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Reframing Climate Change:

How recent emission trends & the latest science change the debate

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June 200

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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_2*

… *failure to mitigate leaves 2°C stabilisation highly unlikely*

Emission-reduction targets

- UK, EU & Global - long term reduction targets

*UK's **80%***	*reduction in CO_2e by*	***2050***
*EU **60%-80%***	*"*	***2050***
*Bali **50%***	*"*	***2050***

- CO_2 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

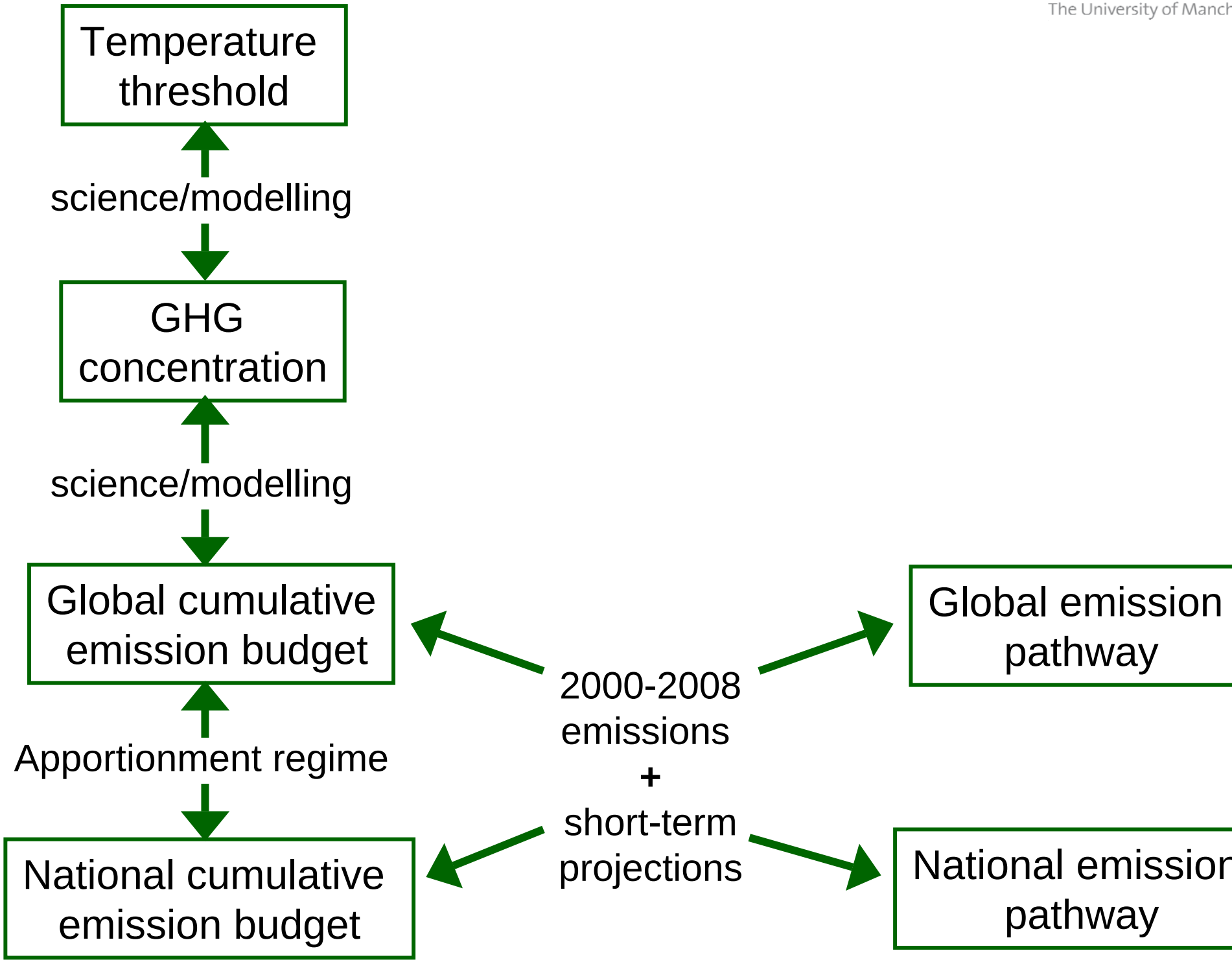
How do global **temperatures**

link to

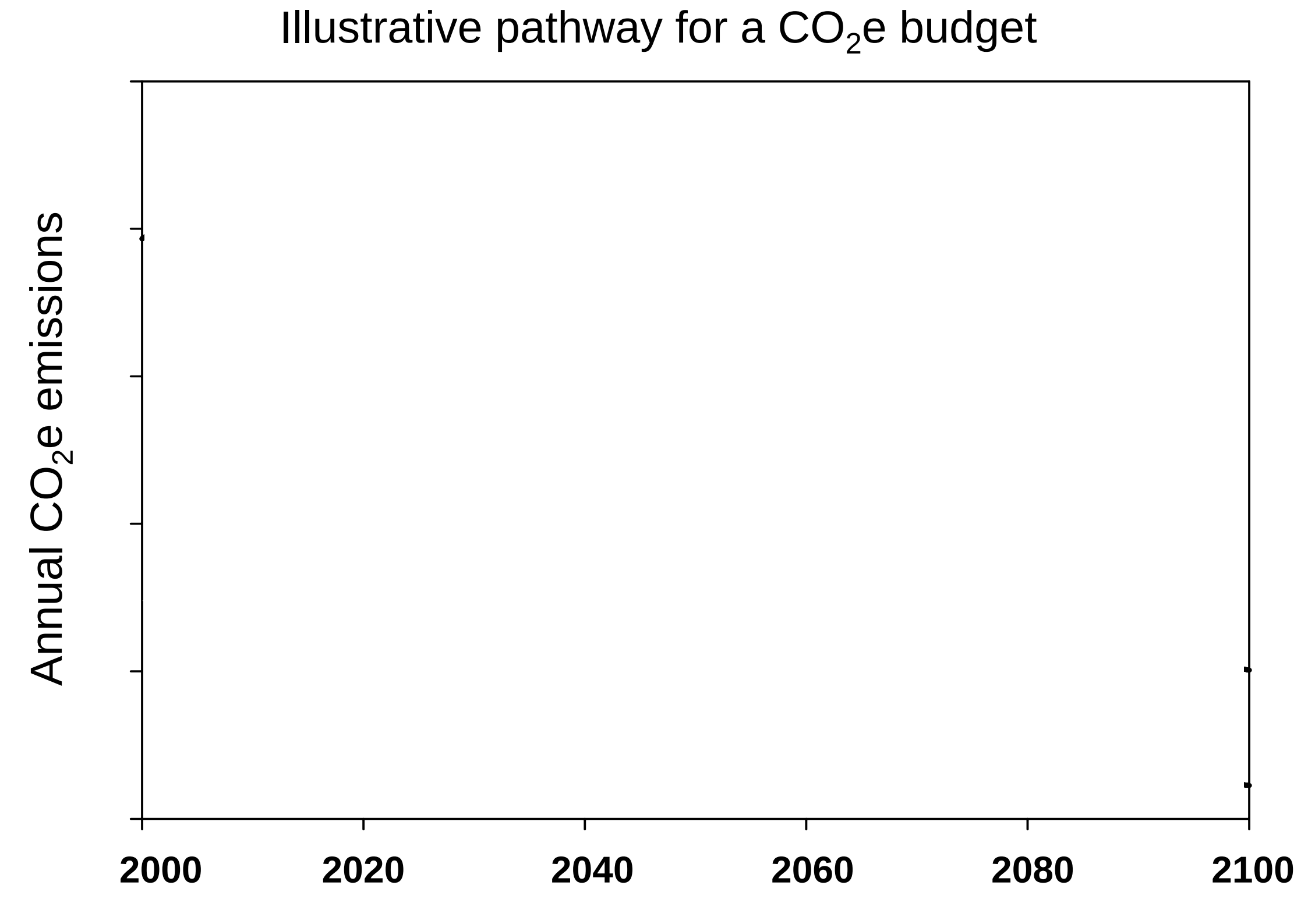
global and national **carbon budgets**

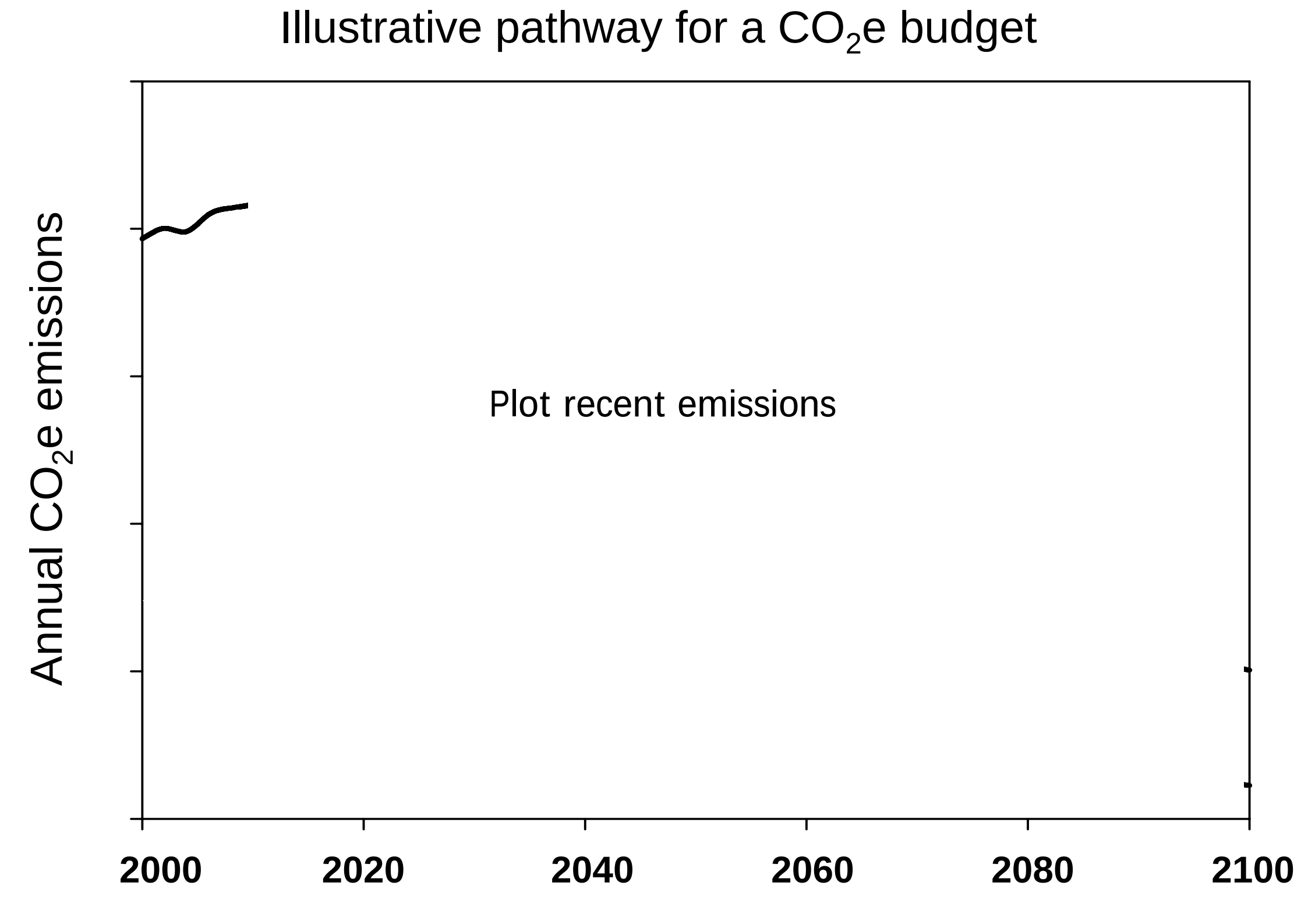
& from there to

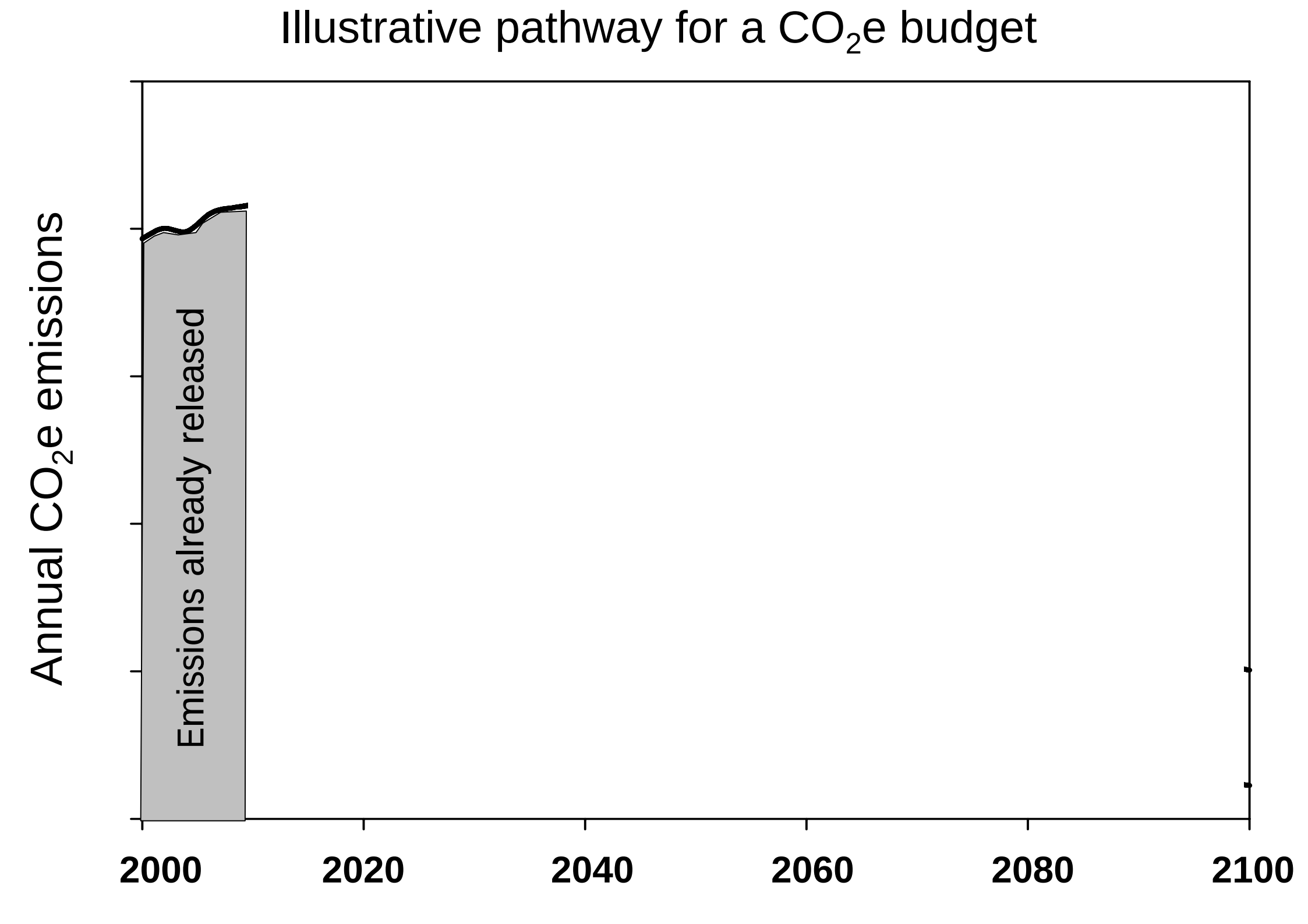
emission-reduction **pathways**?


Temperature threshold
science/modelling
GHG concentration
science/modelling
Global cumulative emission budget
Apportionment regime
National cumulative emission budget
2000-2008 emissions
+
short-term projections
Global emission pathway
National emission pathway

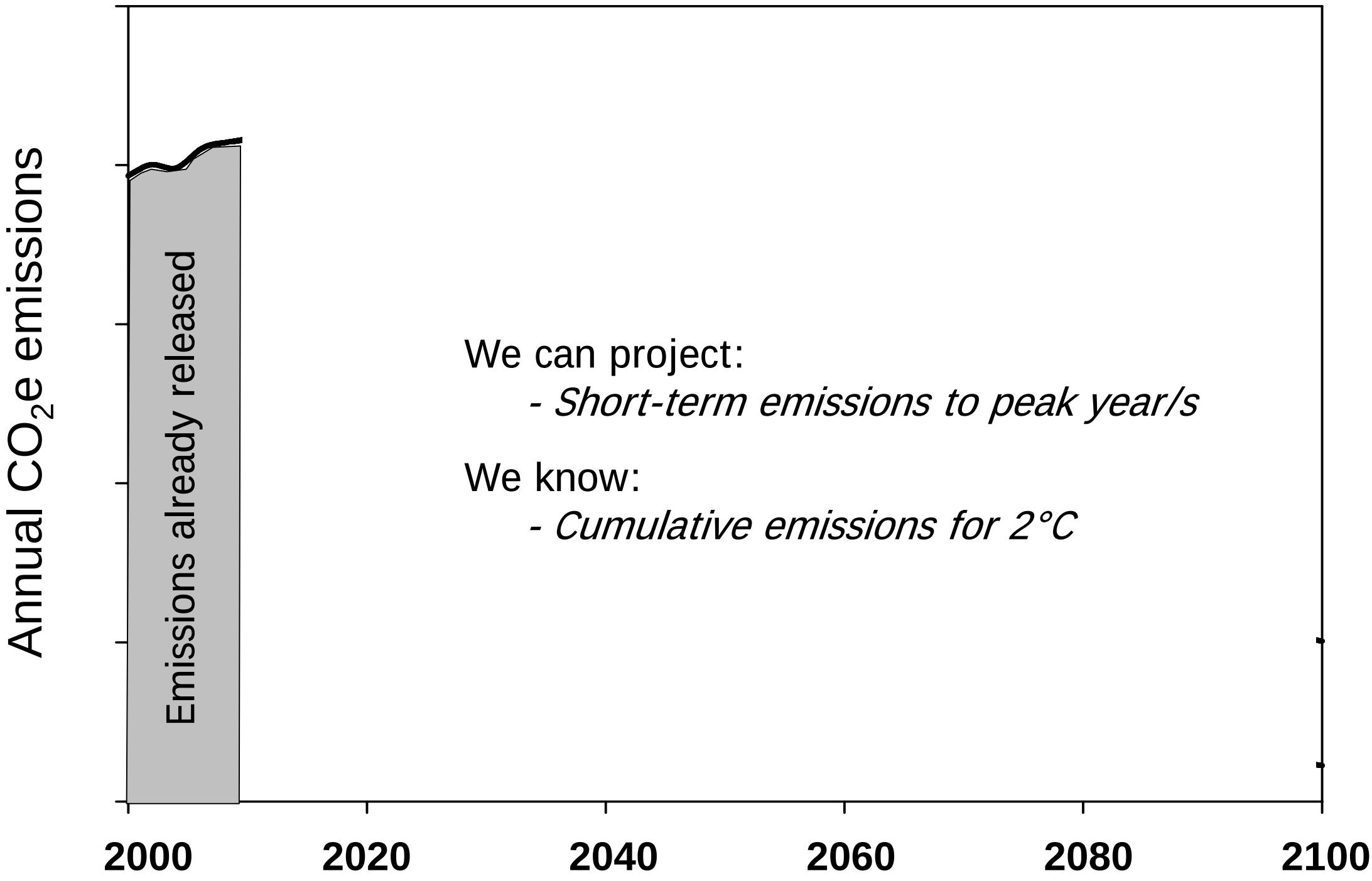
Illustrative pathway for a CO_2e budget

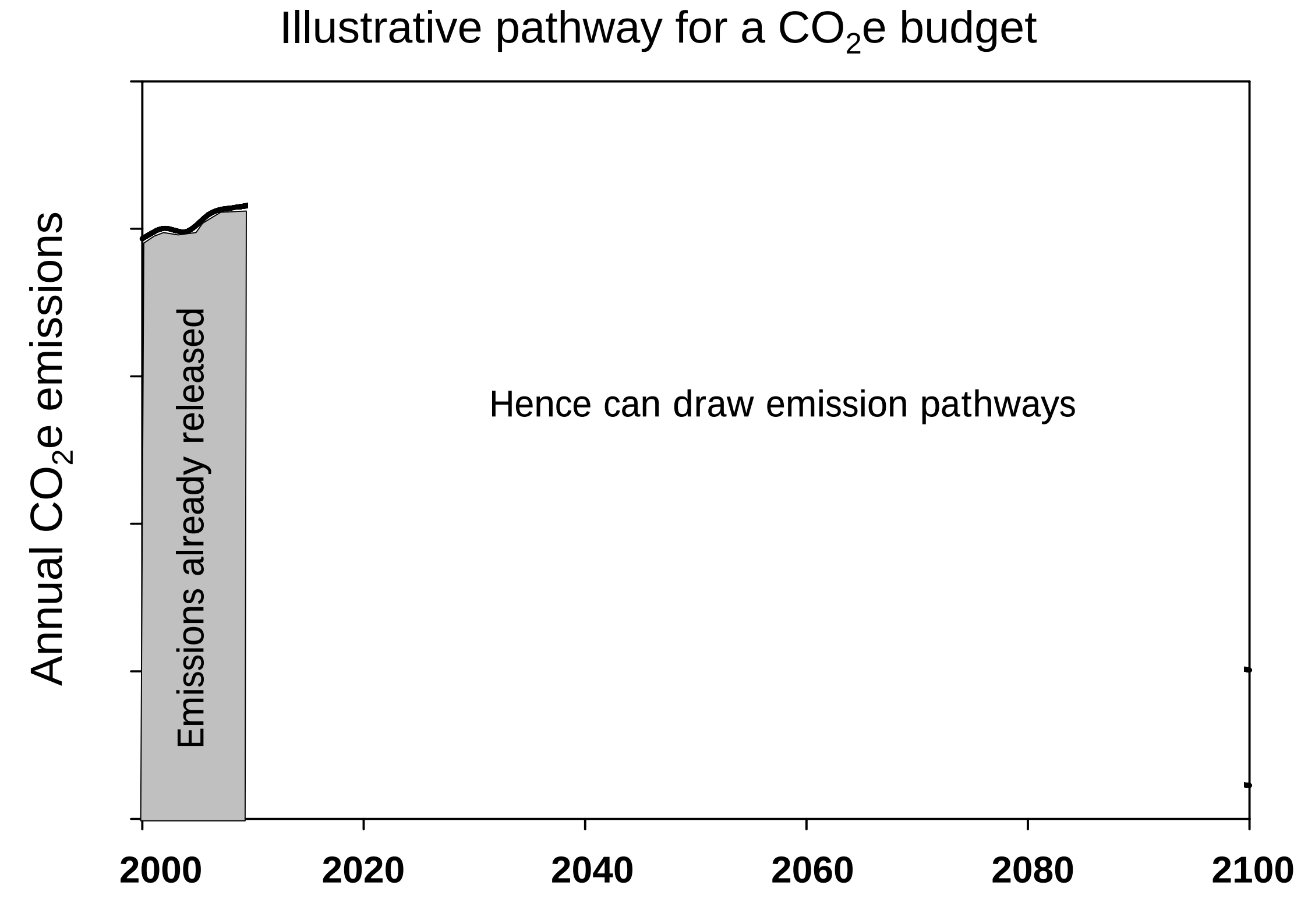

Illustrative pathway for a CO_2e budget
Annual CO_2e emissions
2000
2020
2040
2060
2080
2100

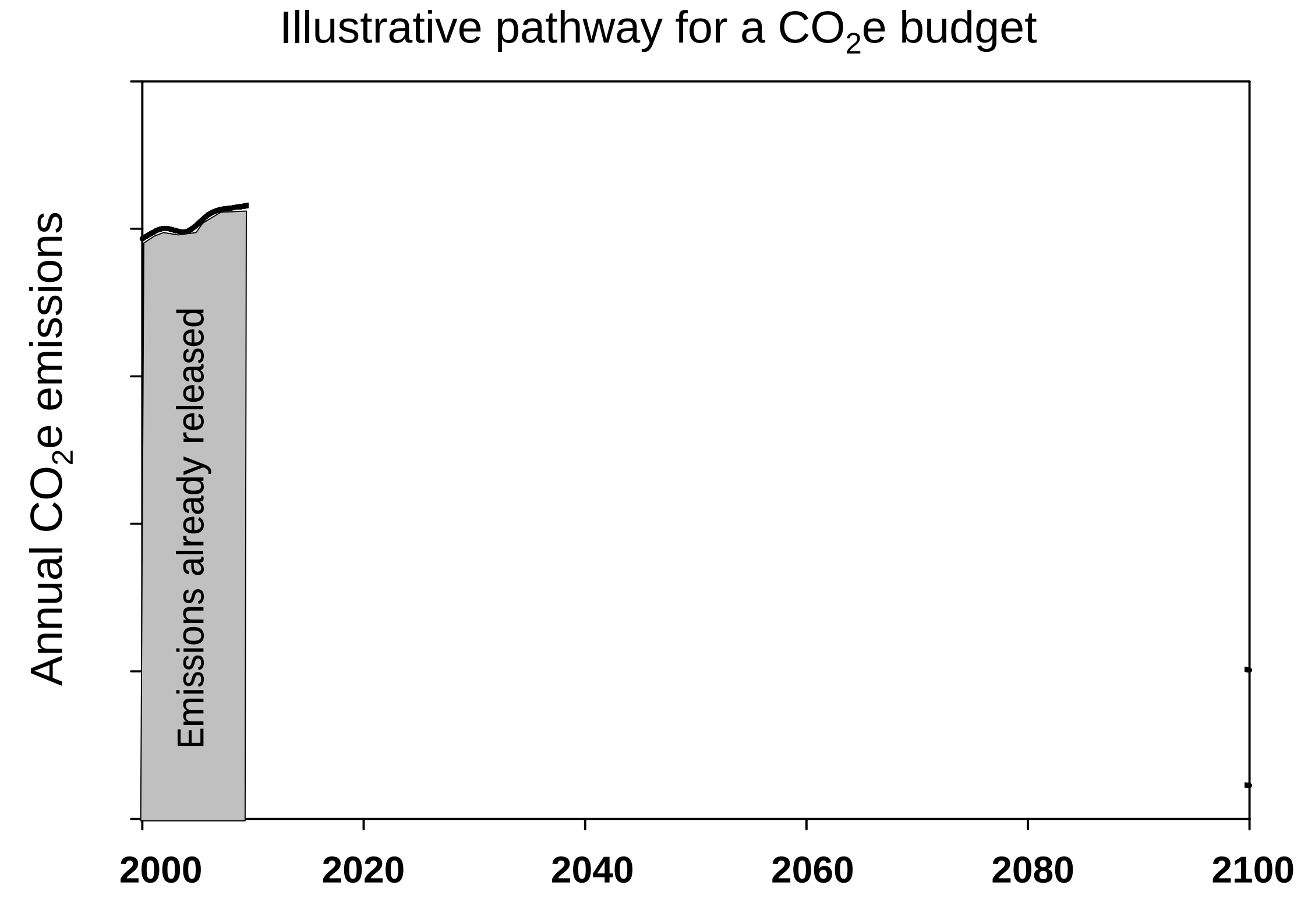

Illustrative pathway for a CO_2e budget
Annual CO_2e emissions
Plot recent emissions
2000
2020
2040
2060
2080
2100


Illustrative pathway for a CO_2e budget
Annual CO_2e emissions
Emissions already released
2000
2020
2040
2060
2080
2100

Illustrative pathway for a CO_2e budget




Illustrative pathway for a CO_2e budget
Annual CO_2e emissions
Emissions already released
Hence can draw emission pathways
2000
2020
2040
2060
2080
2100


Illustrative pathway for a CO_2e budget
Annual CO_2e emissions
Emissions already released
2000
2020
2040
2060
2080
2100

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

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Tyndall's *emission scenarios* *(2000-2100 CO_2e)*

To consider:

1. *CO_2 emissions from landuse (**deforestion**)*
2. *Non-CO_2 GHGs (principally **agriculture**)*

What emission space remains for:

3. *CO_2 emissions from **energy?***

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Tyndall's *emission scenarios* *(2000-2100 CO_2e)*

Included very optimistic:

- land-use & forestry emission scenarios (**deforestation**
- non-CO_2 greenhouse gas emissions (**agriculture**)

Global CO_2e emissions peaks of 2015/20/25?

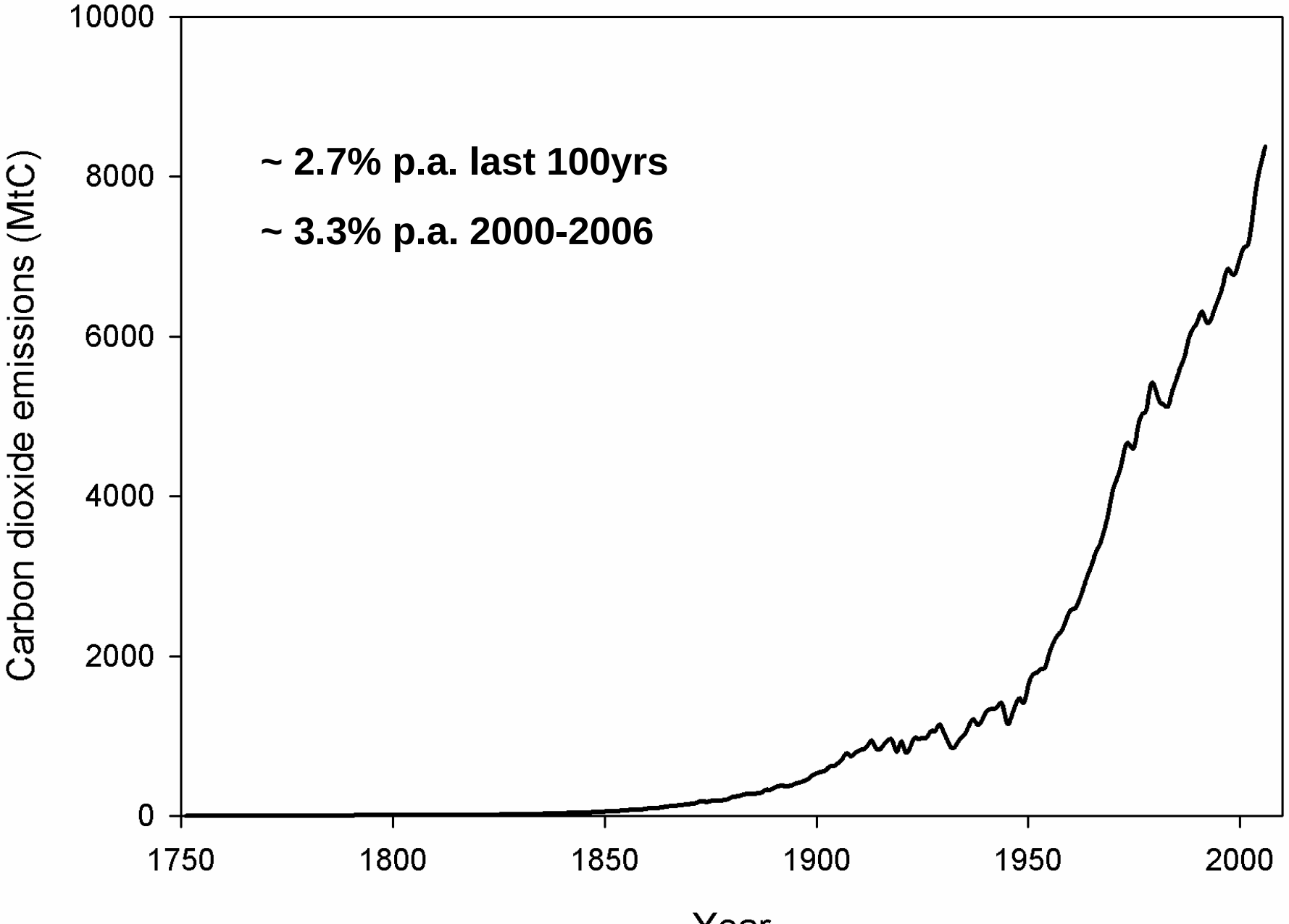
factoring in...

the latest emissions data

what is the scale of the global ‘problem’ we now face?

It’s getting worse!

Global CO_2 emission trends?



… appears we're denying its happening

latest global CO_2e 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 ~2°C we can emit:

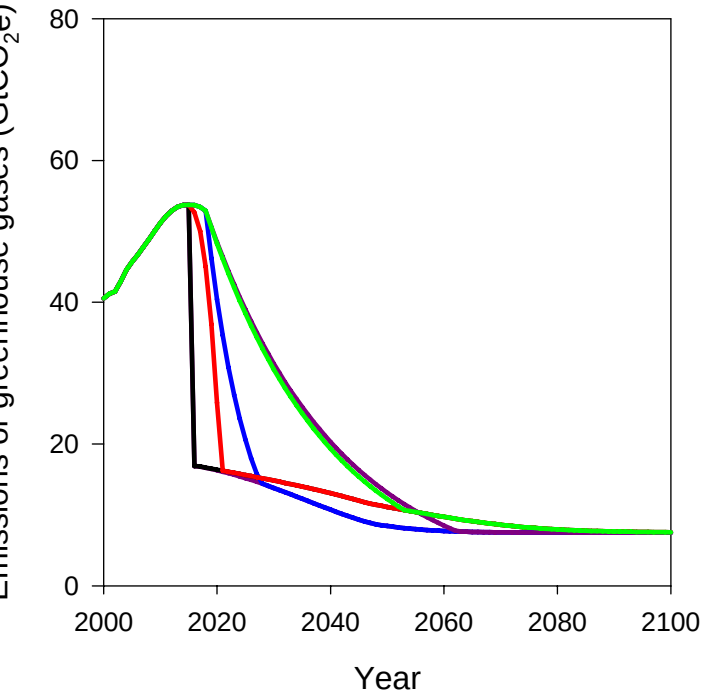
~ 1400 to 2200 $GtCO_2e$

between 2000-2100

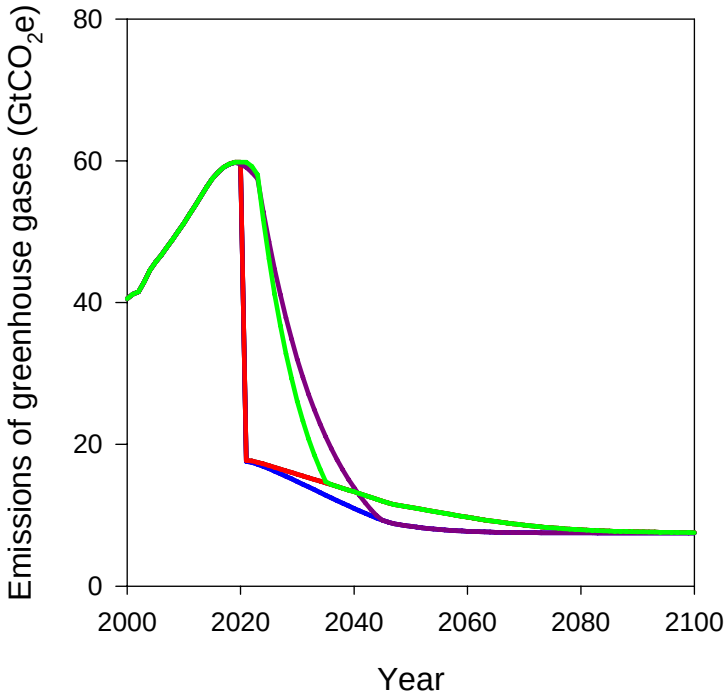
(i.e. the global carbon budget)

Total greenhouse gas emission pathways

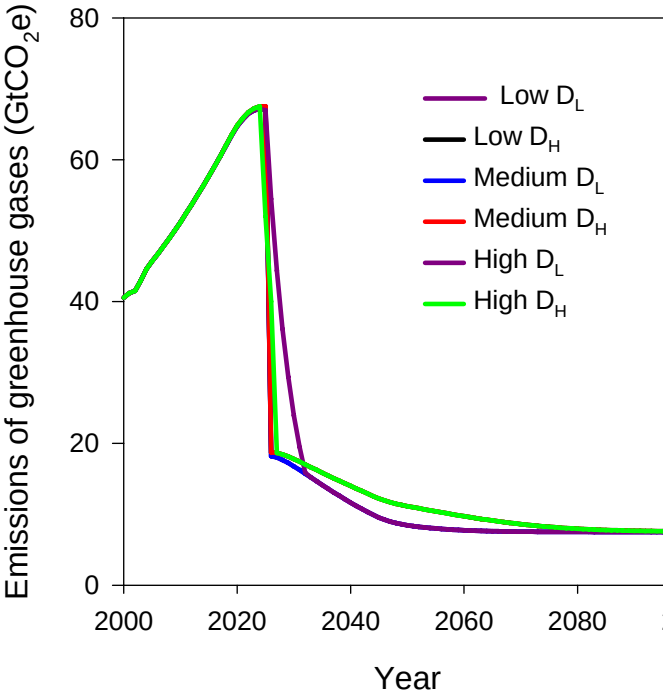
2015 peak



2020 peak

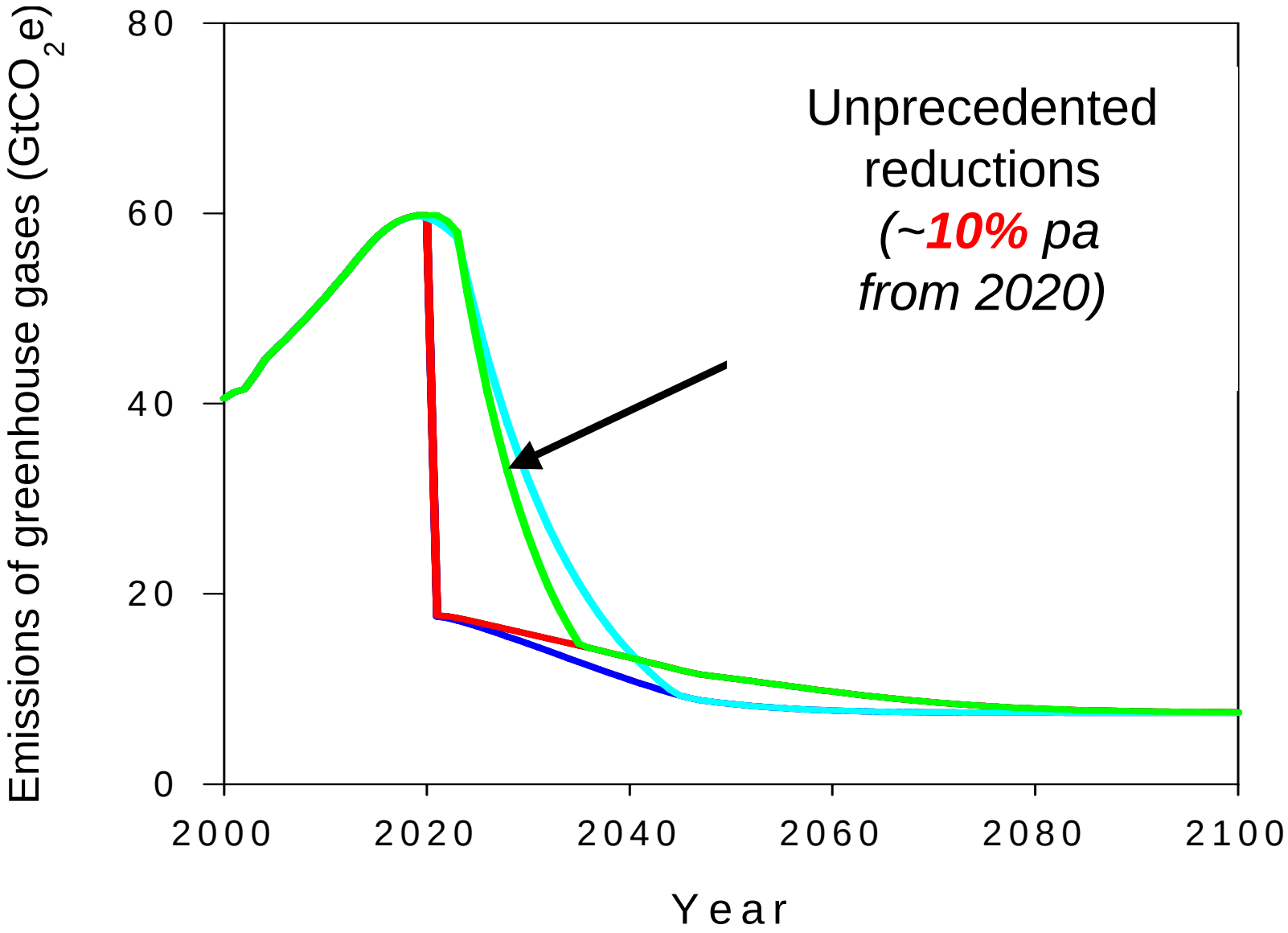


2025 peak



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

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



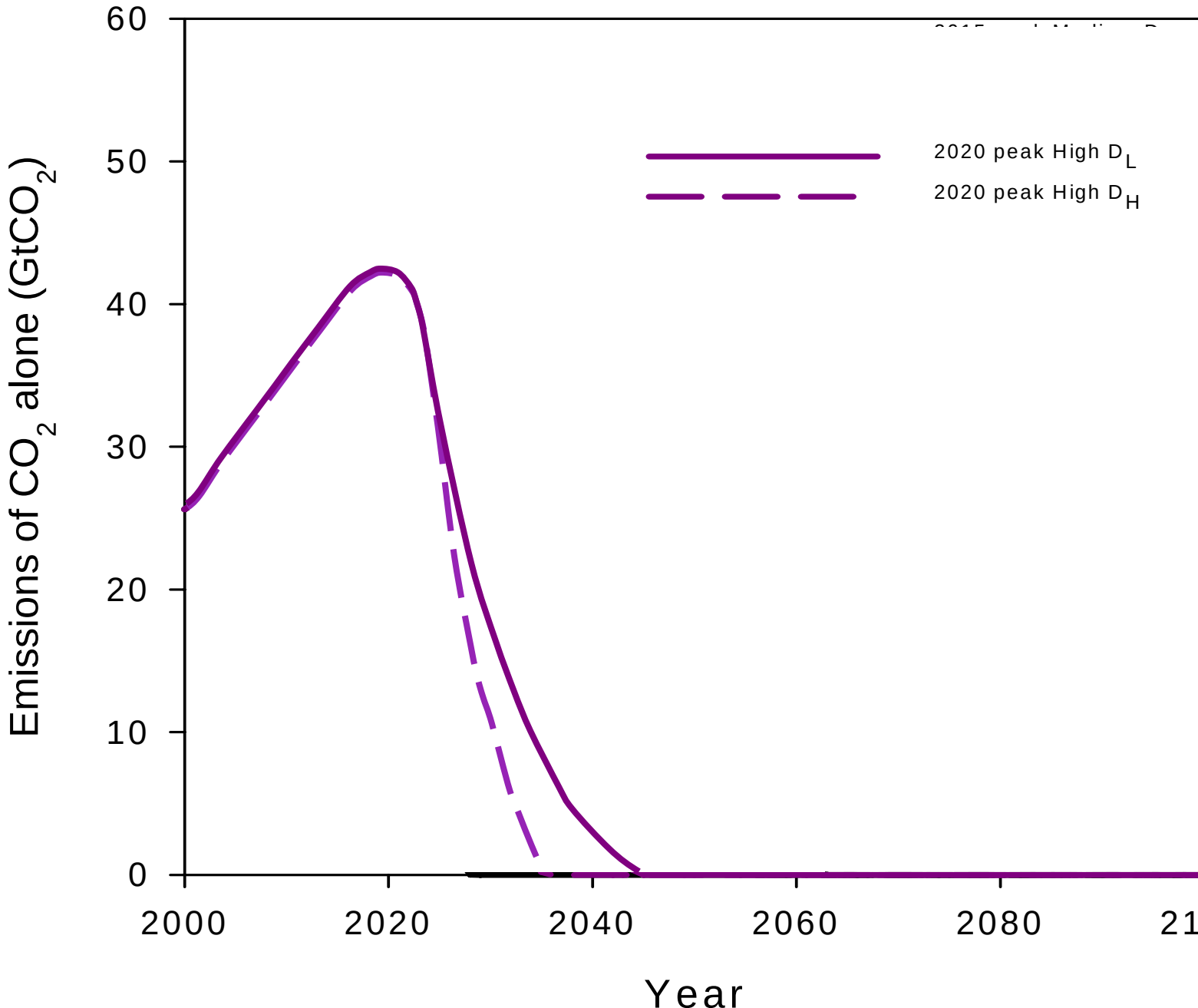
(Anderson & Bows. 2008 Philosophical Transactions A of the Royal Society. 366. pp.3863-3882)

... and for energy emissions?

(with 2020 peak)

13 of 18 scenarios ‘impossible’

Even then total decarbonisation by ~2035-45 necessary



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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_2 from energy*

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

***… 3.5%** annual reductions in CO_2 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

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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

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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?*

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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 unchartered territory

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

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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.

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UK position based on CCC report

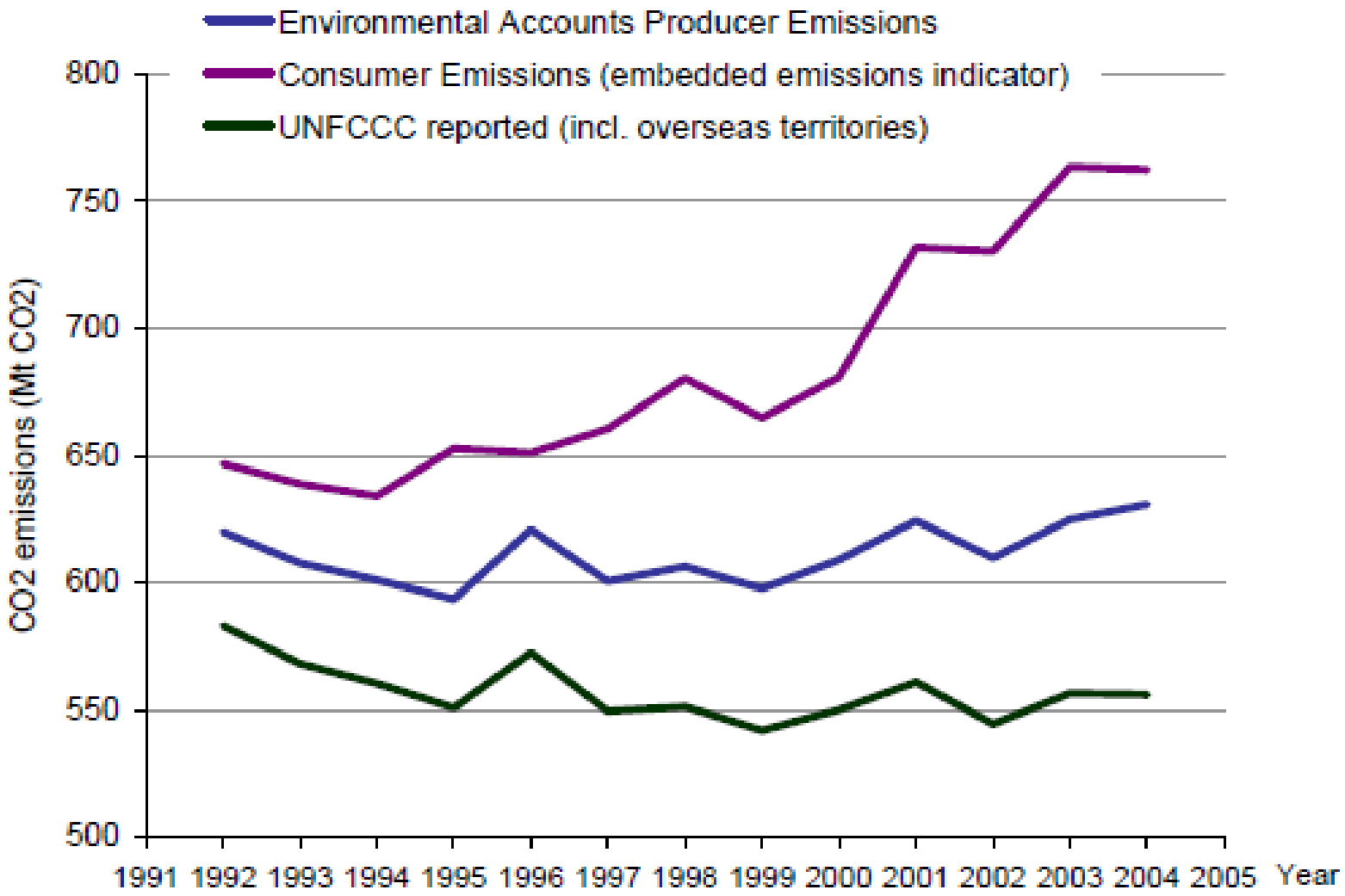
CCC claim their ‘cumulative’ values have ~60% chance of exceeding 2°C

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

Impact of probabilities on UK reduction rates

Prob of Exceeding 2°C	*UK Annual Reduction*
56 - 63%	*3%*
15 - 50%	*5%*
5 - 30%	*9%*

What are current UK emission trends?



Defra July 08 Ref:EV02033

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

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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

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Reframing Climate Change: End

How recent emission trends & the latest science change the debate

Kevin Anderson & Alice Bows