



# *Reframing Climate Change:* *How recent emission trends & the latest science change the debate*

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# Talk outline

- 1) Dangerous climate change - *post-Copenhagen*
- 2) Cumulative emissions - *a new chronology*
- 3) Misplaced optimism - *ignoring the bean counters*
- 4) Global GHG pathways - *impossible challenges?*
- 5) UK & Global response to the challenge
- 6) Implications for historic building – *a few thoughts*

# What is dangerous climate change?

UK & EU define this as 2°C

But:

- ... 2°C impacts at the worst end of the range*
- ... ocean acidification devastating even at 400-450ppmv CO<sub>2</sub>*
- ... failure to mitigate leaves 2°C stabilisation highly unlikely*

# Emission-reduction targets

- UK, EU & Global - long term reduction targets

<i>UK's 80%</i>	<i>reduction in CO<sub>2</sub>e by</i>	<b>2050</b>
<i>EU 60%-80%</i>	<i>“</i>	<b>2050</b>
<i>Bali 50%</i>	<i>“</i>	<b>2050</b>

- CO<sub>2</sub> stays in atmosphere for 100+ years,
- Long-term targets are dangerously misleading

## Put bluntly ...

2050 reduction unrelated to avoiding dangerous climate change (2°C)

**cumulative** emissions that matter (i.e. carbon budget)

this fundamentally rewrites the chronology of climate change

- *from long term gradual reductions*
- *to urgent & radical reductions*

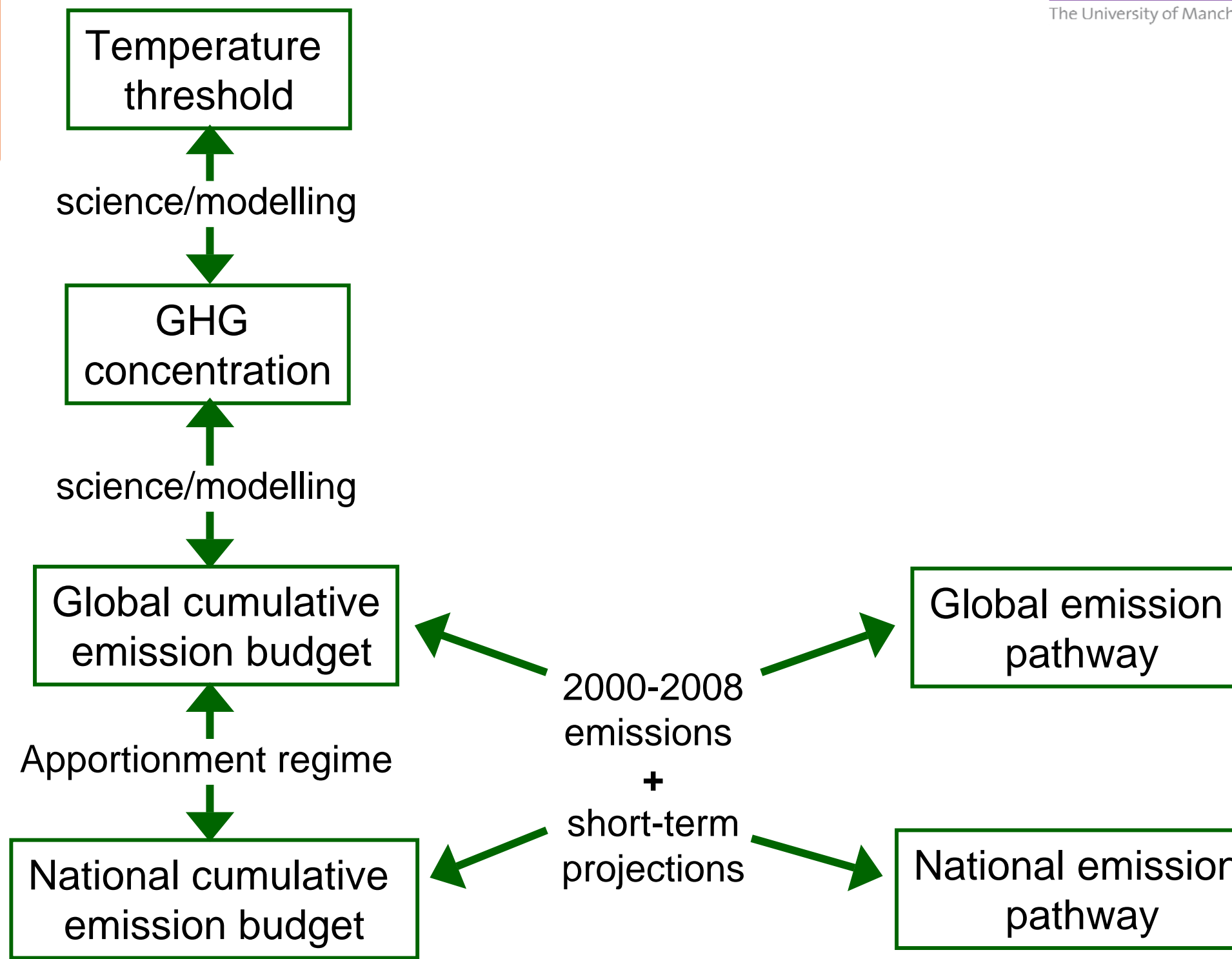
How do global **temperatures**

*link to*

global and national **carbon budgets**

*& from there to*

emission-reduction **pathways?**

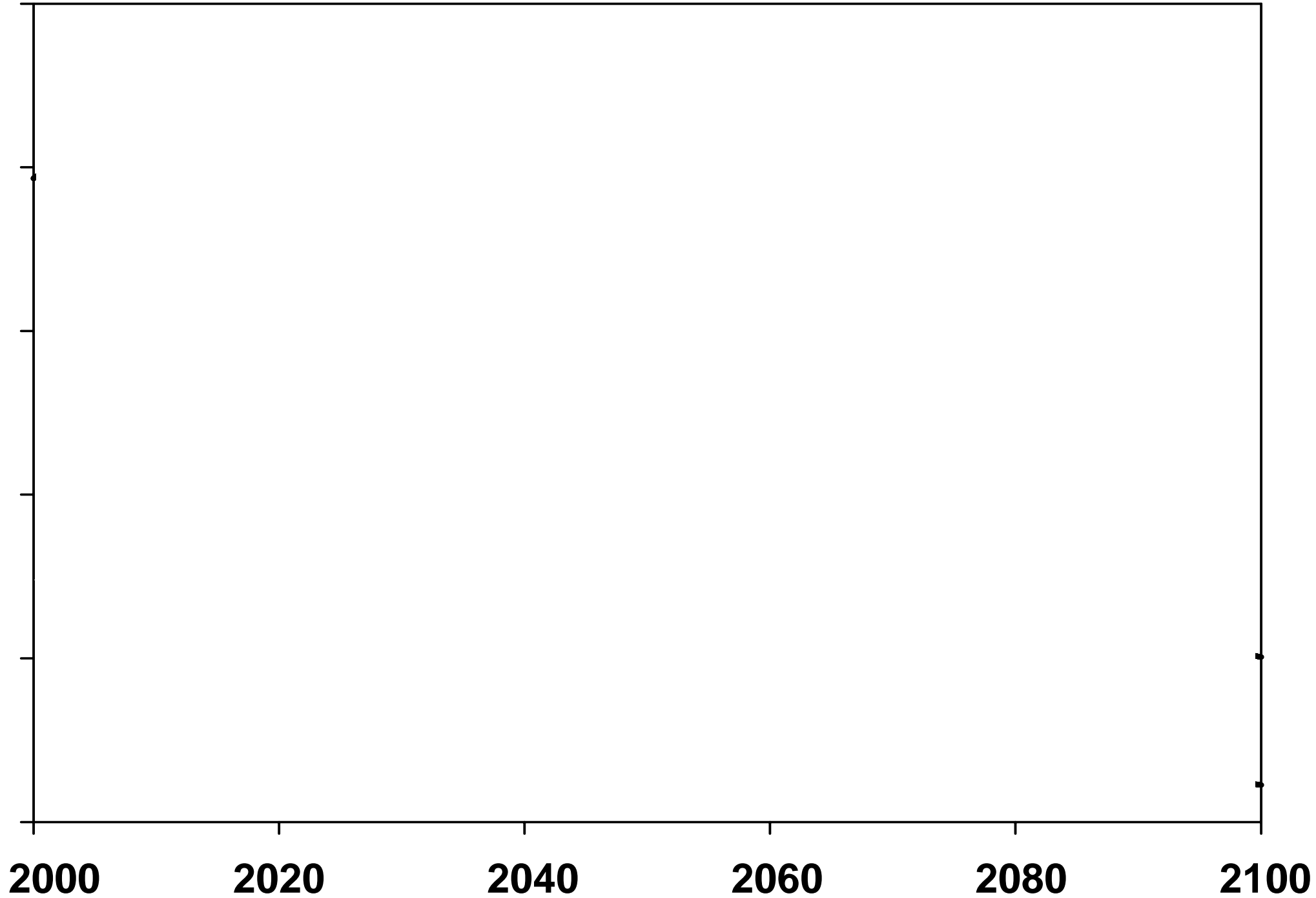


# Illustrative pathway for a CO<sub>2</sub>e budget

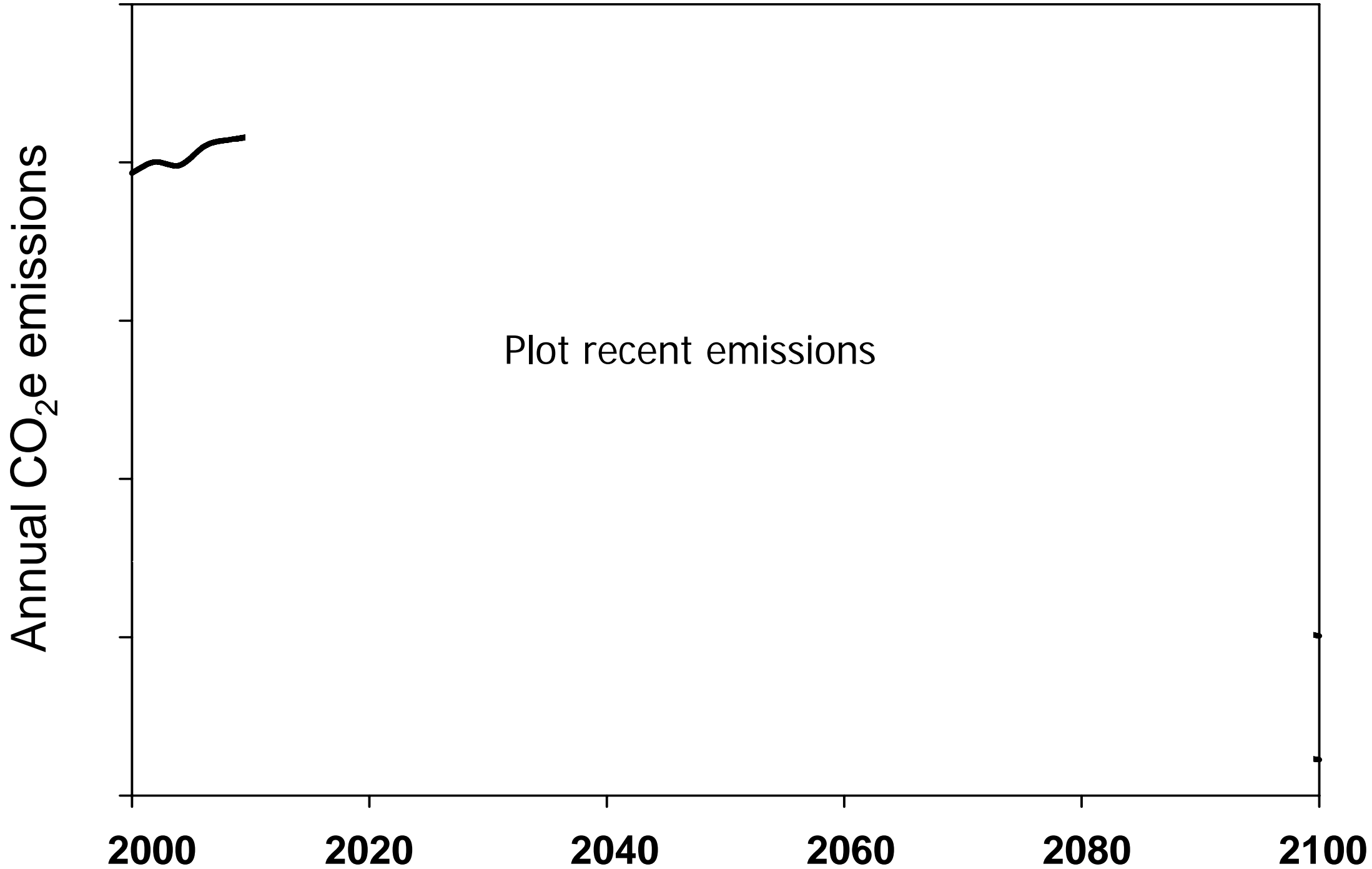


# Illustrative pathway for a CO<sub>2</sub>e budget

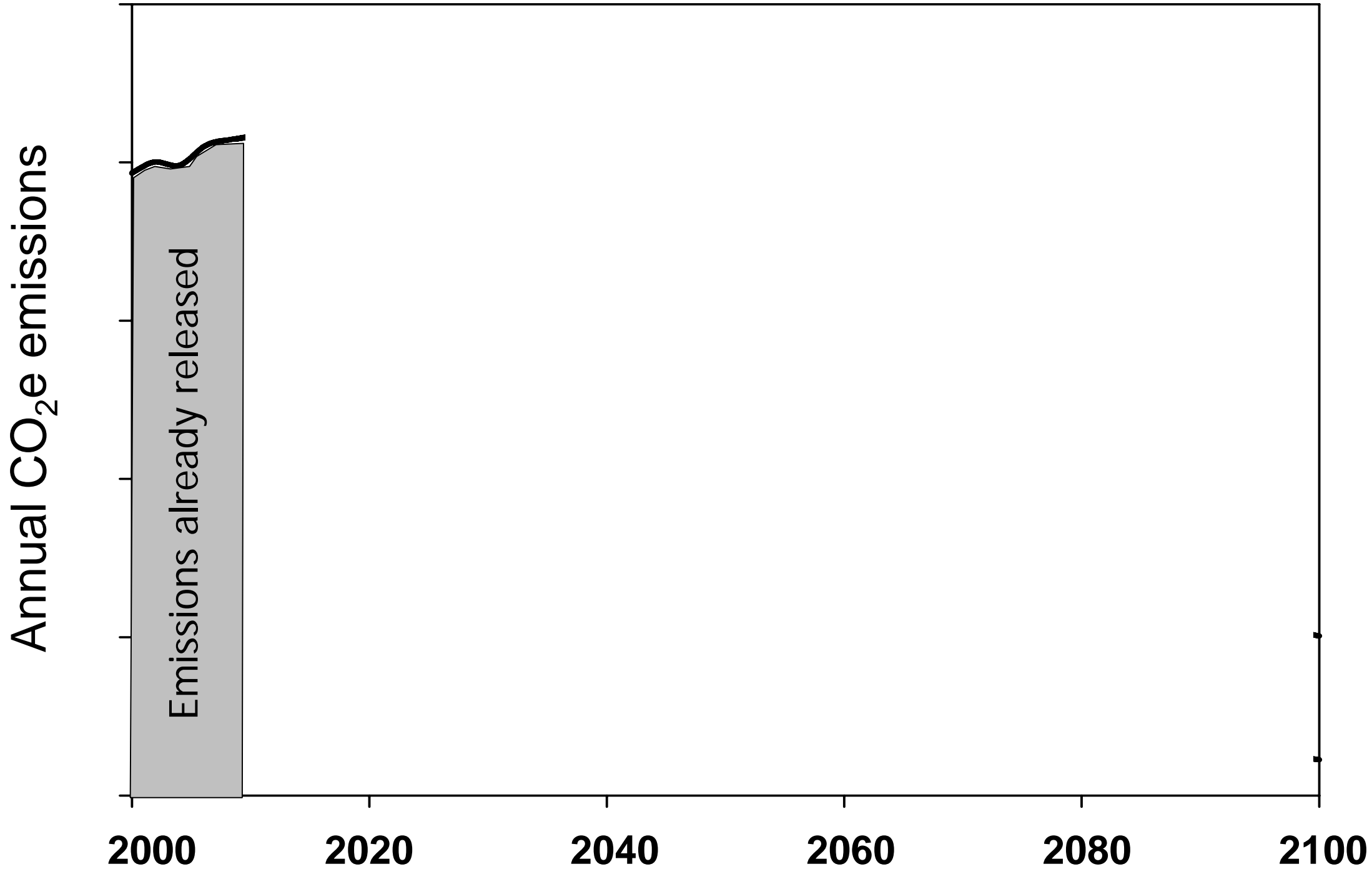
Annual CO<sub>2</sub>e emissions



# Illustrative pathway for a CO<sub>2</sub>e budget

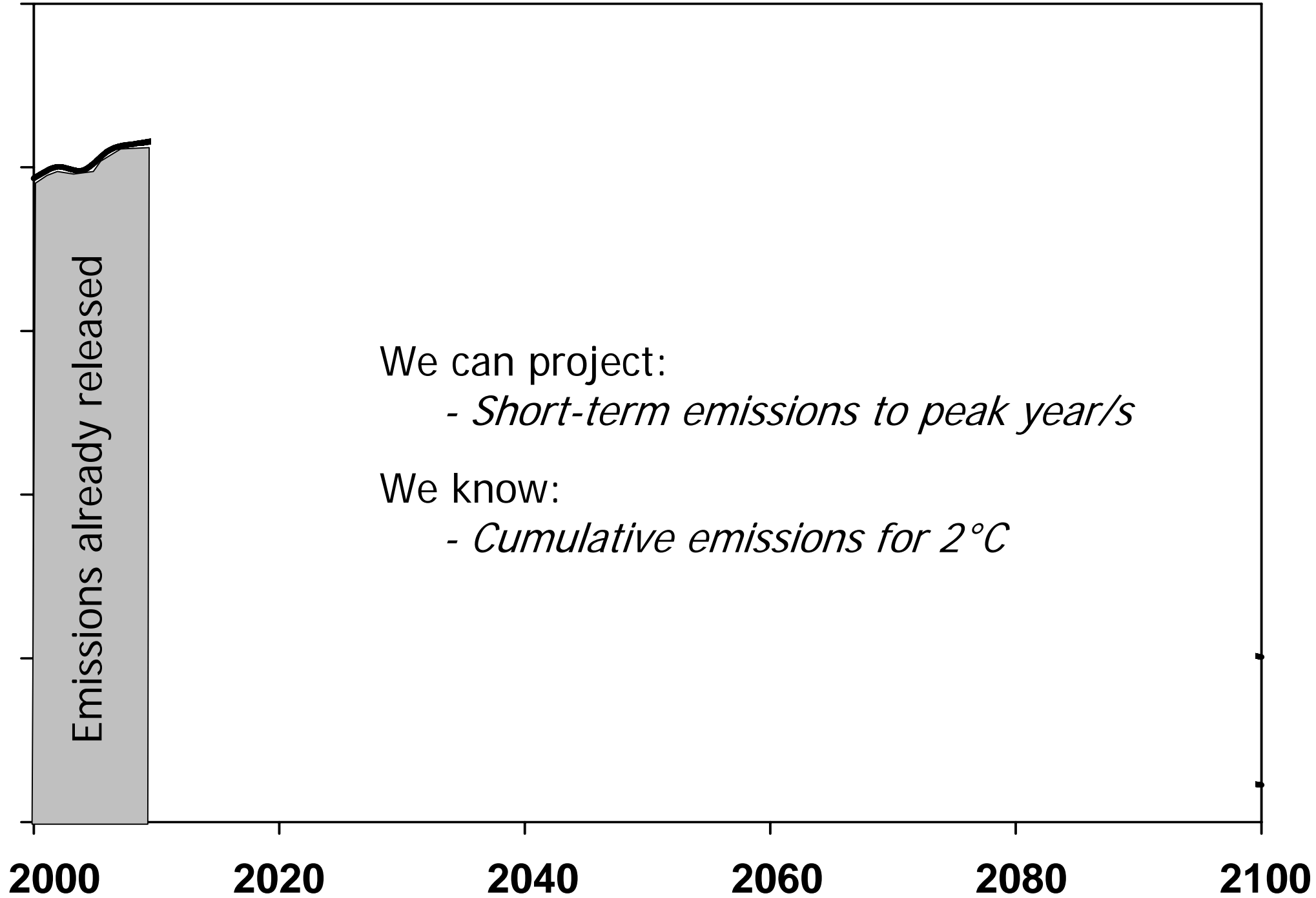


# Illustrative pathway for a CO<sub>2</sub>e budget



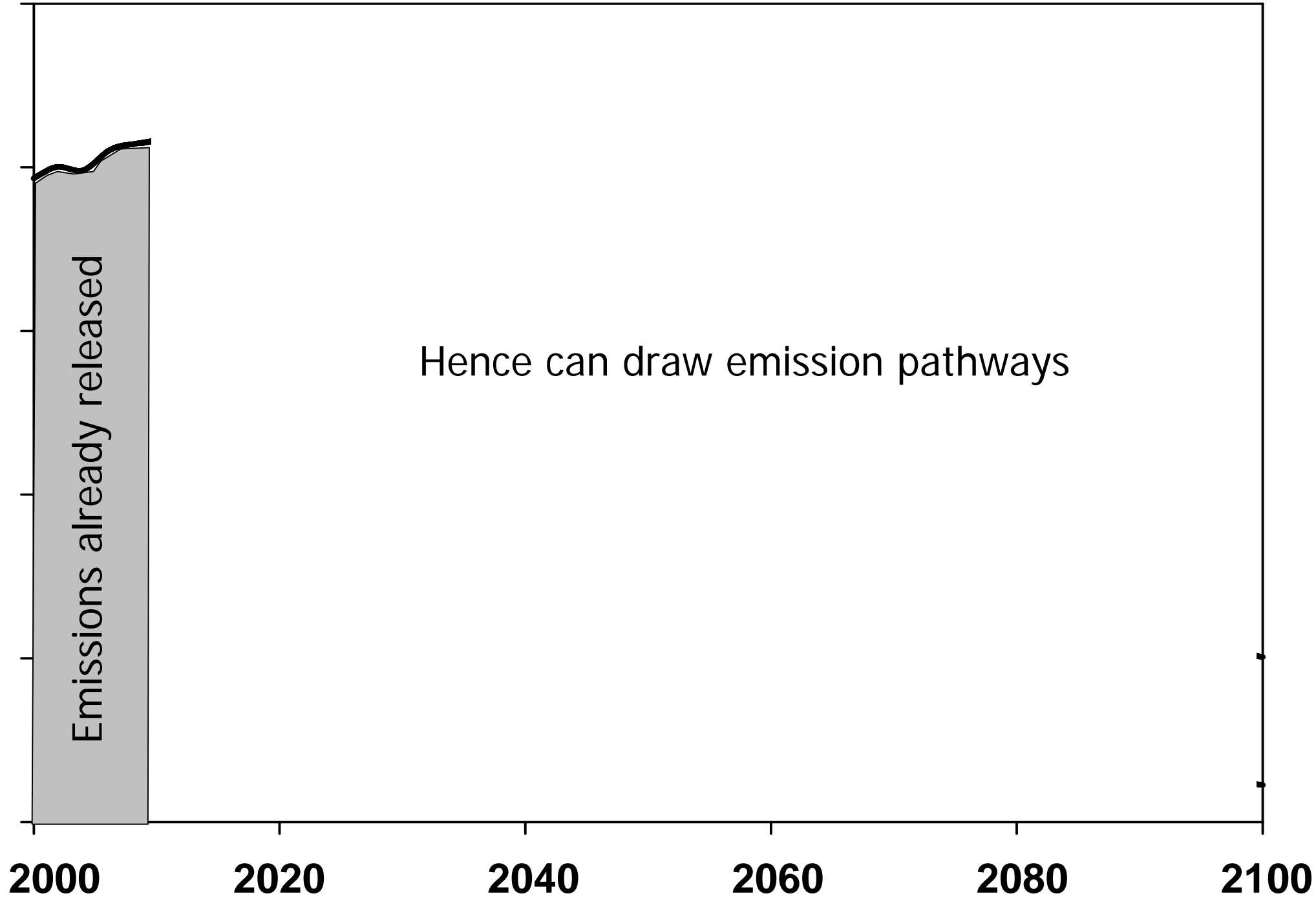
# Illustrative pathway for a CO<sub>2</sub>e budget

Annual CO<sub>2</sub>e emissions



# Illustrative pathway for a CO<sub>2</sub>e budget

Annual CO<sub>2</sub>e emissions



Emissions already released

Hence can draw emission pathways

2000

2020

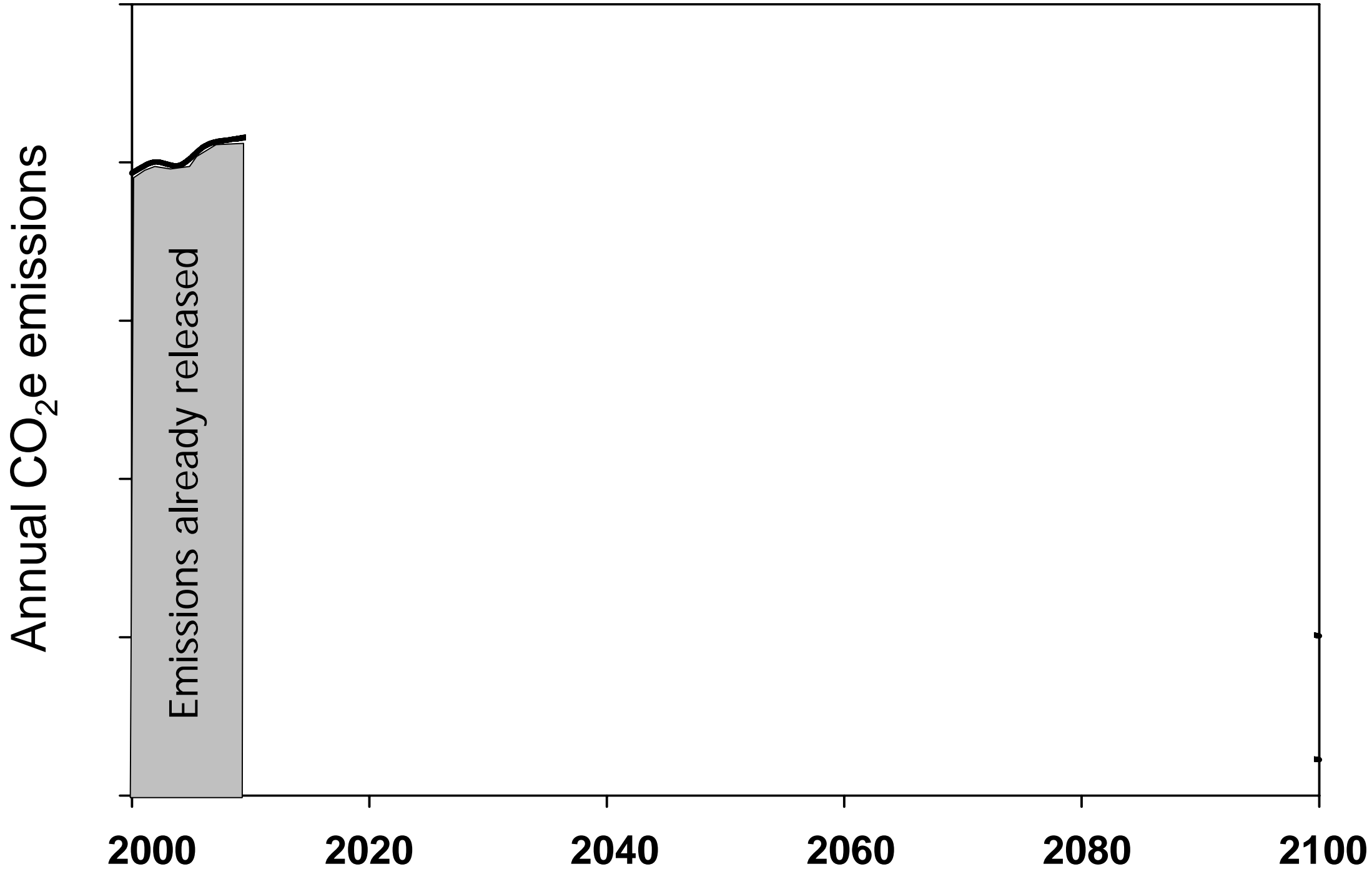
2040

2060

2080

2100

# Illustrative pathway for a CO<sub>2</sub>e budget



How does this 'scientifically-credible' way of thinking alter the challenge we face?

# Tyndall's *emission scenarios* (2000-2100 CO<sub>2</sub>e)

To consider:

1. *CO<sub>2</sub> emissions from landuse (**deforestation**)*
2. *Non-CO<sub>2</sub> GHGs (principally **agriculture**)*

*What emission space remains for:*

3. *CO<sub>2</sub> emissions from **energy**?*



# Tyndall's *emission scenarios* (2000-2100 CO<sub>2</sub>e)

Included very optimistic:

- land-use & forestry emission scenarios (**deforestation**)
- non-CO<sub>2</sub> greenhouse gas emissions (**agriculture**)

Global CO<sub>2</sub>e emissions peaks of 2015/20/25?

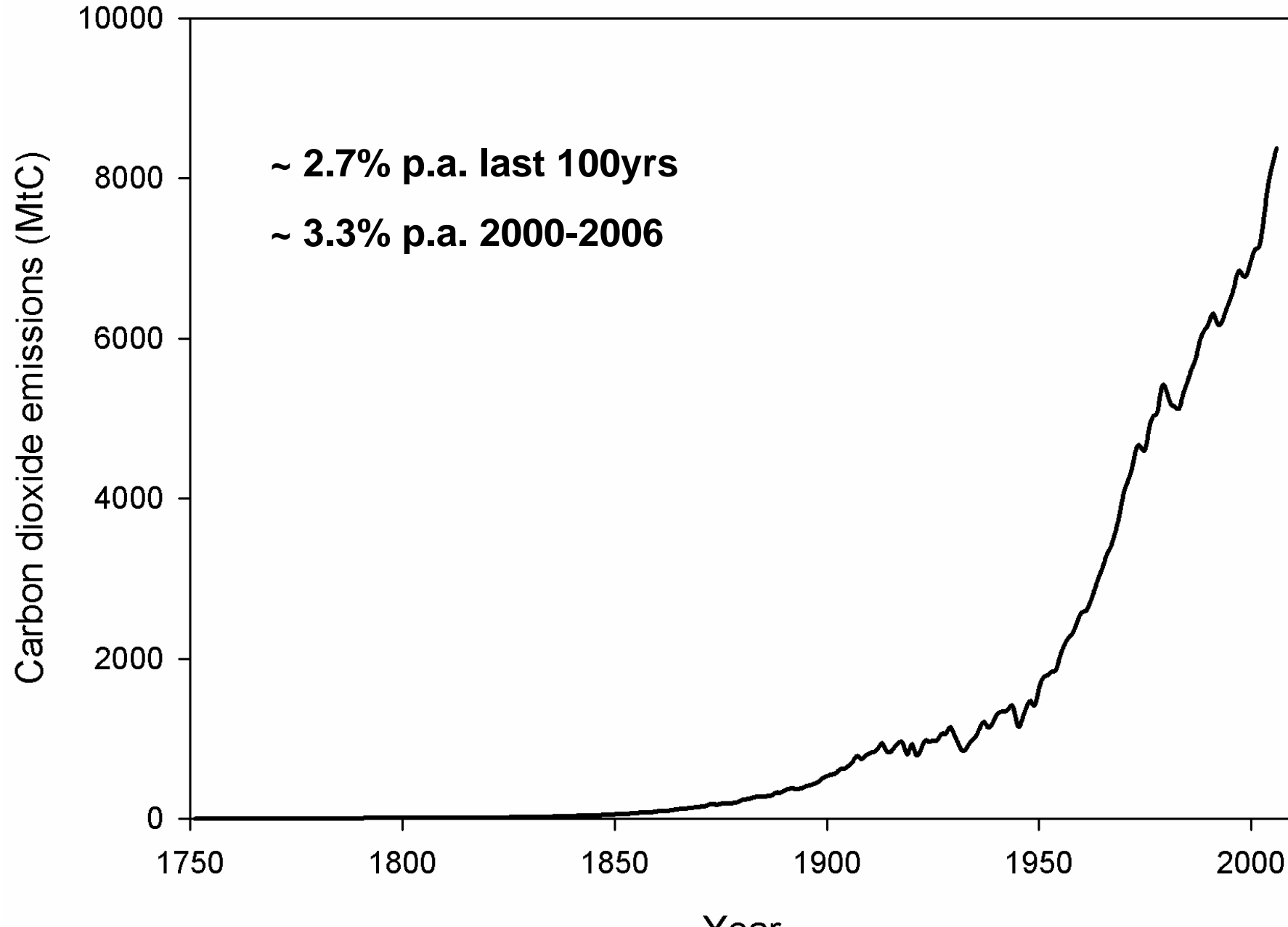
factoring in...

the latest emissions data

what is the scale of the global  
'problem' we now face?

# It's getting worse!

## Global CO<sub>2</sub> emission trends?



... appears we're denying its happening

latest global CO<sub>2</sub>e emission trends?

~ 2.4% p.a. since 2000

~ Stern assumed 0.95% p.a.

*(global peak by 2015)*

## What does:

- this failure to reduce emissions  
&
- the latest science on cumulative emissions

Say about a 2°C future?

# What greenhouse gas emission pathways for 2°C

## *Assume*

- *2015/20/25 global peak in emissions*
- *Highly optimistic deforestation & food emission reductions*
- *~10% to 60% chance of exceeding 2°C*

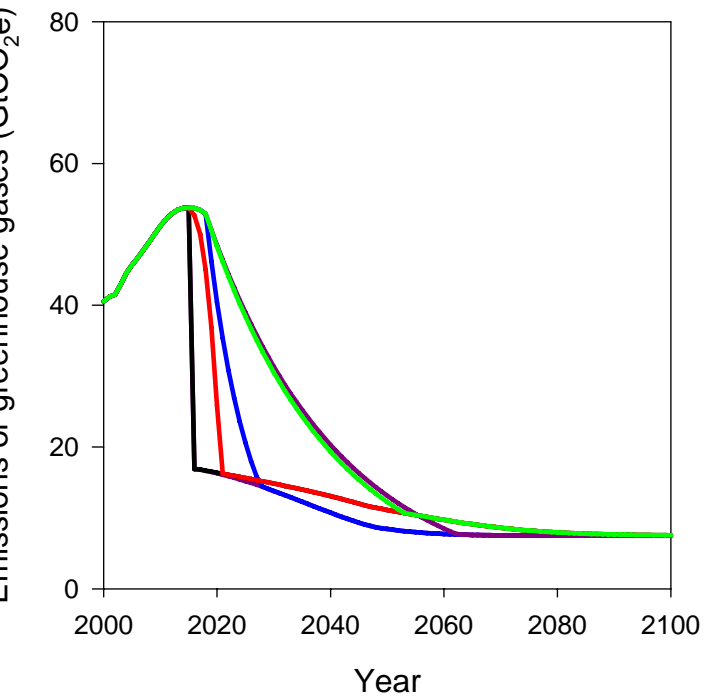
For  $\sim 2^{\circ}\text{C}$  we can emit:

**$\sim 1400$  to  $2200 \text{ GtCO}_2\text{e}$**   
between 2000-2100

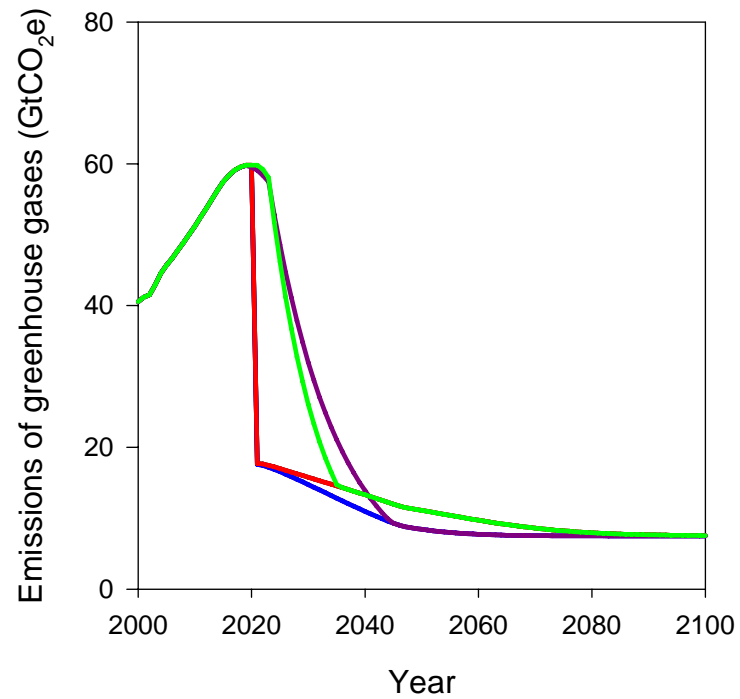
*(i.e. the global carbon budget)*

# Total greenhouse gas emission pathways

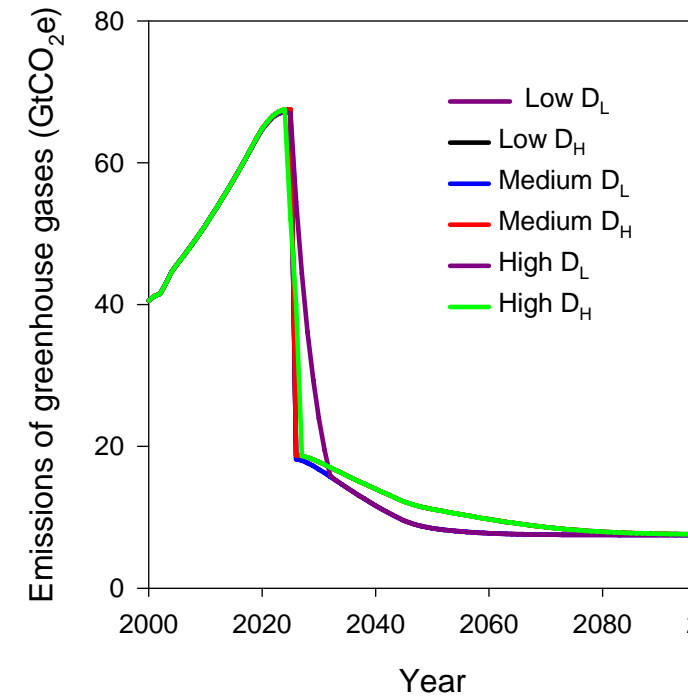
2015 peak



2020 peak



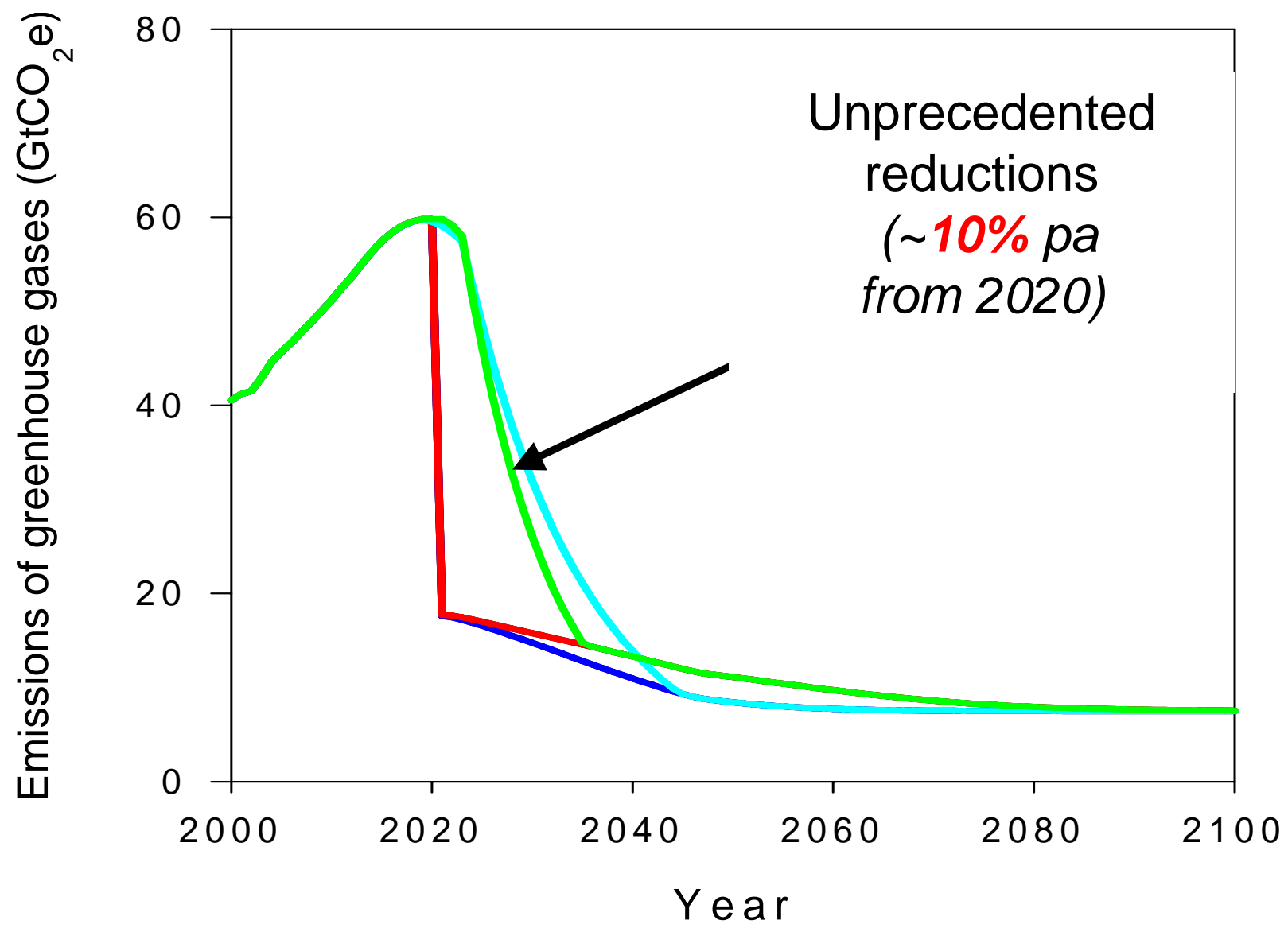
2025 peak



(Anderson & Bows. 2008 Philosophical Transactions A of the Royal Society. 366. pp.3863-3882)



# Reasonable/good chance of 2°C & with a 2020 peak

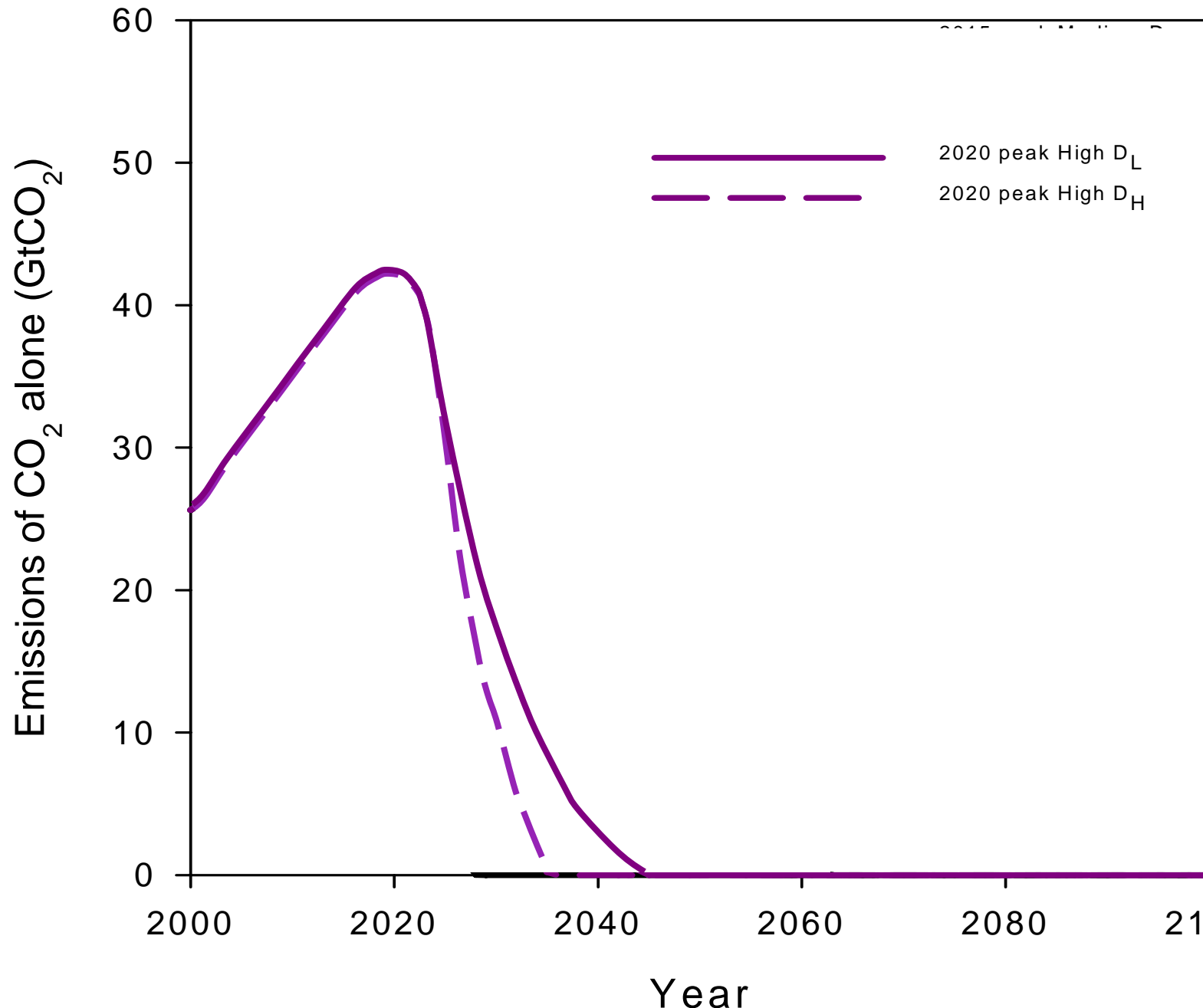


(Anderson & Bows. 2008 Philosophical Transactions A of the Royal Society. 366. pp.3863-3882)

# ... and for energy emissions? *(with 2020 peak)*

13 of 18 scenarios  
'impossible'

Even then total  
decarbonisation by  
~2035-45 necessary



# What annual global emission reductions from energy for 3°C and 4°C

## *Assume*

- *2020 global peak in emissions*
- *Highly optimistic deforestation & food emission reductions*
- *~ 50% chance of exceeding 3°C & 4°C*

For **3°C** & emissions peaking by 2020:

*... 9% annual reductions in CO<sub>2</sub> from energy*

For **4°C** & emissions peaking by 2020:

*... 3.5% annual reductions in CO<sub>2</sub> from energy*

# What are the precedents for such reductions?

Annual reductions of greater than 1% p.a. have only

***“been associated with economic recession or upheaval”***

Stern 200

- *UK gas & French 40x nuclear ~1% p.a. reductions*  
*(ex. aviation & shipping)*
- *Collapse Soviet Union economy ~5% p.a. reductions*

## Need to reframe climate change drivers:

- For mitigation

2°C should remain the driver of policy

- For adaptation

4°C should become the driver of policy

# Urgent need for reality check

*If economic growth not possible with 6% p.a carbon reduction  
... then*

*need planned economic 'contraction' to stabilise even at ~4°C*

# Urgent need for reality check

- *Focus on win-win opportunities is misplaced*
- *Significant ‘pain’ & many losers*
- *4°C is not ‘business as usual’*
  - *but all orthodox reduction in place & successful*
- *What does this mean for adaptation?*



# Urgent need for reality check

***Both mitigation & adaptation rates are:***

- *beyond what we have been prepared to countenance*
- *without historical precedent*

***We've entered new and uncharted territory***

**How are the UK and International Community  
fairing against this challenge?**

# UK Low Carbon Transition Plan (2009:5)

*“To avoid the most dangerous impacts of climate change, average global temperatures must rise no more than 2°C, and that means global emissions must start falling before 2020 and then fall to at least 50% below 1990 levels by 2050.”*

The UK is clearly demonstrating a strong international lead.

# UK position based on CCC report

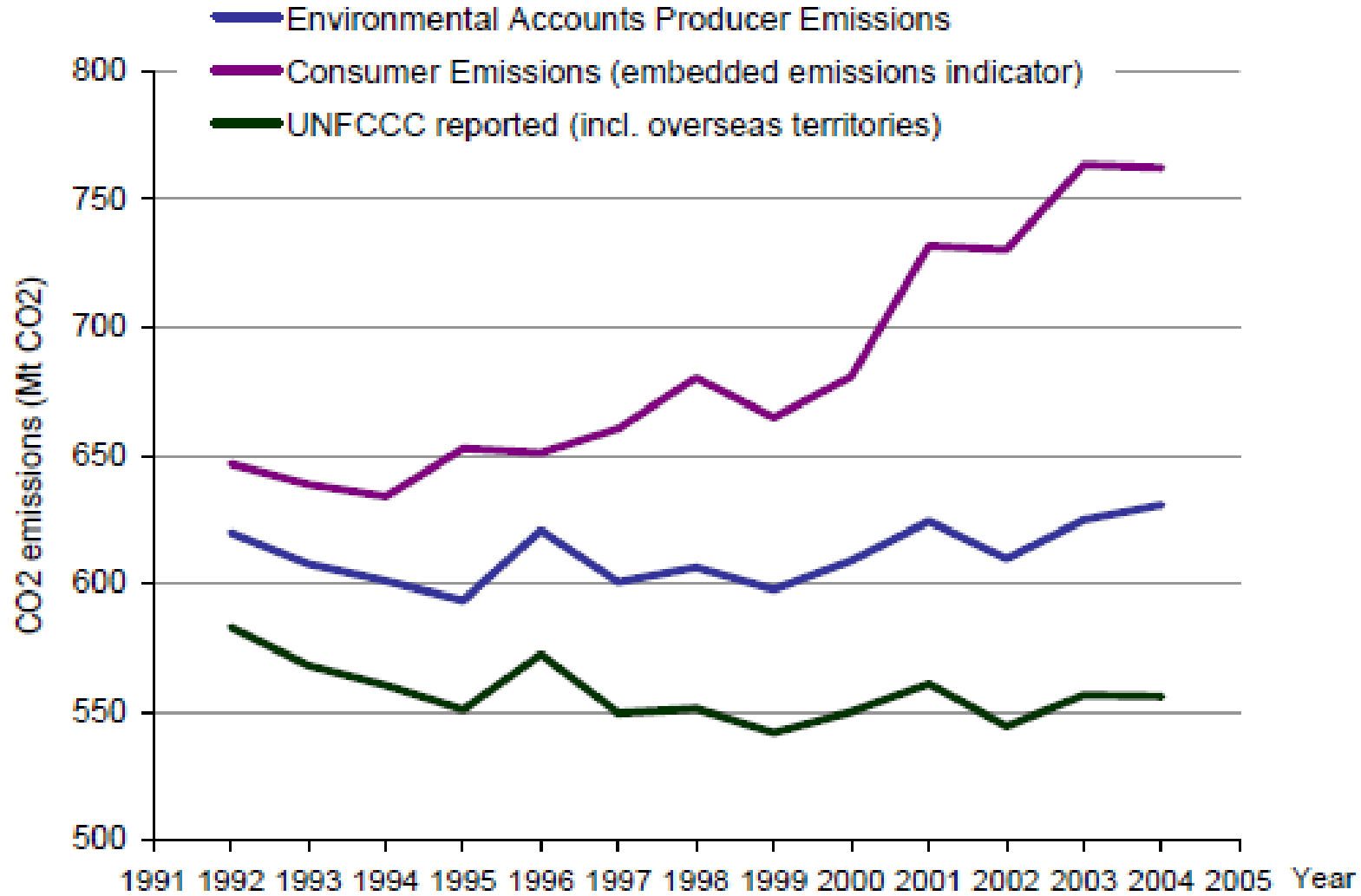
CCC claim their 'cumulative' values have  
~60% chance of exceeding 2°C

Can this be reconciled with *“must’ rise no more than 2°C”* ?

# Impact of probabilities on UK reduction rates

<i>Prob of Exceeding 2°C</i>	<i>UK Annual Reduction</i>
56 - 63%	3%
15 - 50%	5%
5 - 30%	9%

# What are current UK emission trends?



# Summary of best example

- *At best 30-80 chance of exceeding 2°C*
- *Assumes very optimistic Global peak in 2016*
- *Large buyout from poor countries (CCC 17% & 27%)*
- *Partial inclusion of Shipping & Aviation*
- *'Real' emissions up ~18% since 1990*

## ... and what of the rest?

- Waxman-Markey Bill  
*no US reductions necessary before 2017 & 4% by 2020*
- Japan 25% by 2020
- Russia & NZ no targets
- China & India – demand ‘big’ reductions from Annex 1  
*if they’re to engage*
- LDC’s – suggest historical emissions be considered if  
*they’re to significantly engage*



# Implications for historic buildings

*... final thoughts*

# MITIGATION

- Where appropriate improve thermal characteristics of structure
- Heat/cool only where necessary – *not just for comfort*
- Install ground / air source heat pumps
- Don't be afraid of local renewables  
*they can be removed (unlike climate change!)*
- Minimise water consumption (*has high energy content*)
- THE SHOP! *heating/cooling; embedded energy of merchandise; broader sustainability issues ...?*
- Strongly encourage low-carbon transport  
*public-transport concessions, parking preferences*

# ADAPTATION

- Despite political rhetoric - 4°C global mean is likely (2070-2100)
- Regional variations could lead to much higher temperatures
- Significant change in rain fall patterns and possibly quantity
- Unexpected movement of 'pests'
- Identify synergies with mitigation

*... ultimately ..*

*“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.”*

*Roberto Unger*



# *Reframing Climate Change:* **End** *How recent emission trends & the latest science change the debate*

**Kevin Anderson & Alice Bows**