# From rhetoric to reality
## Facing the challenges of climate change


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# Greater Manchester - Climate Strategy

## Core objectives section (pp21-22)

“ 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 …”

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

# Copenhagen Accord (2009)

‘ 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** ”

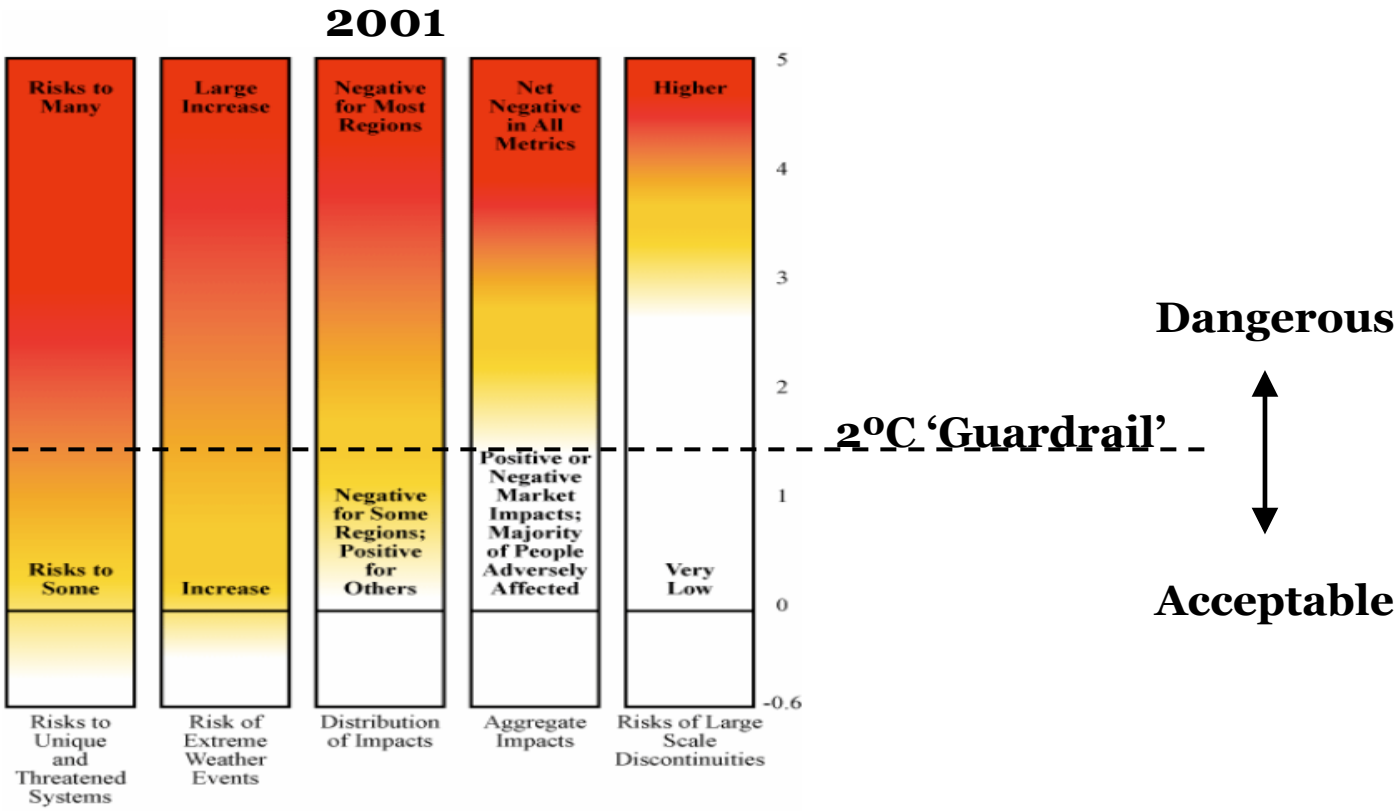
**So for Manchester's Climate Change Strategy the mitigation question is clear**

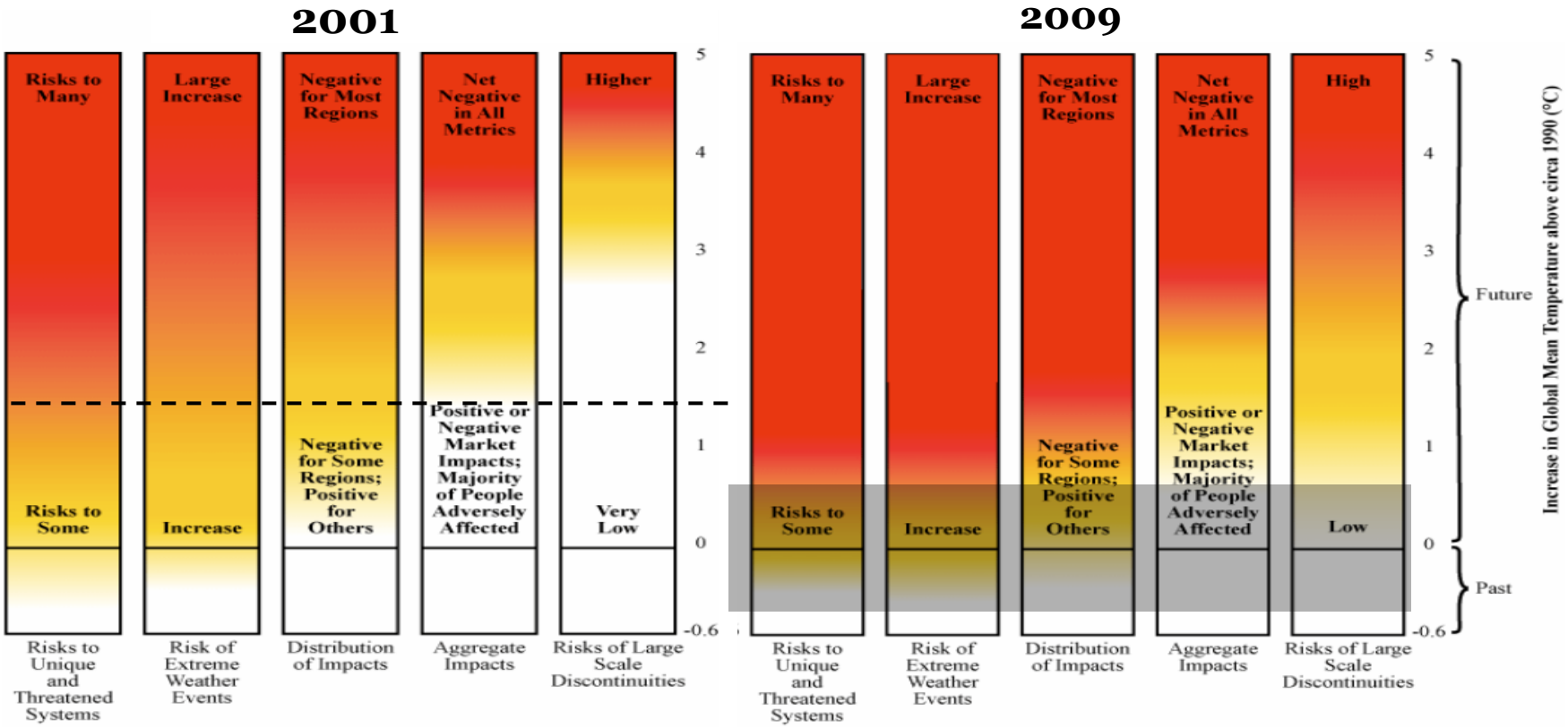
What **emission reductions** give a good chance of staying below 2°C?

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

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

# … but why 2°C ?


2001
Risks to Many
Large Increase
Negative for Most Regions
Net Negative in All Metrics
Higher
Risks to Some
Increase
Negative for Some Regions; Positive for Others
Positive or Negative Market Impacts; Majority of People Adversely Affected
Very Low
5
4
3
2
1
0
-0.6
Risks to Unique and Threatened Systems
Risk of Extreme Weather Events
Distribution of Impacts
Aggregate Impacts
Risks of Large Scale Discontinuities
Dangerous
2ºC 'Guardrail'
Acceptable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Future
Past
Increase in Global Mean Temperature above circa 1990 (°C)
Risks to Unique and Threatened Systems
Risk of Extreme Weather Events
Distribution of Impacts
Aggregate Impacts
Risks of Large Scale Discontinuities

# 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 $CO_2e$ 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**

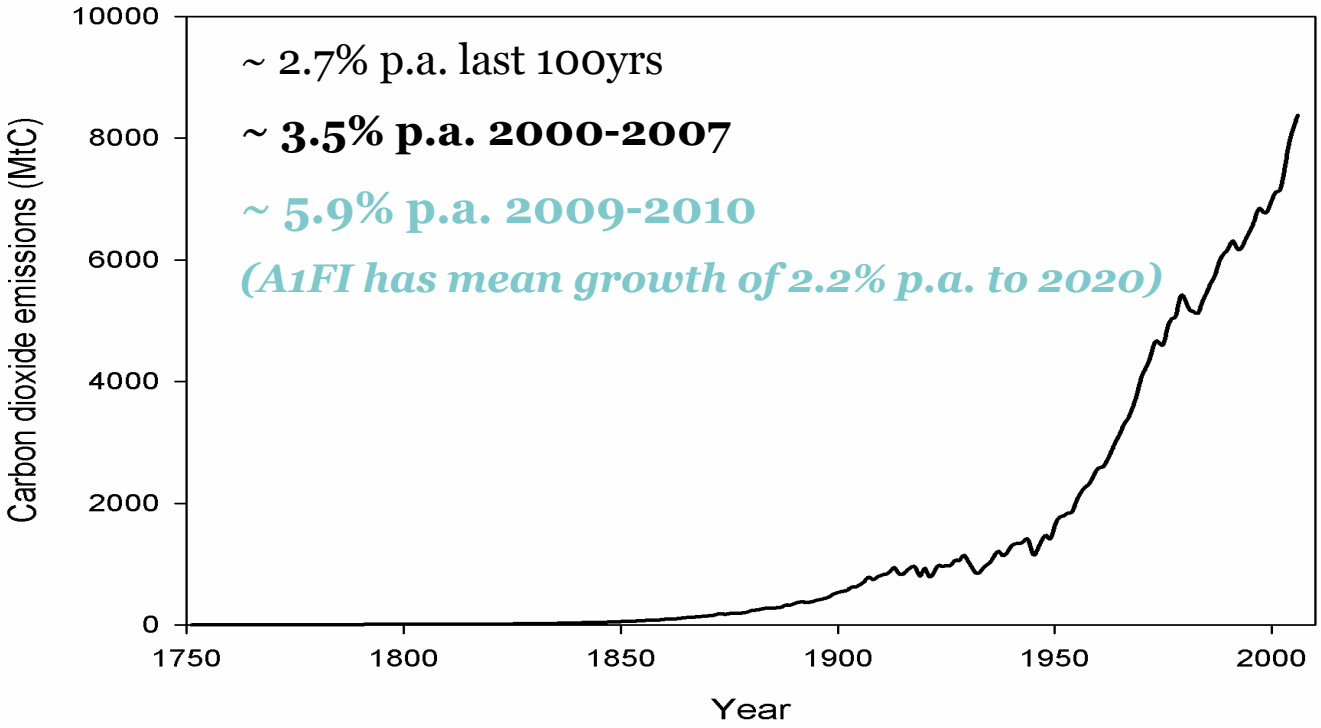
  **- to urgent & radical reductions**

**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

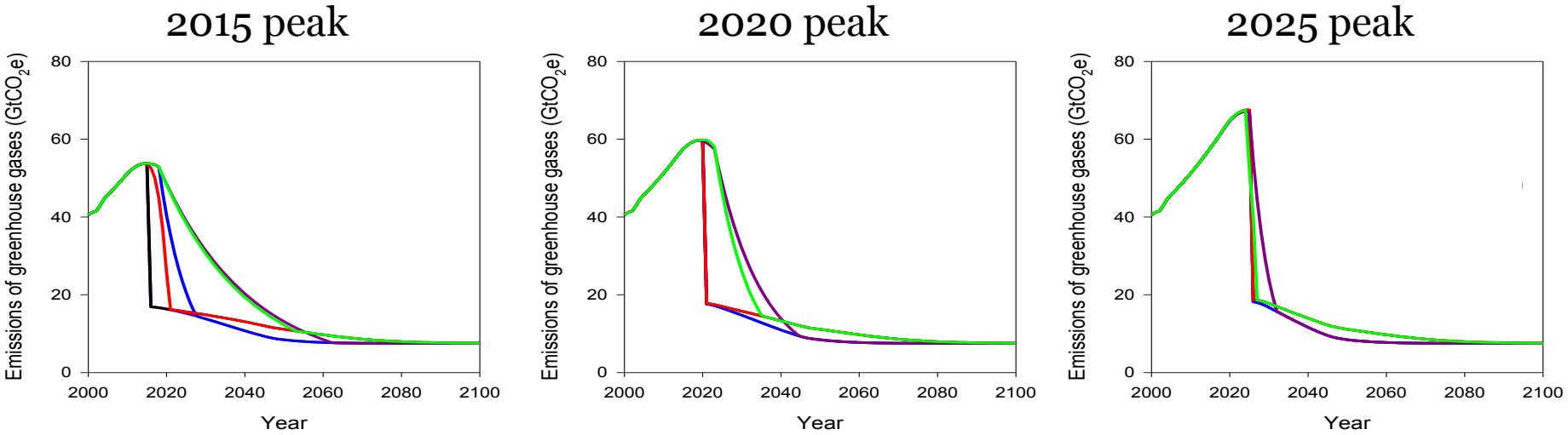
  &

- The latest science on cumulative emissions

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

# Early emissions peak = lower emissions reduction/year

# **Total** greenhouse gas emission pathways

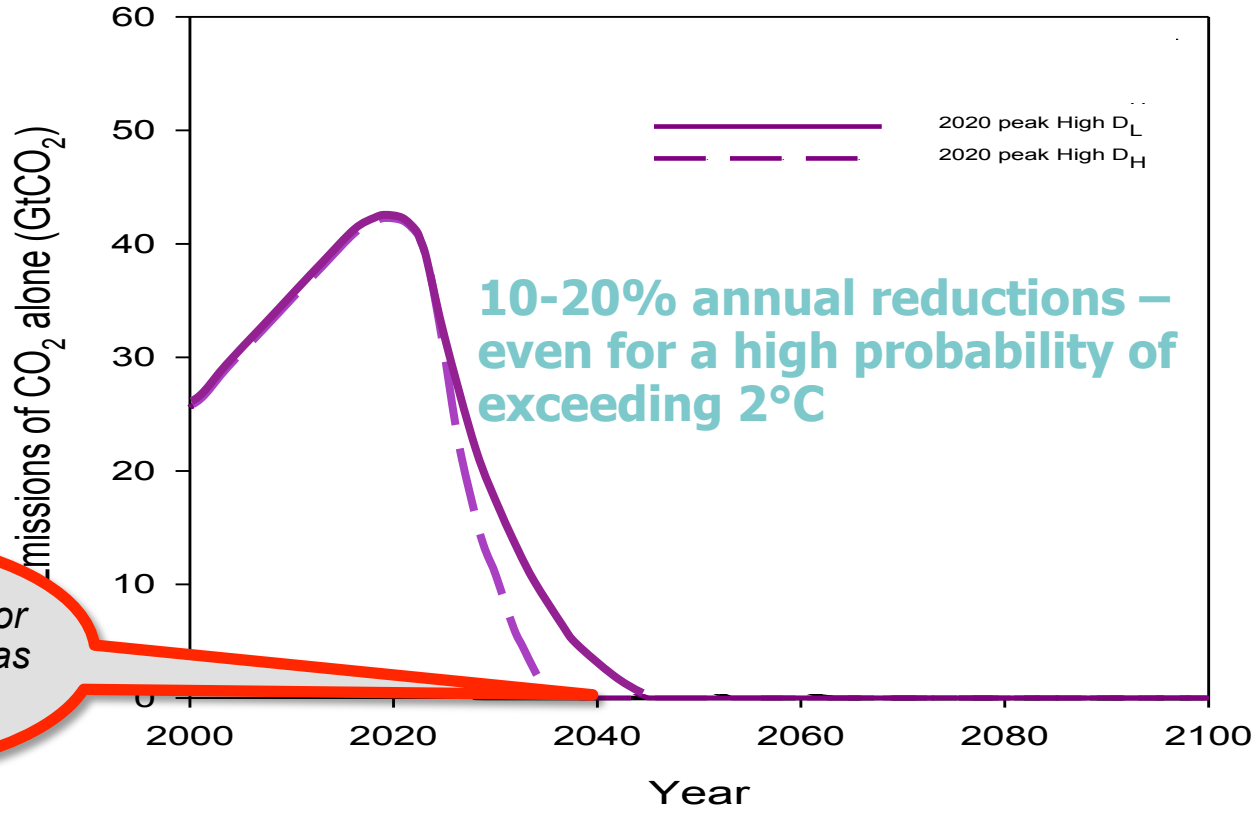



(Anderson & Bows. 2008 Philosophical Transactions A of the Royal Society. 366. pp.3863-3882)

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

13 of 18 scenarios ‘impossible’

**Even then total decarbonisation by ~2035-45 necessary**



# 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**
  - **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
- For the UK anyone earning over £30k

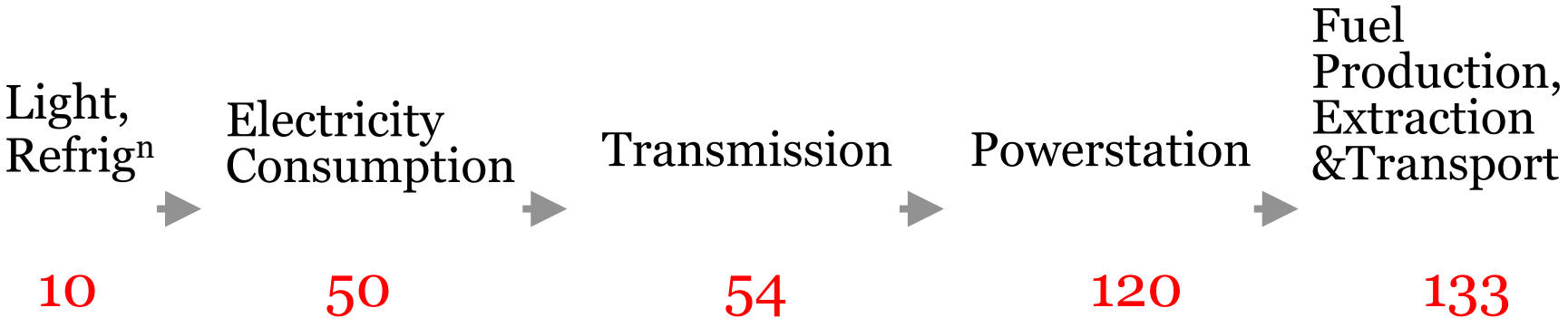
Are **we** sufficiently concerned to

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

**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% $CO_2$ 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 and 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 70% reduction in ‘total’ emissions by 2020

**Adaptation** - plan for impacts around 4C or more by 2050-70

# Thank you

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