Real clothes for the Emperor:

Facing the challenges of climate change

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The global context of Climate Change

… the IEA view

"When I look at this [CO_2] data, the trend is perfectly in line with a temperature increase of 6 degrees Celsius, which would have devastating consequences for the planet."

Fatih Birol - IEA chief economist

… and according to the World Bank, at 4°C

"There will be water and food fights everywhere,"

Jim Yong Kim – WB president

So what of the **UK**?

It is a signatory to:

- the Copenhagen Accord
- the Cancun & Durban Agreements
- and in May 2012 the G8 Camp David agreement

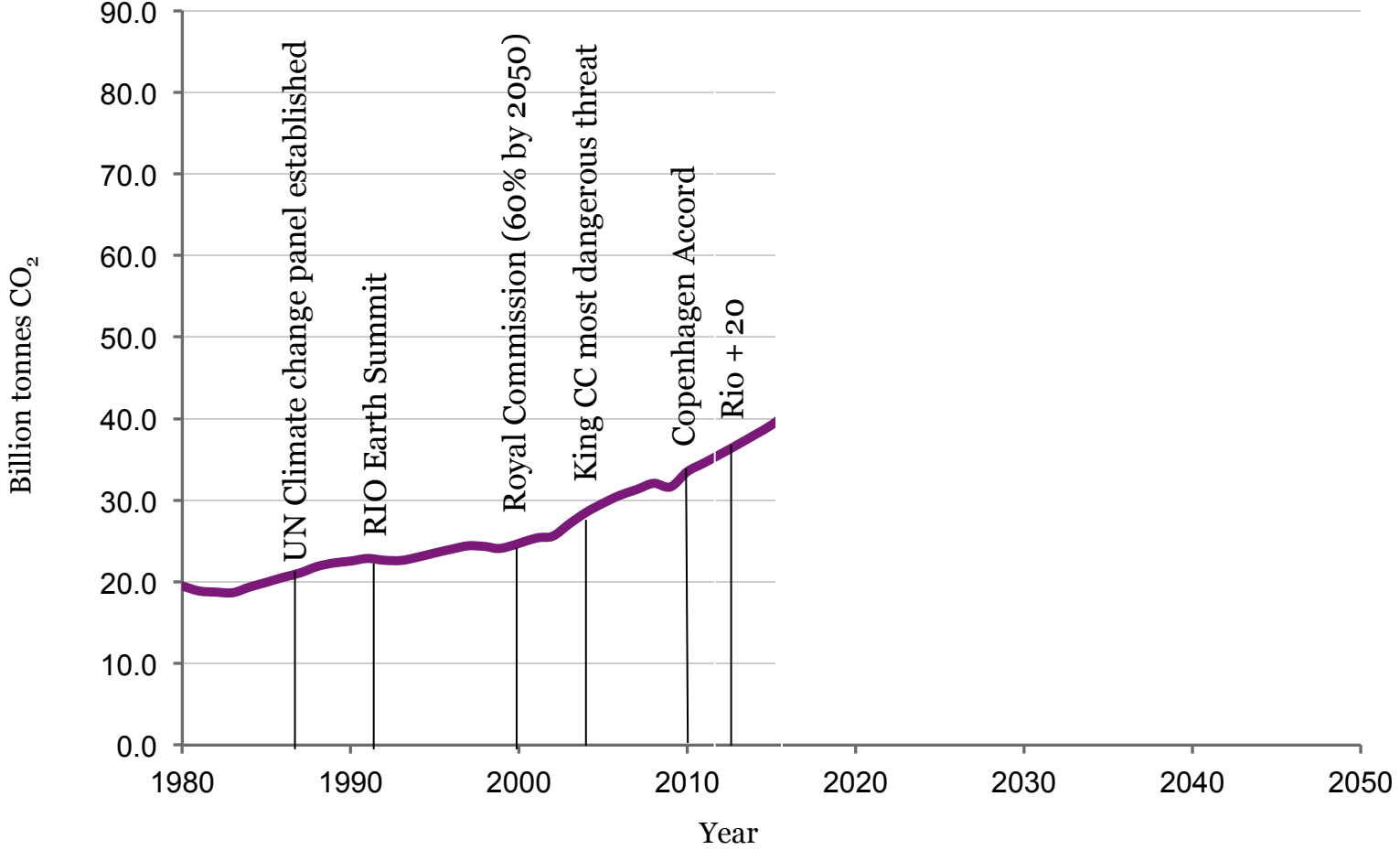
Copenhagen Accord et al & G8 Camp David (2012)

UK has committed to make its fair contribution to

> *"To hold the increase in global temperature **below 2 degrees Celsius**, and take action to meet this objective consistent with **science** and on the basis of **equity**"*

How consistent are 2°C & 4°C futures with emission trends?

Global emission of fossil fuel CO2 (inc. cement)



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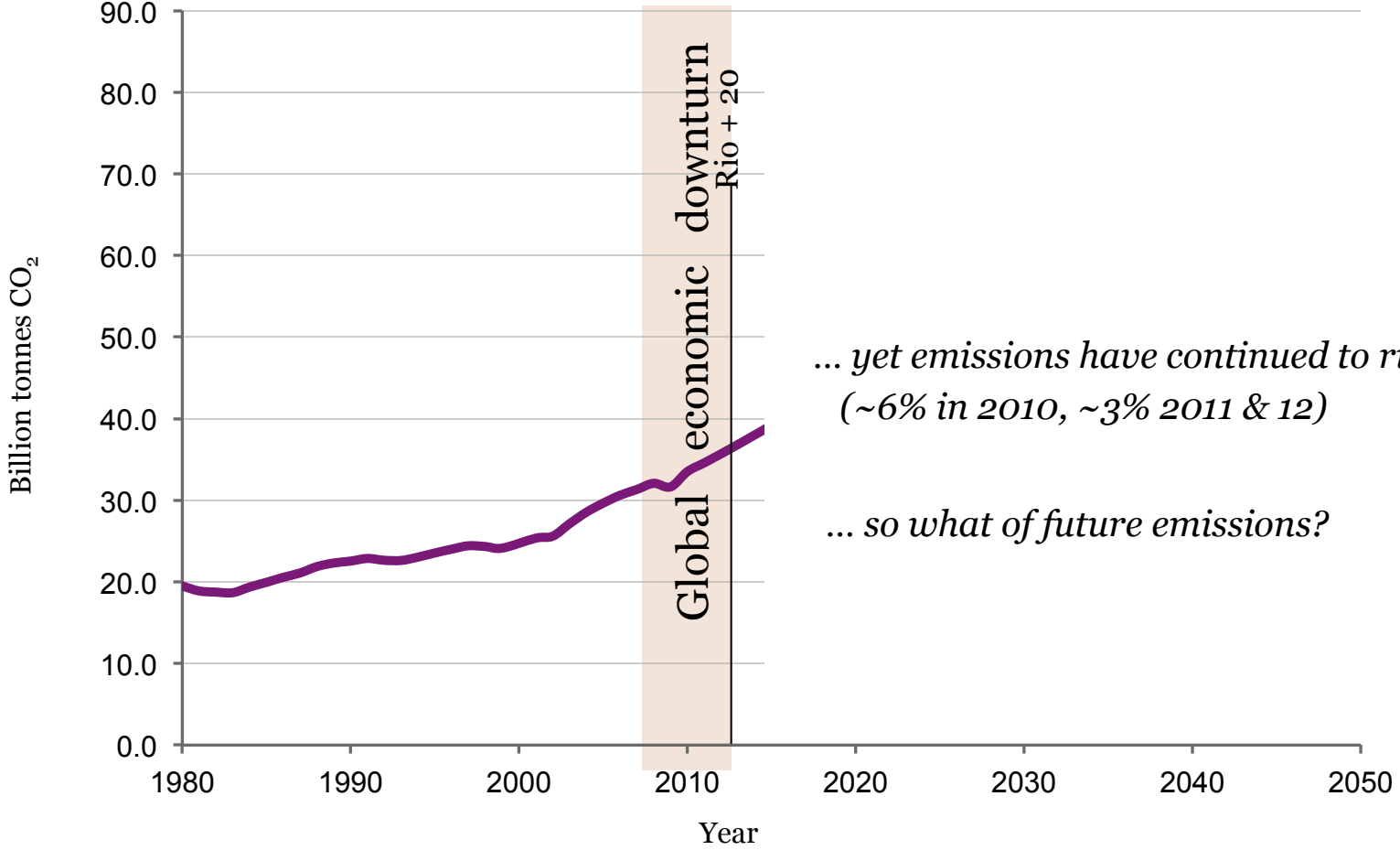
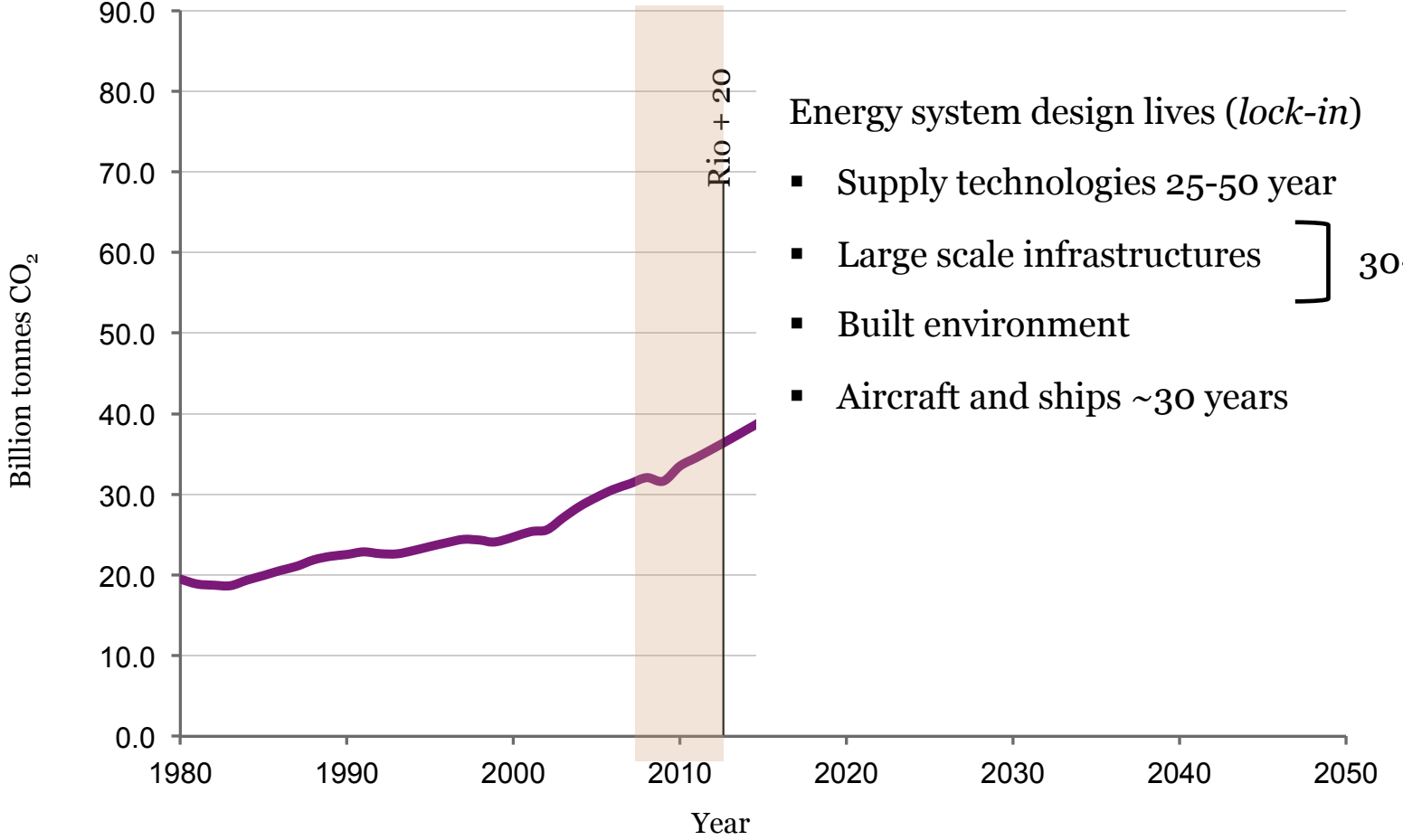


… yet emissions have continued to rise (~6% in 2010, ~3% 2011 & 12)

… so what of future emissions?

Global emission of fossil fuel CO2 (inc. cement)

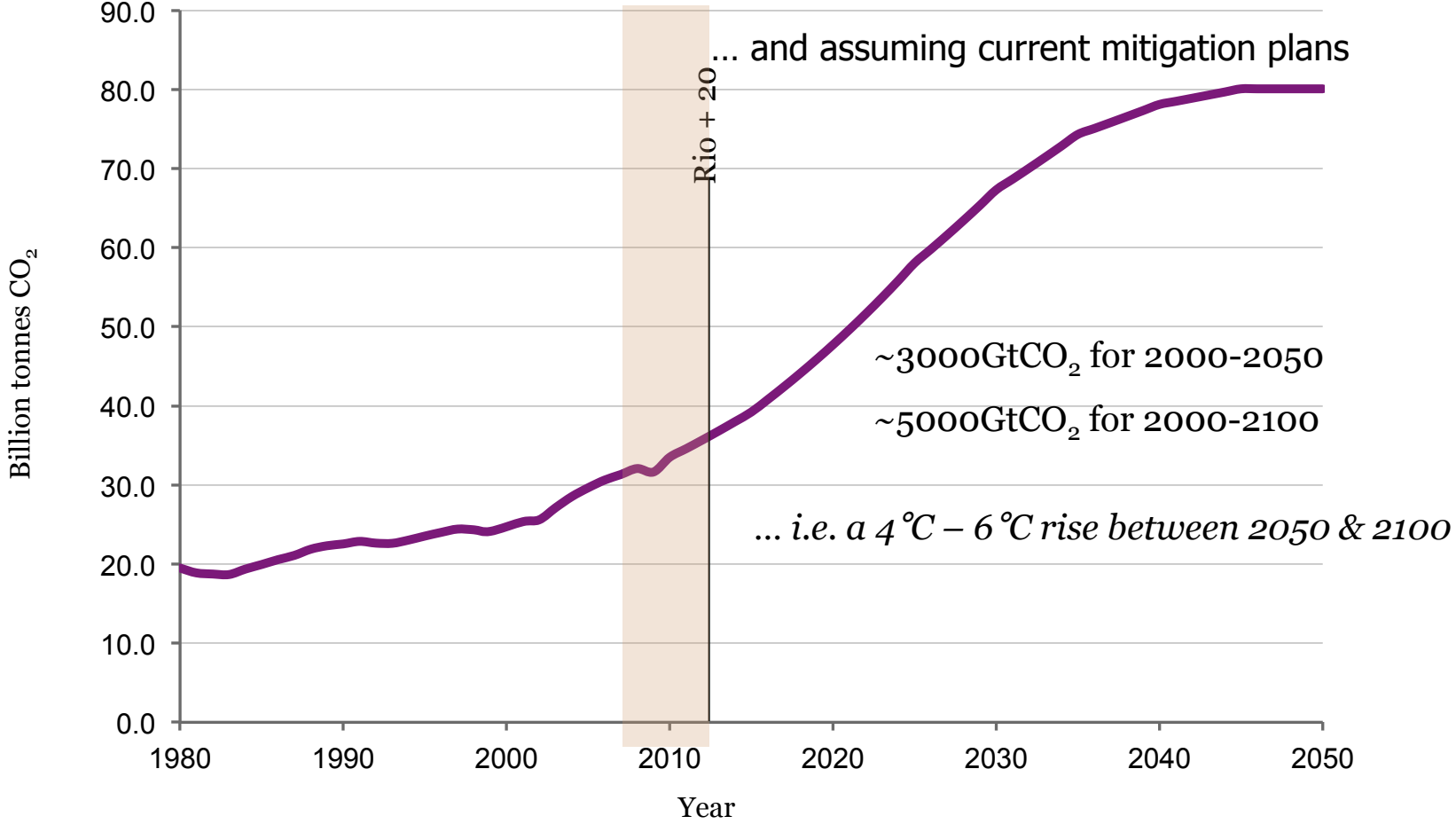


Energy system design lives (*lock-in*)

- Supply technologies 25-50 year
- Large scale infrastructures
- Built environment
- Aircraft and ships ~30 years

30-100 years

Global emission of fossil fuel CO2 (inc. cement)



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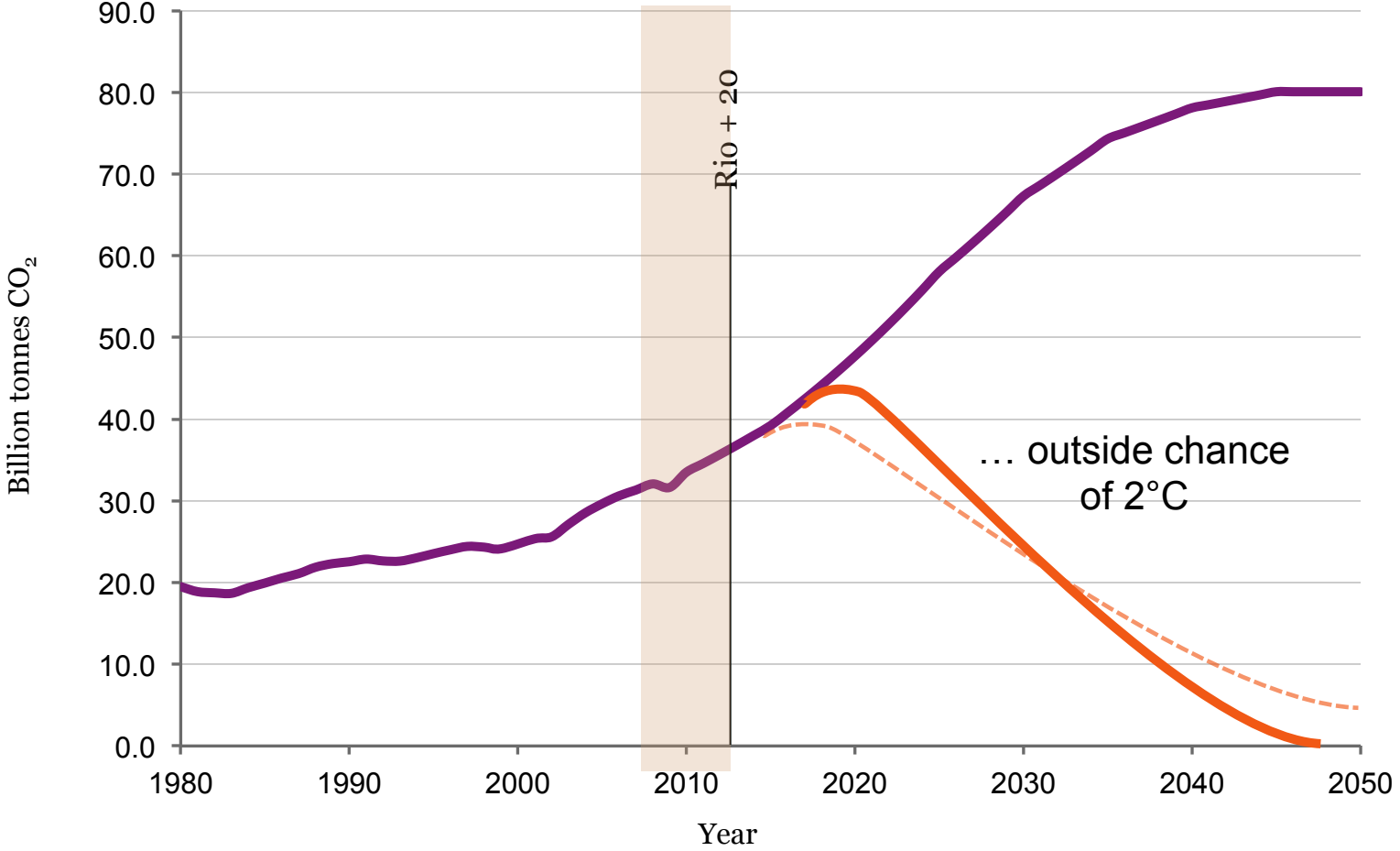

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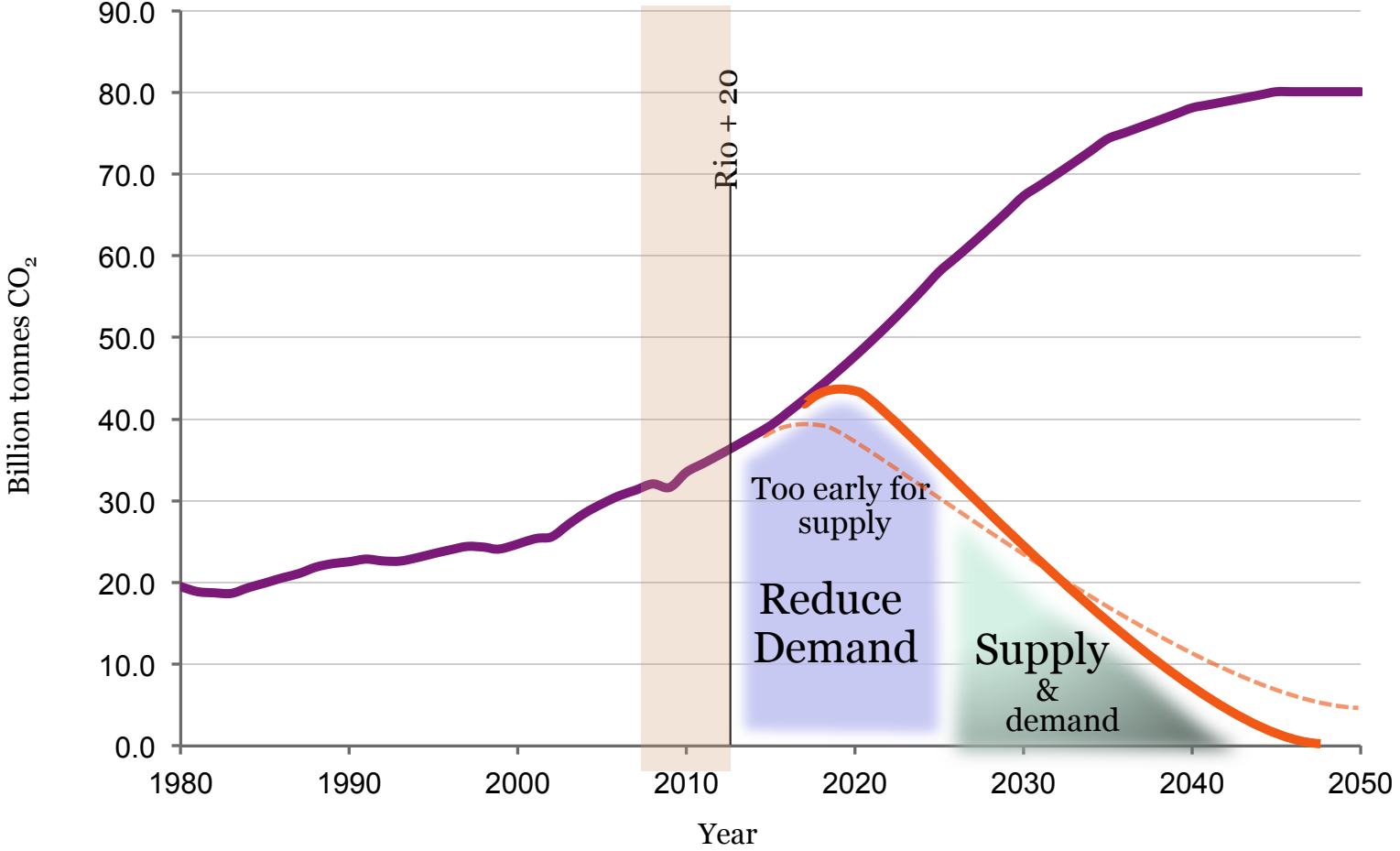


The 'orthodox' view on 2°C mitigation

"To keep … global average temperature rise close to 2°C … the UK [must] cut emissions by at least 80% … the good news is that reductions of that size are possible without sacrificing the benefits of economic growth and rising prosperity."

CCC first report p.xiii & 7 (2009/11)

"… a low stabilisation target of 400ppm CO2e can be achieved at moderate cost … and a high likelihood of achieving this goal."

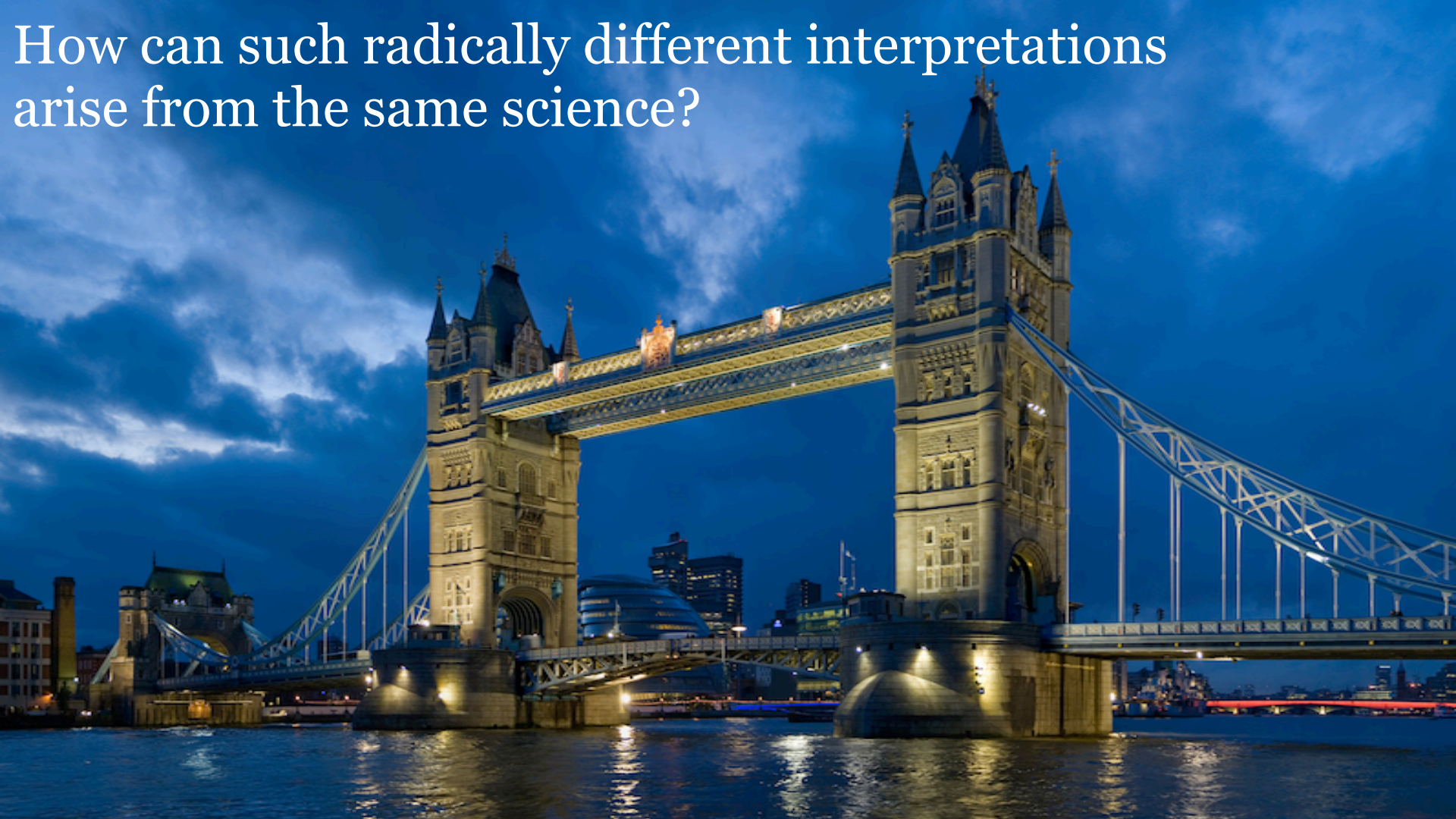
ADAM/Hulme (2010)

2°C – a alternative take …

"... it is difficult to envisage anything other than a ***planned economic recession*** *being compatible with stabilisation at or below 650ppmv* CO_2e*"*

Anderson & Bows 2008/11

How can such radically different interpretations arise from the same science?



The UK has an **inconsistent muddle of 2°C targets** –

with radically different implications for mitigation rates & timeframes

Inconsistencies in 2°C targets

- Copenhagen Accord: *"hold … below 2°C Celsius"*
- UK Low Carbon Transition Plan: *"must rise no more than 2°C"*
- EU: *"do not exceed … by more than 2°C"*

IPCC taxonomy: a *"very unlikely"* to *"exceptionally unlikely"* chance of exceeding 2°C

*… correlates with less than a **10%** chance of exceeding 2°C*

Despite this:

- CCC global budget has 56% chance of exceeding 2°C
- & the Government adopts a pathway with a **63%** of exceeding 2°C

Carbon budget for 63% chance of exceeding 2°C is:

- Over twice the size as for a ~10% chance of exceeding 2°C
- A third larger than for ~40% chance of exceeding 2°C

That is:

The UK government's legally-binding carbon budget is twice the size of that accompanying the UK's explicit international commitments on 2°C!

… the implications of this are profound

Inconsistencies in **emission** 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

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

Additionally, orthodox modellers adjust their assumptions to give politically-palatable outcomes

… with few exceptions, these include:

- Recent historical emissions sometimes ‘mistaken’ or ‘massaged’
- Short-term emission growth seriously down played
- Peak year choice ‘Machiavellian’ & dangerously misleading
- Reduction rate universally dictated by economists
- Geoengineering widespread in low carbon scenarios
- Annex 1/non-Annex 1 emissions split neglected or hidden
- Assumptions about ‘Big’ technology naively optimistic

Consequently, very different results for 2°C arise

	Govt/CCC	Anderson/Bows
% chance of exceeding 2°C	63%	37%
Global peak in emissions	2016	2020
Non-OECD peak	2018	2025
Deforestation considered	no	yes
Mitigation rate	**~4%**	**~10%**

Why aren't scientists whistle-blowing these fudges

1. *We are collectively applying Thomas Moore's maxim "Qui tacet consentiret": Silence gives consent*

2. *We are culpable as a research community of a 'conspiracy of silence',– we don't agree with what's going on but don't want to bite the hand that feeds us*

3. *We are ignorant of some of the fundamental underpinnings for our research*

4. *We don't care – and anyway flagging up these concerns would likely raise difficult questions about our own lifestyles*

2°C … *a political & scientific creed?*

Senior political scientist

"Too much is invested in 2°C for us to say its not possible – it would undermine all that's been achieved

It'll give a sense of hopelessness – we may as well just give in

Are you suggesting we have to lie about our research findings?

… well, perhaps just not be so honest – more dishonest …"

Senior Government Advisor

"We can't tell them (ministers & politicians) it's impossible

We can say it's a stretch and ambitious – but that, with political will, 2°C is still a feasible target"

DECC SoS

- day before attending Copenhagen

"Our position is challenging enough, I can't go with the message that 2°C is impossible – it's what we've all worked towards"

Returning to the 2°C challenge

What does:

- Our failure to reduce emissions

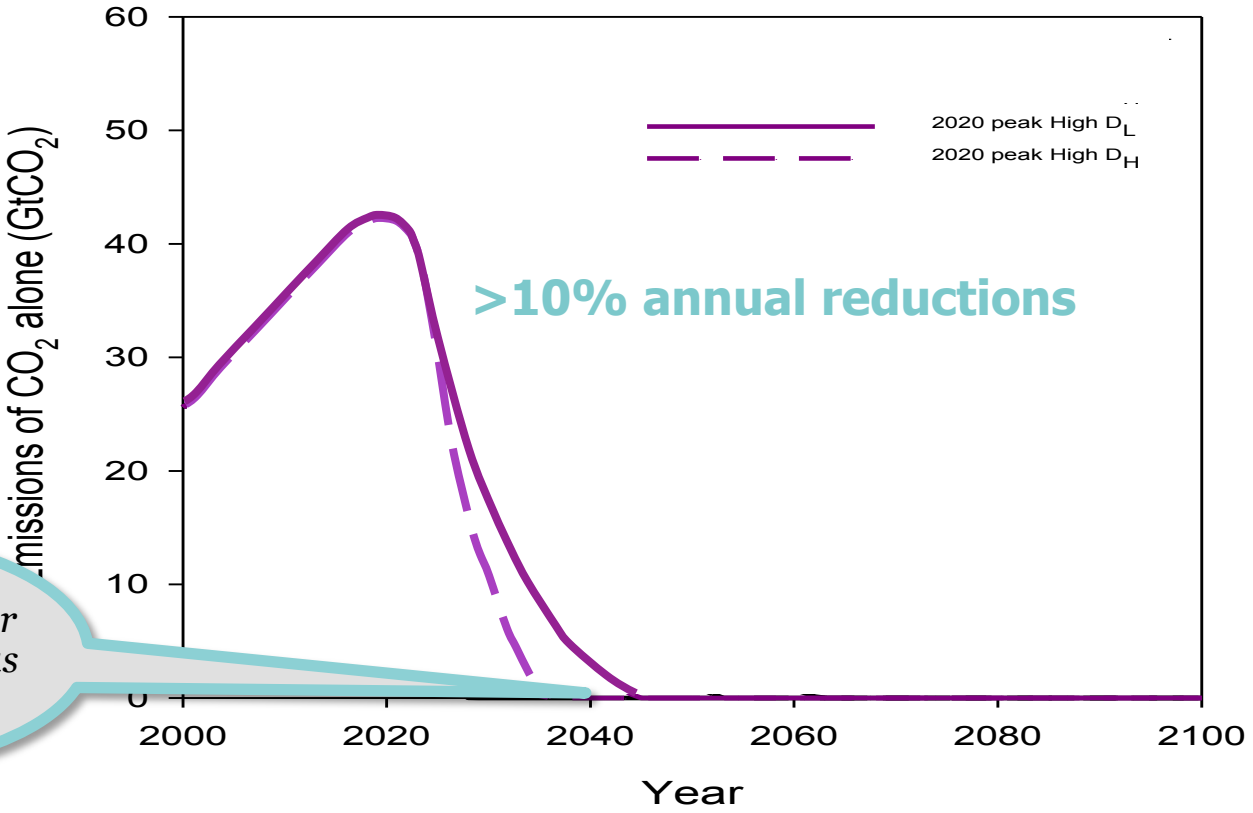
  &

- The latest science on cumulative emissions

- **Say about a 2°C emissions reduction pathway for energy?**

for energy emissions? *(with 2020 peak)*

Total Decarbonisation by ~2035-45



No emission space for coal, gas, or shale gas – even with CCS!

So, where does this leave us?

If this all looks too difficult

… what about a 4°C future?

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

~ 3.5% p.a. reduction in CO_2 from energy is necessary

… & such a reduction rate is achievable

so is aiming for 4°C more realistic?

For **4°C** global mean surface temperature

5°C - 6°C global *land* mean

… & increase °C on the hottest days of:

6°C - 8°C in China

8°C - 10°C in Central Europe

10°C -12°C in New York

In low latitudes **4°C** gives

up to **40% reduction** in maize & rice

as population heads towards **9 billion** by 2050

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

Before despairing …

Have we got the **agency** to achieve the unprecedented reductions rates linked to an outside chance of 2°C ?

To put some numbers on this non-marginal challenge for energy

- 10% reduction in emissions year on year

~40% reduction by	**~2015** (c.f. 1990)
~70%	**~2020**
~90+%	**~2030**

Impossible?

… is living with a 4°C global temperature rise by 2050-70 less impossible?

Agency

- Equity – a message of hope – perhaps?
- Technology – how far, how fast & how soon?

Little chance of changing polices aimed at 7 billion

… but how many people need to make the necessary changes?

Pareto's 80:20 rule

80% of something relates to … 20% of those involved

~80% of emissions from ~20% of population

run this 3 times

~50% of emissions from ~1% of population

Or more realistically:

~40% to 60% from ~1% to 5%

- who's in the 1% to 5%?

- Climate scientists
- Climate journalists & pontificators
- OECD (& other) academics
- Anyone who gets on a plane
- All ministers (& civil servants?)

Are **we** sufficiently concerned to

… make or have enforced substantial personal sacrifices/changes to our lifestyles

NOW ?

Technical **AGENCY**
– another message of hope

Car efficiency (without rebound)

- UK mean car emissions ~175g/km (new ~150g/km)
- EU 2015 plan 130g/km (fleet mean with buy out)
- 2008 BMW 109g/km, VW, 85-99g/km; 1998 Audi A2 ~ 75g/km
- ~8 year penetration of new cars … ~90% of vehicle-km

  ~50% CO_2 reduction in 10 years with no new technology
- Reverse recent trends in occupancy **~70% by 2020**

To summarise…

Uncomfortable implications of conservative assumptions

If …

- Link between cumulative emissions & temp' is broadly correct
- Industrialising (non-OECD) nations peak emissions by 2025/30
- There are rapid reductions in deforestation & food emissions
- No 'discontinuities' (tipping points) occur

  & Stern/CCC/IEA's "feasible" reductions of 3-4% p.a. is achieved

2°C stabilisation is virtually impossible

4°C by 2050-2070 looks 'likely' (could be earlier & on the way to 6°C+)

For policy makers the message is simple but uncomfortable

- Should avoid 4°C at all costs
- Need ~70% decarbonisation over next decade or so
- Only small % of global population need to mitigate
- Low carbon energy supply is too little too late in the West
- Principal response is to reduce energy demand now
- *Carbon trading & prices are not viable for non-marginal (large) reductions*

Some non-scientific messages for policy-makers (& academics)

- Lead by example
- Don't be the exception - *(cars, planes, ships – all argue to be treated leniently)*
- Don't hide behind/blame others - *(UK blames China, China blame US …)*
- Consider the system - *(e.g. shale's impact on coal use, etc.)*
- Acknowledge it is not going to be easy – it will often hurt

Finally,

"... this is not a message of futility, but a wake-up call of where our rose-tinted spectacles have brought us. Real hope, if it is to arise at all, will do so from a bare assessment of the scale of the challenge we now face."

Anderson & Bows

Beyond 'dangerous climate change

Philosophical Transactions of the Royal Society

Jan 2011

Thank you

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