

A nighttime photograph of a cityscape, likely Manchester, featuring a prominent tall skyscraper with a grid-like facade and many lit windows. The foreground shows various buildings, some with lit windows, and a street with streetlights. The sky is a deep blue, suggesting dusk or dawn.

From rhetoric to reality
Facing the challenges of climate change

Professor Kevin Anderson

Tyndall Centre for Climate Change Research

Presentation to Manchester City Council – Jan. 2013

The global context of Climate Change

... the IEA view

“When I look at this [CO₂] 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

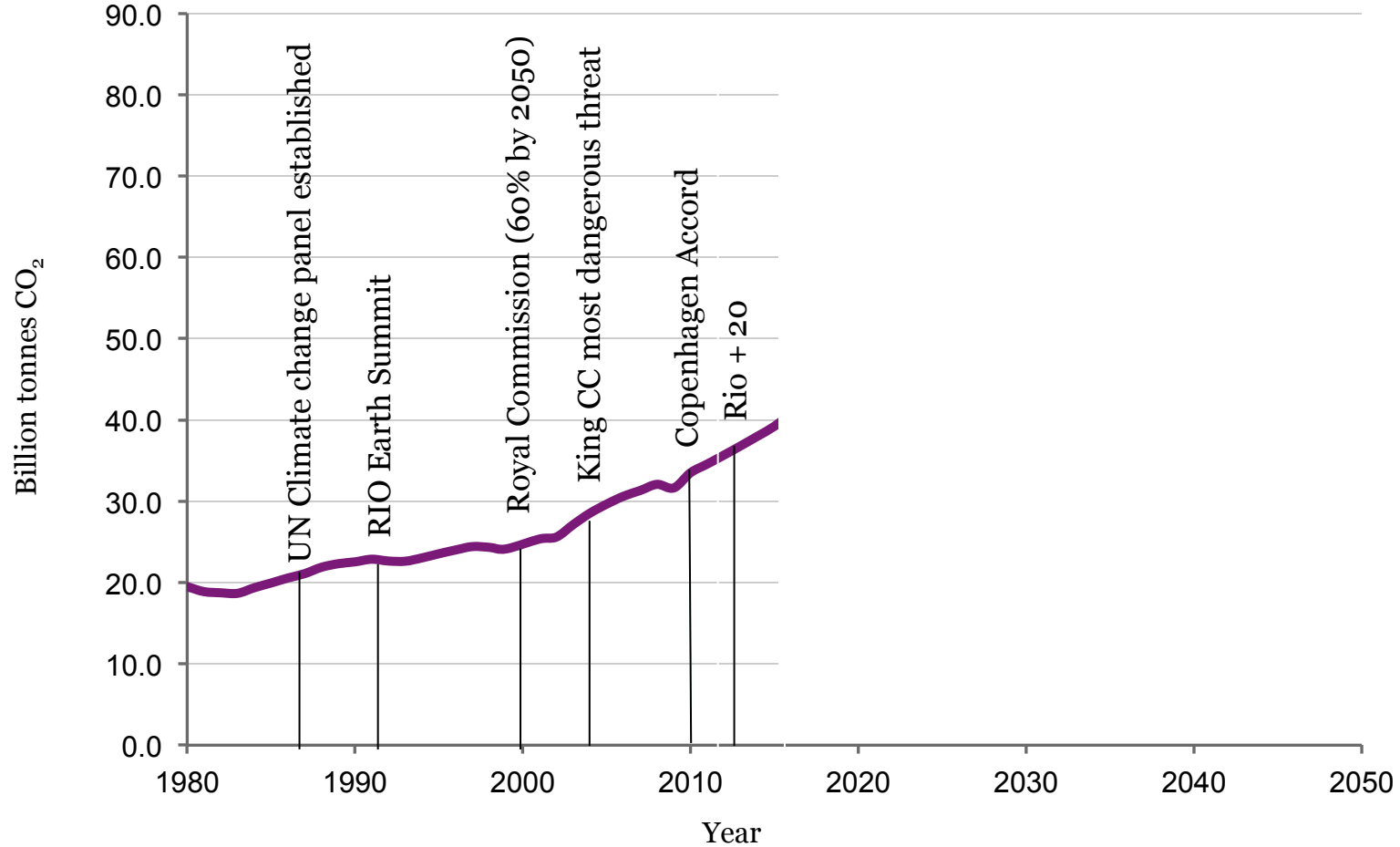
... and according to the World Bank, at just 4°C

"There will be water and food fights everywhere,"

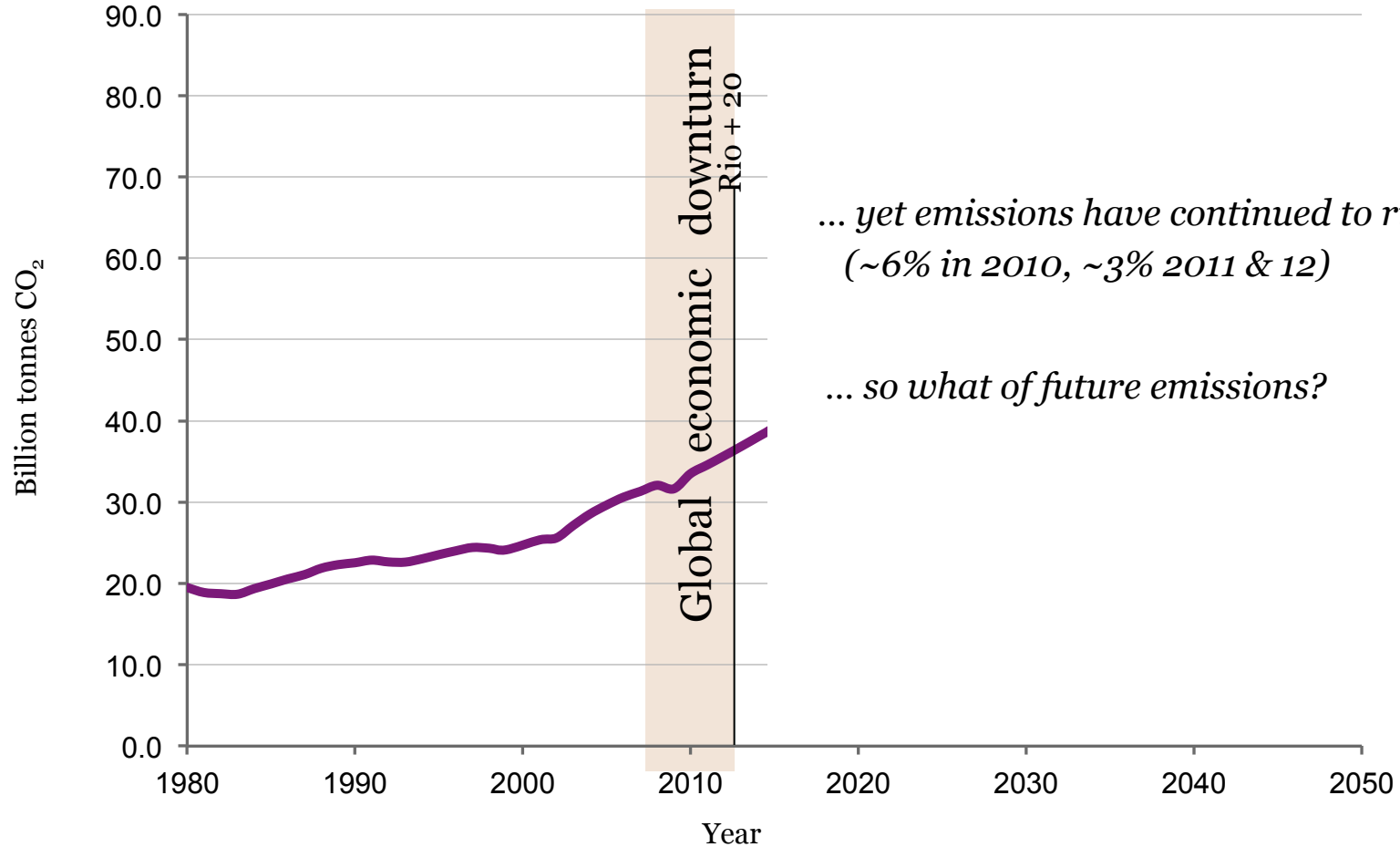
Jim Yong Kim – WB president

**... how are emissions changing
& where are they heading**

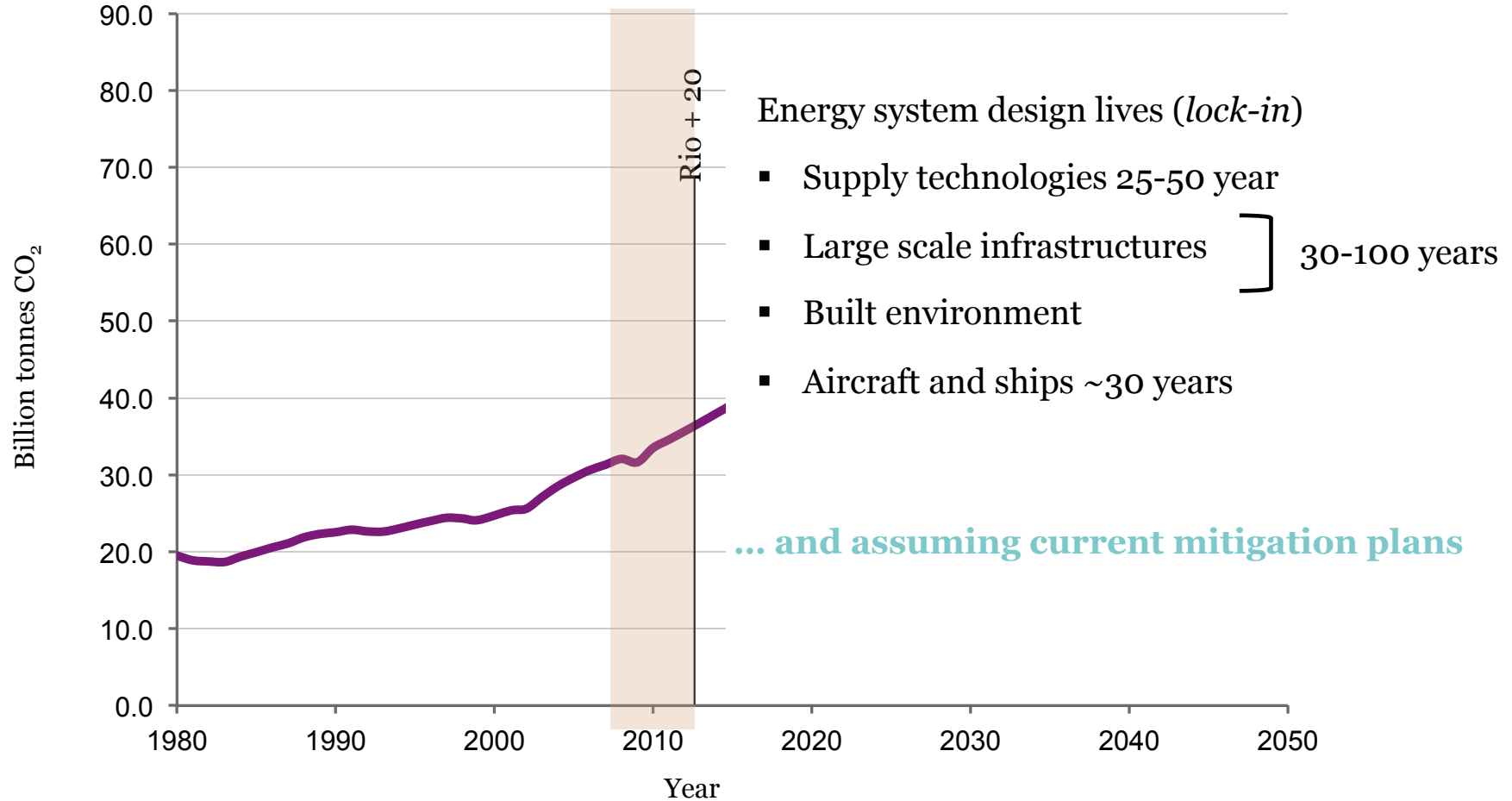
Global emission of fossil fuel CO₂ (inc. cement)



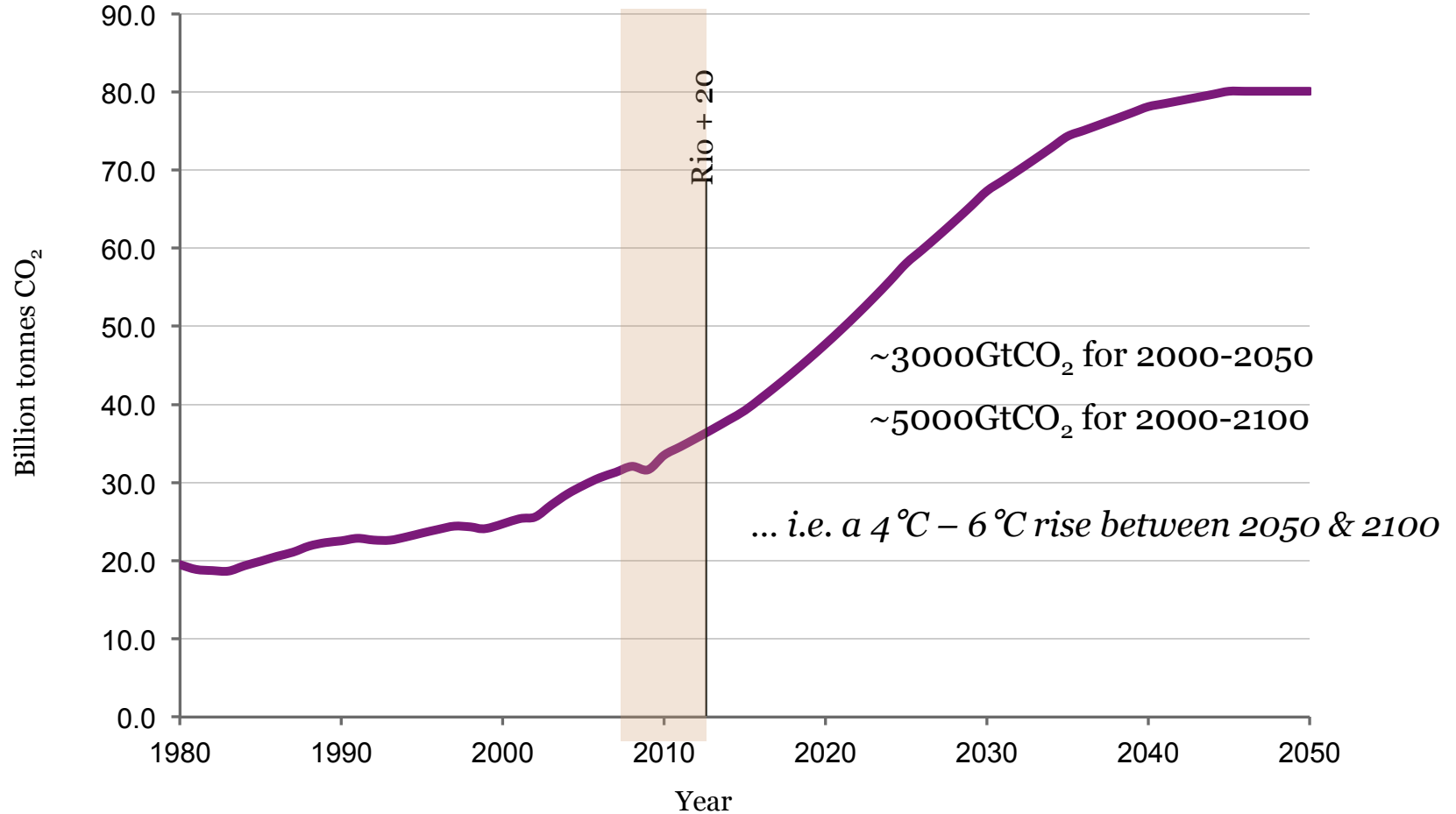
Global emission of fossil fuel CO₂ (inc. cement)



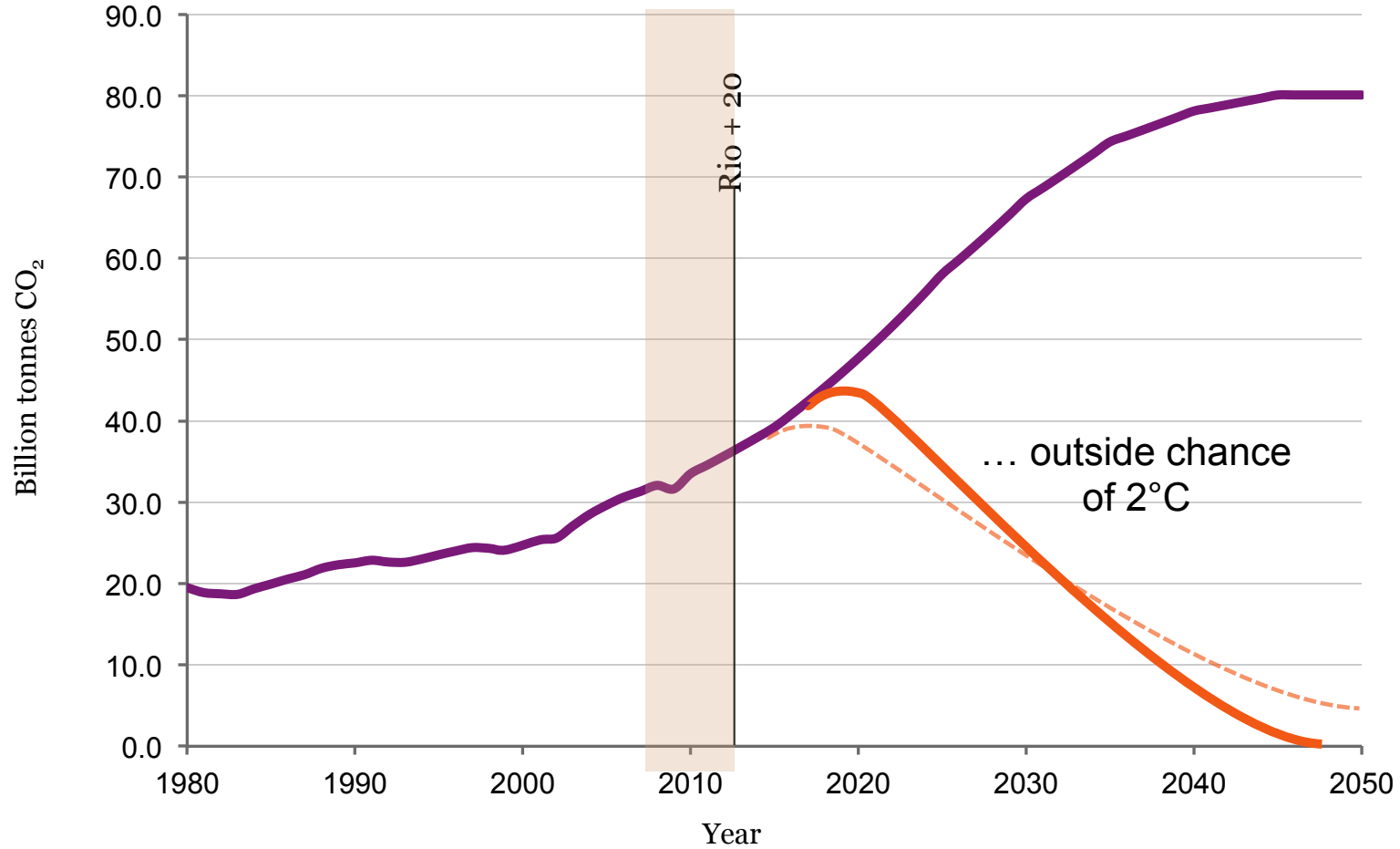
Global emission of fossil fuel CO₂ (inc. cement)



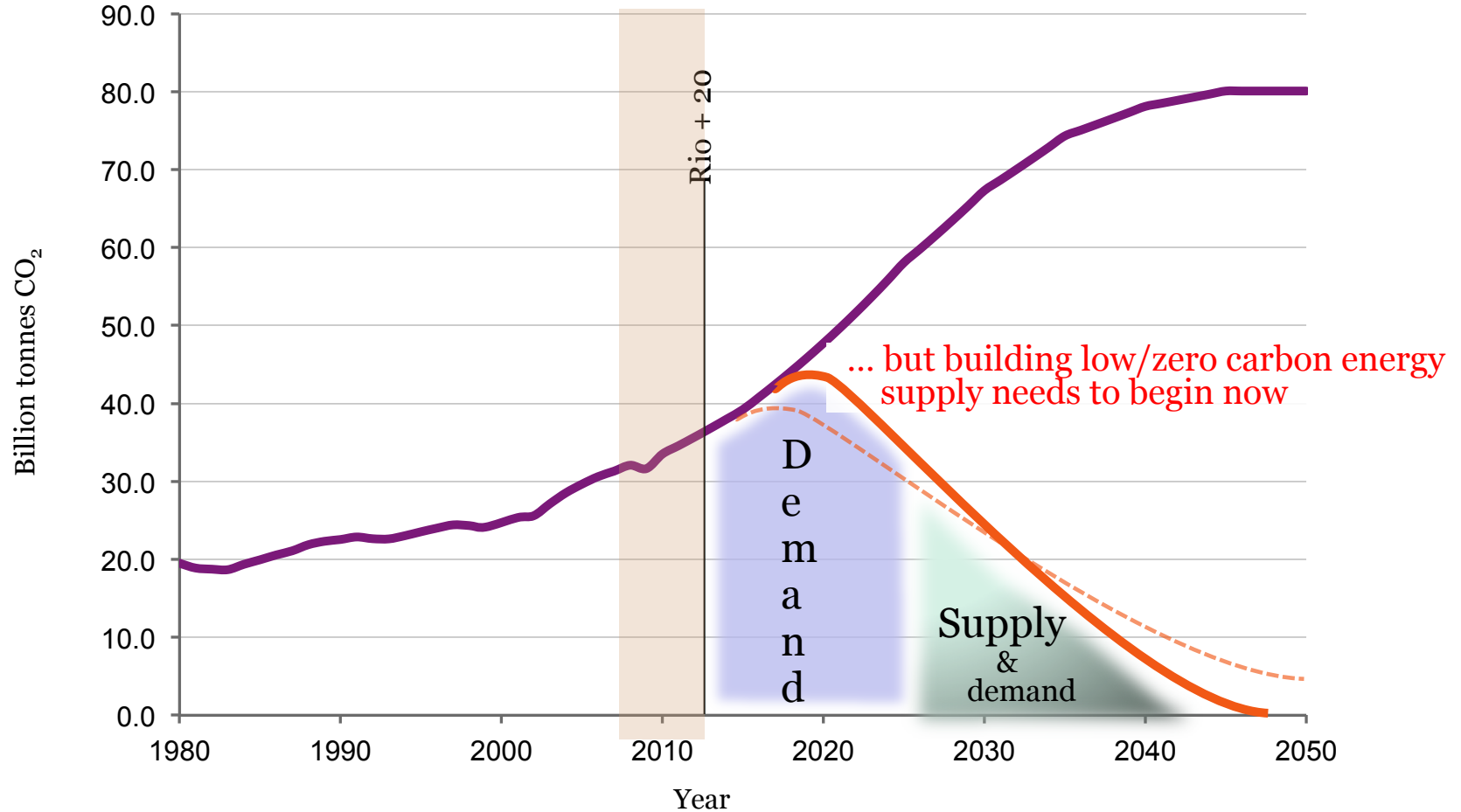
Global emission of fossil fuel CO₂ (inc. cement)



Global emission of fossil fuel CO₂ (inc. cement)



Global emission of fossil fuel CO₂ (inc. cement)



Greater Manchester – Climate Change Strategy

“ Greater Manchester intends to make its contribution to the targets set in the ... **UK Low Carbon Transition Plan** ... [t]his is the right thing to do as part of the global effort to combat climate change ...”

“ Radical action on carbon emissions is needed in order to pass a **viable and safe** climate onto future generations ...”

“2020 ... target of CO₂ emissions reduction [of] **48%**” (c.f. 1990)

MACF-refresh “**Headline Objective ... 41% by 2020**” (c.f. 2005)

But what do we mean by
“viable and safe” ?

Copenhagen Accord (2009) & G8 Camp David (2012)

‘ 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**’

The UK Low Carbon Transition Plan states ...

“ to avoid the most dangerous impacts of climate change, average global temperatures must rise **no more than 2°C** ”

So for Manchester's Climate Change Strategy the **mitigation** question is clear

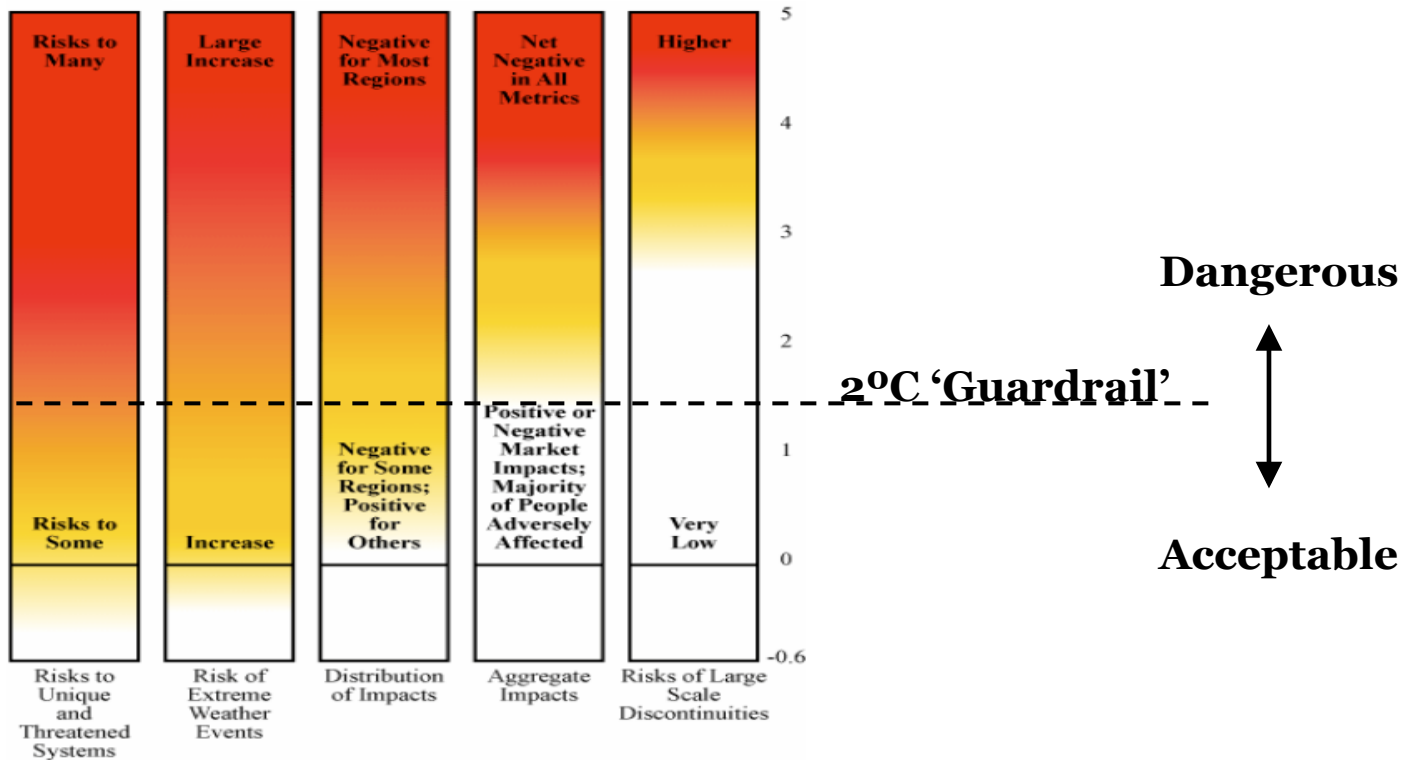
What **emission reductions** give a good chance
of staying below 2°C?

... and for **adaptation**, in case the global community
fails to mitigate ...

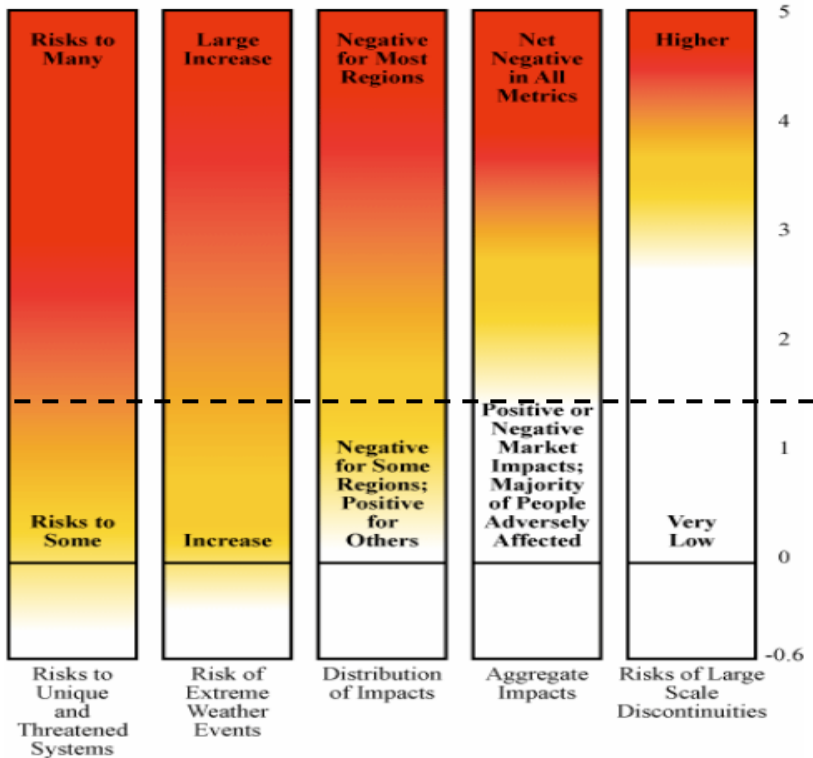
What **temperatures**/climate should Manchester prepare for?

... but why 2°C ?

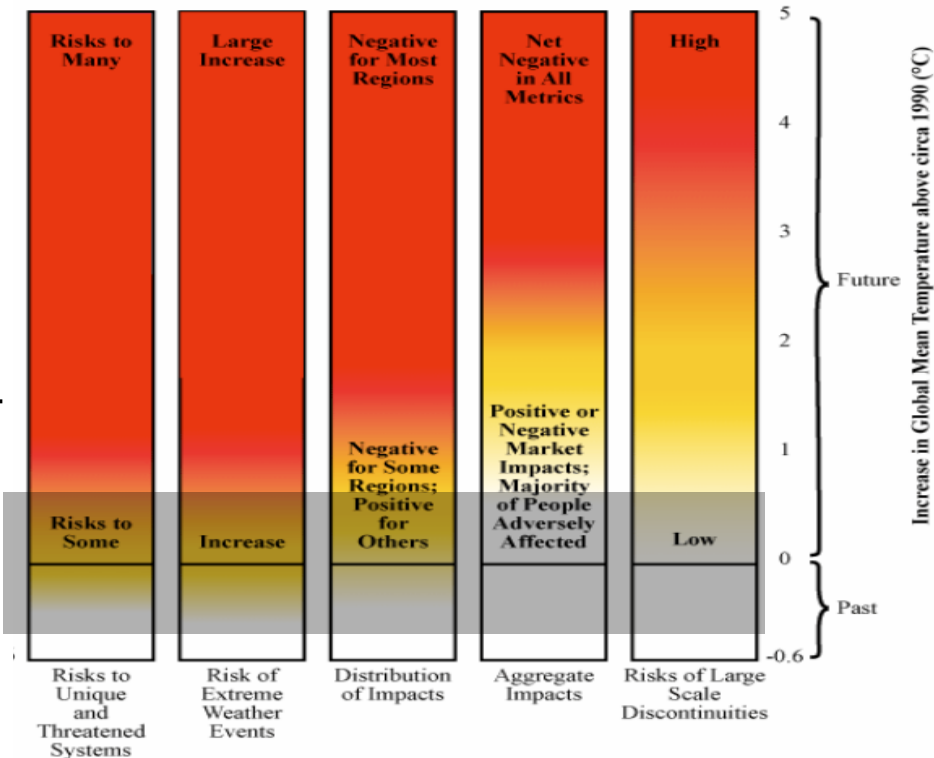
2001



2001



2009



**Is 2°C – dangerous or
extremely dangerous?**

Is 1°C the new 2°C?

... sticking with 2°C?

Emission-reduction targets

- UK, EU & Global - long term reduction targets

UK's 80%	reduction in CO ₂ e by	2050
EU 60%-80%	“	2050
Bali 50%	“	2050

- CO₂ 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**

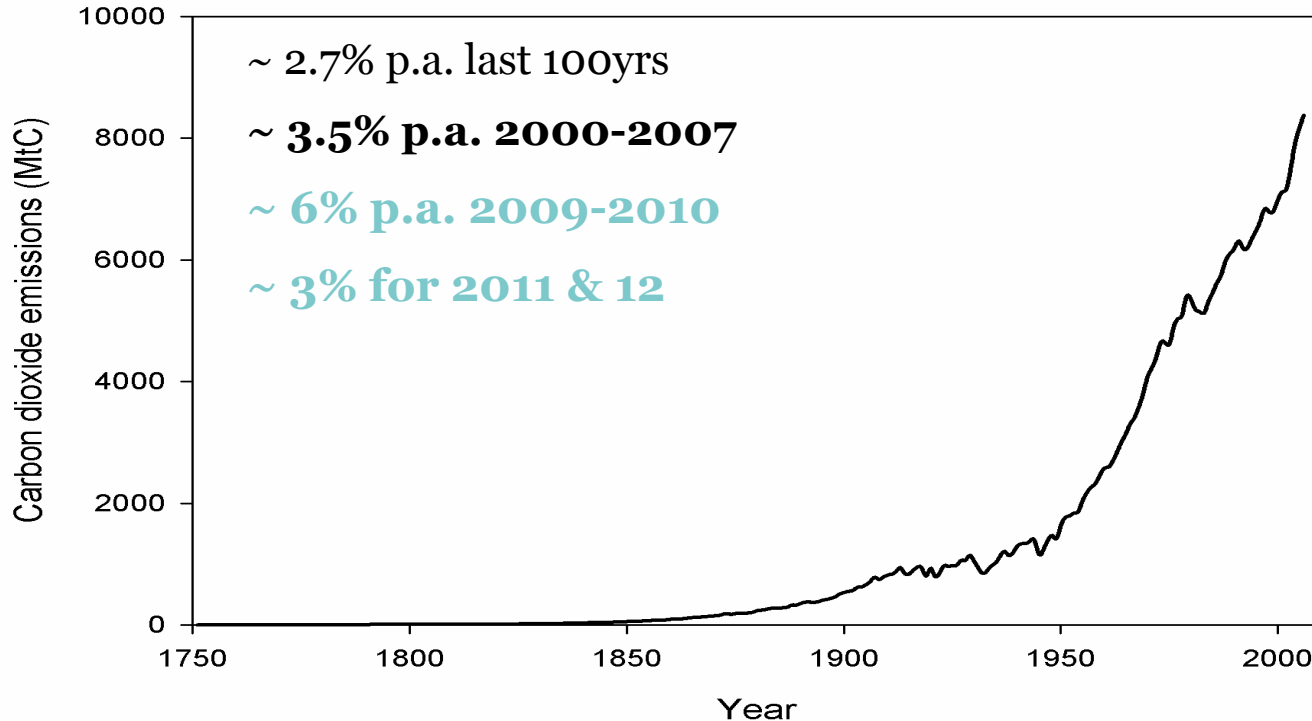
factor in...

the latest emissions data

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

Things are getting worse!

Global CO₂ emission trends?

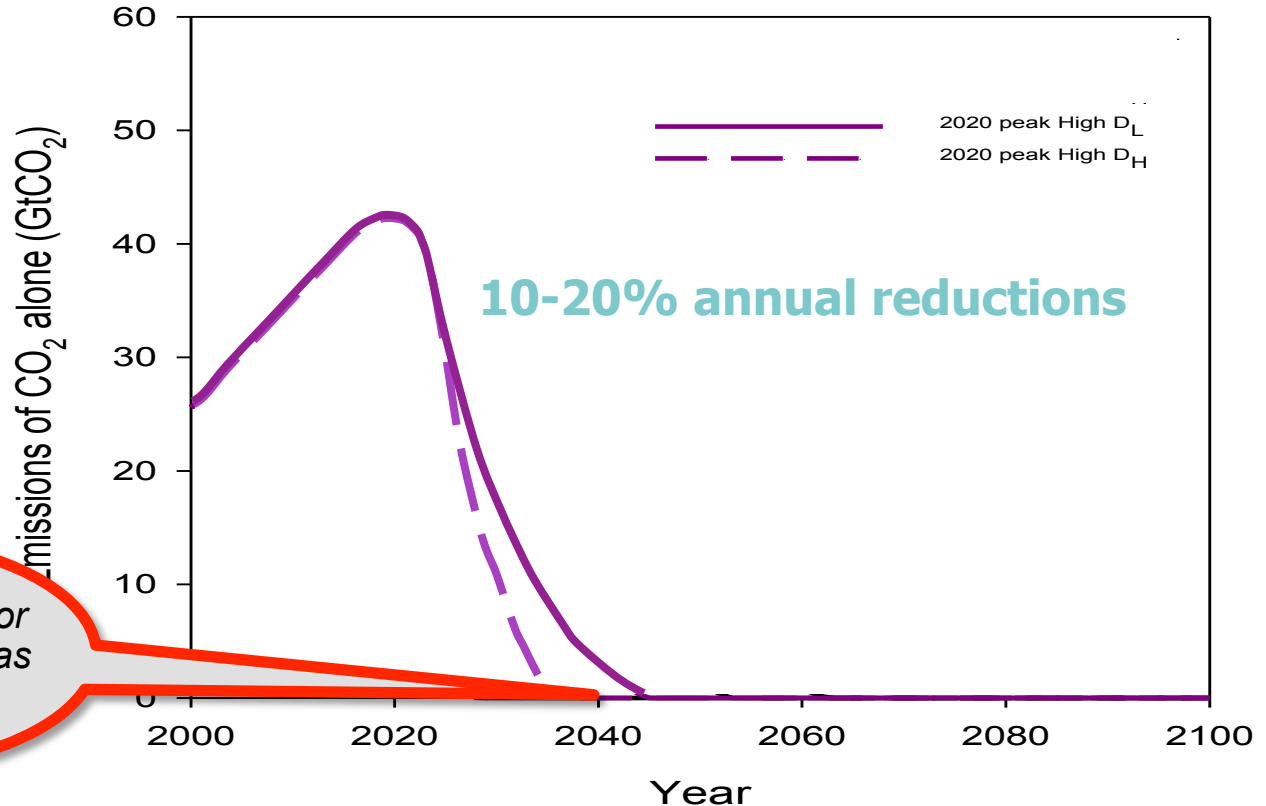


What does:

- This failure to reduce emissions
&
- The latest science on cumulative emissions
- **Say about a 2°C emissions reduction pathway?**

For energy emissions? (*with 2020 peak*)

**Total
Decarbonisation
by ~2035-45**



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

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 CO₂ 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 policies 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
- For the UK anyone earning over £30k

Are **we** sufficiently concerned to

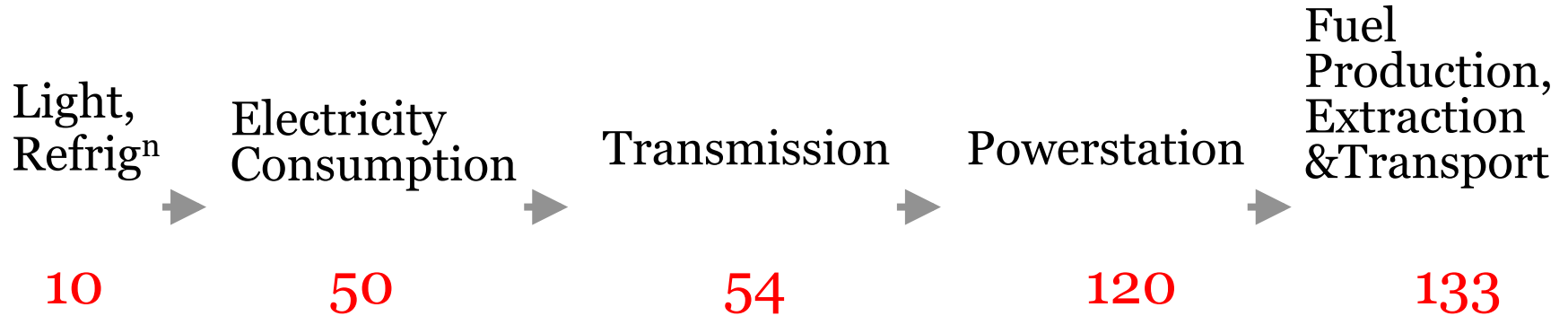
... make or have enforced substantial personal
sacrifices/changes to our lifestyles

To accept a steady-state rather than growing economy?

NOW ?

Technical **AGENCY**
– another message of hope

The Electricity system



Demand opportunities dwarf those from supply in short-term

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% CO₂ reduction by 2020 with no new technology**
- Reverse recent trends in occupancy **~70% by 2020**

To conclude ...

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+)

However,

“... 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

... & for Manchester, the challenge is:

Mitigation - a 60-70% reduction in 'total' emissions by ~2020

Adaptation - plan for impacts of up to 4C or more by 2050-70

Thank you



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