



CPRE NW Group  
Tyndall Centre Lecture  
&  
Mayoral Green Summit



Campaign to Protect  
Rural England  
North West

*23 January 2018*

# Agenda

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- 10.30 am Welcome address - Peter Raynes, Chairman CPRE NW Group
- 10:35 am Talk on Climate Change - Kevin Anderson, Tyndall Centre
- 11:20 am Questions & Answers
- 11:50 am Listening event - Louise Marix Evans, Quantum Feedback to the Mayoral Green Summit
- 12:25 pm Summary, and next steps
- 12:30 pm Event closes



Campaign to Protect  
Rural England  
North West

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## Standing up for the countryside



Together we can  
save the countryside  
we all love

# The UK, Paris & climate change

## *Laggard or Leader?*

twitter: @KevinClimate

web: [kevinanderson.info](http://kevinanderson.info)

MANCHESTER  
1824

The University of Manchester

UPPSALA  
UNIVERSITET

**Kevin Anderson**  
Professor of Energy & Climate Change



**CEMUS**



**Tyndall°Centre**<sup>®</sup>  
for Climate Change Research

# Fragility of our place on space-ship Earth

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



## ... a climate message from the Pope

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

## ... a climate message from the Pope

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*... 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

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



Framework Convention on  
Climate Change

Distr.: Limited  
12 December 2015

Original: English

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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

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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?

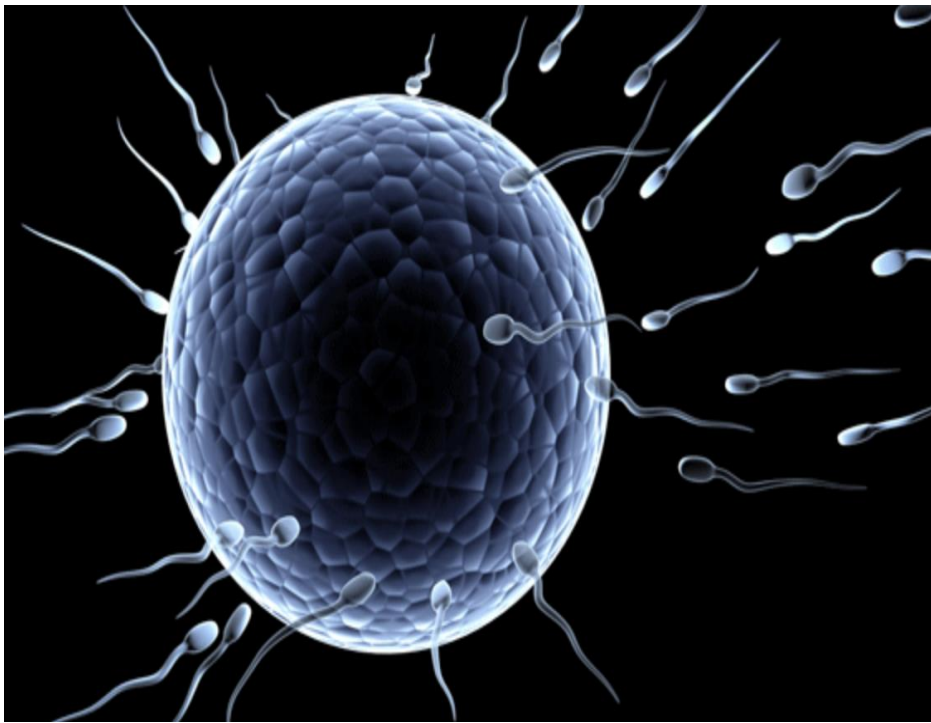
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To the poor living in climatically vulnerable regions *now*



To our own wealthier children *tomorrow*



To future generations



Even to us now

*(migration & breakdown of Schengen)*



To other species & ecosystems  
now & over millennia

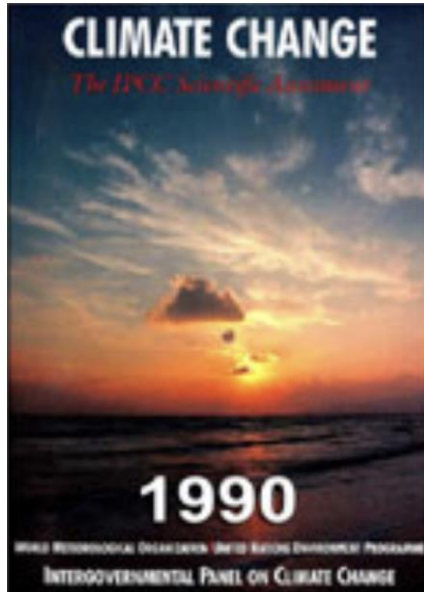


To our own unique home

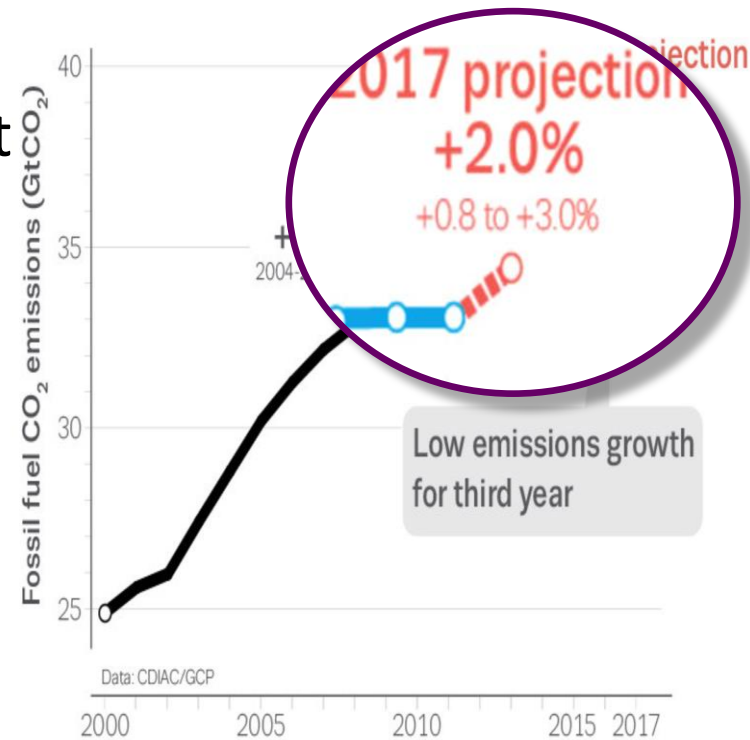
# Responding to the mitigation challenge?



# Humility as a starting point for hope & action



- 1990: first IPCC report
- 2016: CO<sub>2</sub> 60% >1990
- 2017: CO<sub>2</sub> 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*

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- Offsetting ... paying a poor person to diet for us
- Clean development mechanism (CDM) ... state sanctioned offsetting
- Emissions trading (EUETS) ... so many permits the €tCO<sub>2</sub> stays low
- Negative emission technologies ... at huge planetary scale
- Geo-engineering ... a sticking plaster on gangrene

***... we have not seriously tried real mitigation!***

Even in the UK total CO<sub>2</sub> remains high - *little change since 1990*

*(inc. aviation & shipping, imports & exports)*

Real mitigation:  
*take home issues to consider*

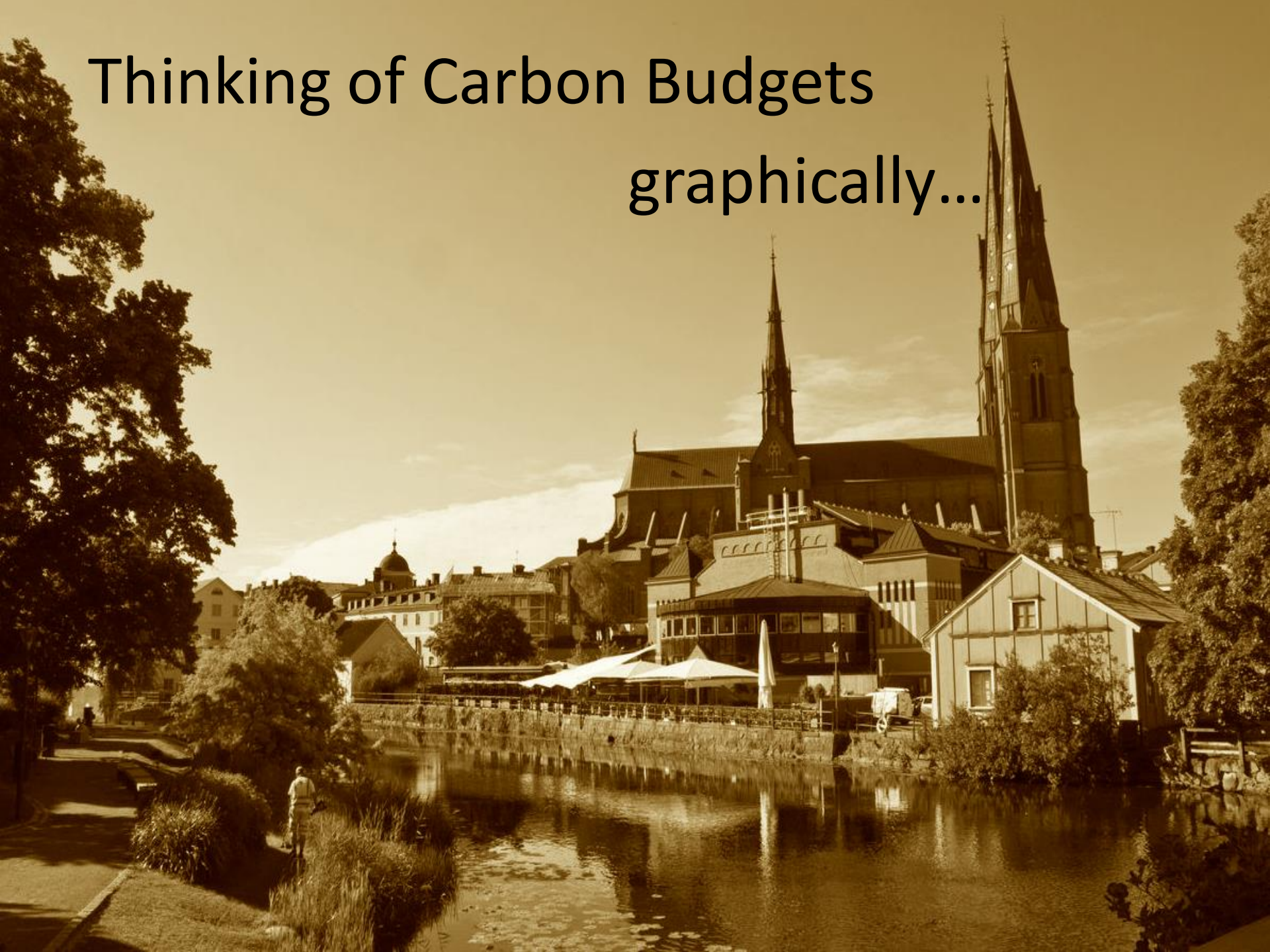


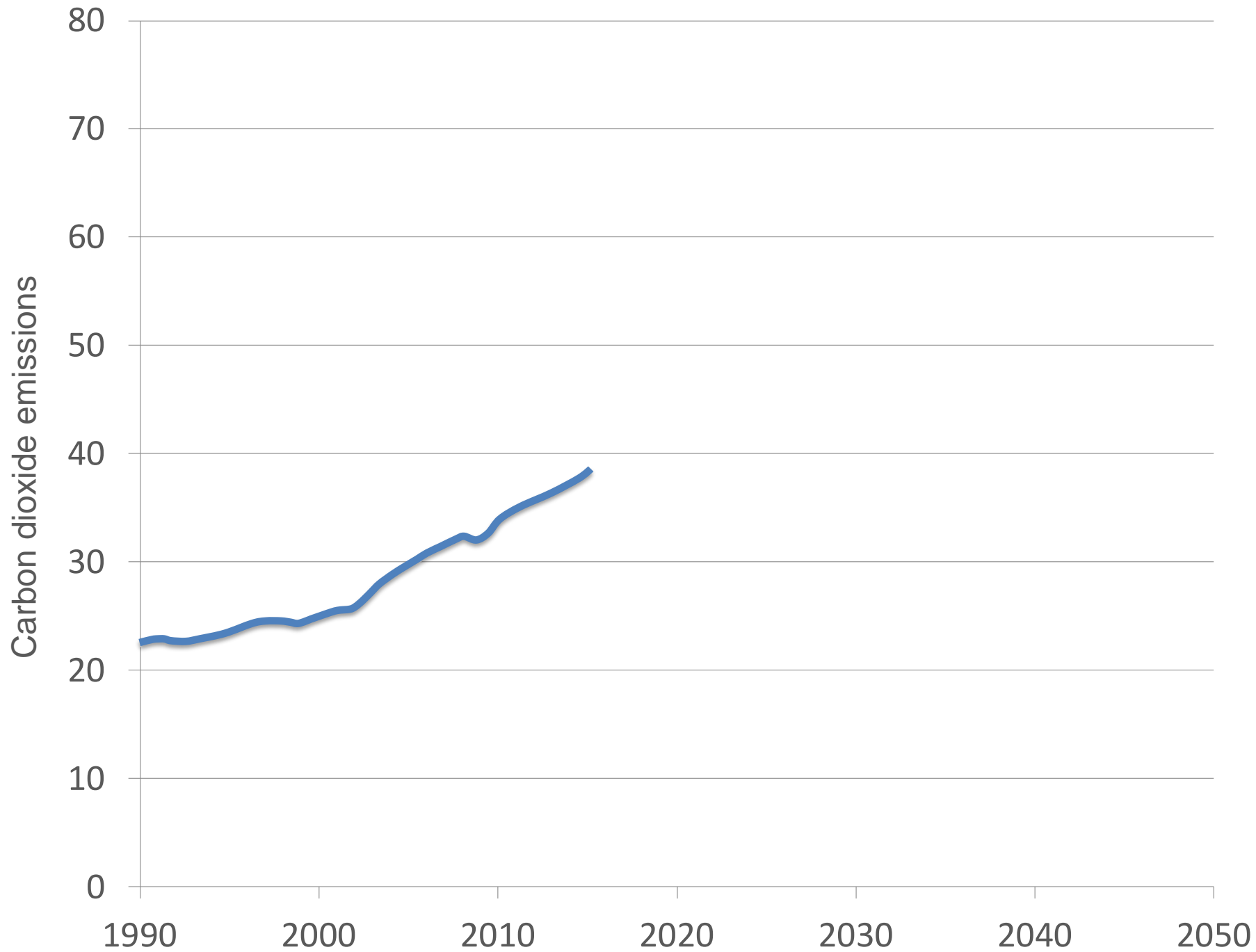
# Take home issues to consider

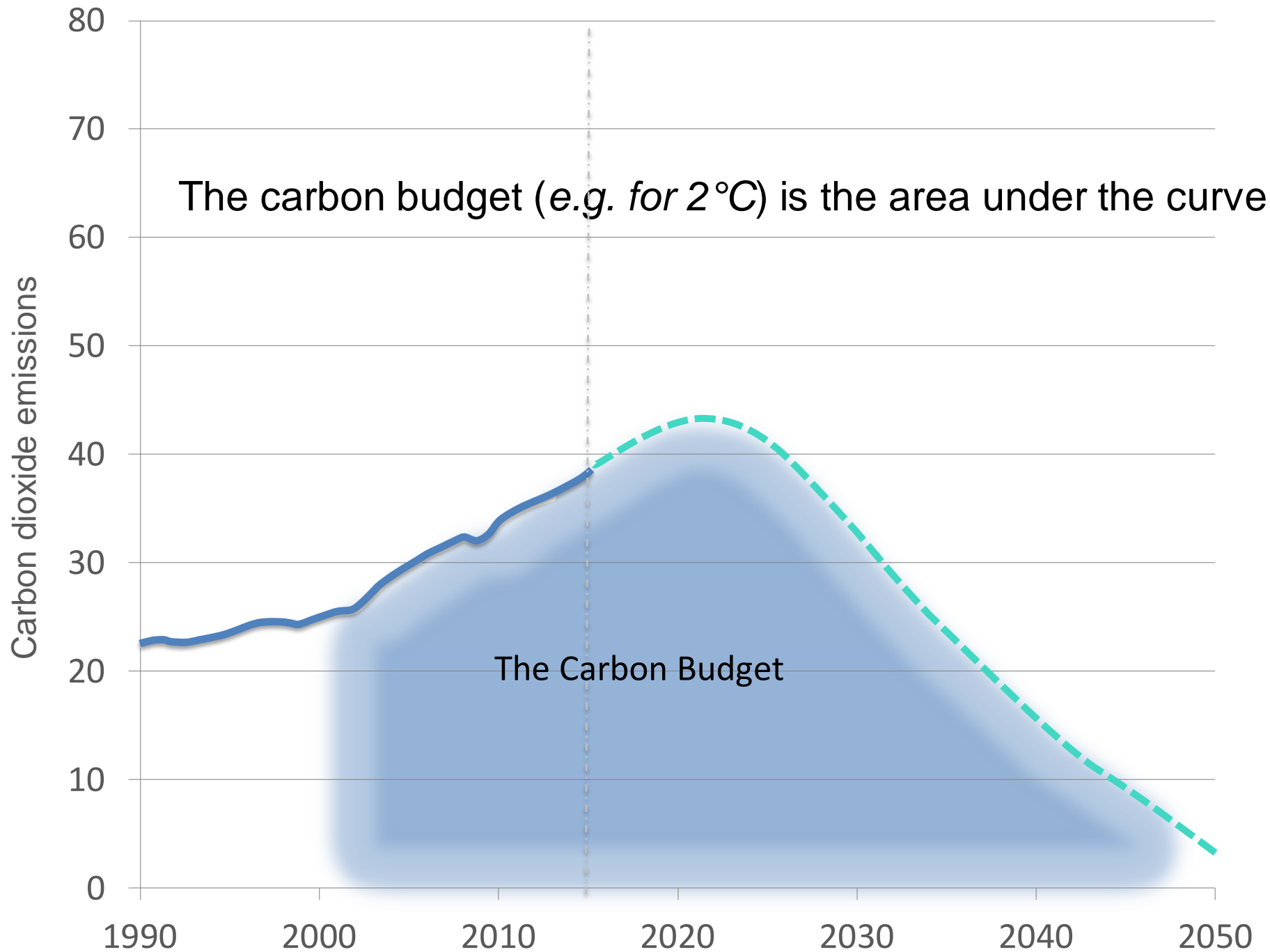
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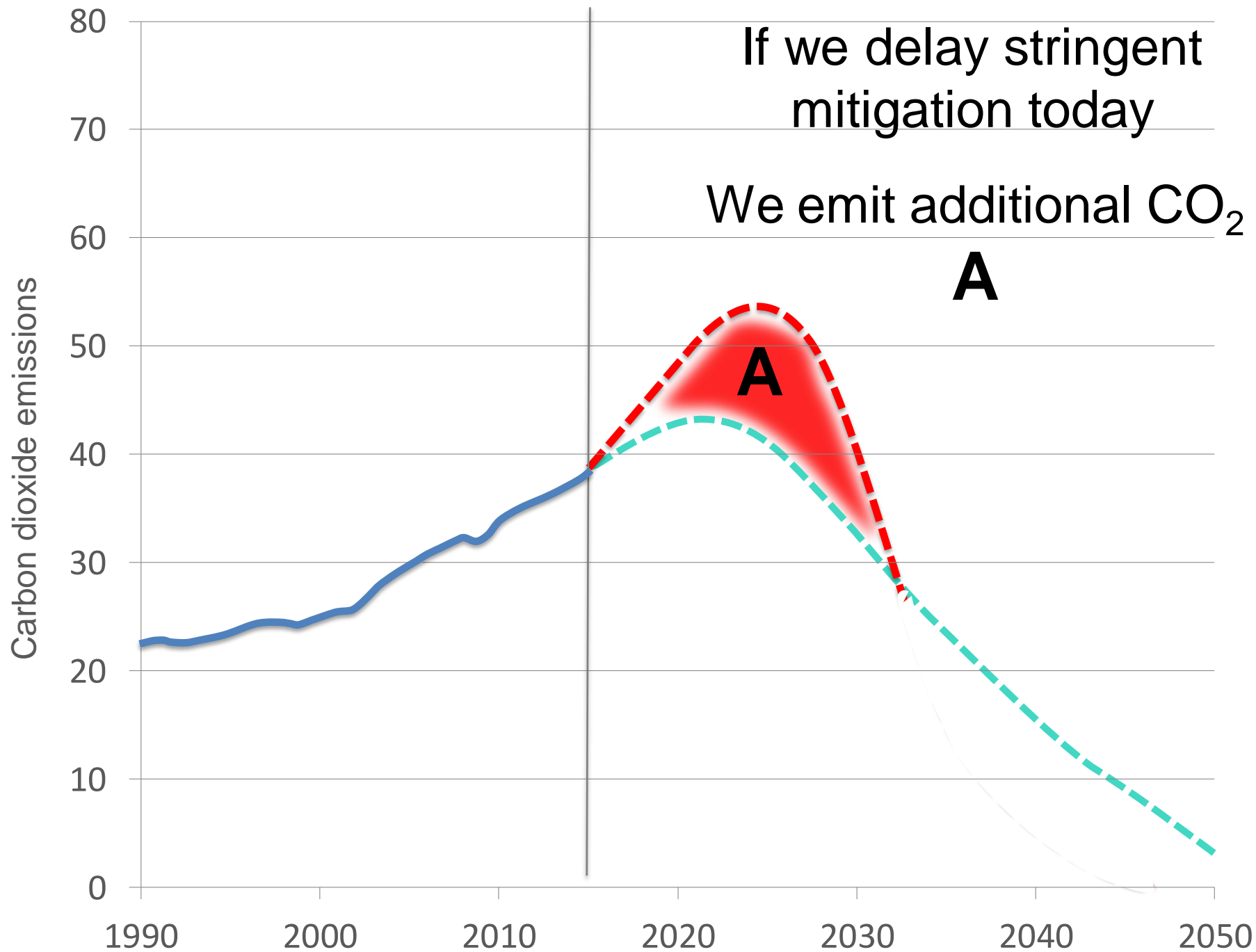
- The Paris commitments are **far more challenging** than most scientists & politicians are prepared to admit
- **Real mitigation** is still possible for 2°C - *just*
- **Long term** targets have no scientific basis (*e.g. 2030, 50, etc.*)
- It's total emissions - **Carbon Budgets** - that matter

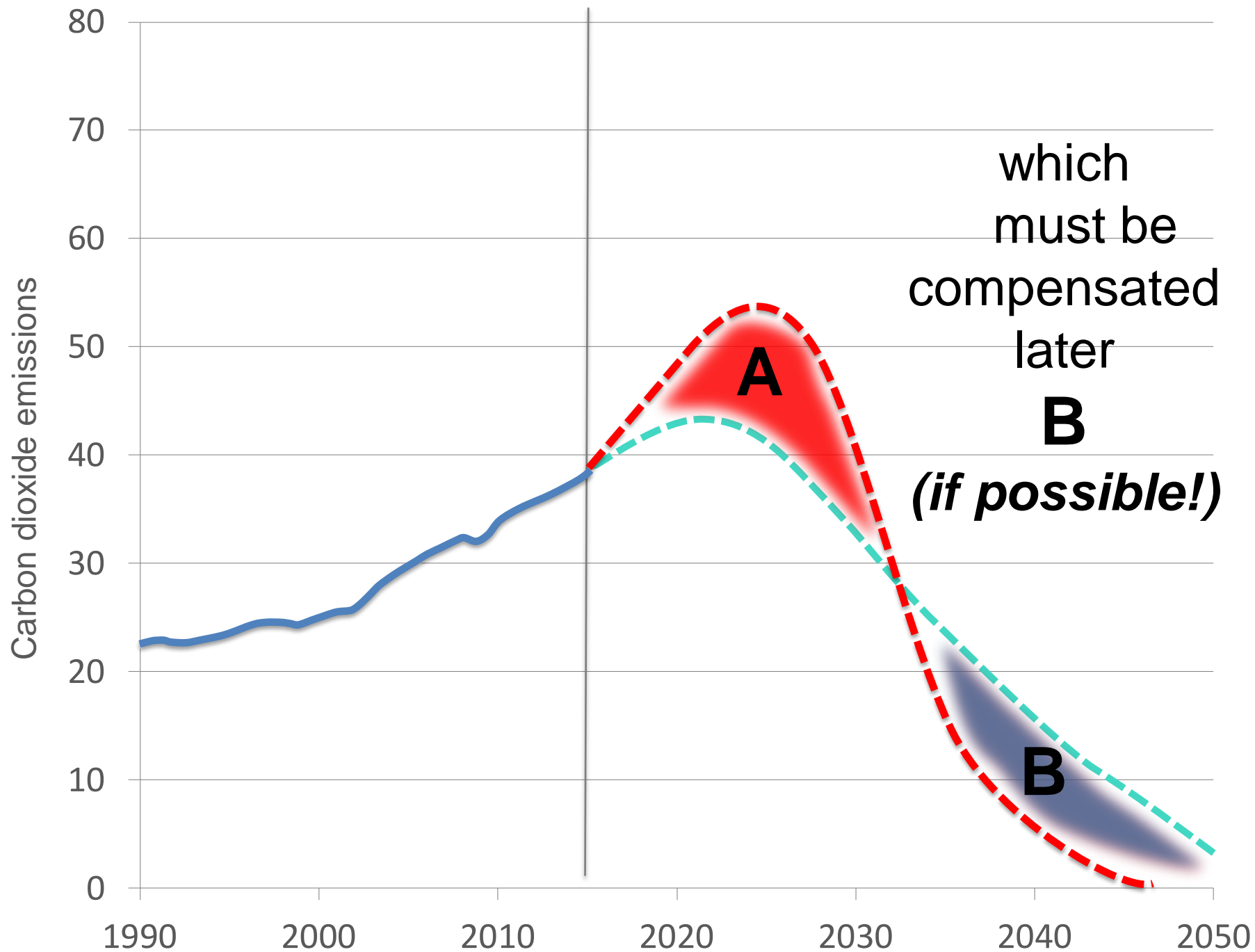
# Thinking of Carbon Budgets graphically...



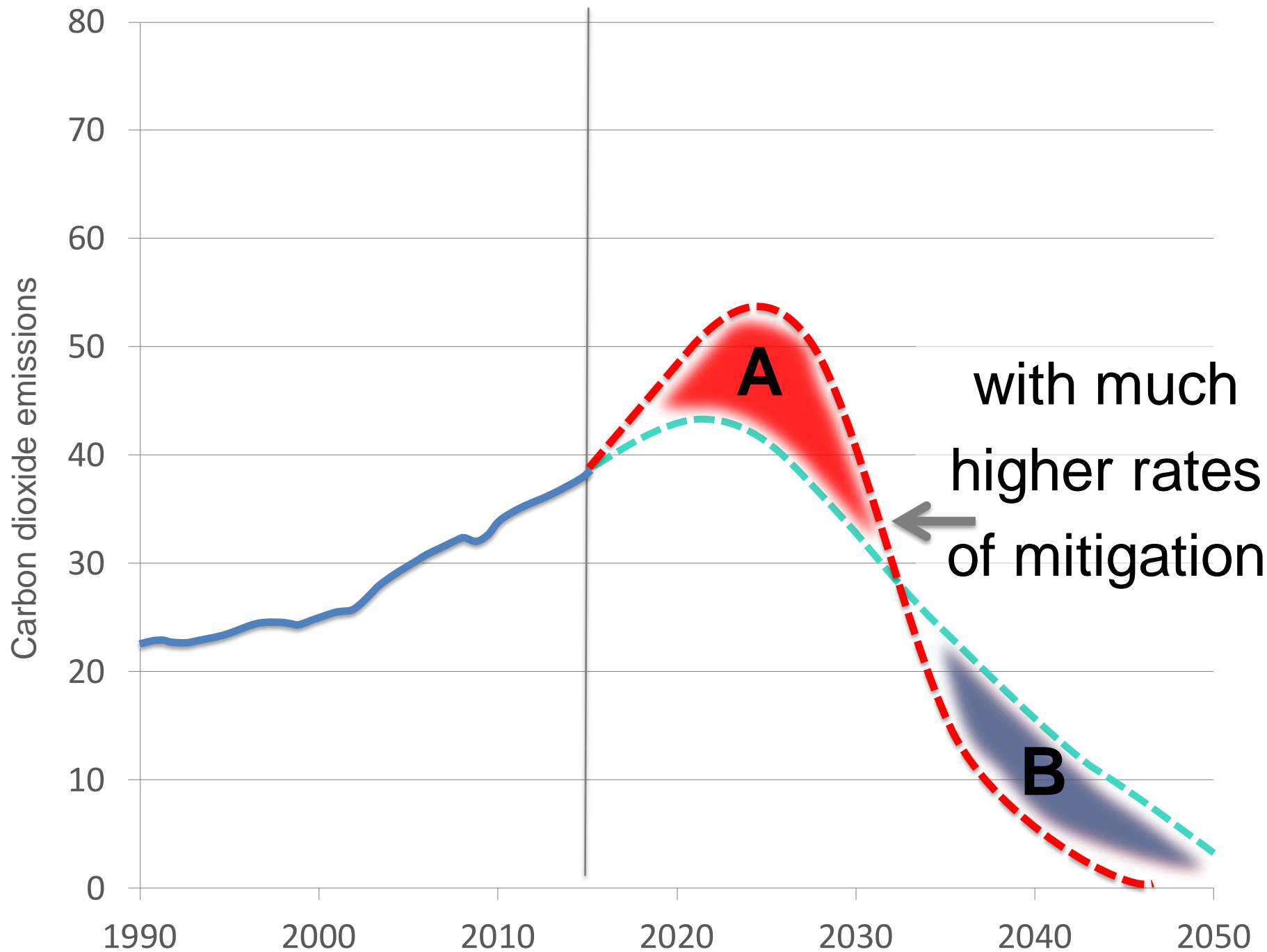












# Returning to the Paris Agreement



# My pre-Paris provocation

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

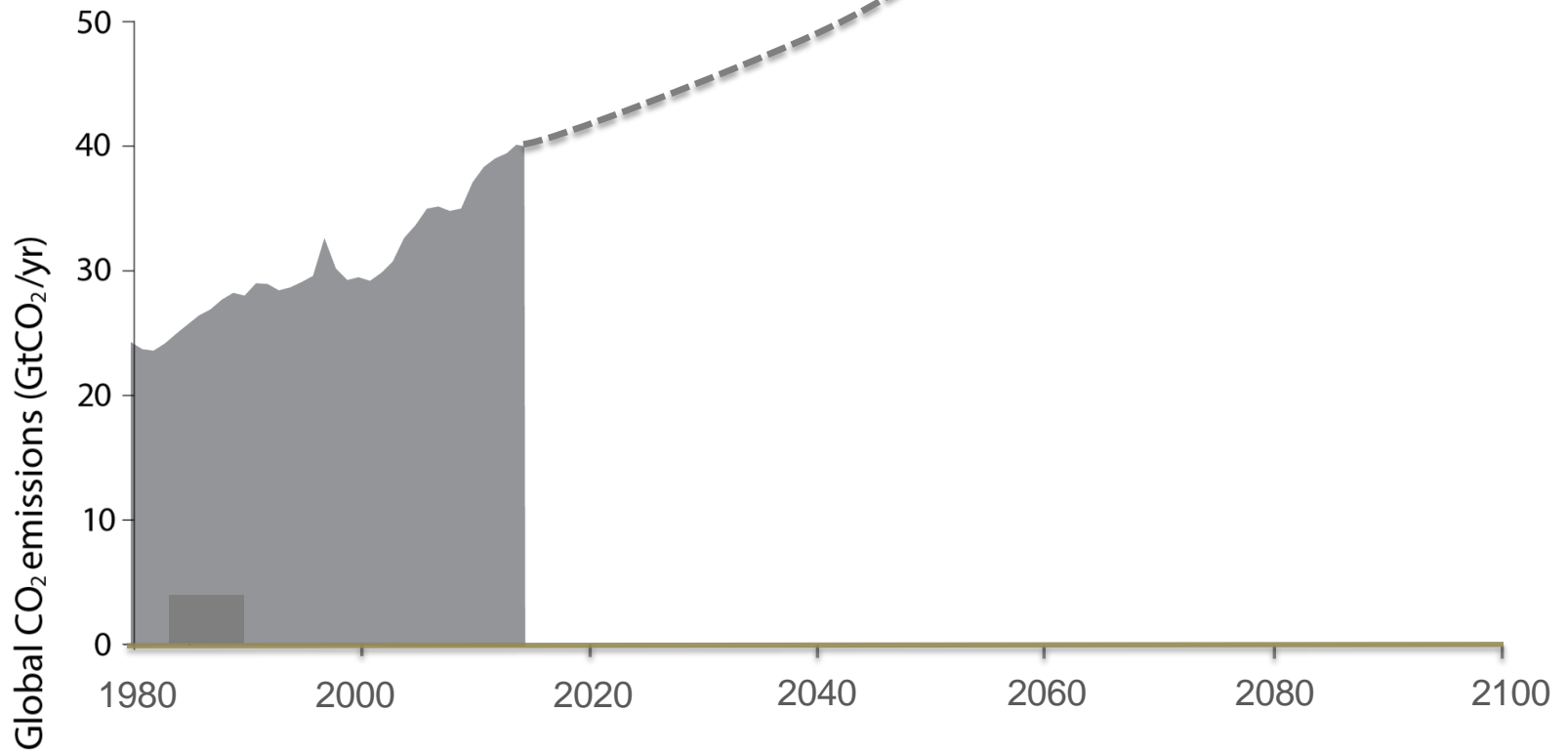
- Universities, NGOs, etc. have been **co-opted** by near-term **power**
- & typically **fear** questioning the dominant **neo-liberal** model

# Quantifying the mitigation challenge

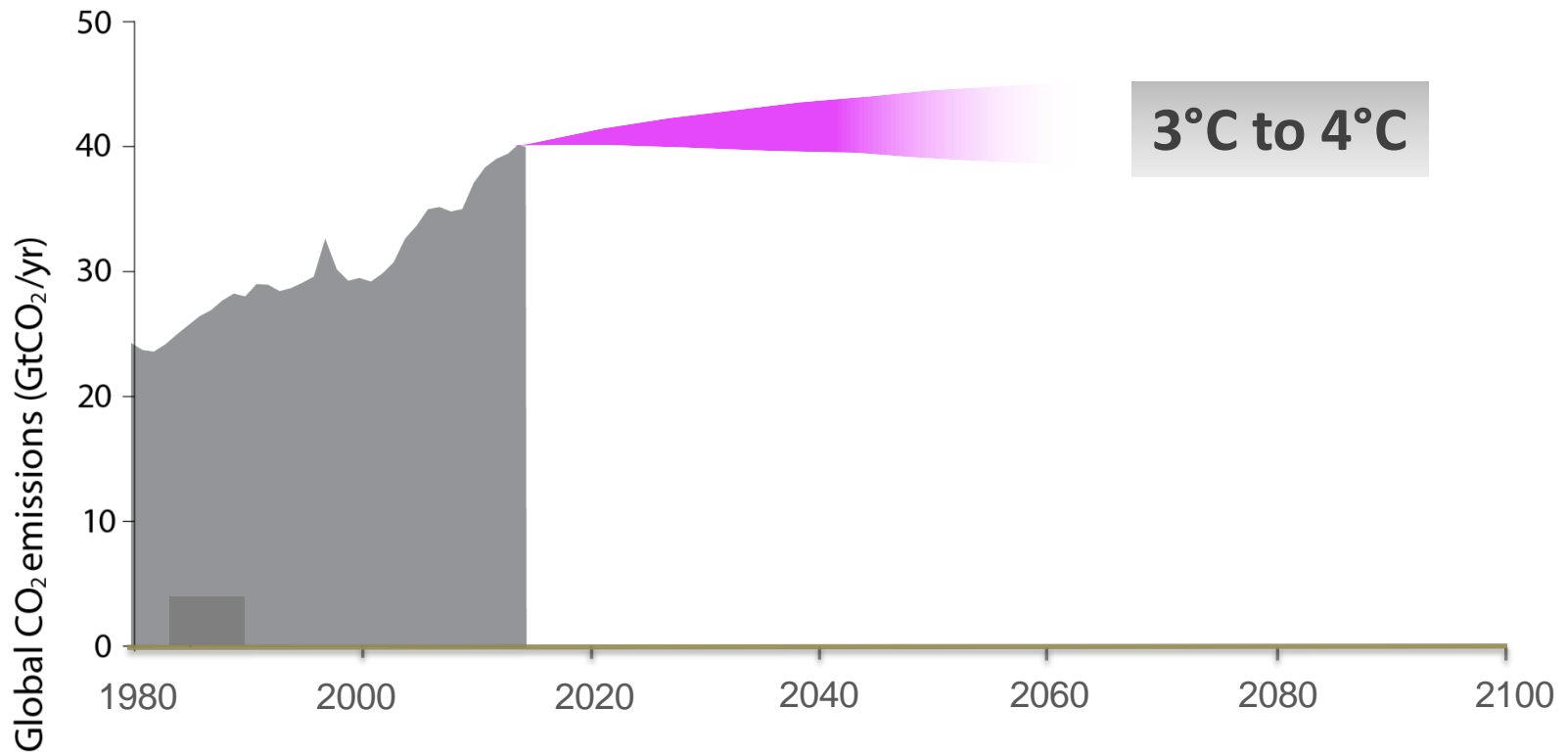


**Before Paris ...**

**4°C to 6°C**

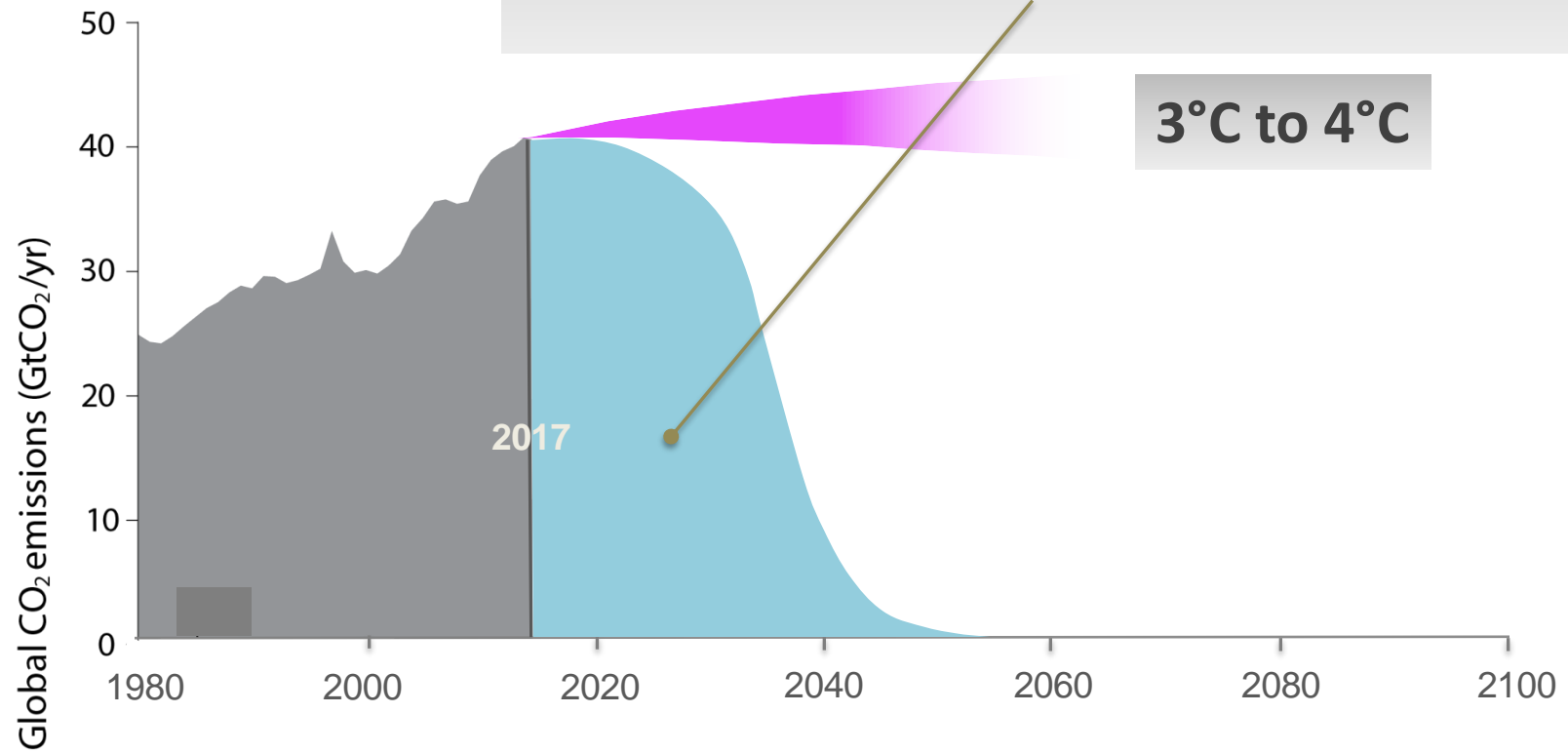


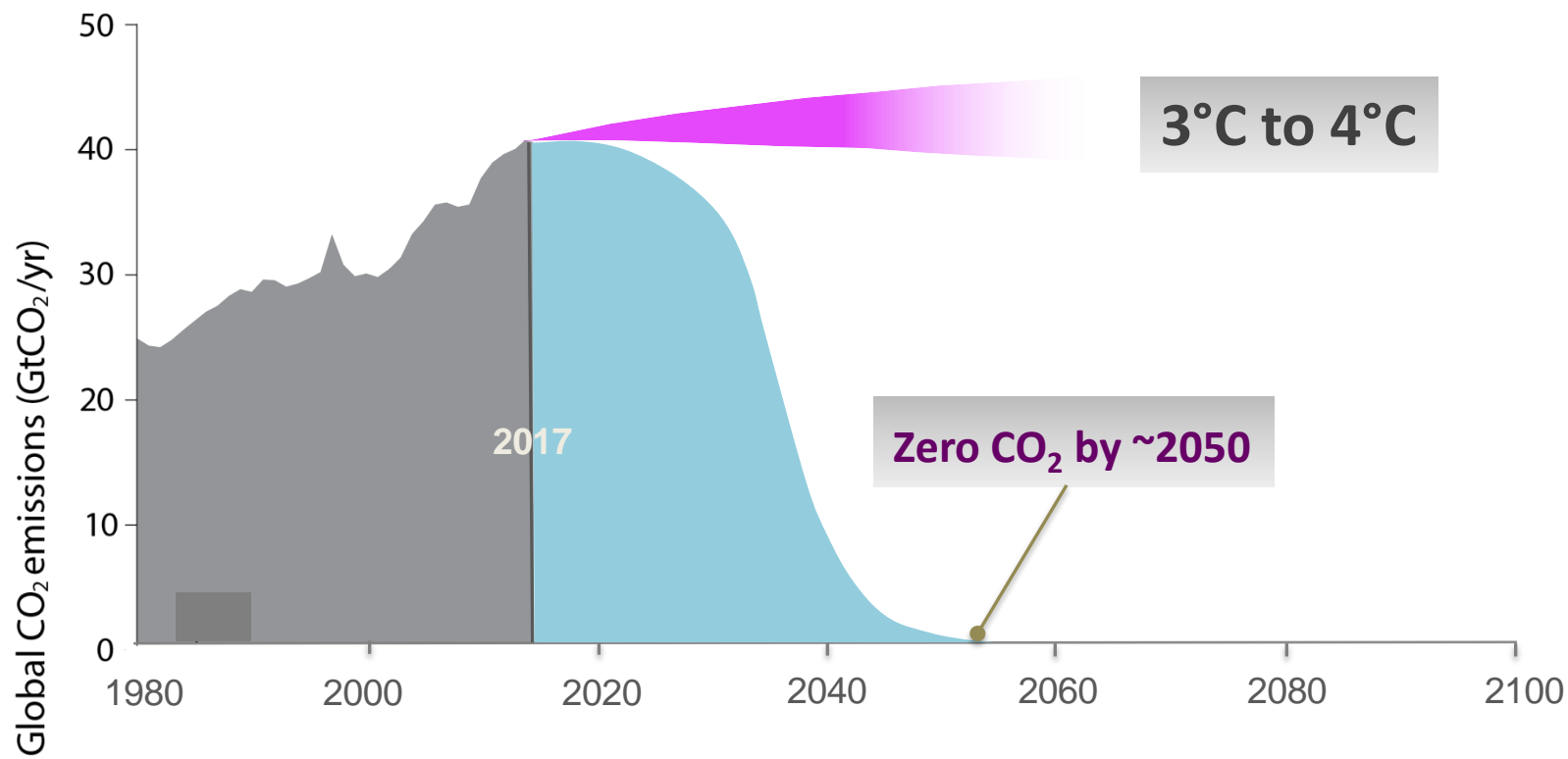
# With Paris ... national pledges add up to...



And to stay *“well below 2°C”*

- the carbon budget remaining from 2017 is:
- approx. **800 billion tonnes CO<sub>2</sub>** (i.e. 800GtCO<sub>2</sub>)



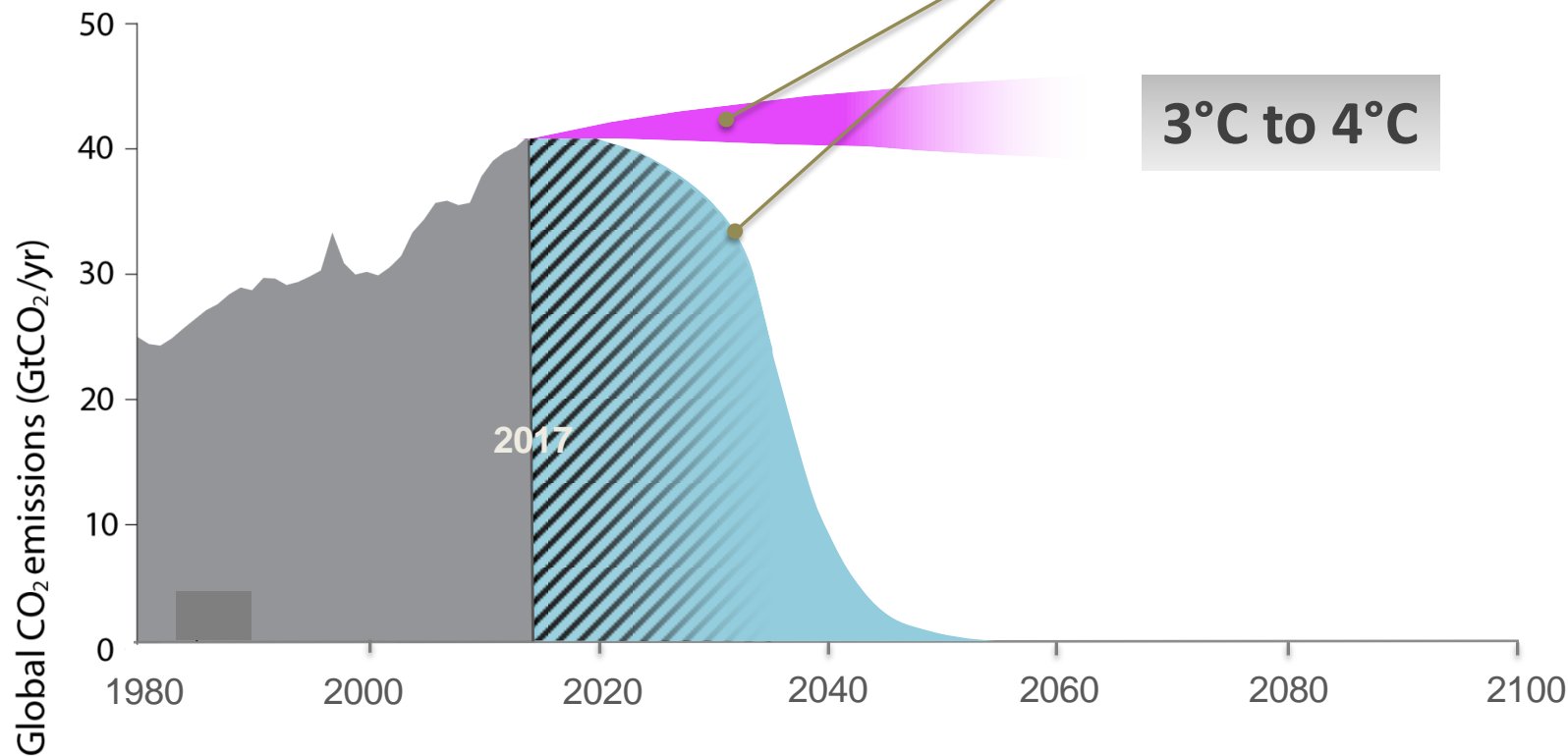




*A “romantic illusion”?*

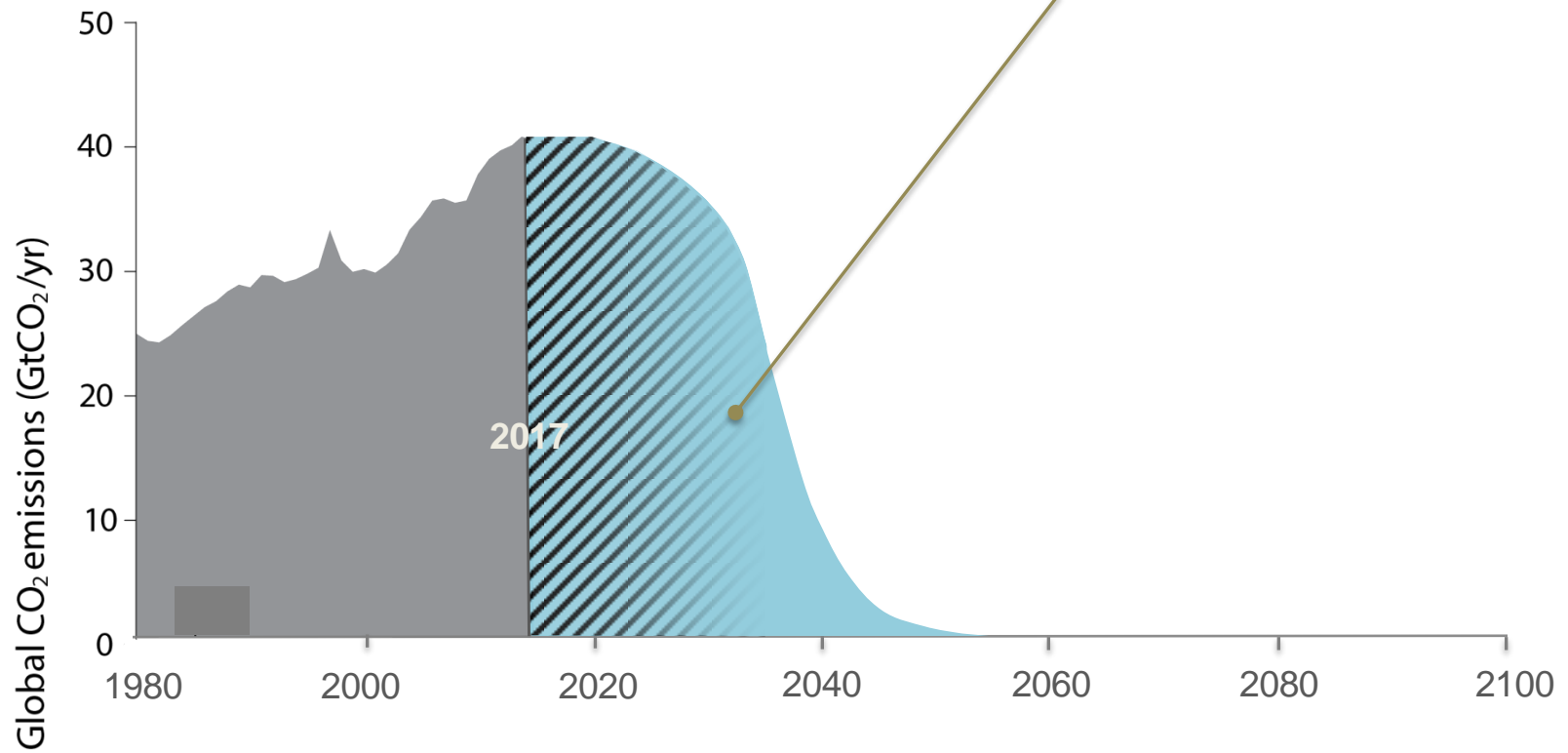
To move rapidly from current to 2°C pathways, requires  
**Immediate & deep cuts in ENERGY DEMAND**

**3°C to 4°C**



**Zero CO<sub>2</sub> ENERGY SUPPLY is a pre-requisite of 2°C**

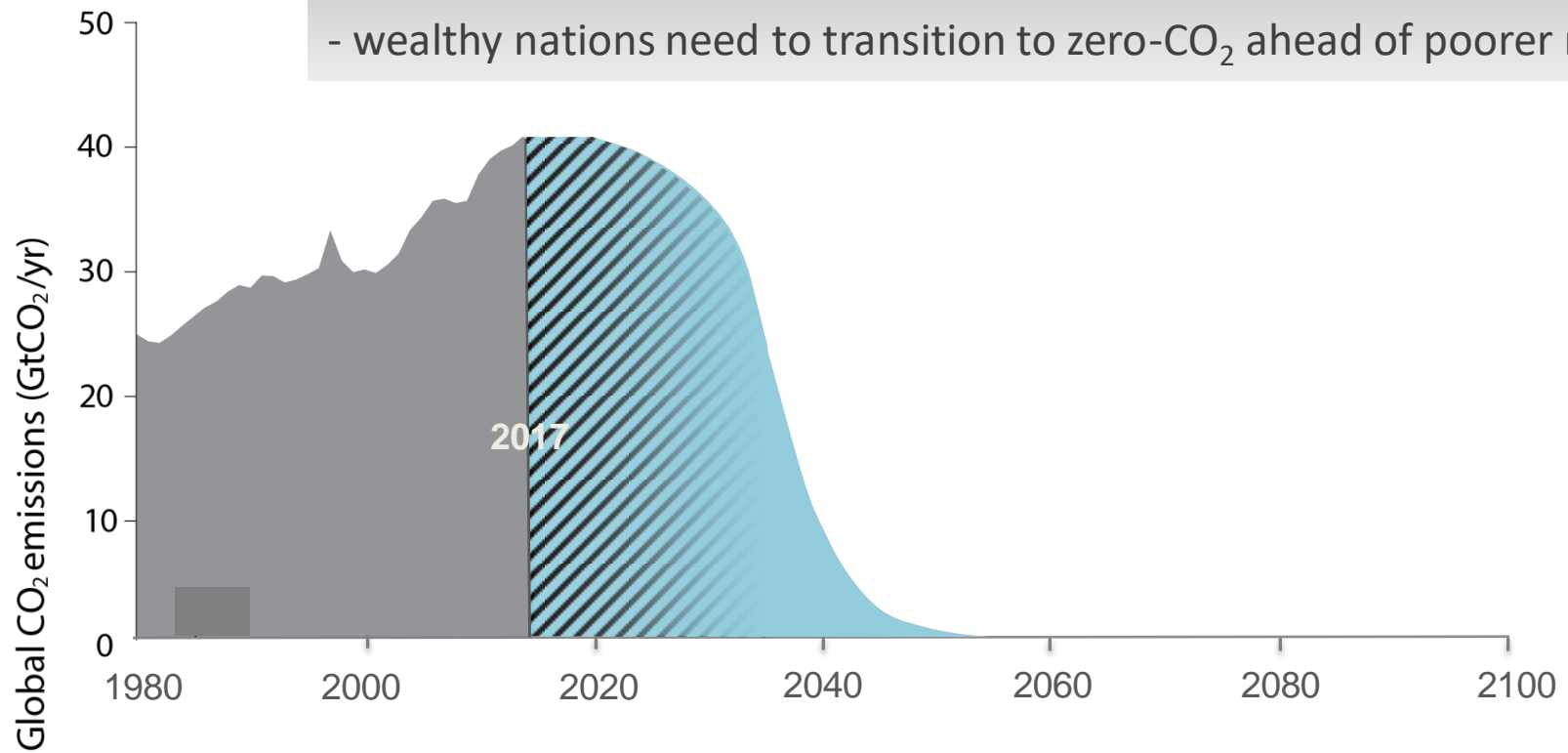
- *with planning & construction starting now*
- *& delivering in 1 to 3 decades*



*Another  
“romantic illusion”?*

**But Paris also has an important EQUITY dimension**

- wealthy nations need to transition to zero-CO<sub>2</sub> ahead of poorer nations



# How can this fit with the Paris euphoria?

Nations Unies

Conférence sur les Changements Climatiques 2015

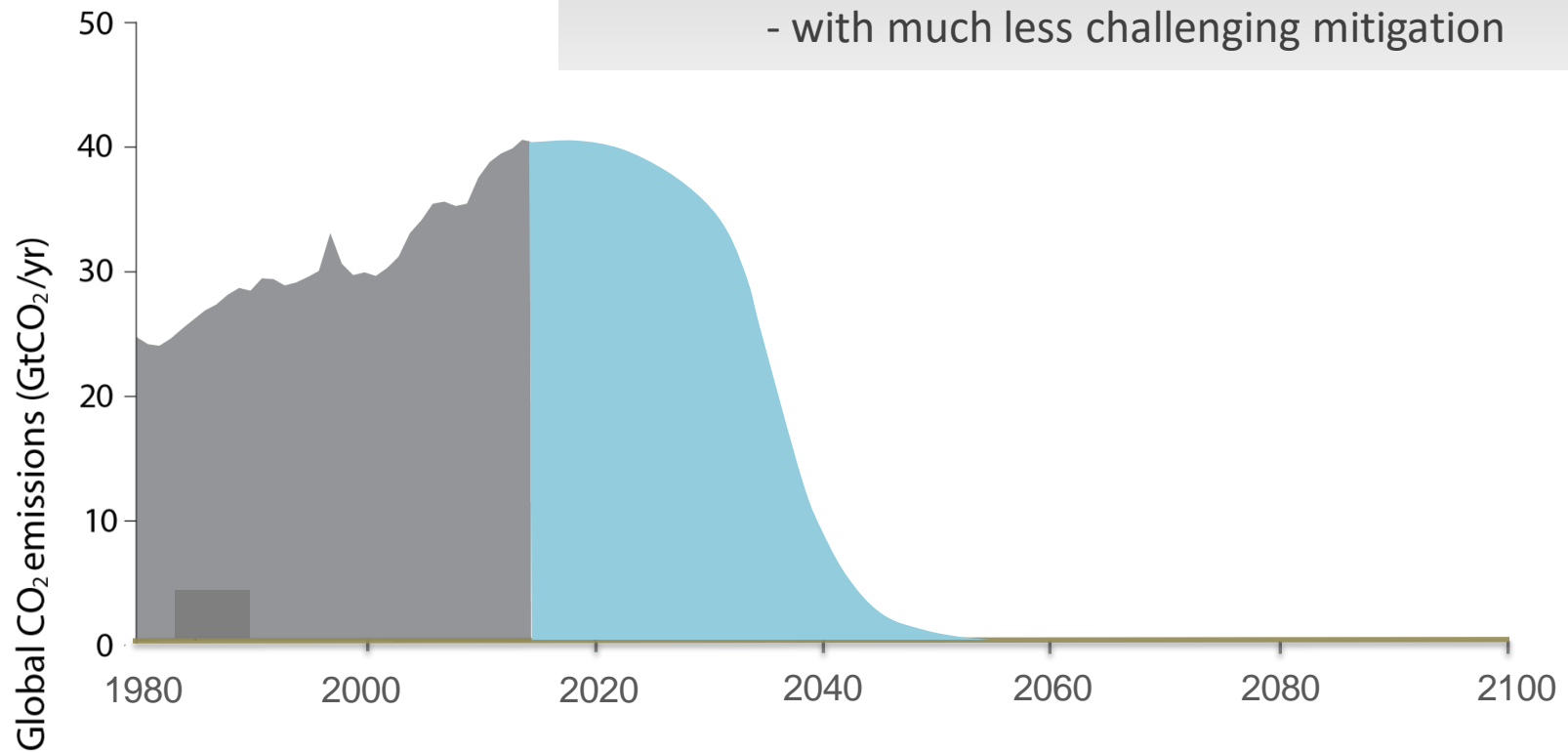
COP21/CMP11

Paris France

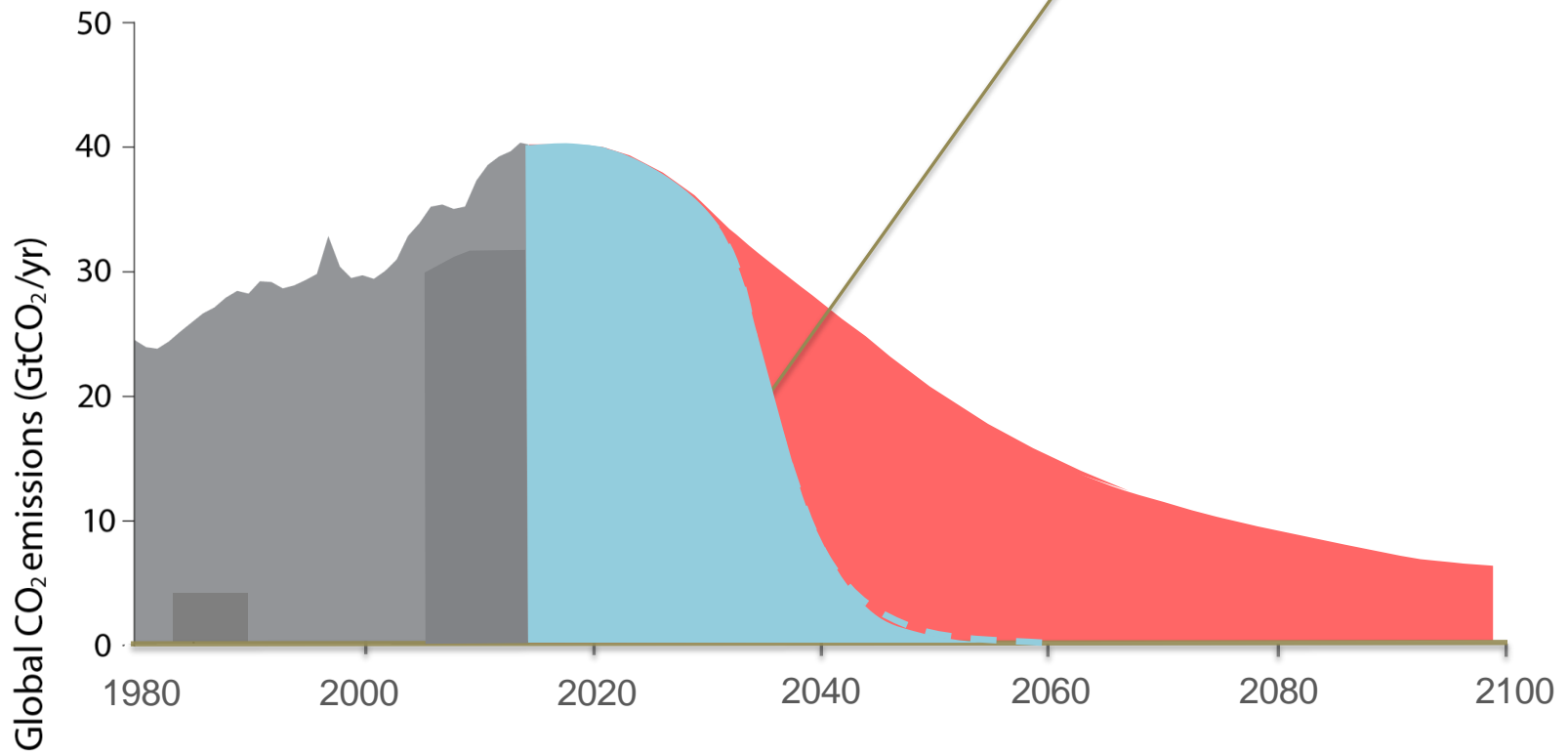


**... because policymakers have received a different story**

- 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<sub>2</sub>**  
*i.e. 2x the IPCC's carbon budget for a likely chance of 2°C*



So for a “likely” chance of 2°C

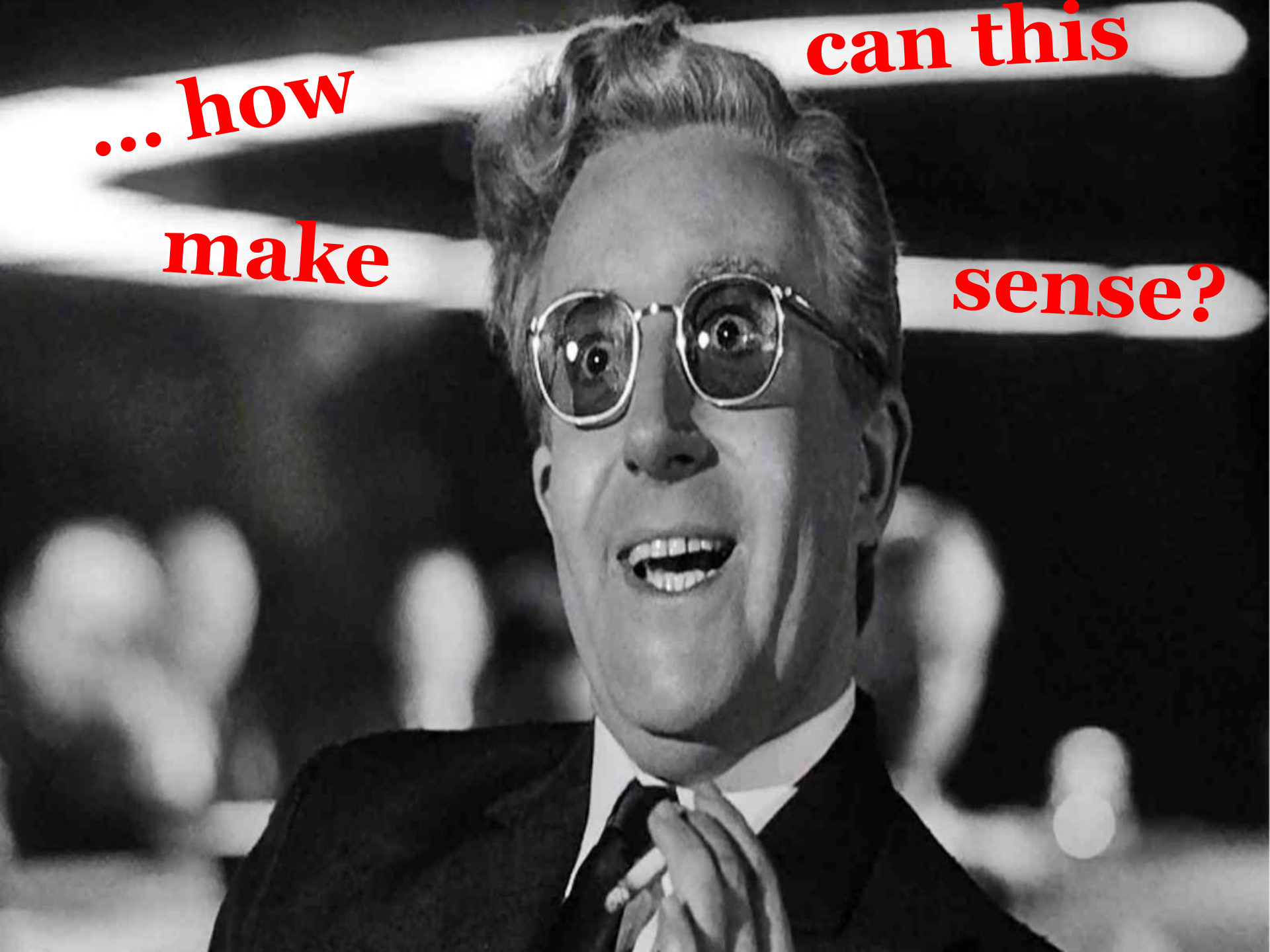
- IPCC **science** suggests around **800GtCO<sub>2</sub>** from 2017
- IPCC economic **modellers** typically use **~1600GtCO<sub>2</sub>** from 2017

**... how**

**make**

**can this**

**sense?**





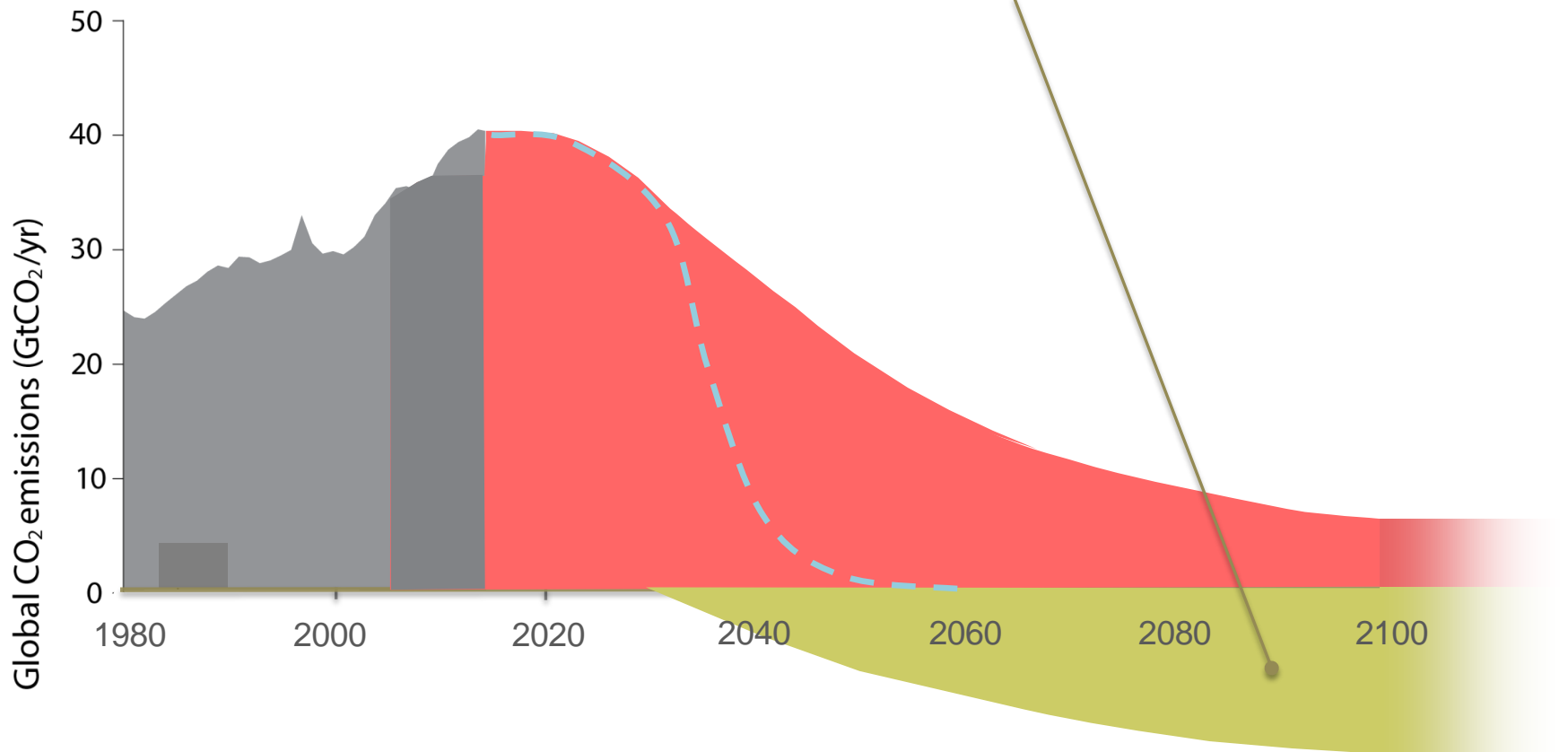
... by pulling a rabbit from the magician's hat

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models conjure up **“Negative Emission Technologies” (NETs)**

- to suck **100s billions tonnes of CO<sub>2</sub>** directly from the atmosphere
- they & emissions continue after the end of the century



# *The 'NET' that dominates the models is ...*

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

*Grow trees/plants*

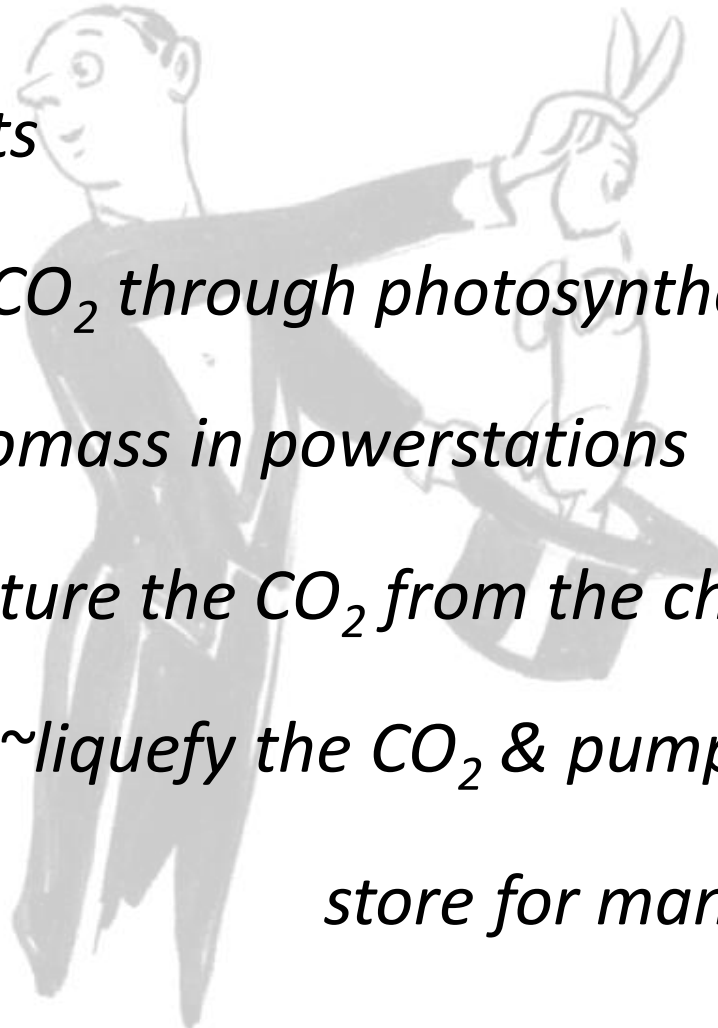
*they absorb CO<sub>2</sub> through photosynthesis*

*burn biomass in powerstations*

*capture the CO<sub>2</sub> from the chimney*

*~liquefy the CO<sub>2</sub> & pump it underground*

*store for many 1000s of years*



# *The 'NET' that dominates the models is ...*

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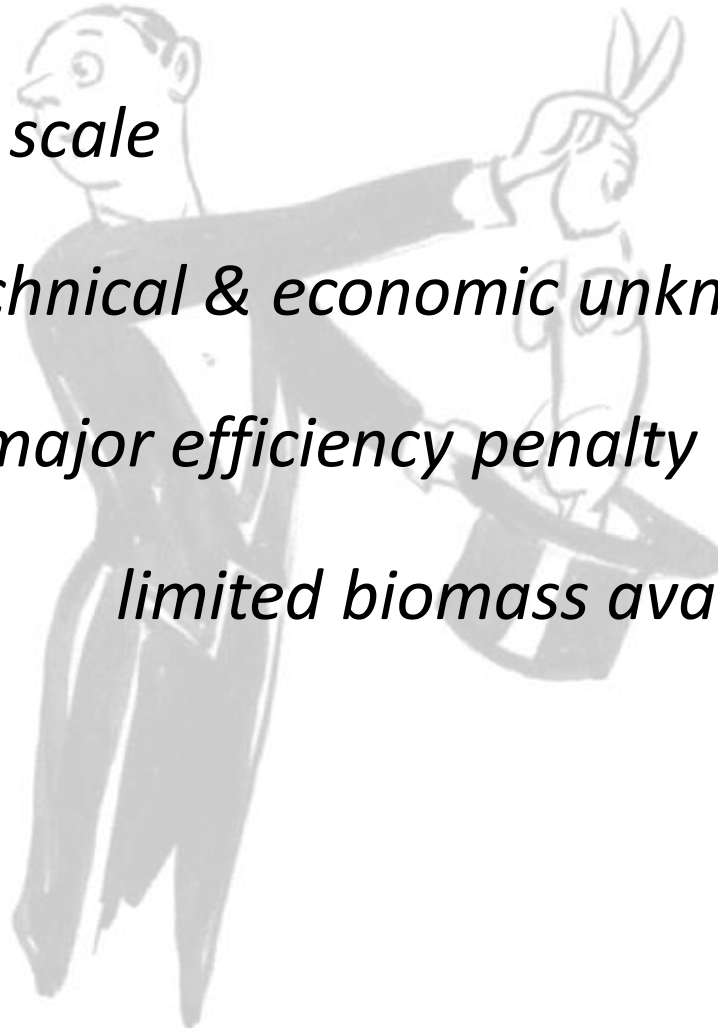
## ***BECCS – biomass energy with carbon capture & storage:***

*Never worked at scale*

*huge technical & economic unknowns*

*major efficiency penalty*

*limited biomass availability (fuel or food?)*



... or the equivalent of adding another biosphere!

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+



oceans & plants absorb  $\sim 20\text{GtCO}_2/\text{yr}$   
*i.e.  $\sim 1/2$  of what we emit*

BECCS assumed to absorb  $10\text{-}20\text{GtCO}_2/\text{yr}$   
*i.e. up to another planet's worth of biosphere*

# So Paris, some Academics & Politicians ...

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- **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<sub>2</sub> from the air in the future*
  - ... supporting ongoing fossil-fuel use to 2100 & beyond*
  - ... & masking how 2 °C demands major social change*

# My position on NETs

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- 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**

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To

- Peak CO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> by **2025**
- **~fully** decarbonised energy by around **2035**

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



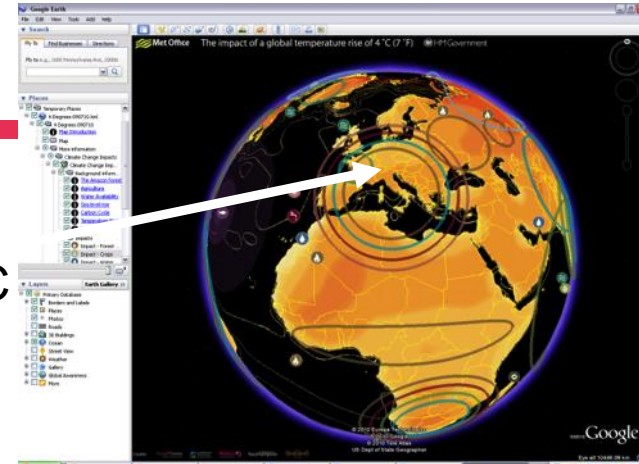
# Global impacts: 4°C

Hottest days

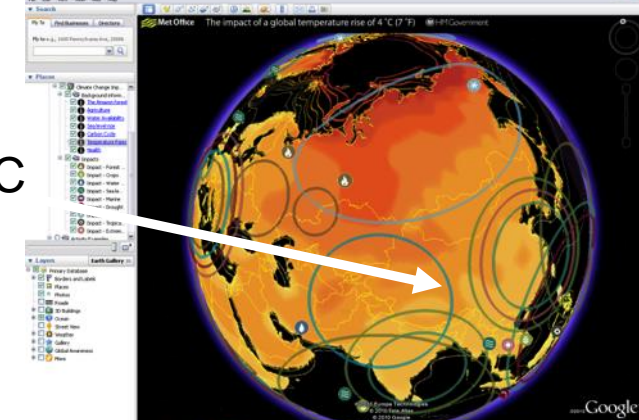


Prolonged & more severe heatwaves  
(6 to 12°C hotter)

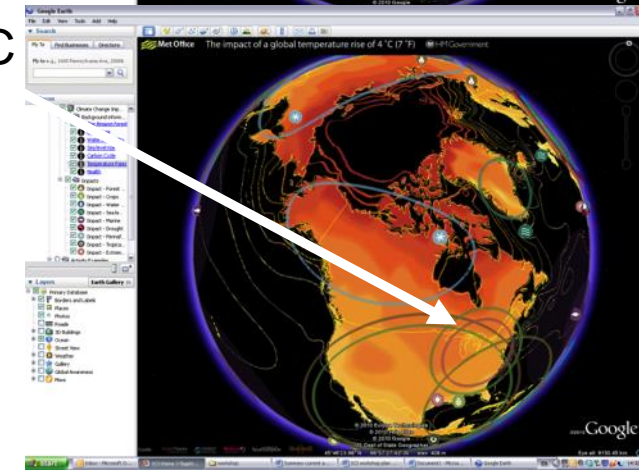
+8°C



+6°C



+10-12°C

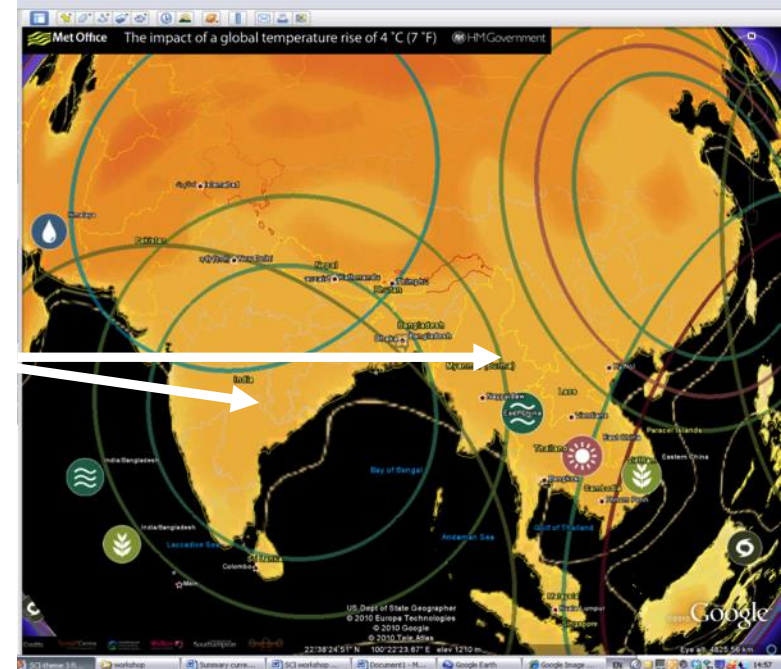
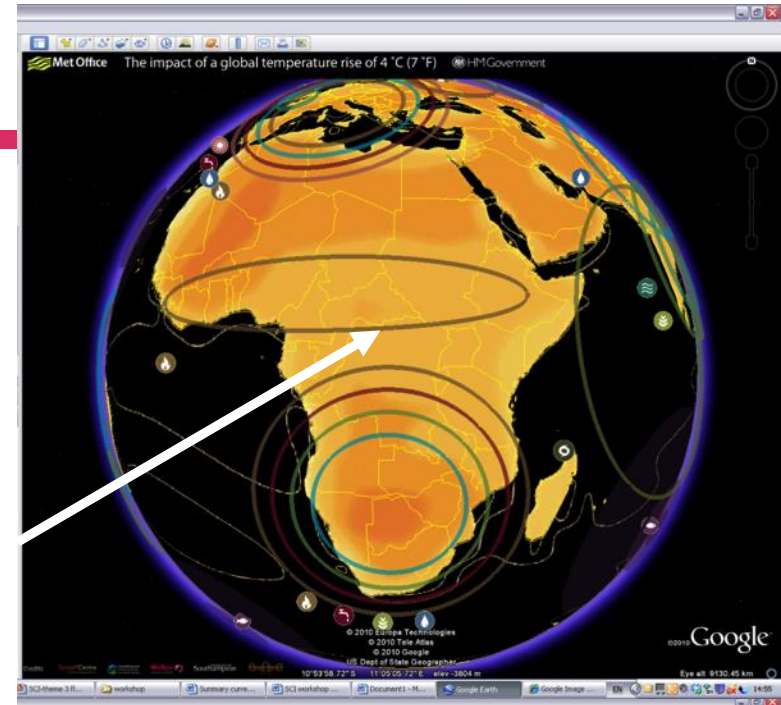


# Global impacts: 4°C

## Food crops



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

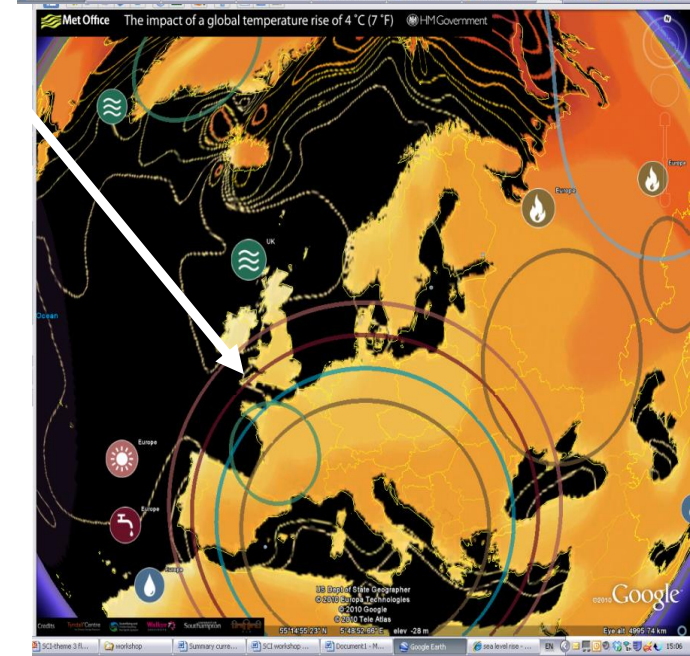
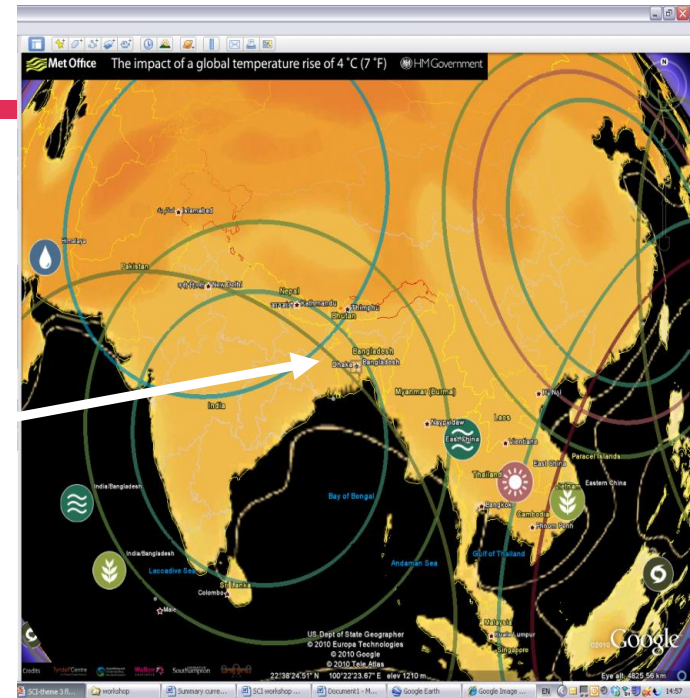


# Global impacts: 4°C

## Sea level rise



**50-150cm** rise,  
higher in low latitudes



# **There is a widespread view that 4°C is...**

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- 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*

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

# SUPPLY: low-CO<sub>2</sub> *electricity*

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*Tidal*

*Wave*



*Biomass*

*(CCS ?)*

## SUPPLY: low-CO<sub>2</sub> *energy*

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- But, electricity is typically 20% of final energy demand
- So also need a massive programme of electrification

# **DEMAND:** opportunities for near-term mitigation

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- 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

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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<sub>2</sub> asymmetry & mitigation



# **EQUITY: extreme emission asymmetry**

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~50% of global CO<sub>2</sub> 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<sub>2</sub> 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

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- Most of the 7.5 billion have little scope to reduce emissions
- There is huge asymmetry in responsibility
- Rapid & near-term reduction in CO<sub>2</sub> from top 10% of emitters
- Real opportunity for leading by example
- And thereby catalysing system-change (*governments & society*)



# Climate Change demands System Change

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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

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

*... starting now ...*

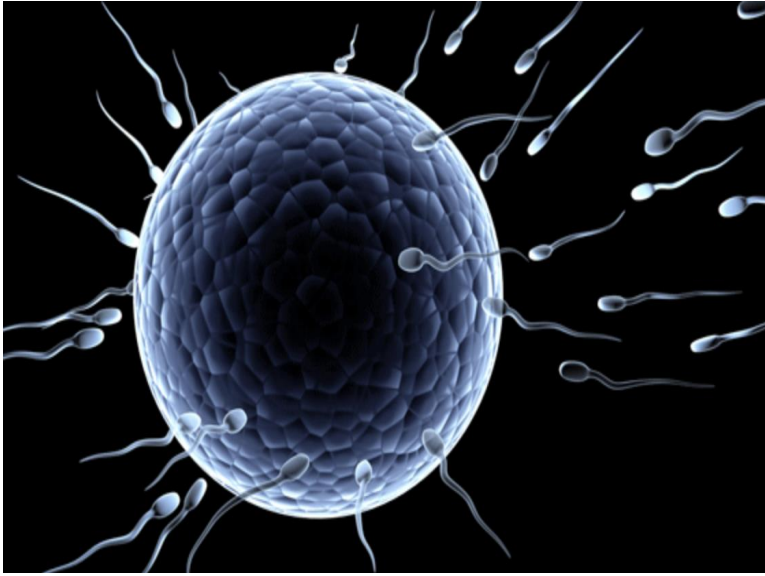
... we've a long way to go

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... we've a long way to go

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... we've a long way to go

---



... but we know where to find the solutions

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*& 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

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- Retrofit existing buildings
- All new buildings to be passive-house standard
- Max CO<sub>2</sub> standard for all new cars/electrification  
*(e.g. 100gCO<sub>2</sub>/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

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- Major electrification programme (htg, transport, etc)
- Much higher rated interconnectors
- Roll out smart grid/intelligent metering/community energy
- Sustainably exploit renewable & v. low CO<sub>2</sub> energy
- Indigenous biomass/biogas/P2G for intermittency/base load

# What this may mean for UK Energy POLICY

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- 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 ...

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A short-term *realpolitik*

*or*

A sustainable long-term *real-climate*

# Manchester: laggard or leader?

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- Climate commitments based on clear & fair carbon budgets
- Do not exclude 'difficult to decarbonise' sectors
- Explicitly Informed by *science* and *equity*
- Use territorial CO<sub>2</sub> 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 ...

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*“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*

# Thanks for listening

twitter: @KevinClimate

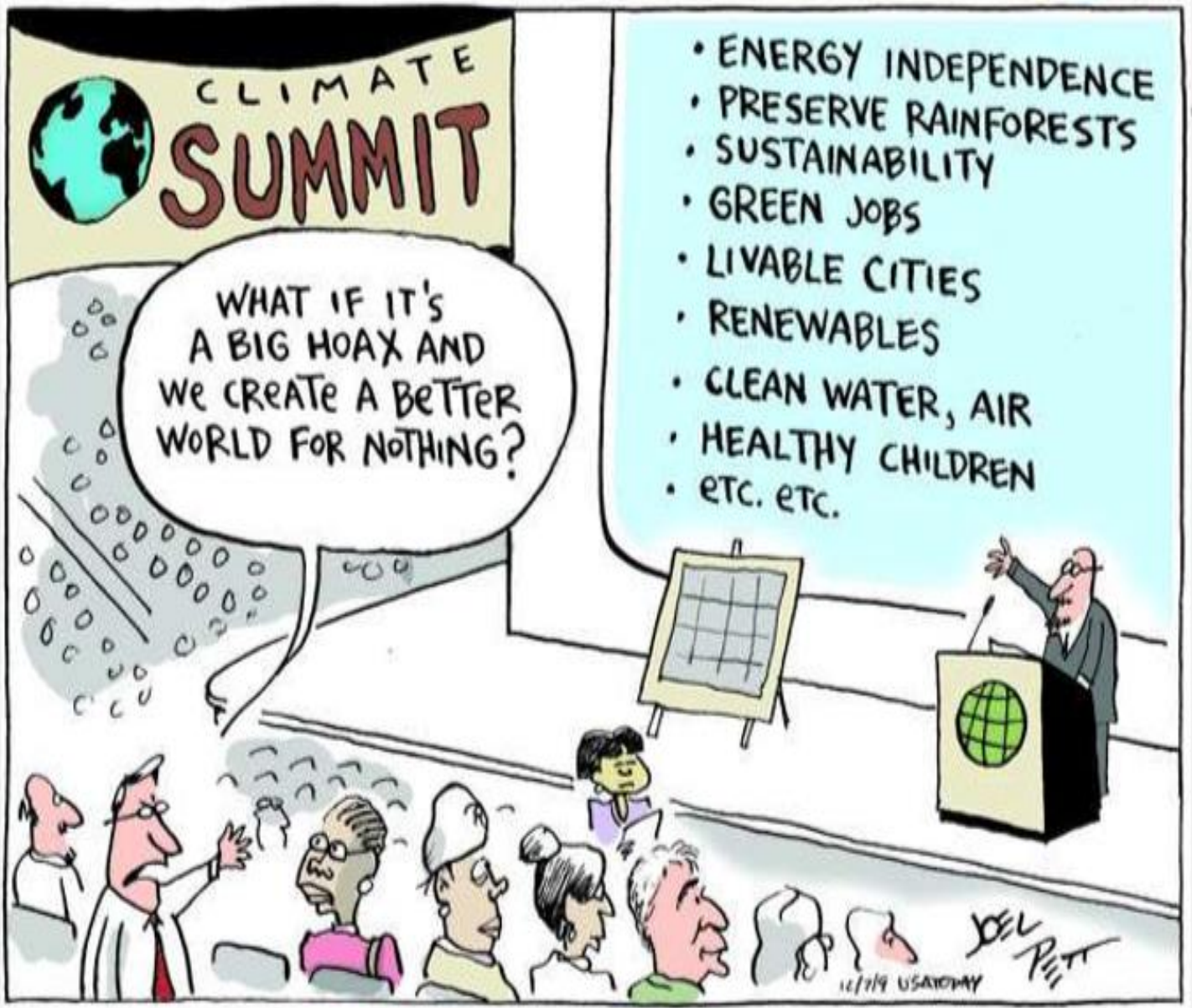
*web: [kevinanderson.info](http://kevinanderson.info)*



**Kevin Anderson**  
Professor of Energy & Climate Change



**Tyndall°Centre®**  
for Climate Change Research



CLIMATE  
**SUMMIT**

WHAT IF IT'S  
A BIG HOAX AND  
WE CREATE A BETTER  
WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- etc. etc.

DEU PITT  
11/19 USA TODAY

# Greater Manchester Green Summit

21.3.2018 | Manchester Central

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

#GMGreenCity

Our ambition? To be one of Europe's leading green cities.





# CPRE Green Summit Workshop

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

#GMGreenCity

Louise Marix Evans  
Quantum Strategy & Technology  
23 January 2018



**Setting  
City  
Area  
Targets and  
Trajectories  
for  
Emission  
Reduction**

Expert Workshops

Listening Events

Green Summit

Environment Charter

Environment  
Charter

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

#GMGreenCity



GREENHOUSE  
GAS PROTOCOL



WORLD  
RESOURCES  
INSTITUTE



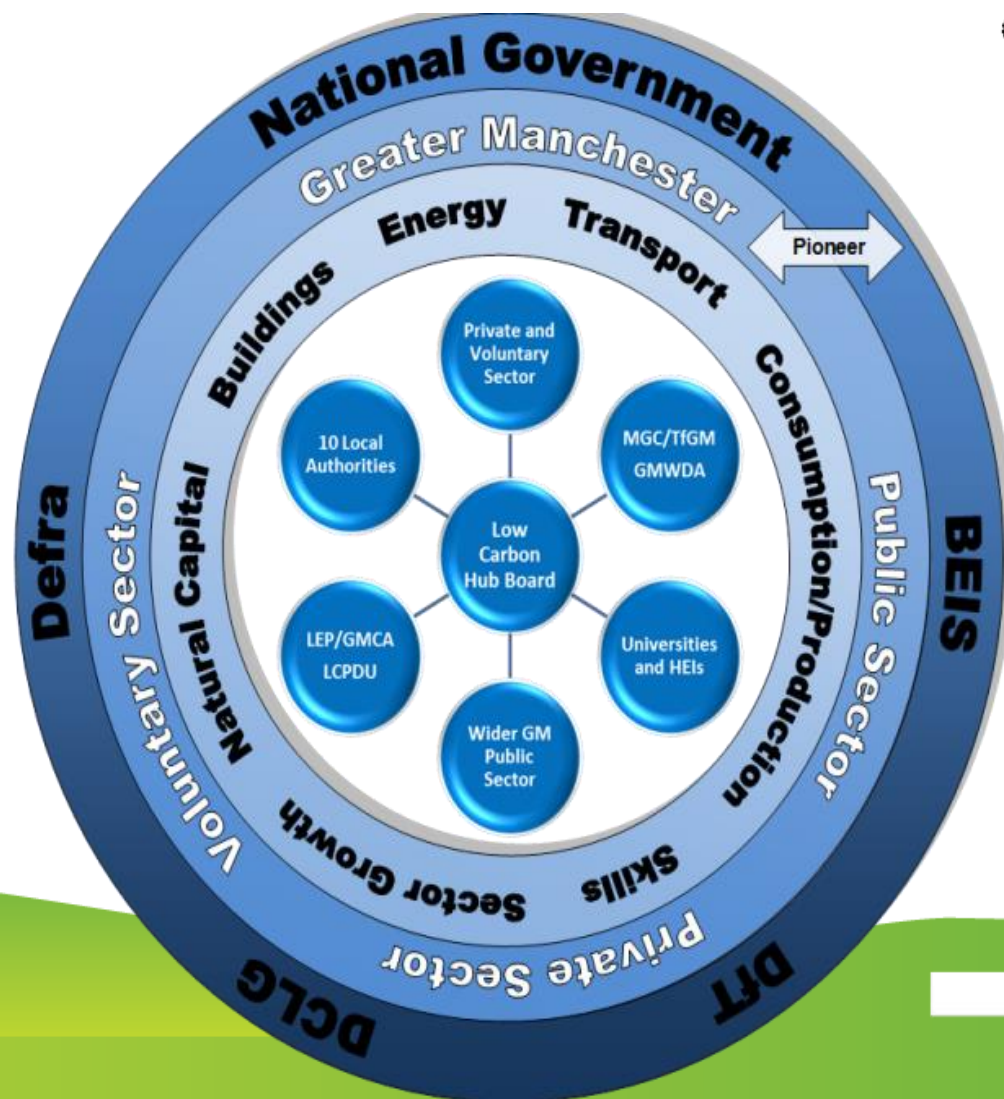
COMPACT  
of MAYORS

CORECITIESUK

# Climate Change Strategy (2012) and Climate Change and Low Emissions Implementation Plan (2016-2020).

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

#GMGreenCity



# Research & Evidence

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

#GMGreenCity



GM spends over £5 bn/pa on energy (all)

Use of electricity and gas in buildings accounts for 72% of direct CO<sub>2</sub> emissions

Longer term targets require energy efficiency, low or zero carbon heating





GM has 140MW of installed renewable electricity & 29MW of heat capacity



But we have technical potential for 9% of our electricity demand and 68% of our heat demand to come from renewable sources



# Existing Programmes

**Smart Systems and Heat (SSH)** – national pilot

**NEDO Smart Communities** £20+ million smart energy Demand Side Response

**Buildings Efficiency** - Award Winning £19m energy efficiency domestic programme & investment opportunities identified in non-domestic buildings

**Heat Networks** - £10m funding for first two networks agreed

**Transport** - Electric Vehicle recharging Infrastructure, £23m, Velocity Cycling Network, Extension of Metrolink

**Business support** - £3m Green Growth programme.



## **Green Space & Biodiversity – Natural Capital benefits:**

Greater Manchester's urban woodland sequesters nearly 25,000 tonnes of CO<sub>2</sub> per year at a value of about £2m

- A single tree can reduce air pollution by 20%
- Communities with more greenspace experience 80% less vandalism and 30% less medical depression
- Demand for energy to cool buildings can be reduced by 75% by having green roofs



- We have an opportunity to create a new vision for Greater Manchester
- `Business as Usual' not enough to achieve carbon neutral by 2050
- We must significantly scale up our environment, energy generation & efficiency activities
- Partner collaboration, with citizens, business and academia is key to accelerating progress.





# WORKSHOP SESSION

## Sticky wall exercise for Green Summit listening



# WORKSHOP SESSION

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

**#GMGreenCity**

## What should Greater Manchester do to become a Rural-friendly, Green & Carbon Neutral city-region?

On your OWN generate your own list of ideas  
3 mins



In pairs, compare results...

Agree your top 5 actions

Write: 1 action per paper

WRITE BIG

6-7 words per action

10 mins

**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

#GMGreenCity

**What should Greater  
Manchester do to  
become a Rural-friendly,  
Green & Carbon Neutral  
city-region?**



# Hand in your top 2 actions...

Do not worry, all five of your actions will be taken in.



**ANDY BURNHAM**  
MAYOR OF  
GREATER  
MANCHESTER

**#GMGreenCity**

# Hand in your remaining 3 actions...



# Reviewing the results...

We will write these up and feed them into the Green Summit listening analysis

Jackie Copley, CPRE, will synthesize them into a more formal letter to the Mayor to build on the Mayoral Asks from the CPRE previously issued



# More ways to get involved

Take the survey – <https://pollev.com/GreenSummit>

Share the survey within your organisation and networks

Talk to your friends, colleagues and neighbours and suggest they take the survey and get involved.



**Our trusted partners:**

The Environment Agency

Greater Manchester Combined Authority

Department for Business, Energy and Industrial Strategy

**ANDY BURNHAM**

MAYOR OF  
GREATER  
MANCHESTER

**#GMGreenCity**





## Next Steps:

Louise from Quantum will take away the raw data from today's listening event and write a summary to feed into the Greater Manchester Mayor's Green Summit.

CPRE will also write to the Greater Manchester Mayor setting out clear asks for action on climate change, rural protection and enhancement as plans are progressed, under our five campaign themes of:

- countryside;
- food and farming;
- planning and housing;
- transport; and
- energy and waste.





Thank you for listening  
and participating today

The slides will be available after the event. For  
more information visit our website

[www.cprelancashire.org.uk](http://www.cprelancashire.org.uk)