The UK, Paris & climate change

Laggard or Leader?

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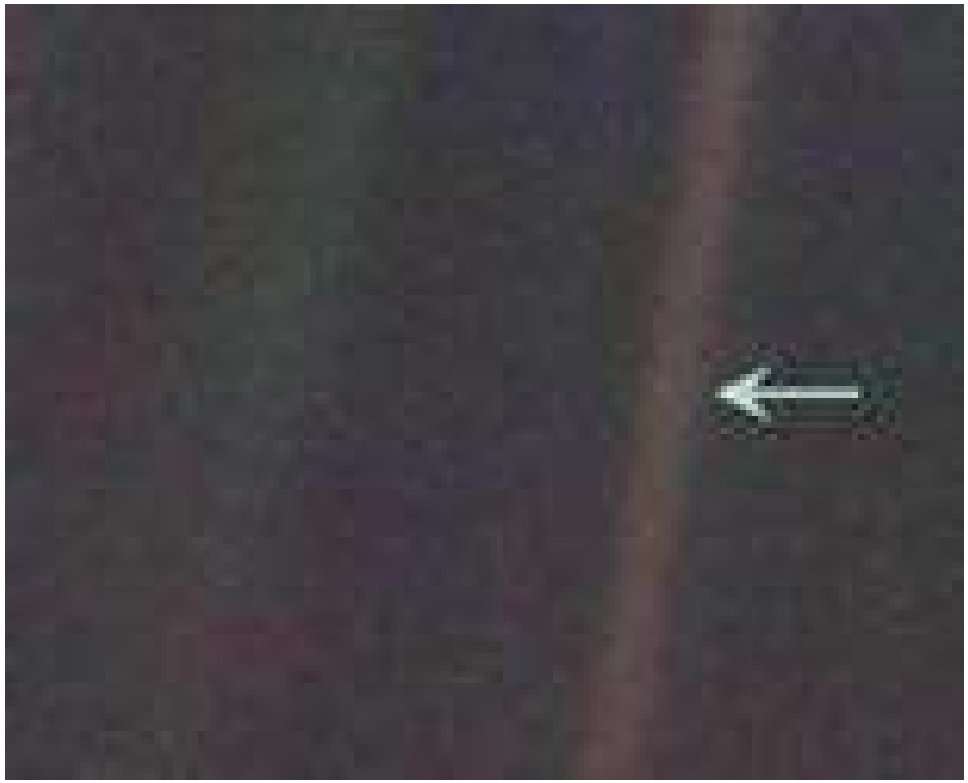
Fragility of our place on space-ship Earth

Coming to terms with our new world vision (1960s -)



… a climate message from the Pope

*… the alliance of **technology and economics** ends up side-lining anything unrelated to its immediate interests.*

… a climate message from the Pope

*… the alliance of technology and economics ends up side-lining anything unrelated to its immediate interests. … whereas any **genuine** attempt to introduce change is viewed as a nuisance based on **romantic illusions***


So what is the
mitigation challenge?

The Paris Agreement establishes our commitments

United Nations

Framework Convention on Climate Change

FCCC/CP/2015/L.9/Rev.1

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Conference of the Parties
Twenty-first session
Paris, 30 November to 11 December 2015

Agenda item 4(b)
Durban Platform for Enhanced Action (decision 1/CP.17)
Adoption of a protocol, another legal instrument, or an agreed outcome with legal force under the Convention applicable to all Parties

ADOPTION OF THE PARIS AGREEMENT

Proposal by the President

Draft decision -/CP.21

The *Conference of the Parties*,

Recalling decision 1/CP.17 on the establishment of the Ad Hoc Working Group on the Durban Platform for Enhanced Action,

Also recalling Articles 2, 3 and 4 of the Convention,

Further recalling relevant decisions of the Conference of the Parties, including decisions 1/CP.16, 2/CP.18, 1/CP.19 and 1/CP.20,

The Paris Agreement establishes our commitments

i.e. … to take action to:

… hold the increase in global average temperature to ***well below 2°C*** *above pre-industrial levels and pursue* ***efforts*** *to limit the temperature increase to* ***1.5°C***

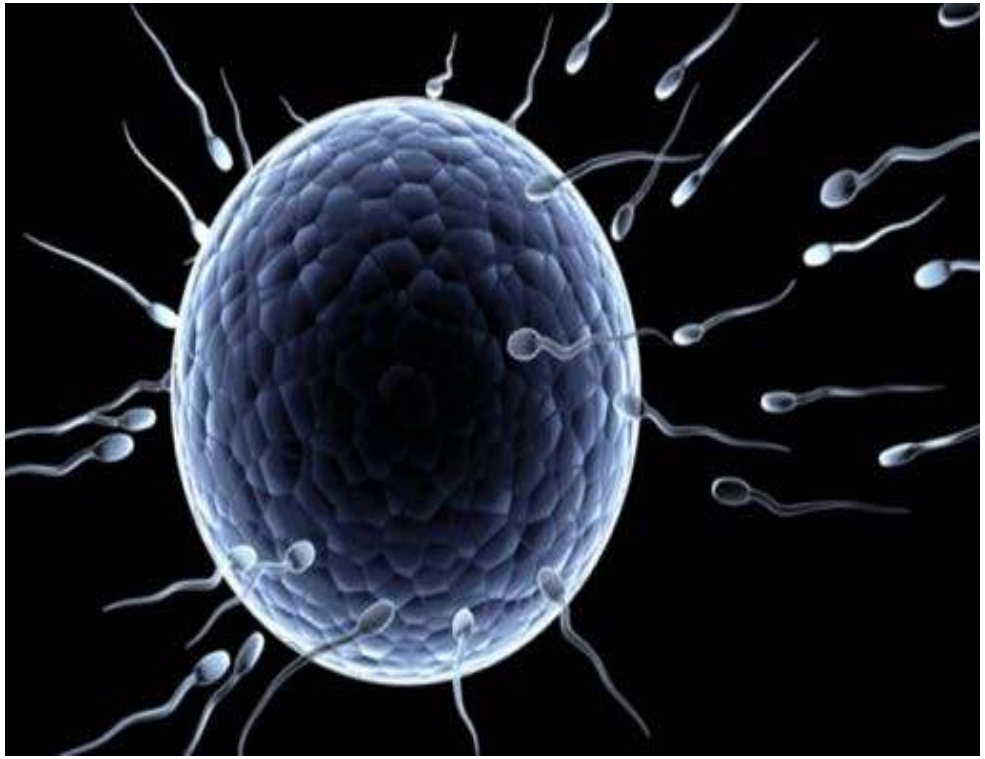
… to undertake rapid reductions in accordance with ***best science***

… on the ***basis of equity***,

To whom are our commitments made?

To the poor living in climatically vulnerable regions ***now***

To our own wealthier children ***tomorrow***



To future generations

Even to us now

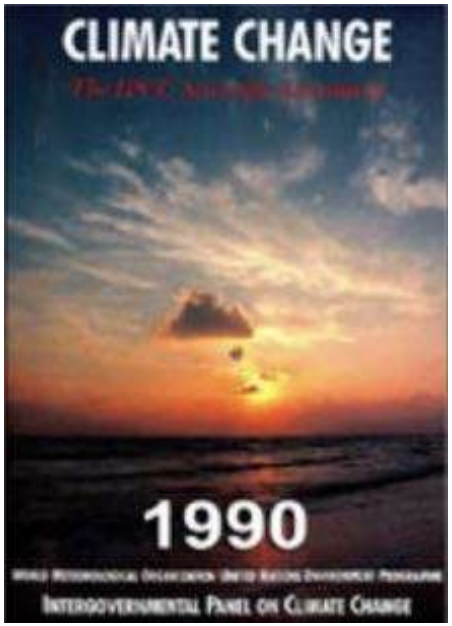
(migration & breakdown of Schengen)

To other species & ecosystems now & over millennia

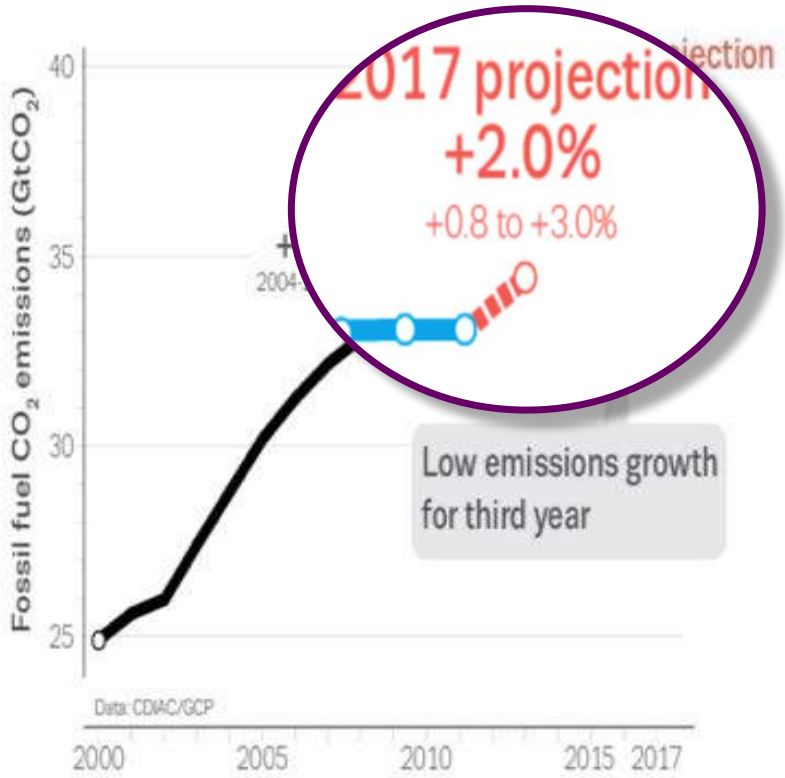
To our own unique home

Responding to the mitigation challenge?

Humility as a starting point for hope & action



- 1990: first IPCC report
- 2016: CO_2 60% >1990
- 2017: CO_2 still rising
- Up by around 2%



Despite optimistic rhetoric, we've delivered
27 years of abject failure in terms of reducing total emissions

Thus far … *litany of **technocratic** frauds*

- Offsetting … paying a poor person to diet for us
- Clean development mechanism (CDM) … state sanctioned offsetting
- Emissions trading (EUETS) … so many permits the €tCO2 stays low
- Negative emission technoligies … at huge planetary scale
- Geo-engineering … a sticking plaster on gangrene

… we have not seriously tried real mitigation!

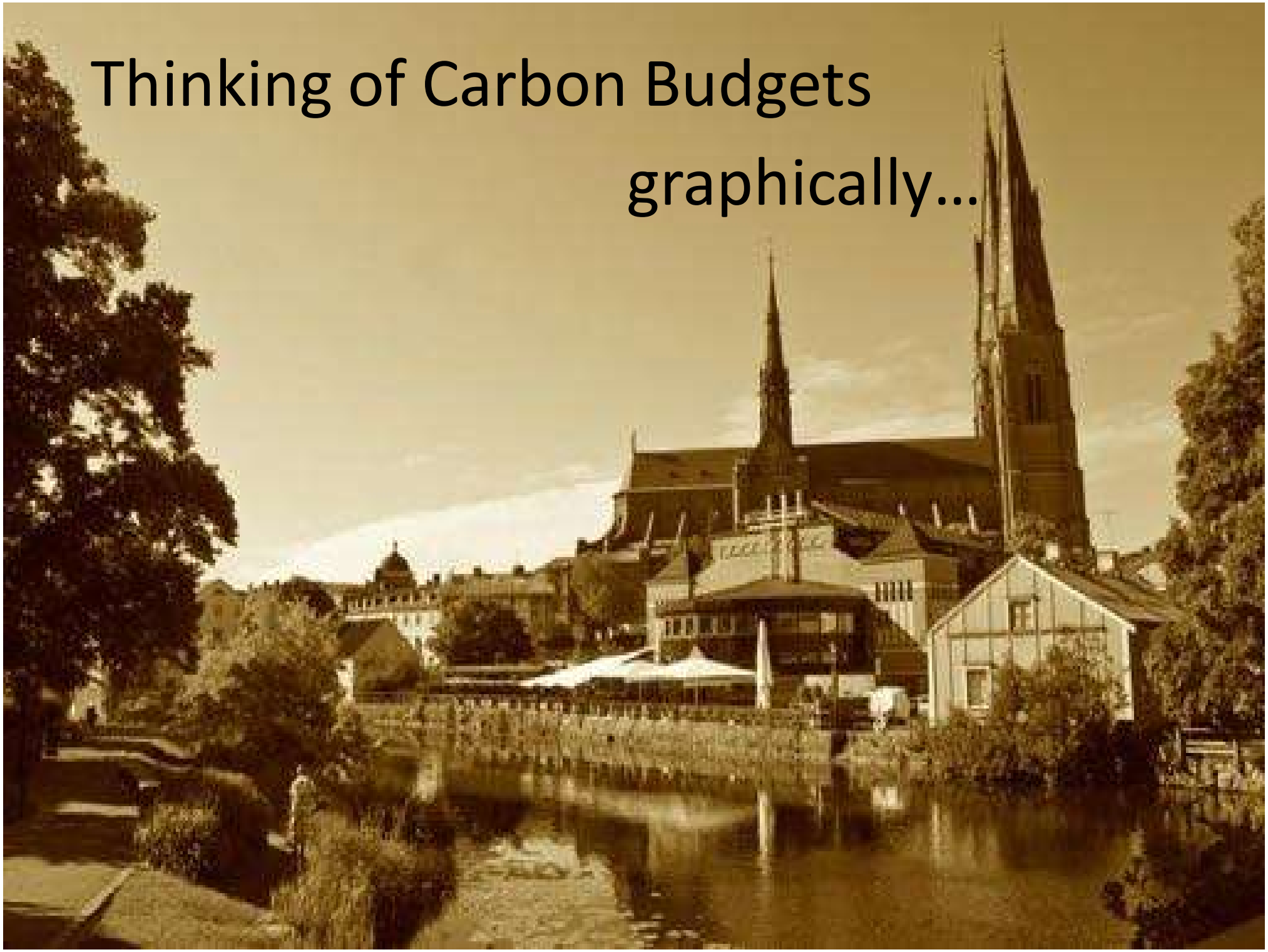
Even in the UK total CO_2 remains high - *little change since 1990*

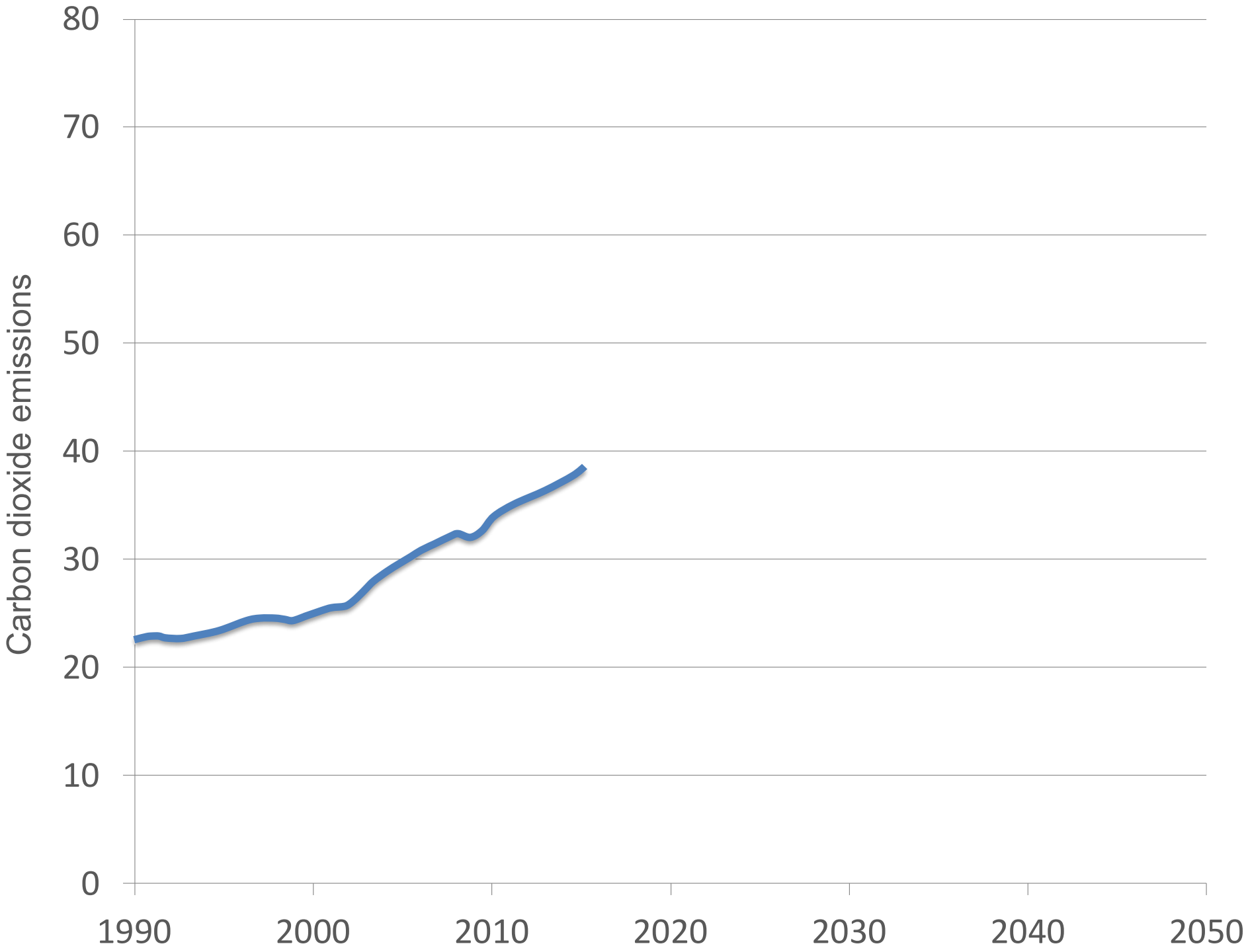
(inc. aviation & shipping, imports & exports)


Real mitigation:
take home issues to consider

Take home issues to consider

- The Paris commitments are **far more challenging** than most scientists & politicians are prepared to admit
- **Real mitigation** is still possible for 2°C - *just*
- **Long term** targets have no scientific basis *(e.g. 2030, 50, etc.)*
- It's total emissions - **Carbon Budgets -** that matter


Thinking of Carbon Budgets
graphically…


Carbon dioxide emissions
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1990
2000
2010
2020
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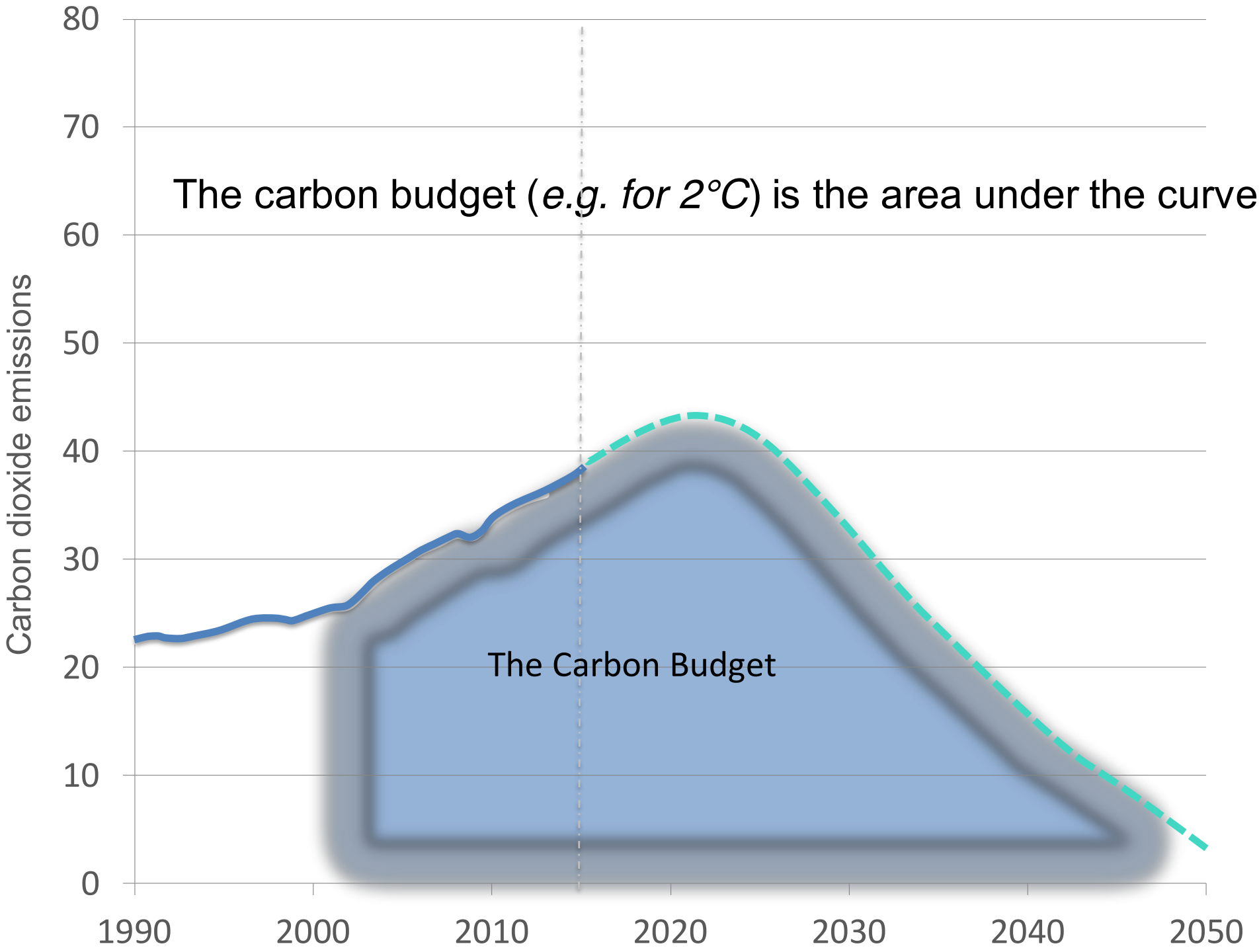
The carbon budget (*e.g. for 2°C*) is the area under the curve
The Carbon Budget
Carbon dioxide emissions
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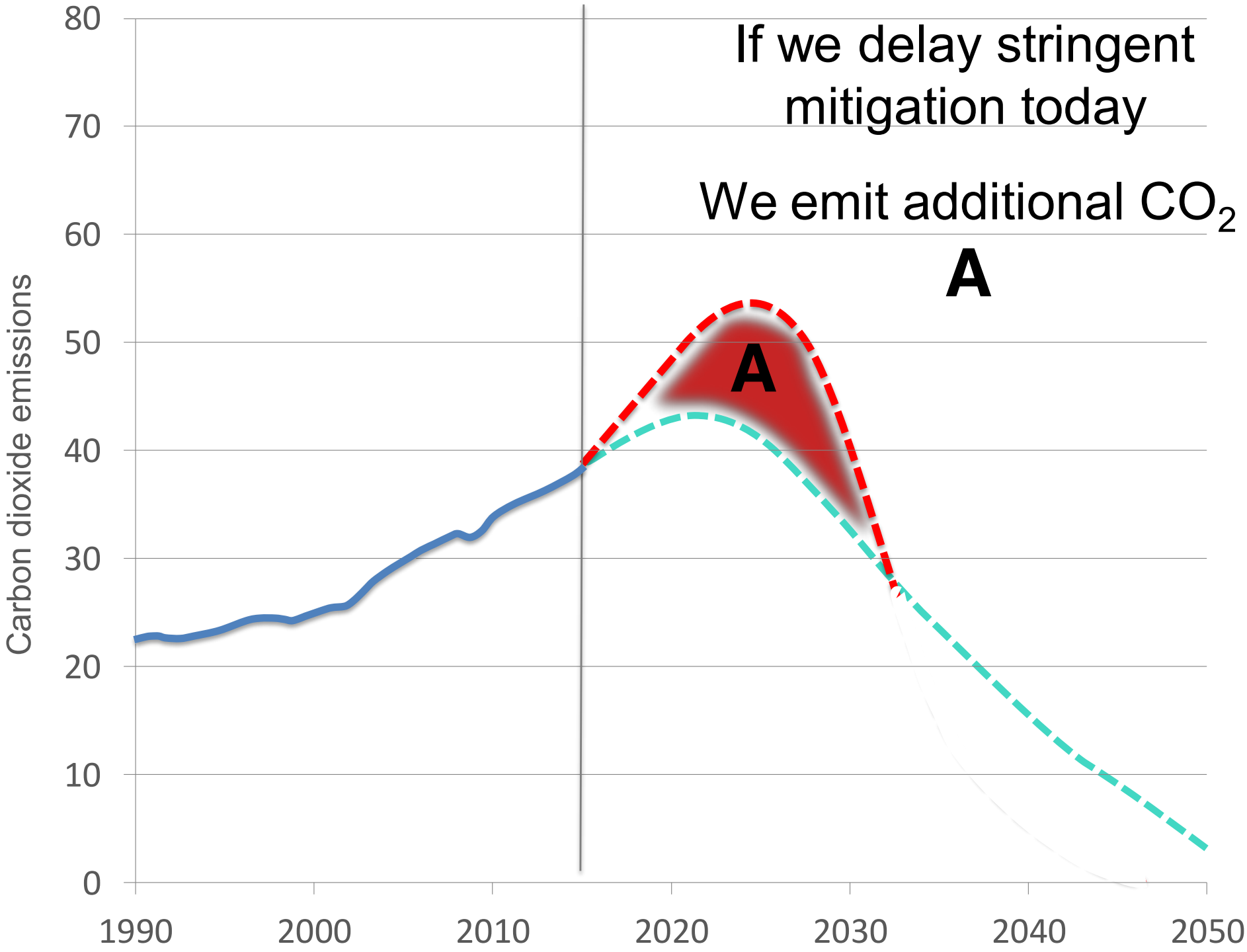
If we delay stringent mitigation today
We emit additional CO_2
A
A
Carbon dioxide emissions
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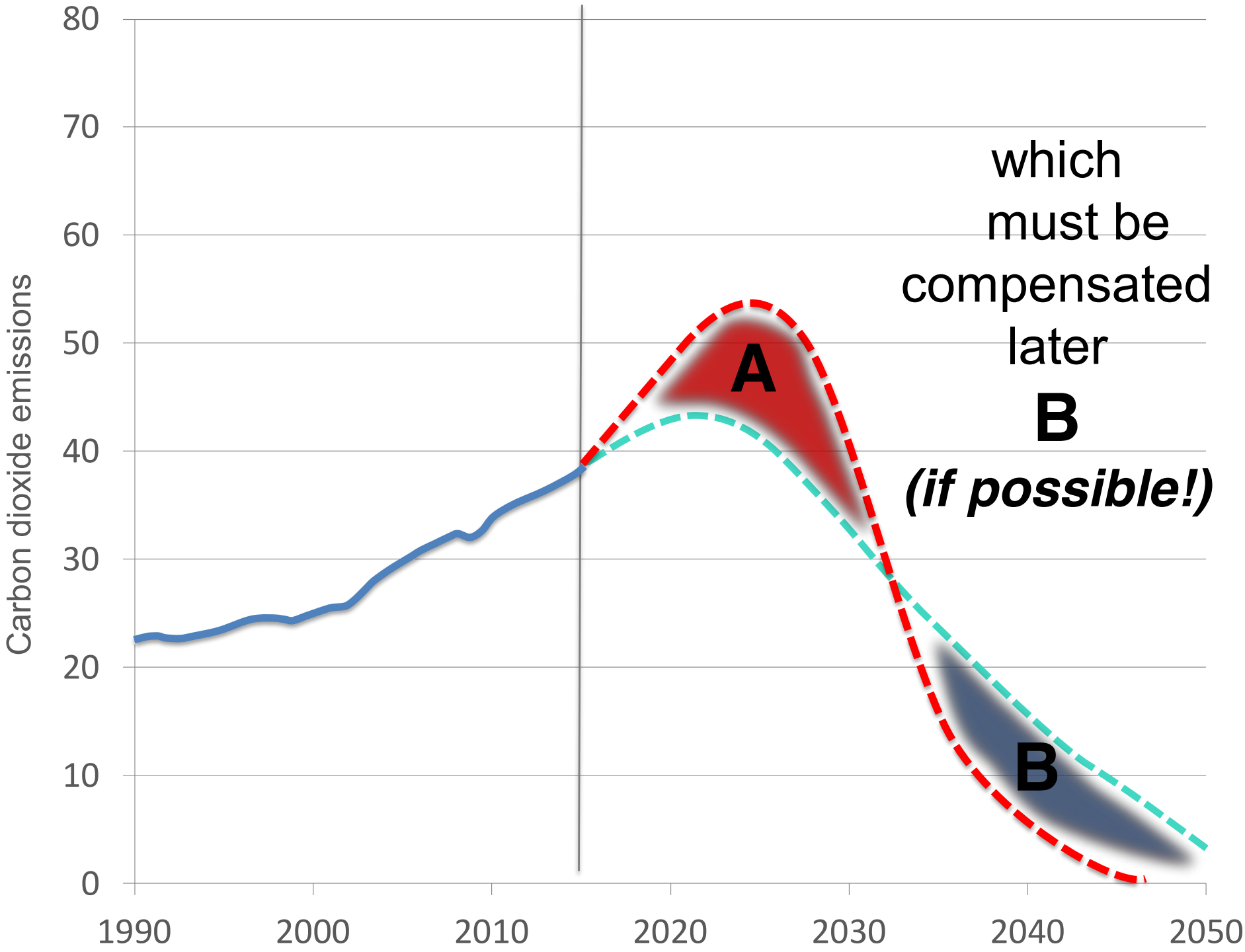
Carbon dioxide emissions
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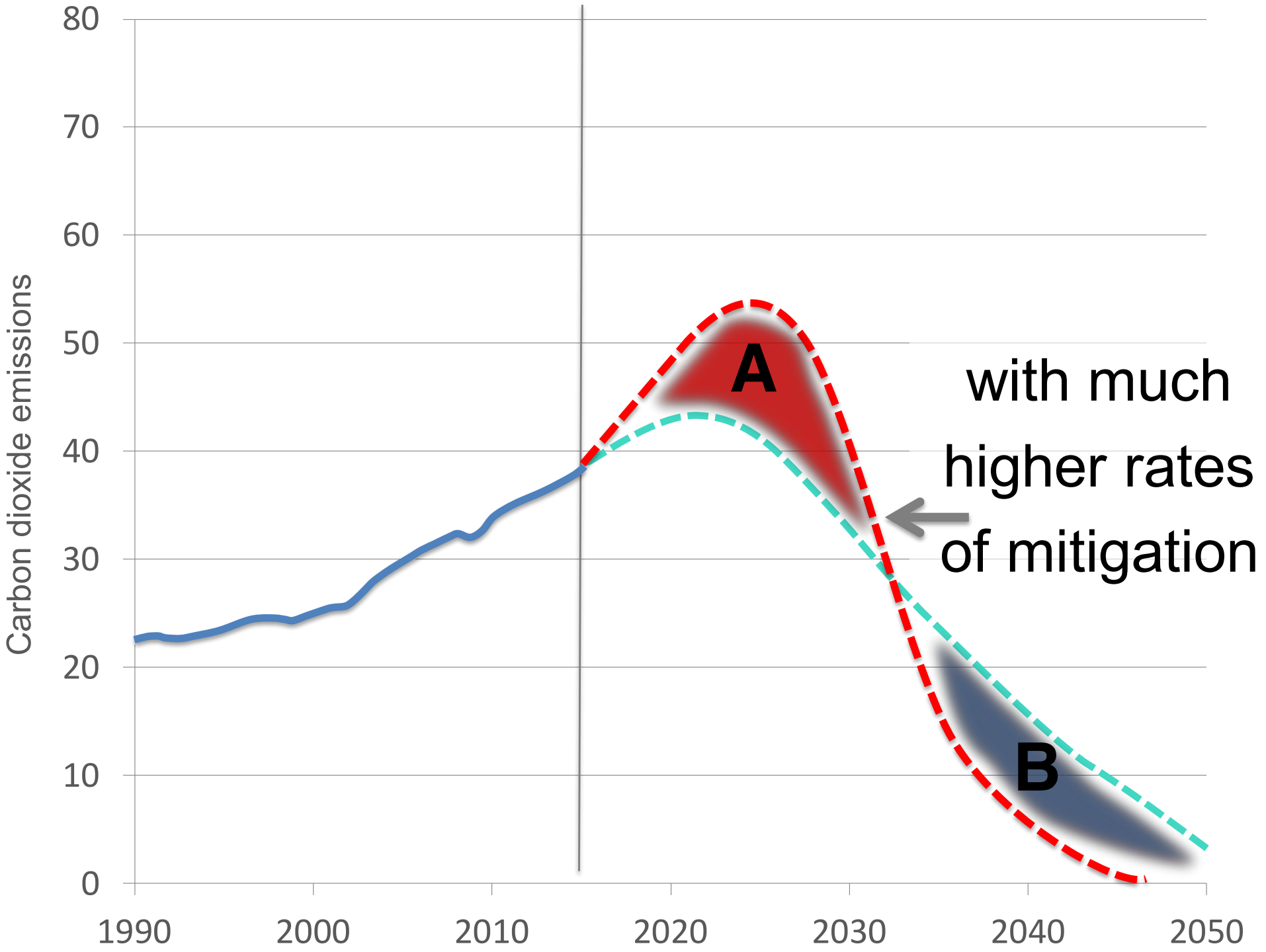
A
B
B
which
must be
compensated
later
(if possible!)


Carbon dioxide emissions
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0
1990
2000
2010
2020
2030
2040
2050
A
B
with much
higher rates
of mitigation

Returning to the Paris Agreement

My pre-Paris provocation

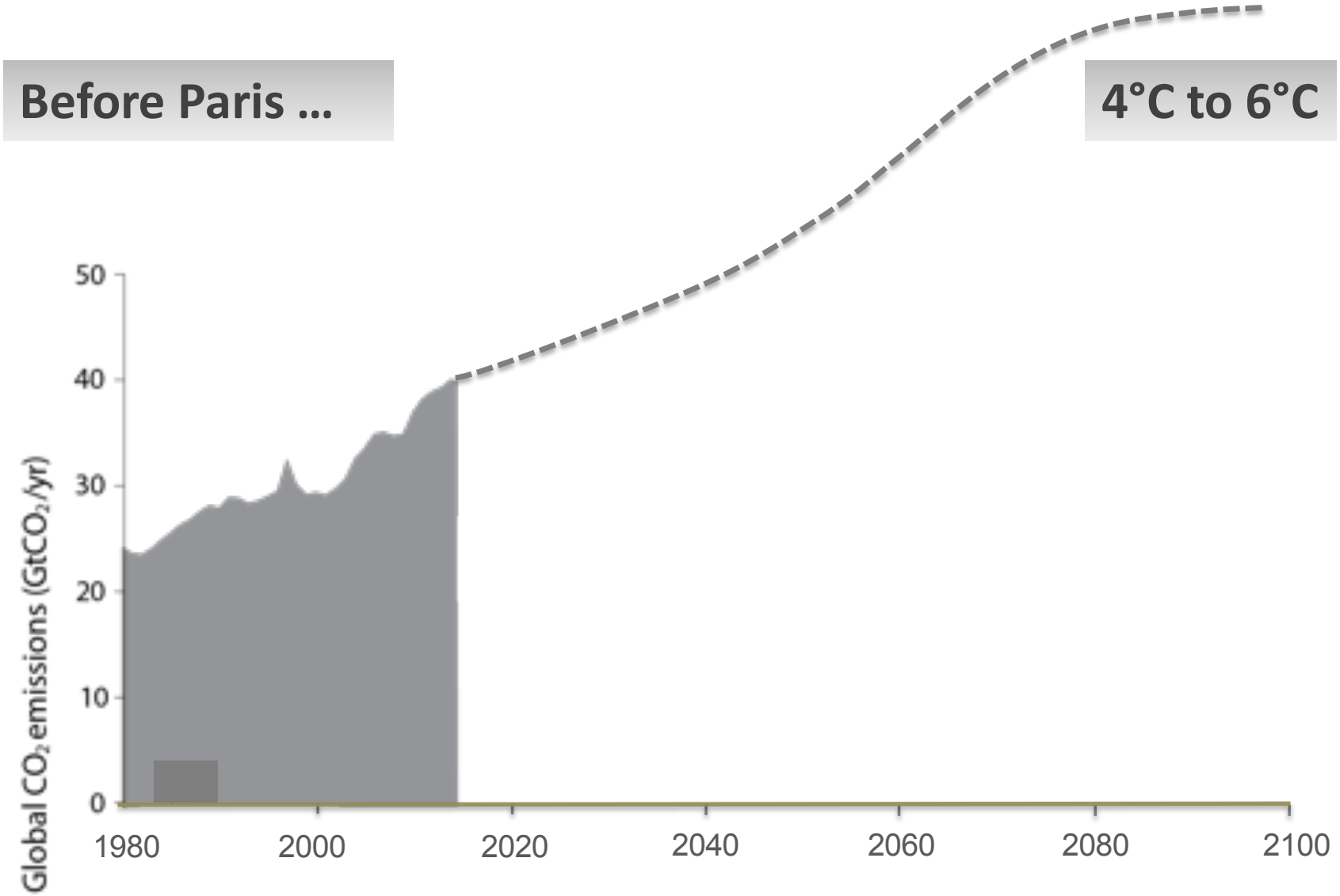
In developing 2°C emission scenarios, we've applied questionable assumptions and fine-tuned our analysis to align with political & economic sensibilities.

- Universities, NGOs, etc. have been **co-opted** by near-term **power**
- & typically **fear** questioning the dominant **neo-liberal** model

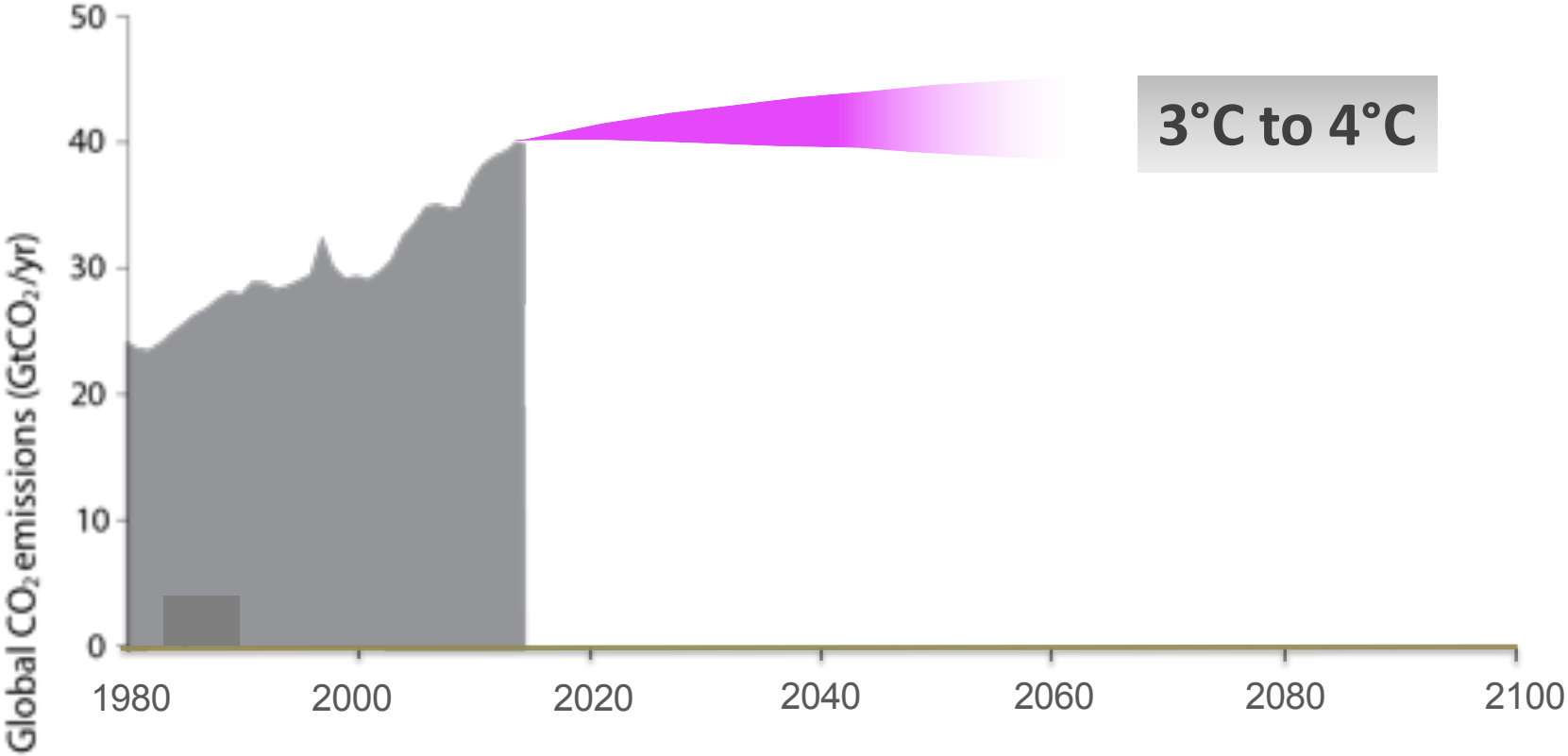
Quantifying the mitigation challenge

Before Paris …

4°C to 6°C

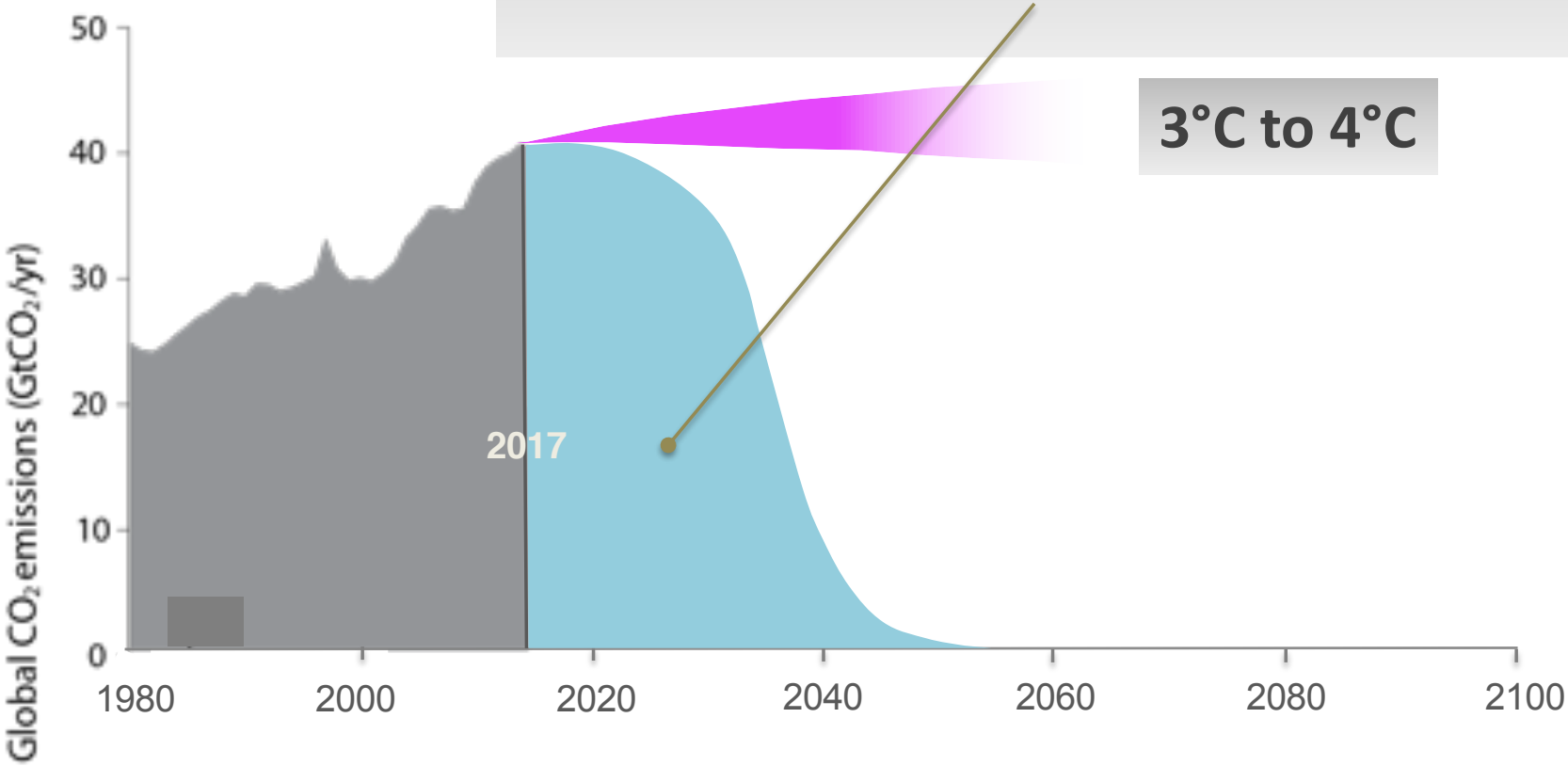


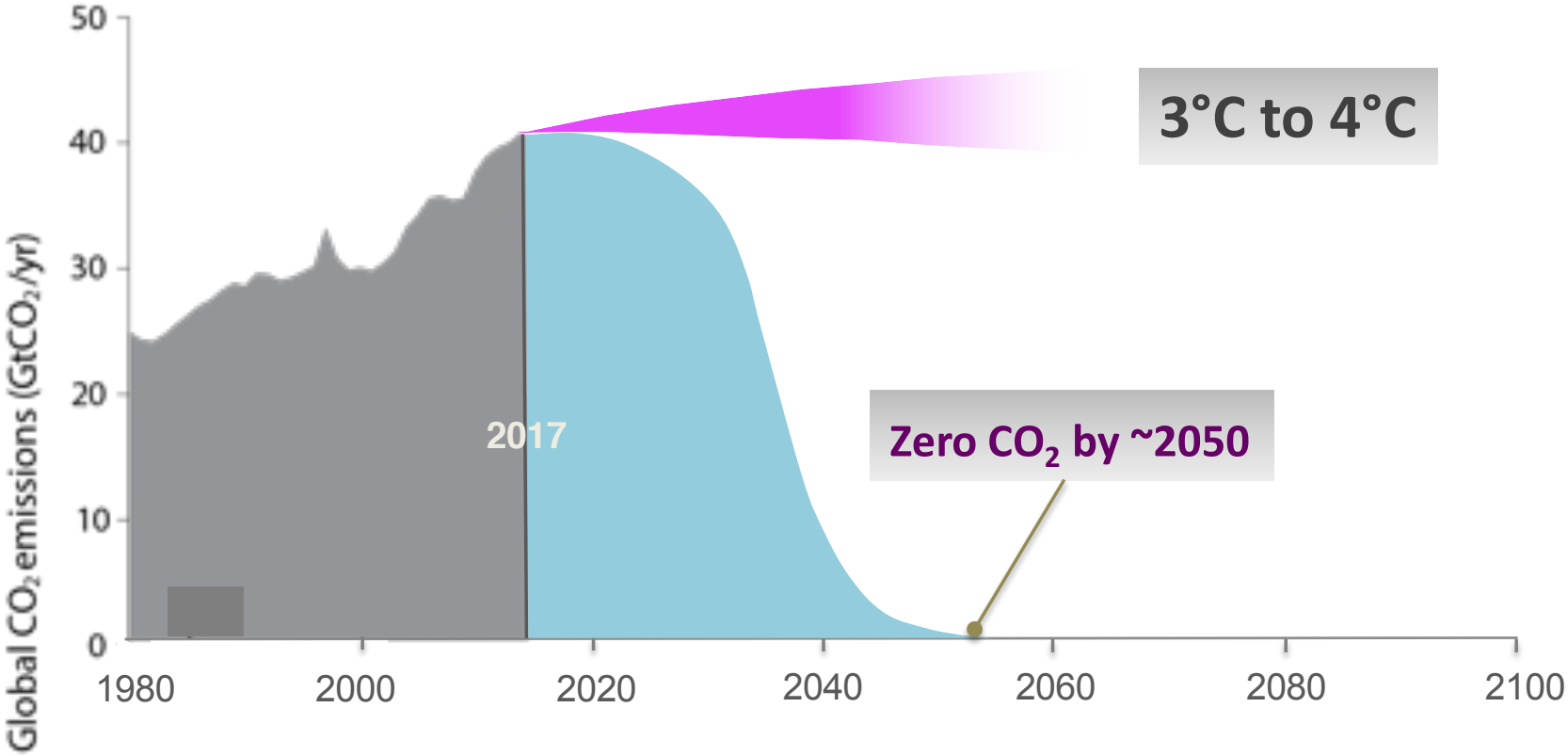
With Paris
… national pledges add up to...



And to stay ***"well below 2°C"***

- the carbon budget remaining from 2017 is:
- approx. **800 billion tonnes CO_2** (i.e. 800GtCO_2)

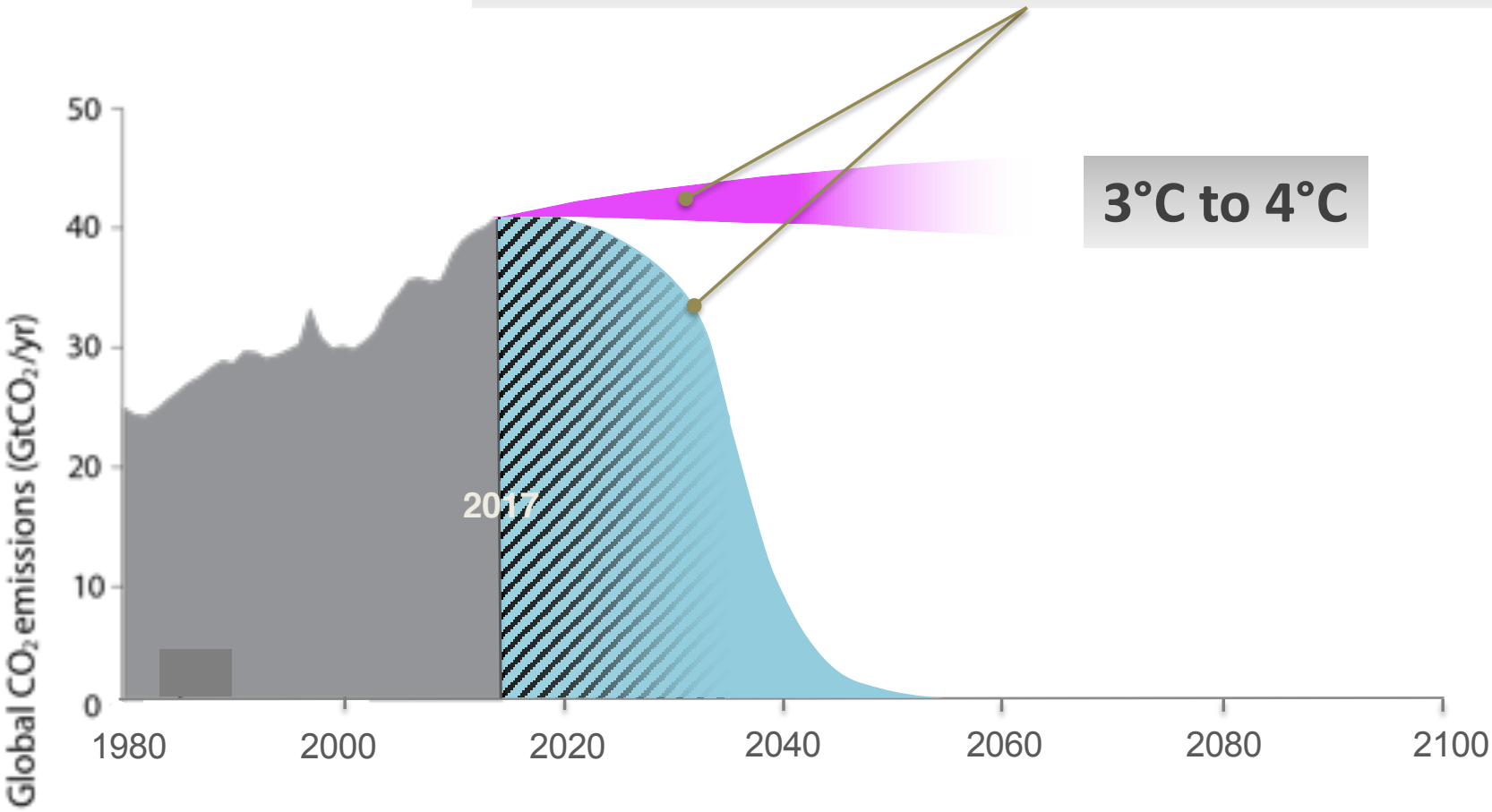



Global CO_2 emissions ($GtCO_2$/yr)
50
40
30
20
10
0
1980
2000
2020
2040
2060
2080
2100
2017
3°C to 4°C
Zero CO_2 by ~2050

A "romantic illusion"?

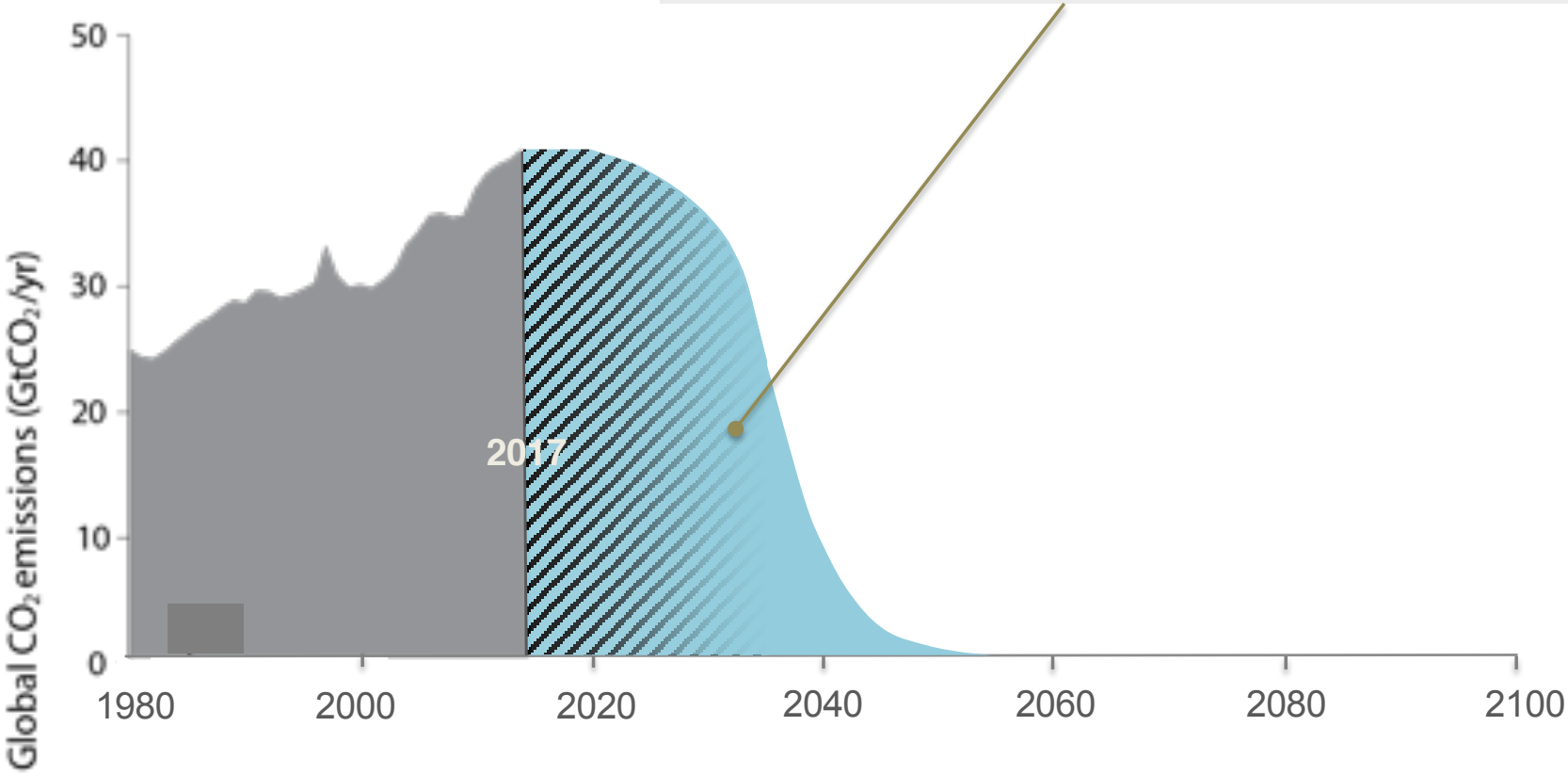
To move rapidly from current to 2°C pathways, requires

Immediate & deep cuts in ENERGY DEMAND



Zero CO_2 ENERGY SUPPLY is a pre-requisite of 2°C

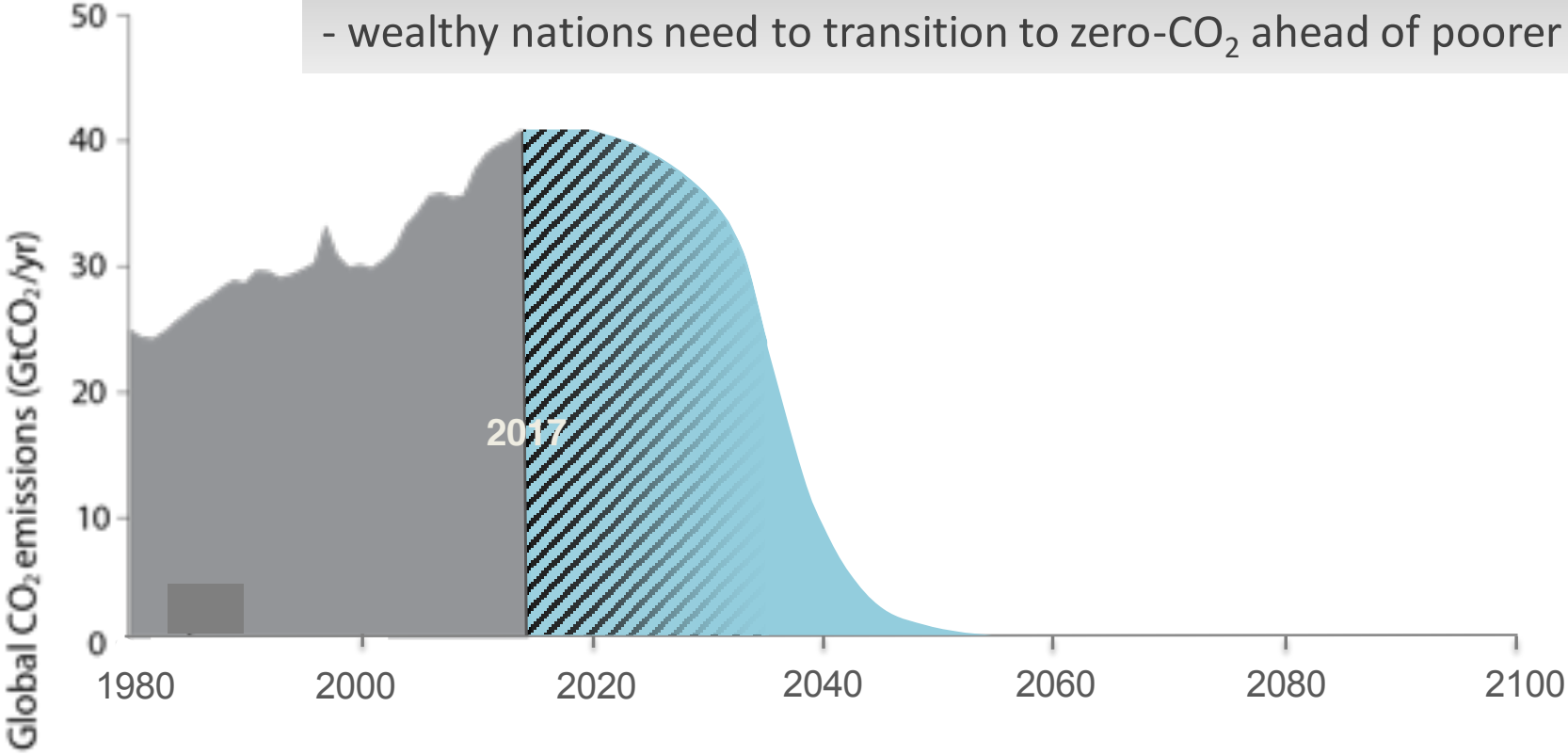
- *with planning & construction starting now*
- *& delivering in 1 to 3 decades*



Another "romantic illusion"?

But Paris also has an important EQUITY dimension

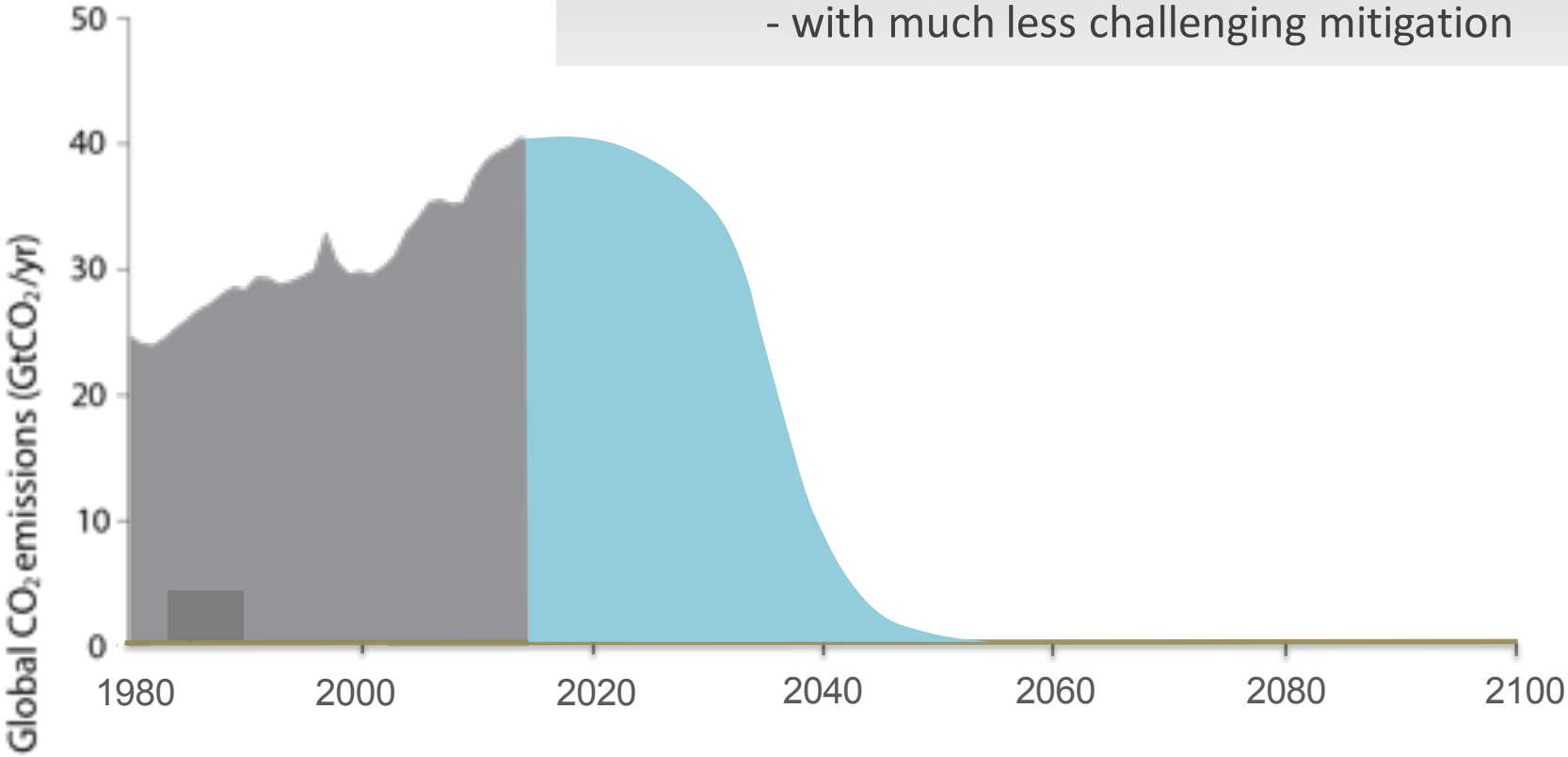
- wealthy nations need to transition to zero-CO_2 ahead of poorer nations



How can this fit with the Paris euphoria?

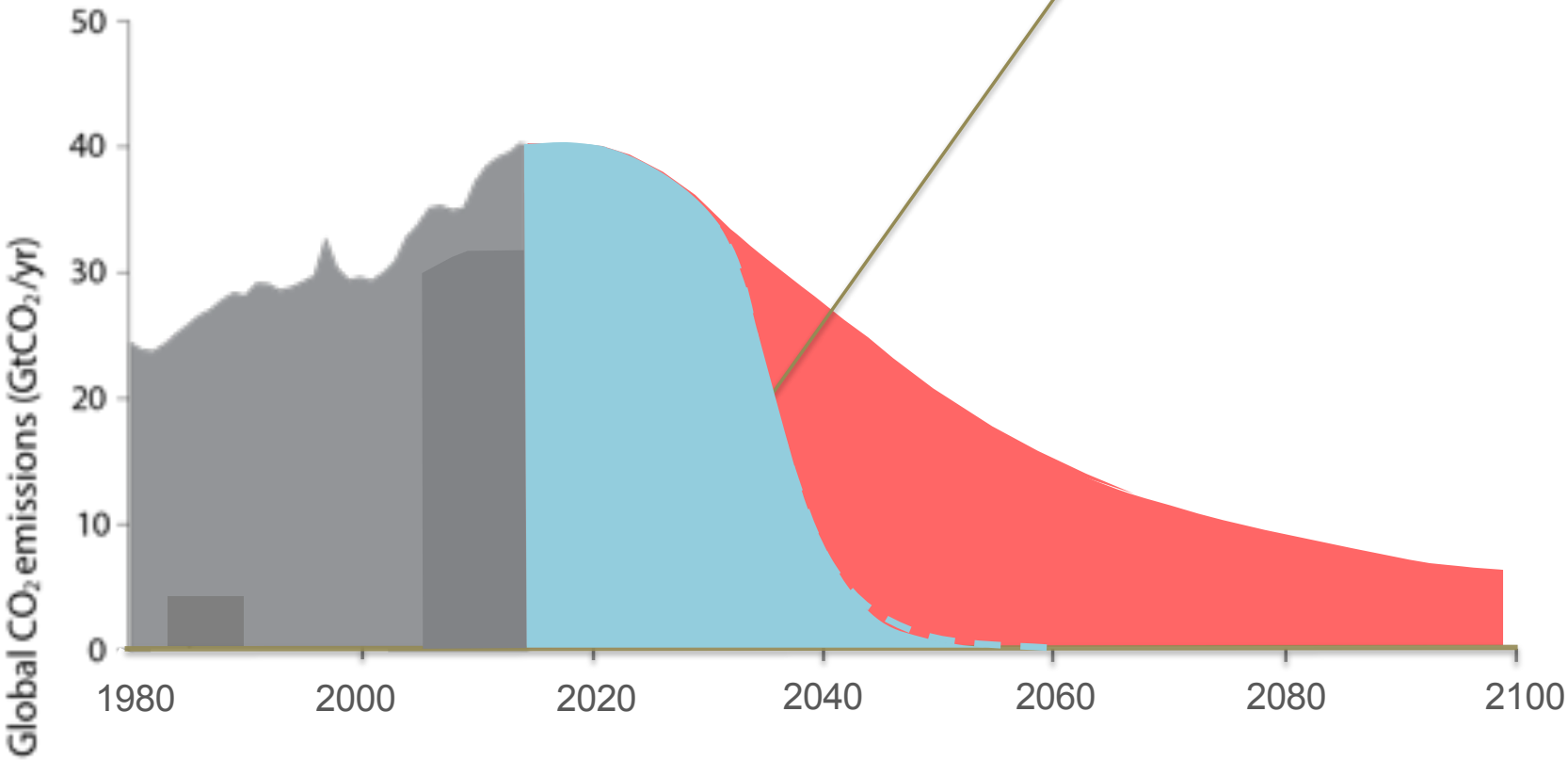
… because policymakers have received a different story

- their advice is dominated by modellers (IAM)
- who use much bigger 2°C carbon budgets
- with much less challenging mitigation



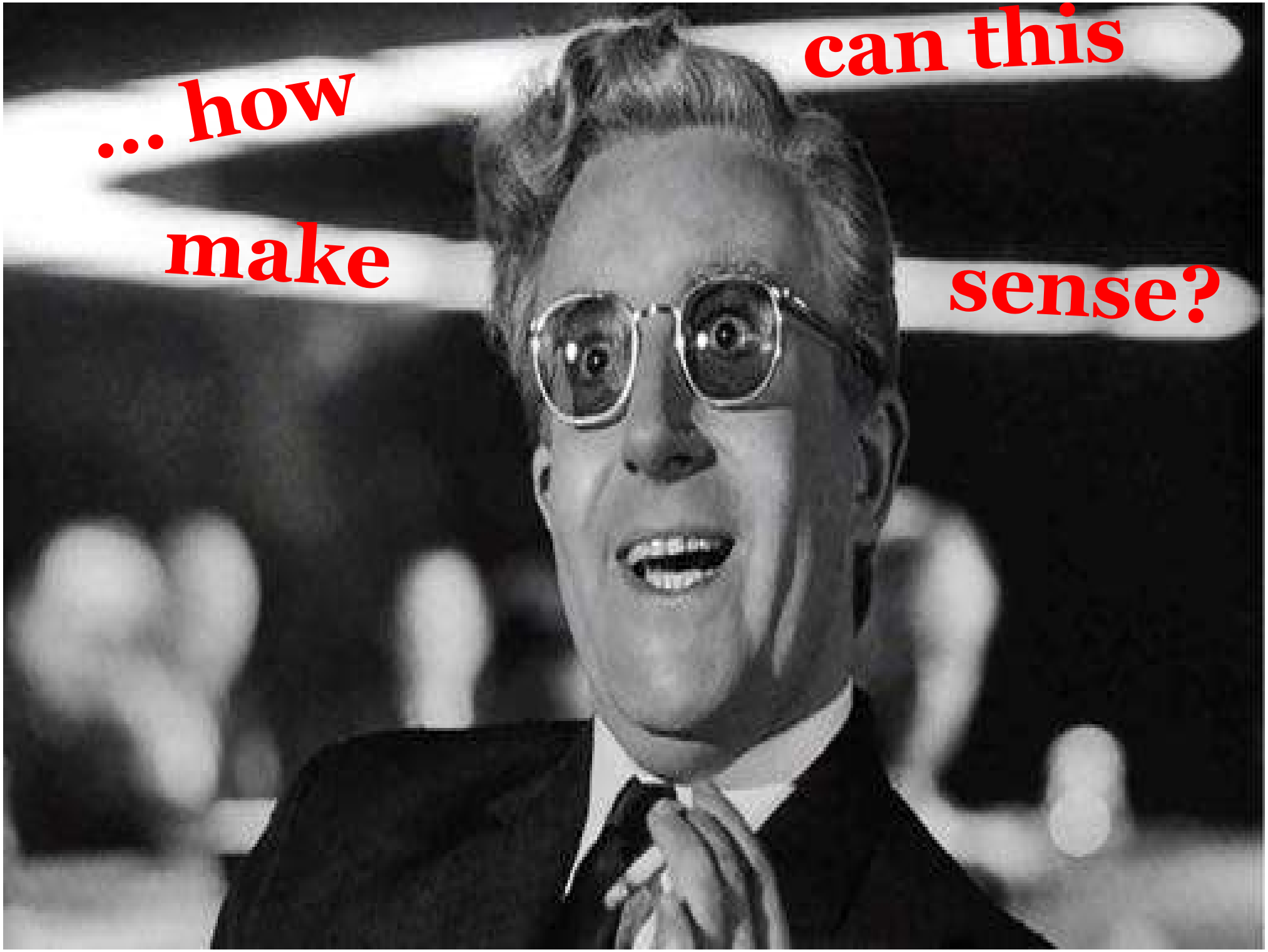
Modelled emissions are nearer **1600 $GtCO_2$**

i.e. 2x the IPCC's carbon budget for a likely chance of 2°C

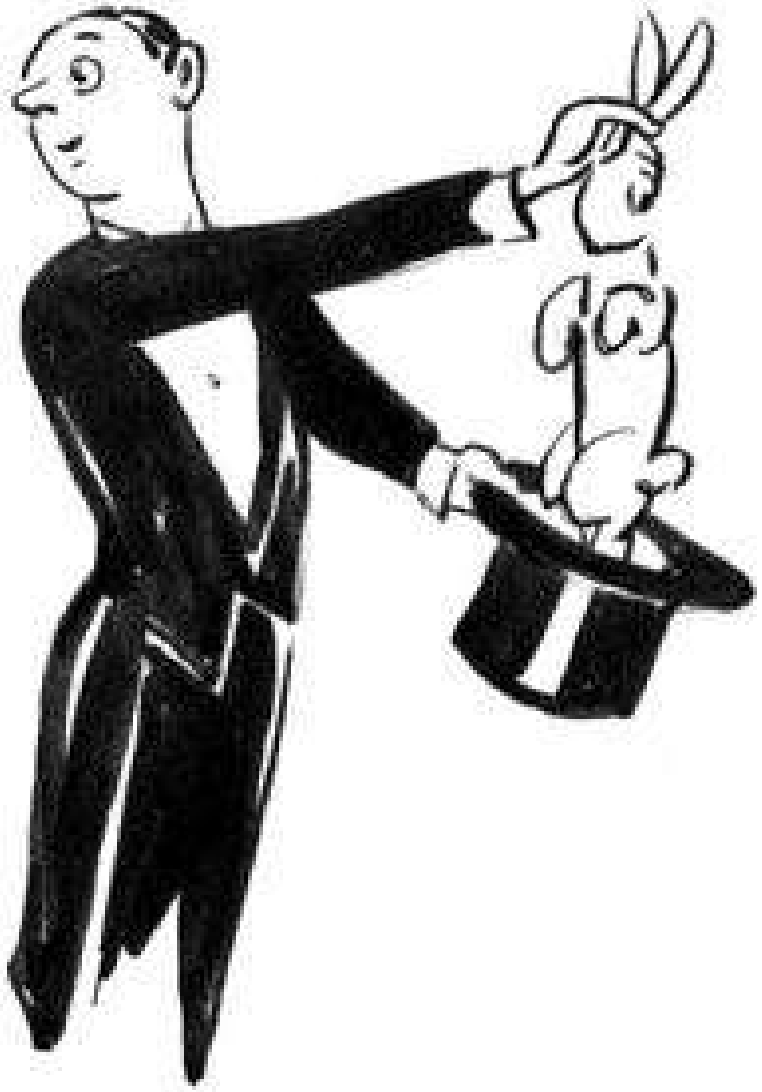


So for a “likely” chance of 2°C

- IPCC **science** suggests around **800GtCO$_2$** from 2017
- IPCC economic **modellers** typically use **~1600GtCO$_2$** from 2017

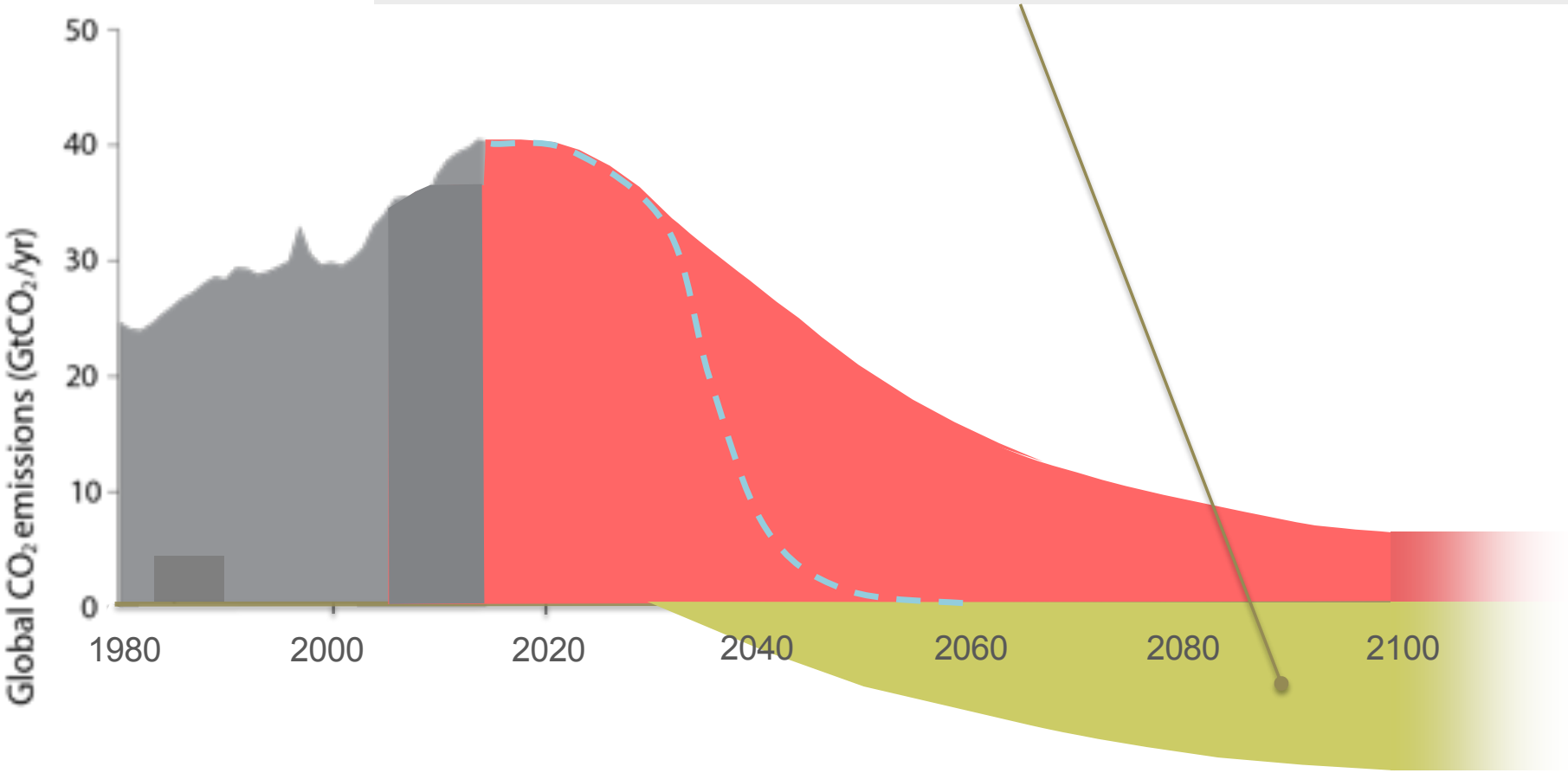

... how
can this
make
sense?

… by pulling a rabbit from the magician's hat



models conjour up **"Negative Emission Technolgies" (NETs)**

- to suck **100s billions tonnes of CO_2** directly from the atmosphere
- they & emissions continue after the end of the century



The 'NET' that dominates the models is …

***BECCS** – **biomass energy with carbon capture & storage**:*

Grow trees/plants

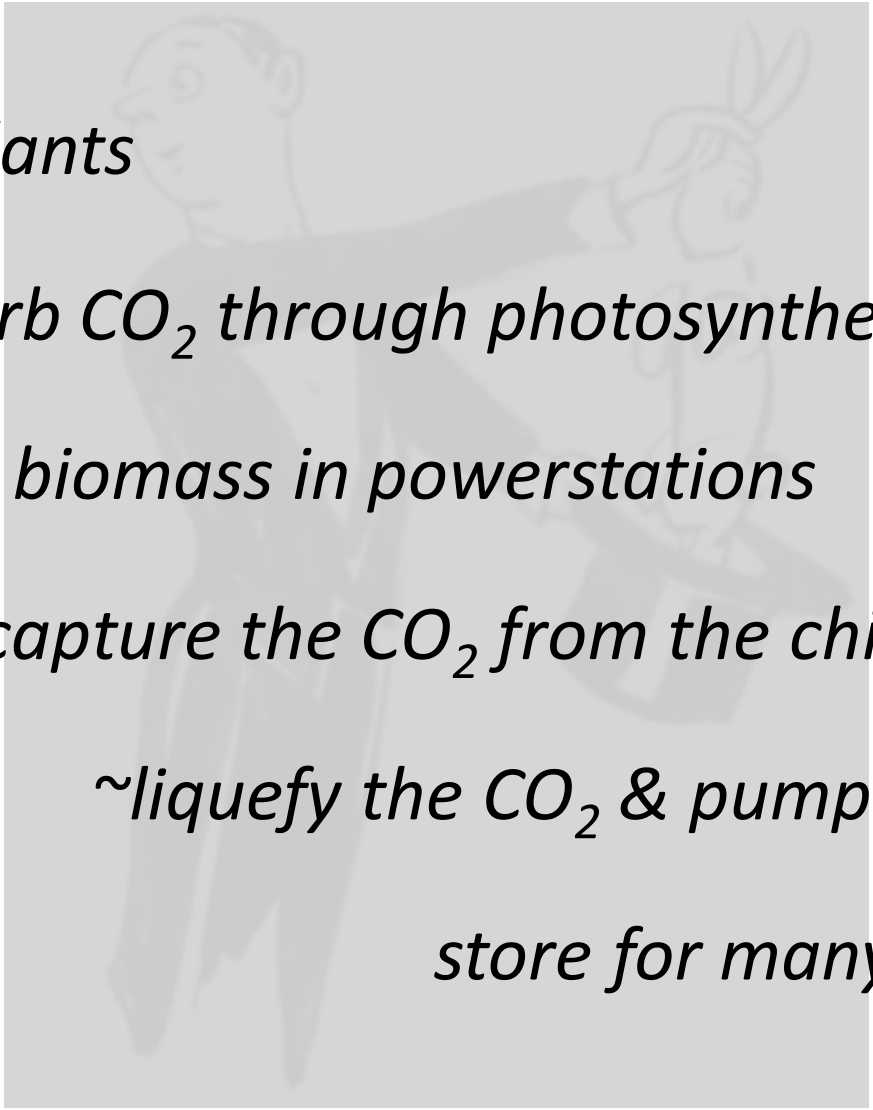
they absorb CO_2 through photosynthesis

burn biomass in powerstations

capture the CO_2 from the chimney

~liquefy the CO_2 & pump it underground

store for many 1000s of years



The 'NET' that dominates the models is …

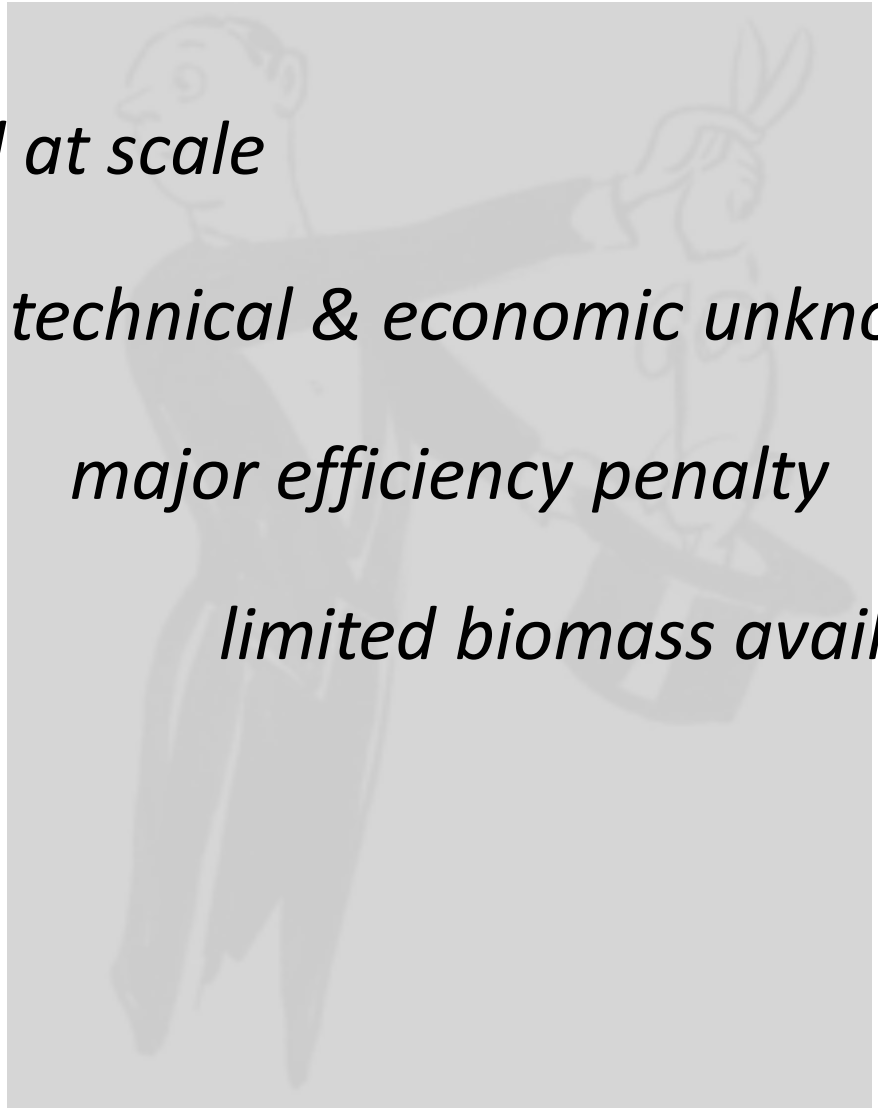
BECCS – biomass energy with carbon capture & storage:

Never worked at scale

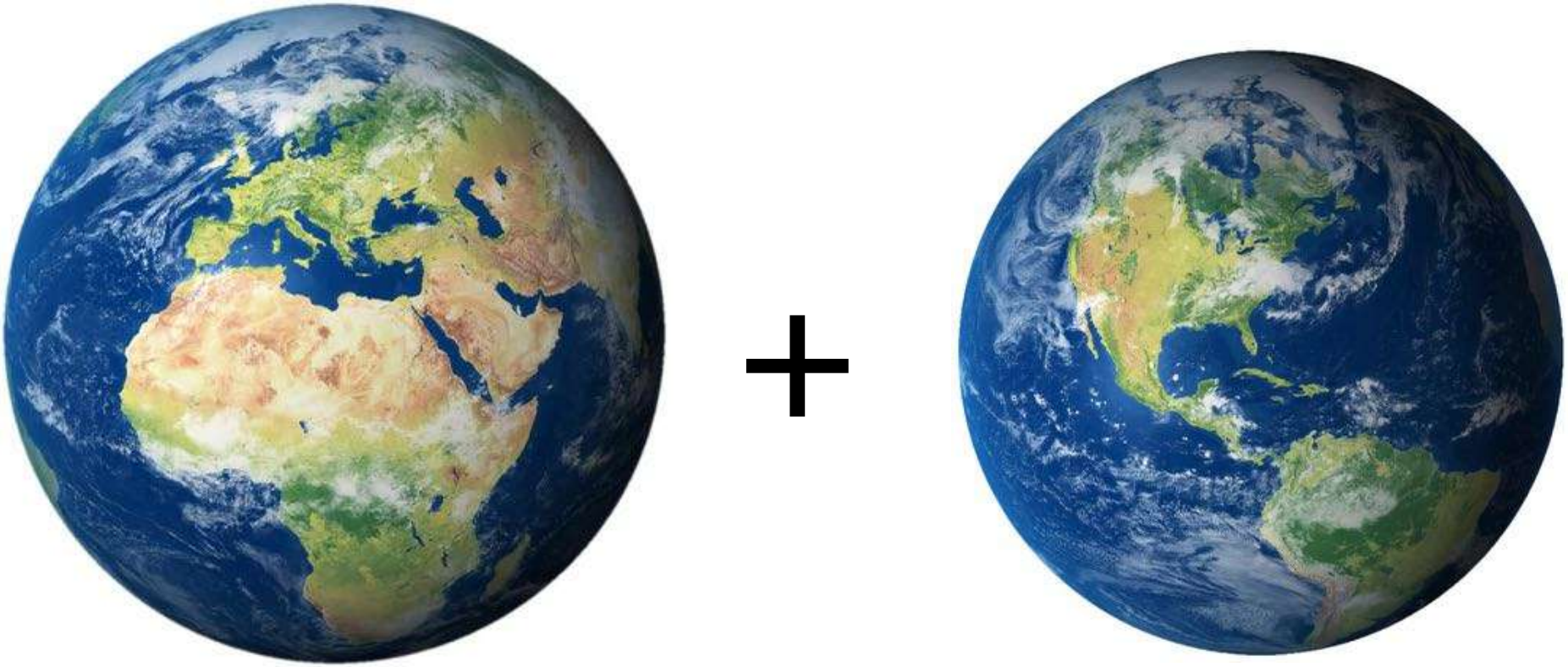
huge technical & economic unknowns

major efficiency penalty

limited biomass availability *(fuel or food?)*



… or the equivalent of adding another biosphere!



oceans & plants absorb ~20GtCO_2/yr

i.e. ~1/2 of what we emit

BECCS assumed to absorb 10-20GtCO_2/yr

i.e. up to another planet's worth of biospere

So Paris, some Academics & Politicians …

- **rather than focus on urgent & deep mitigation now**

  … *with challenging political & economic repercussions*

- **prefer to rely on non-existent negative emission technologies**

  … *to suck huge quantities of CO_2 from the air in the future*

  … *supporting ongoing fossil-fuel use to 2100 & beyond*

  … *& masking how 2℃ demands major social change*

My position on NETs

- Support a well funded Research, Development & (potential) Deployment
- But develop mitigation scenarios & strategies assuming no NETs

If we pursue 'real' mitigation for 2°C

and NETs do prove successful at huge global scale

then 1.5°C may be possible – theoretically

If we rely on NETs for 2°C

and they prove not to be viable at huge scale

then we lock in 3° to 5°C

Major reliance on NETs for 2°C mitigation is a **"moral hazard"** par excellence


without NETs
…what are our Paris commitments?

Headline mitigation message for **non-OECD**

To

- Peak CO_2 by early 2020s
- Ramp up mitigation to 10% p.a. by early 2040s
- **~fully** decarbonised energy during **2050s**

Headline mitigation message for **OECD**

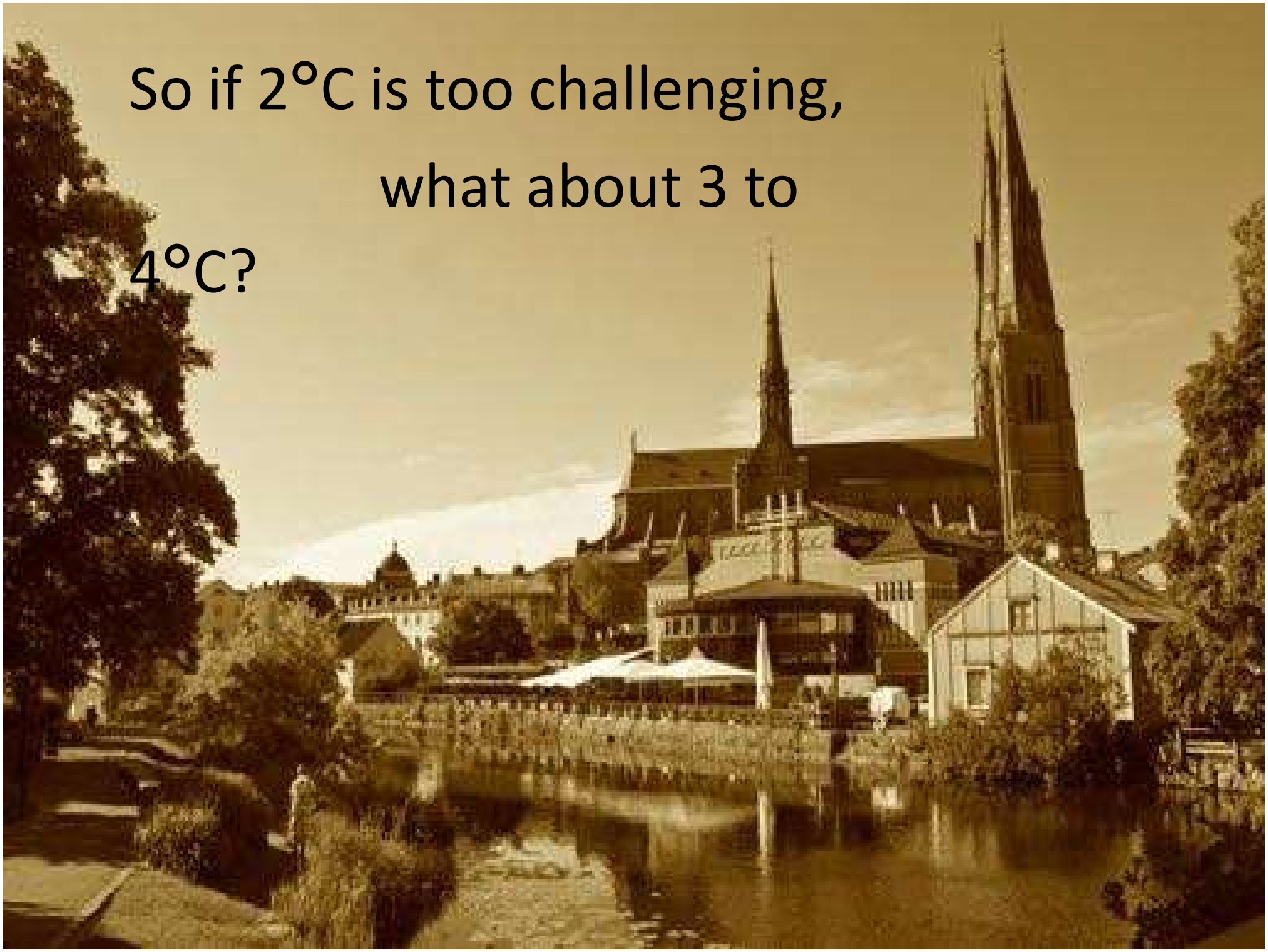
To

- mitigate at **>10% p.a.** starting now
- **~60%** reduction in CO_2 by **2025**
- **~fully** decarbonised energy by around **2035-40**

Headline mitigation message for the **UK**

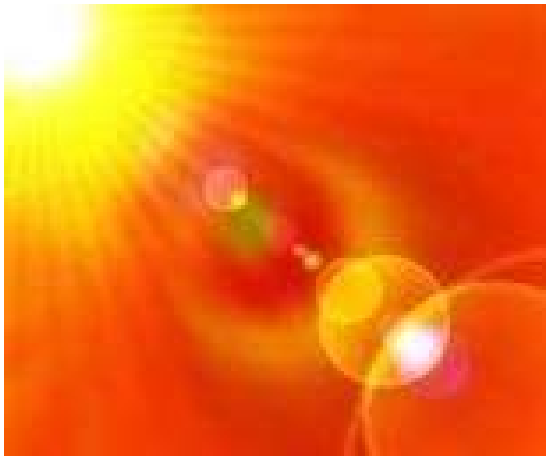
To

- mitigate at **>13% p.a.** starting now
- ~75% reduction in CO_2 by **2025**
- **~fully** decarbonised energy by around **2035**

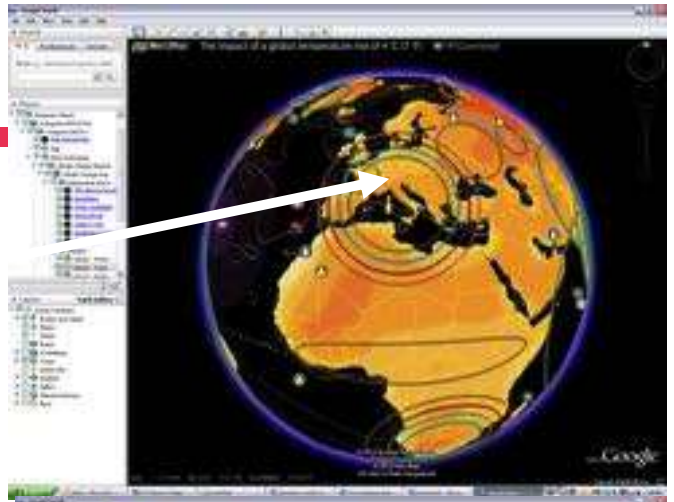

So if 2°C is too challenging,
what about 3 to
4°C?

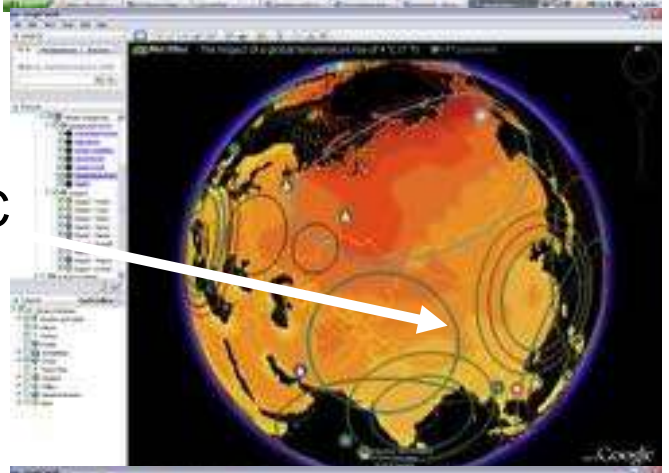
Global impacts: 4°C

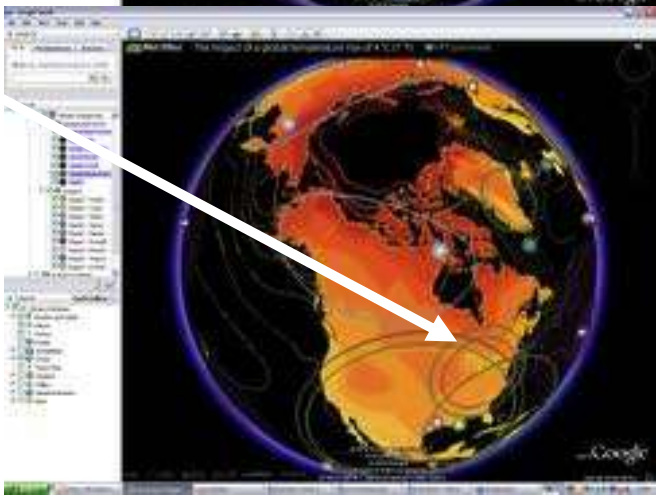
Hottest days



Prolonged & more severe heatwaves
*(**6 to 12°C** hotter)*



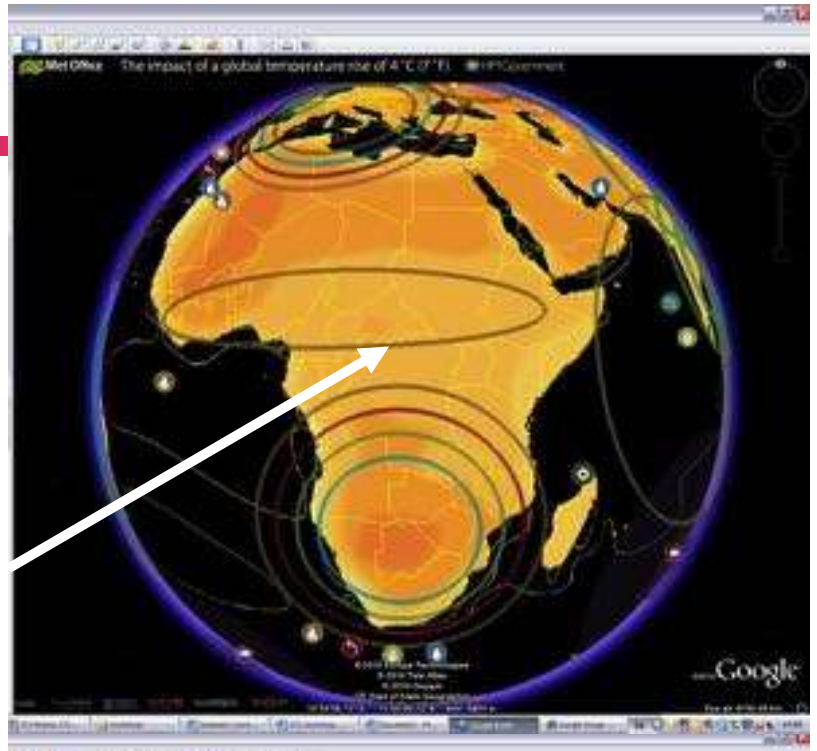


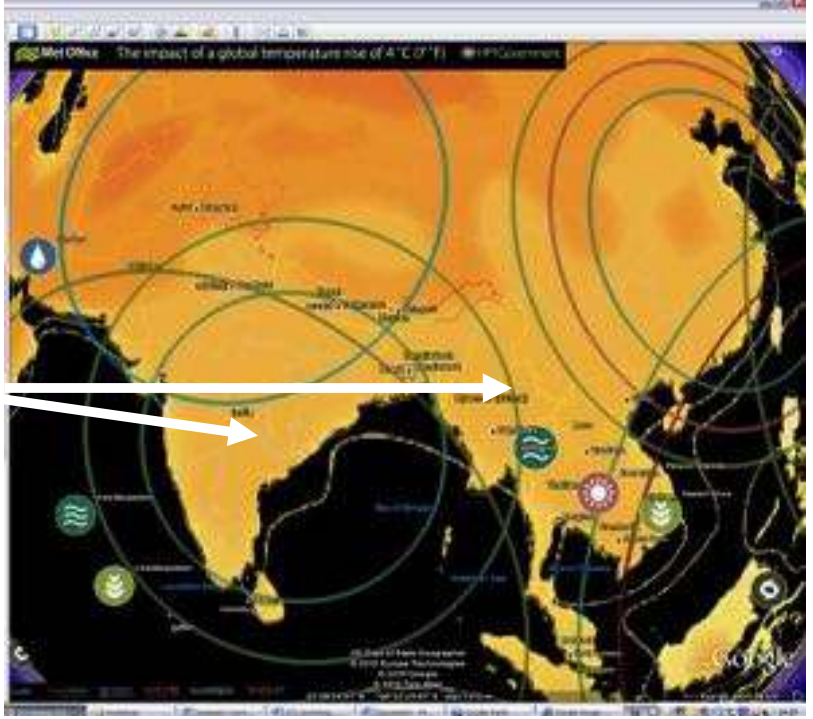


Global impacts: 4°C

Food crops

30-40% reduction in maize, wheat & rice yields in low latitudes.

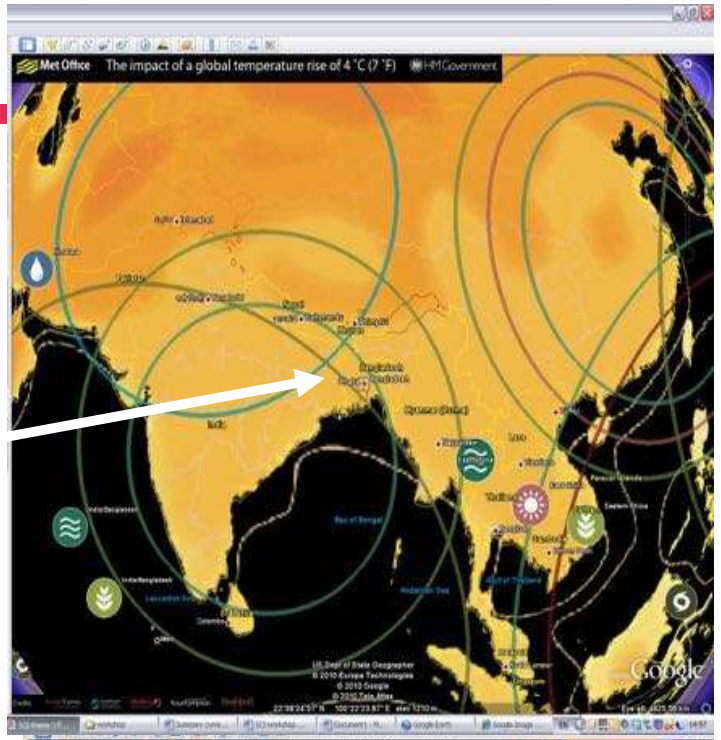


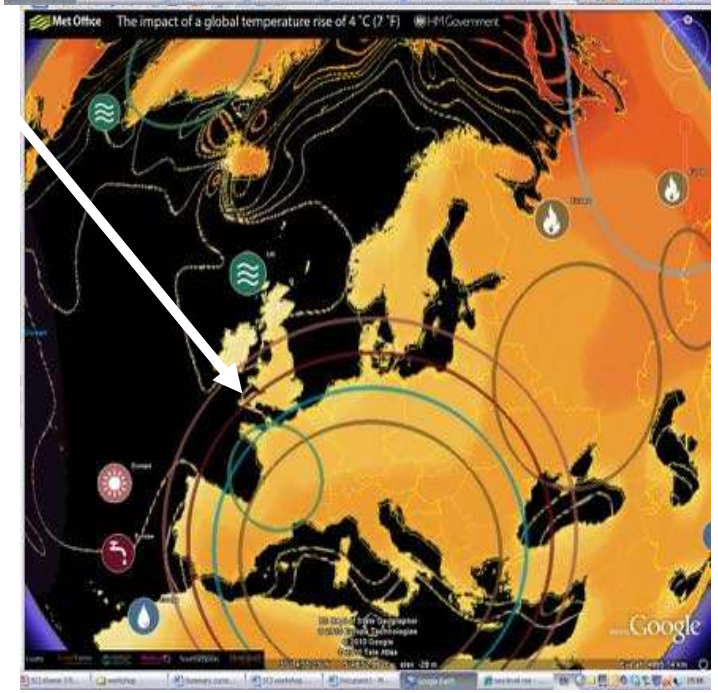


Global impacts: 4°C

Sea level rise

50-150cm rise,
higher in low latitudes





There is a widespread view that 4°C is…

- Incompatible with an organised global community
- Beyond ‘adaptation’
- Devastating to eco-systems
- Highly unlikely to be stable (‘tipping points’)

… consequently …

4° C should be avoided at ‘all’ costs

Is 2°C it still a viable goal?

Hypothesis: yes … *just*

- **Technology**
  - Demand: near term options
  - Supply: decadal timeframe
- **Equity**: immediate & near-term

SUPPLY: low-CO_2 *electricity*

Tidal

Wave

Biomass

(CCS ?)

SUPPLY: low-CO_2 *energy*

- But, electricity is typically 20% of final energy demand

- So also need a massive programme of electrification

DEMAND: opportunities for near-term mitigation

- Establish stringent efficiency standards
- Tighten year on year
- Providing long-term & dynamic market signal

Industrialised/wealthy nations:

(NB: accompanying policies to address issues of rebound are essential)

Beyond technology

But:

Technology (supply & demand) alone cannot deliver on the Paris budgets

(i.e. "alliance of technology and economics" is insufficient)

Need deep changes in *what **we** do, how **we** do it & how often **we** do it*

(i.e. "romantic illusions" are now critical)

Equity:

CO_2 asymmetry & mitigation

EQUITY: extreme emission asymmetry

~50% of global CO_2 comes from ~**10%** of the population

EQUITY: extreme emission asymmetry

… if the top 10% of global emitters

were to reduce their carbon footprint

to the level of a typical EU citizen

Global CO_2 emissions would be cut ~33%

So, who is in this key 10% group?

So, who is in this key 10% group?

So, who is in this key 10% group?

So, who is in this key 10% group?

So, who is in this key 10% group?

So, who is in this key 10% group?

EQUITY: frames a new agenda for mitigation

- Most of the 7.5 billion have little scope to reduce emissions
- There is huge asymmetry in responsibility
- Rapid & near-term reduction in CO_2 from top 10% of emitters
- Real opportunity for leading by example
- And thereby catalysing system-change *(governments & society)*

Climate Change demands System Change

Interpreting Paris through the **logic of carbon budgets** begs fundamental questions of our **norms & paradigms**

- *Marshall-style transition in supply technologies*
- *rapid penetration of most efficient end-use technologies*
- *profound shift in behaviour & practices*
- *development of economic models fit for purpose*
- *serious consideration of inter/intra generational equity*
- *major reparation (not aid!) for poorer nations*

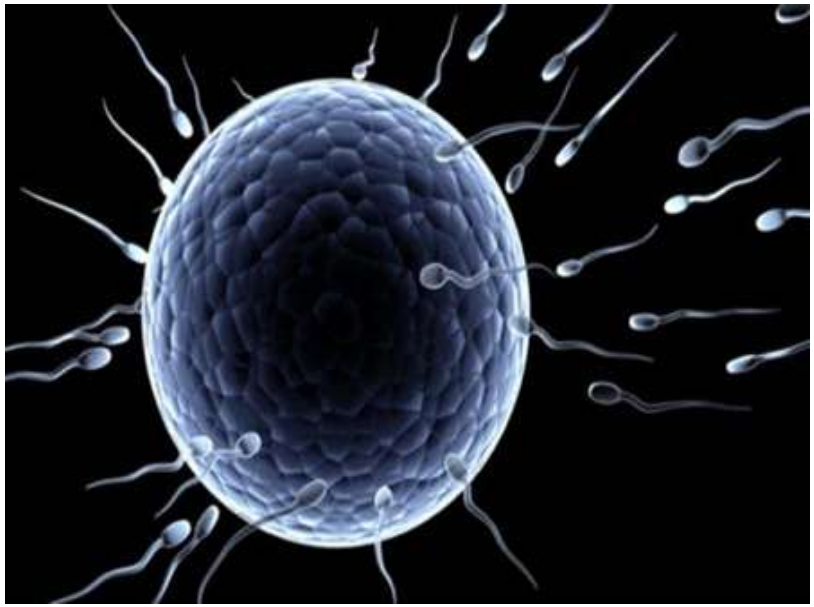
Climate Change demands System Change

Interpreting Paris through the **logic of carbon budgets** begs fundamental questions of our **norms & paradigms**

… starting now …

… we've a long way to go

… we've a long way to go



… we've a long way to go

… but we know where to find the solutions

*& they're not in an utopian "alliance of **technology** & **economics**"*

*… but hidden in the Pope's **"romantic illusions"***

So what of the UK & Manchester?

What this may mean for UK Energy **DEMAND**

- Retrofit existing buildings
- All new buildings to be passive-house standard
- Max CO_2 standard for all new cars/electrification

  (e.g. 100gCO2/km; tighten 8% pa.)
- Policies to drive behavioural change by hi-energy users

  (progressive metering tariffs, frequent flier levy, PCA)

i.e. power down energy demand by 40-70% in 10-15 years

What this may mean for UK Energy **SUPPLY**

- Major electrification programme (htg, transport, etc)
- Much higher rated interconnectors
- Roll out smart grid/intelligent metering/community energy
- Sustainably exploit renewable & v. low CO_2 energy
- Indigenous biomass/biogas/P2G for intermittency/base load

What this may mean for UK Energy **POLICY**

- Rapid *retirement* of all hydrocarbon assets
- CCS investment for cement/steel
- Moratorium on airport expansion
- Major programme of public transport
- Hi-speed rail connections into continental Europe
- Long term investment cycles *(i.e. a low discount rate <3.5%)*

Our ultimate choice is between …

A short-term ***realpolitik***

or

A sustainable long-term ***real-climate***

Manchester: laggard or leader?

- Climate commitments based on clear & fair carbon budgets
- Do not exclude ‘difficult to decarbonise’ sectors
- Explicitly Informed by ***science*** and ***equity***
- Use territorial CO_2 but be guided by ***consumption-based*** data
- ‘Real’ mitigation – ***not*** highly speculative ***NETs, Offsets,*** etc.
- Complement mitigation with ***increased support of global south***
- Put Manchester at the heart of a new decarbonised revolution

and a message of hope to finish …

*"at every level the greatest obstacle to transforming the world is that we lack the **clarity** and **imagination** to conceive that it could be different."*

Robert Unger

Kevin Anderson
Professor of Energy & Climate Change

The University of Manchester

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