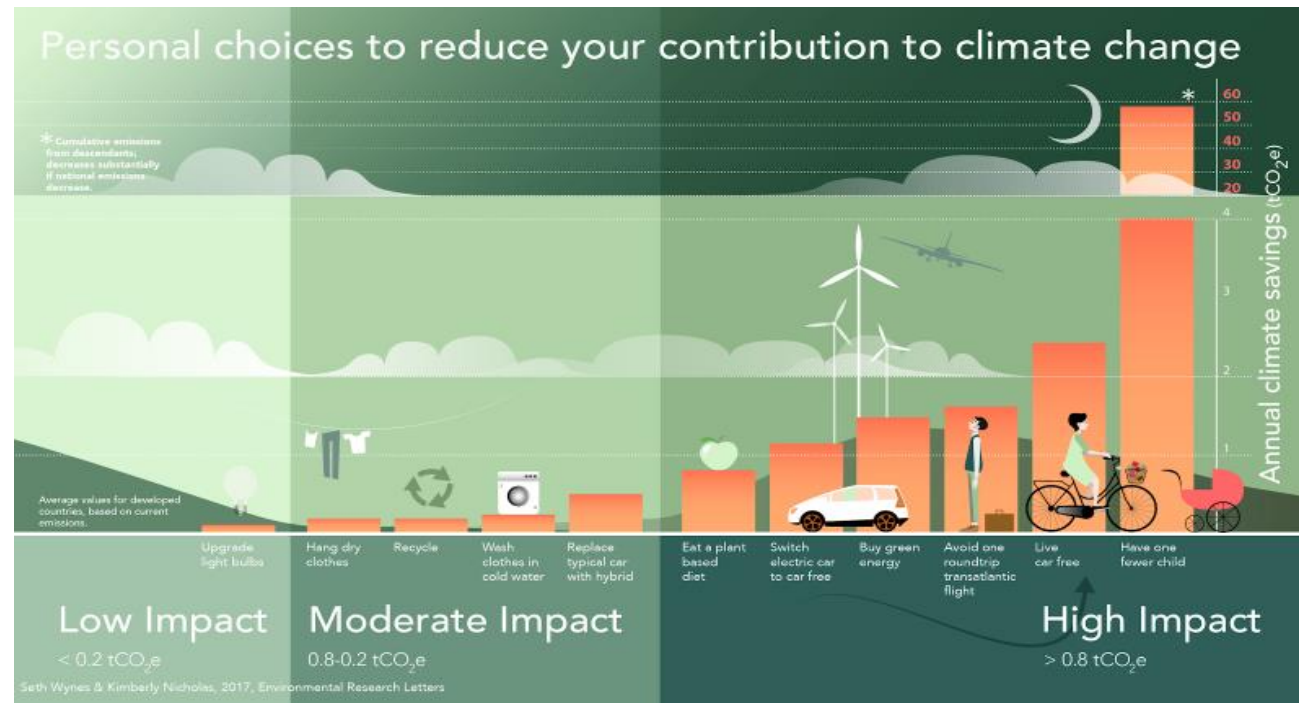
... and not knowing this
is tantamount to
exacerbating the
problem



Why should we start?

Know your carbon footprint: <https://www.atmosfair.de/en/home>

Please consider offsetting: <http://www.standfortrees.org/manvsearth>



Thank you

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