Averting dangerous climate change: accelerating the energy transition

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Outline

1. Brief review of climate change (CC) timing
2. Pricing carbon to address the issue: fast enough?
3. The NZ policy potential for accelerating the energy transition
4. Conclusion

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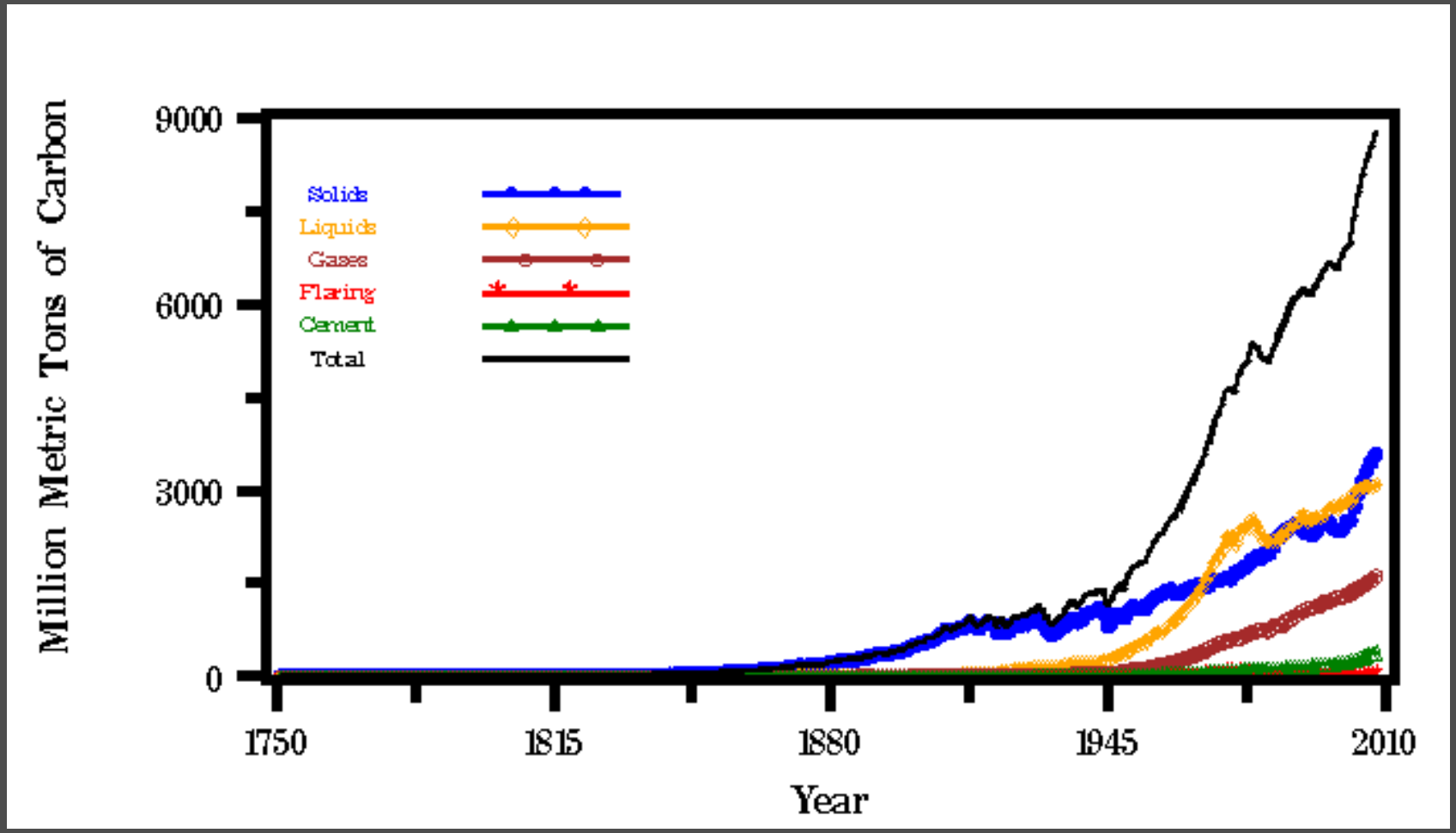
1 Brief review of CC timing

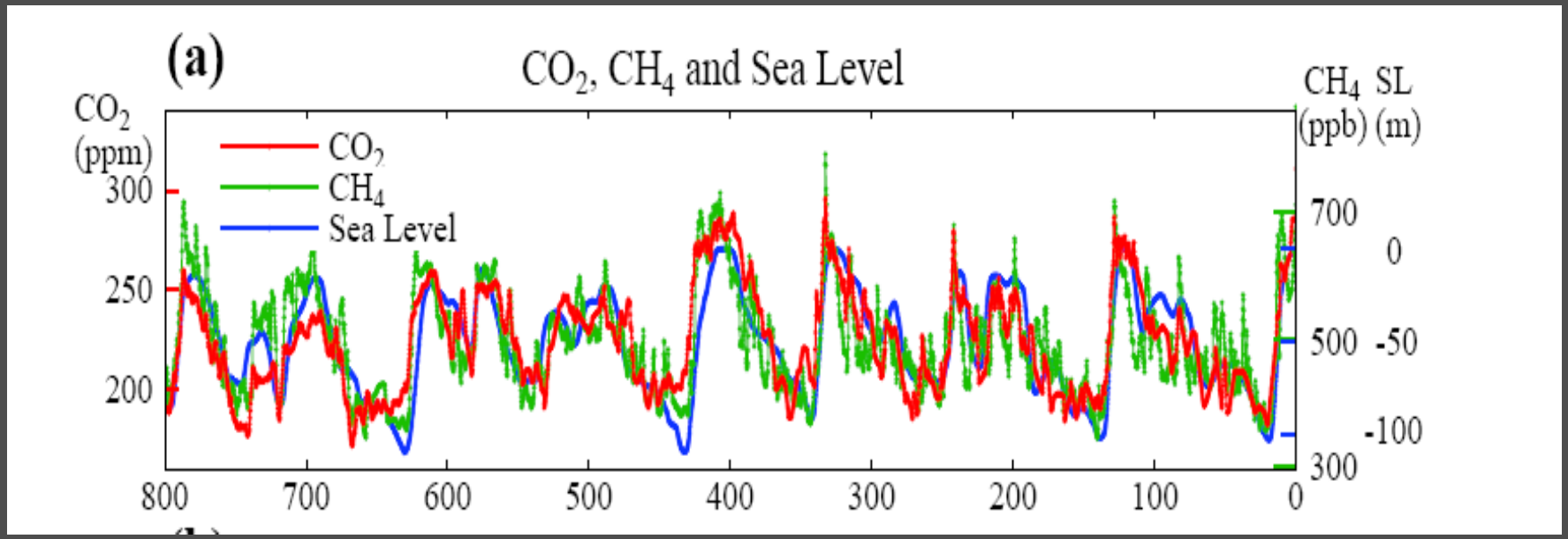
CO_2 emissions from fossil fuels:

inexorable rise since the time of Adam Smith



Source: CDIAC http://cdiac.ornl.gov/trends/emis/glo.html

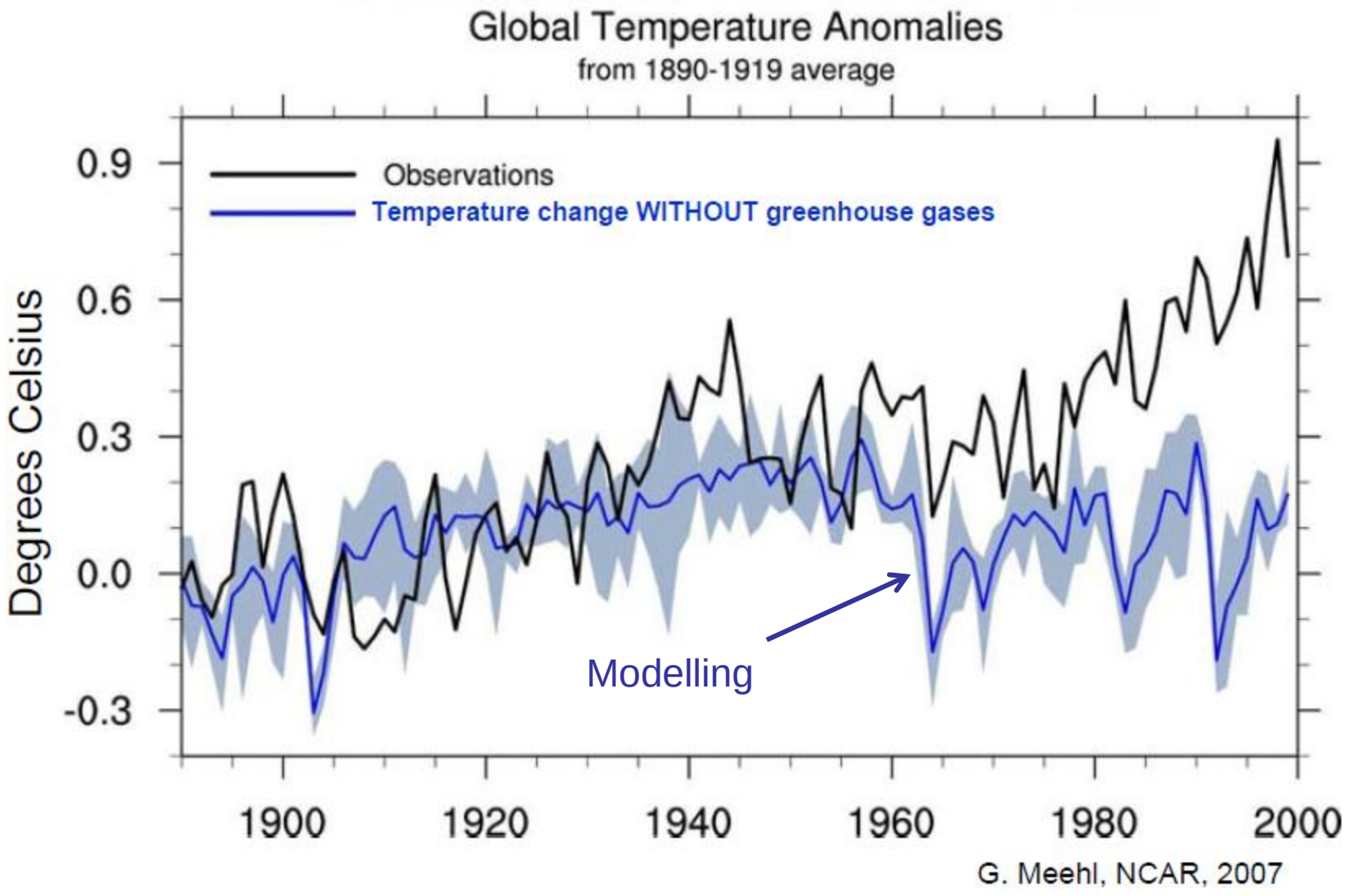
…an unprecedented experiment with the atmosphere



Source: Hansen et al (08)

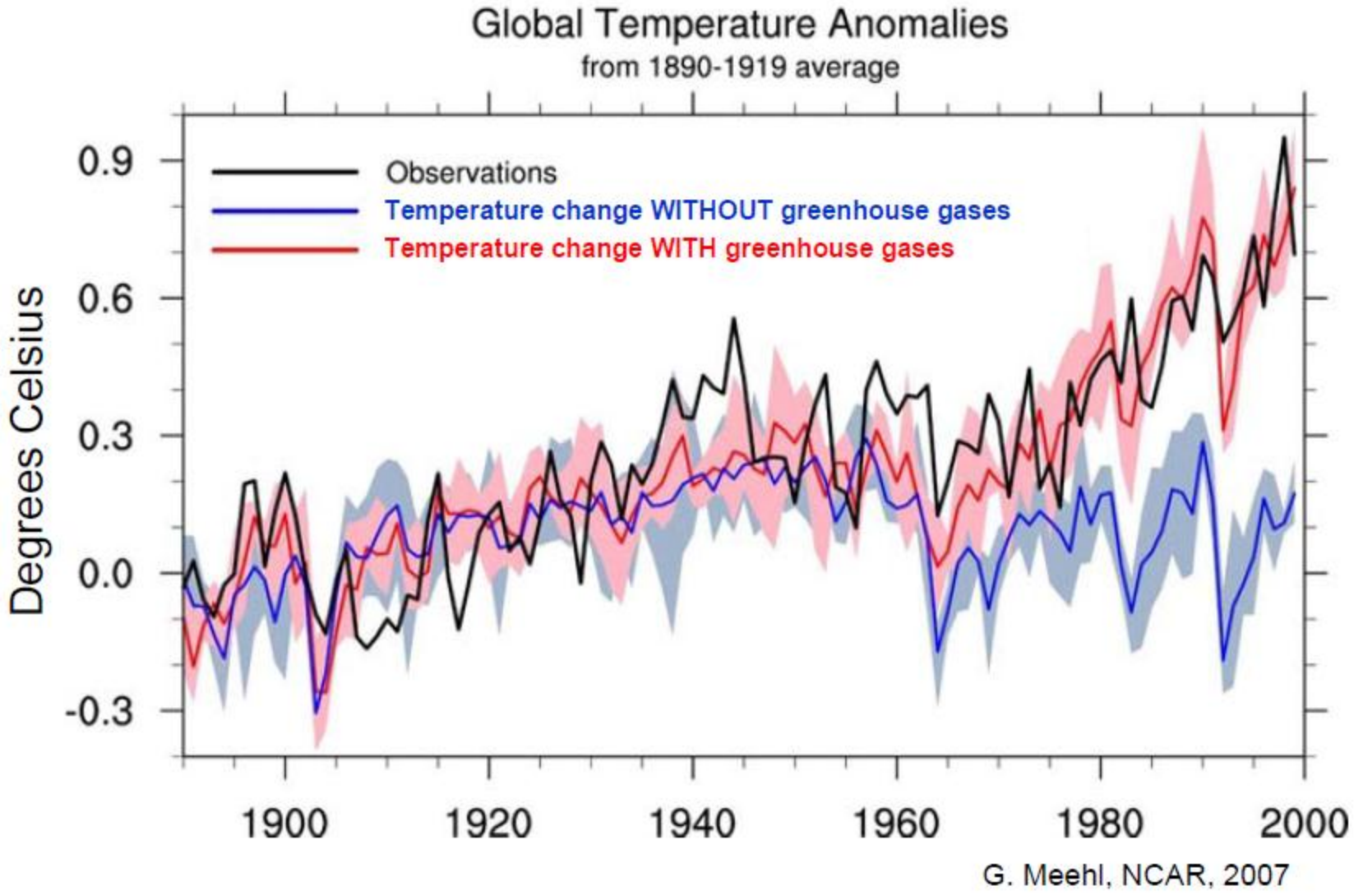
"…human beings are now carrying out a large scale geophysical experiment of a kind that could not have happened in the past nor be reproduced in the future." –Revelle & Suess, 1957

Attribution of Actual Climate Change



Slide courtesy of Martin Manning

Attribution of Actual Climate Change



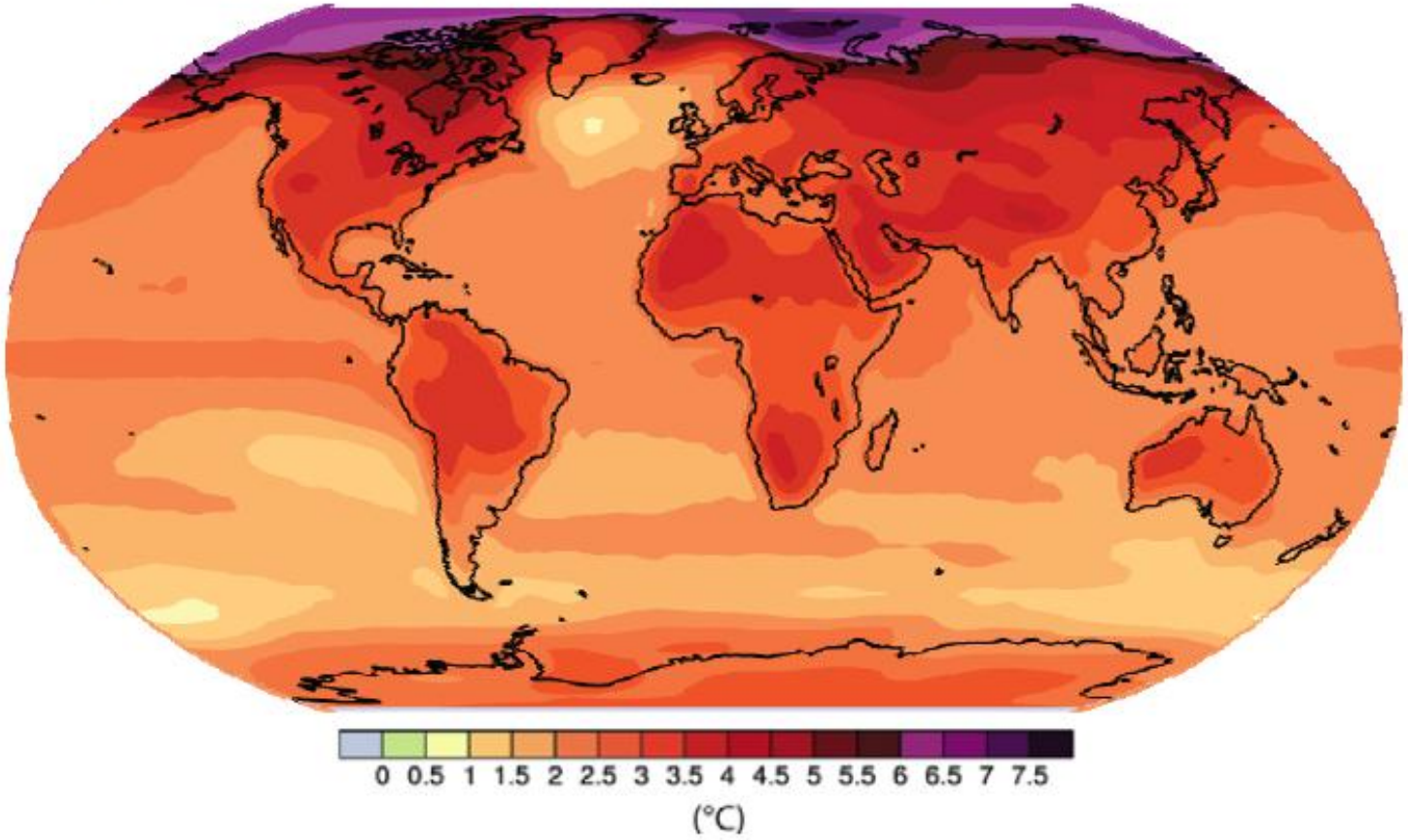
Temperature impacts

The warming pattern in the 2090s for a mid-range scenario

Global average temperature is warmer than preindustrial by 3.4°C;

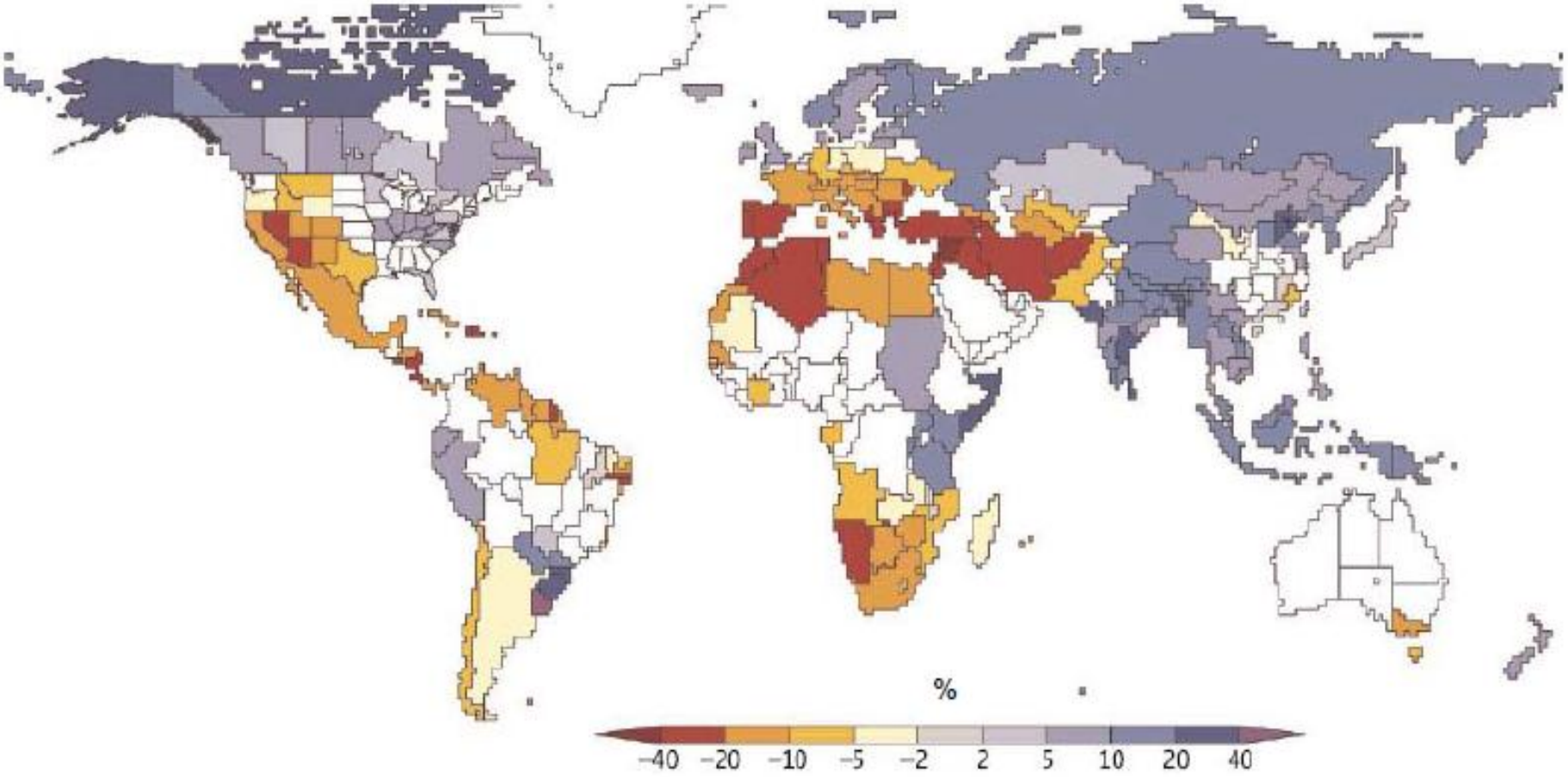
But much of the Northern Hemisphere land is warmer by 4.1 – 4.6°C

The Arctic is warmer by 6.5°C and more.



Source: Martin Manning, CCRI

Rainfall impacts – perhaps more vital than temps.



Map shows changes in water availability (runoff) by 2050, for the IPCC mid-range emissions scenario.

Colour denotes percentage change, white means trend is unclear.

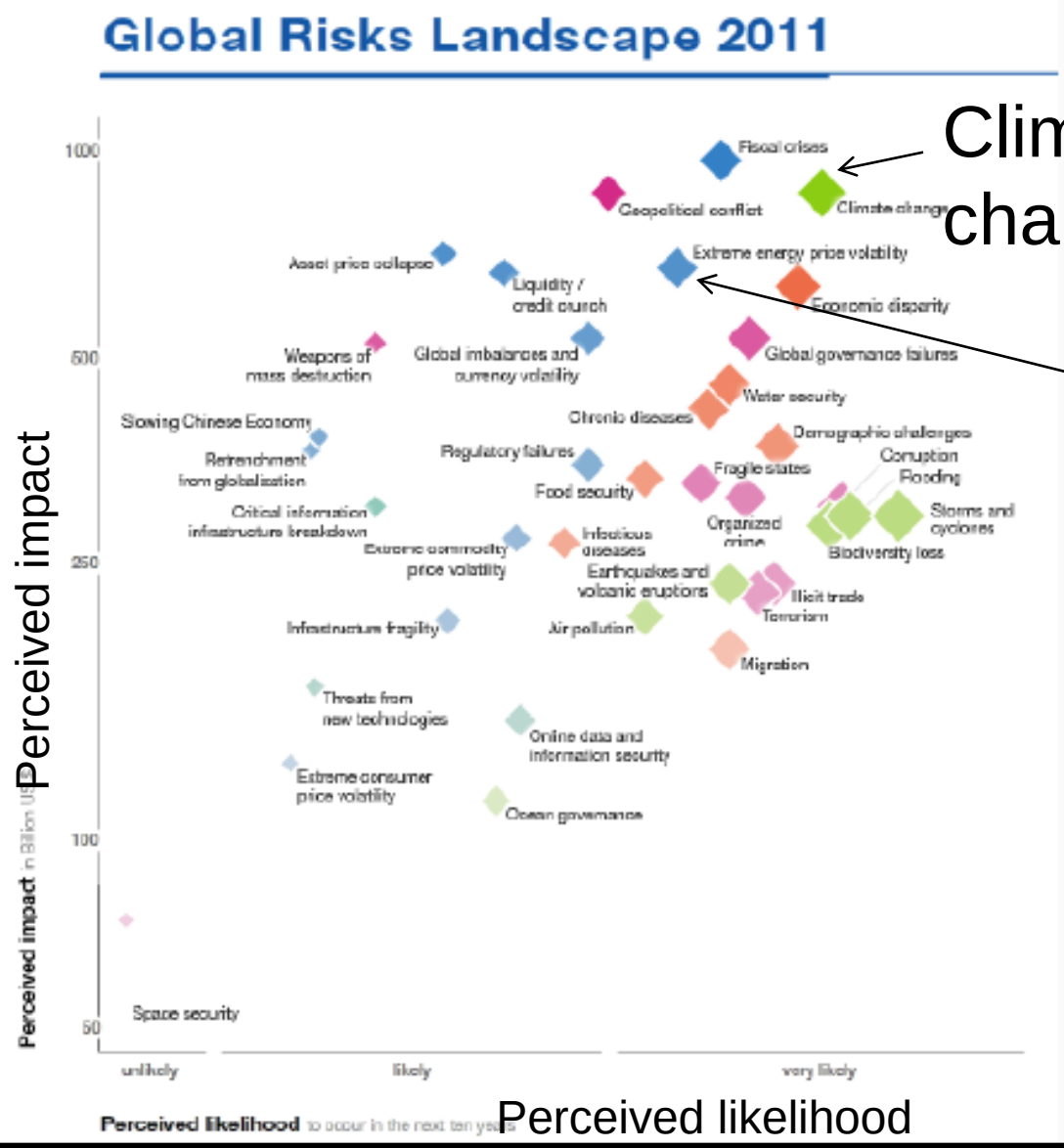
Source: Martin Manning, CCRI

Projections of sea level rise by 2100
adapted from The Royal Society (2010)

Sea level rise estimates have risen, recently

Source	Projected sea level rise by 2100 (metres)
Rahmstorf (2007)	0.5 - 1.4
Horton (2008)	0.5 – 1.0
Pfeffer (2008)	0.8 – 2.0
Vermeer (2009)	0.8 – 1.9
Grinstead (2009)	0.3 – 2.2
Jevrejeva (2010)	0.6 – 1.6

How big? Munich RE's view of the risks



Climate change

Energy price volatility

Economic risks

Geopolitical risks

Environmental risks

Societal risks

Technological risks

- Survey of 580 leaders and decision makers across the globe
- Supported by 18 workshops
- Assessment of 37 global risks for the next 10 year period

Hoeppe (2011) Extreme Weather Events…

http://www.munichre.com/app_pages/www/@res/pdf/ir/publications/presentations/2011_06_06_climate_change_and_water_investment_conference_en.pdf21

What warming are we now physically committed to? 3 views

View 1:

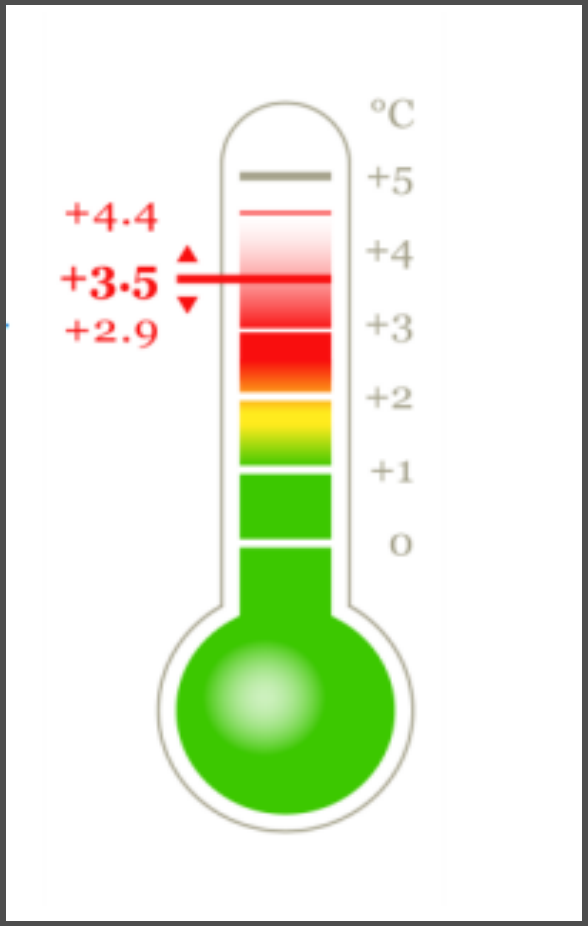
Warming ‘in the pipeline’, mostly attributable to slow feedbacks, is now about 2°C – Hansen et al (2008)

View 2:

‘…CO_2 concentrations are already at levels predicted to lead to global warming of between 2.0 and 2.4°C’ - Richardson et al (March 2009) [pre-Copenhagen COP]

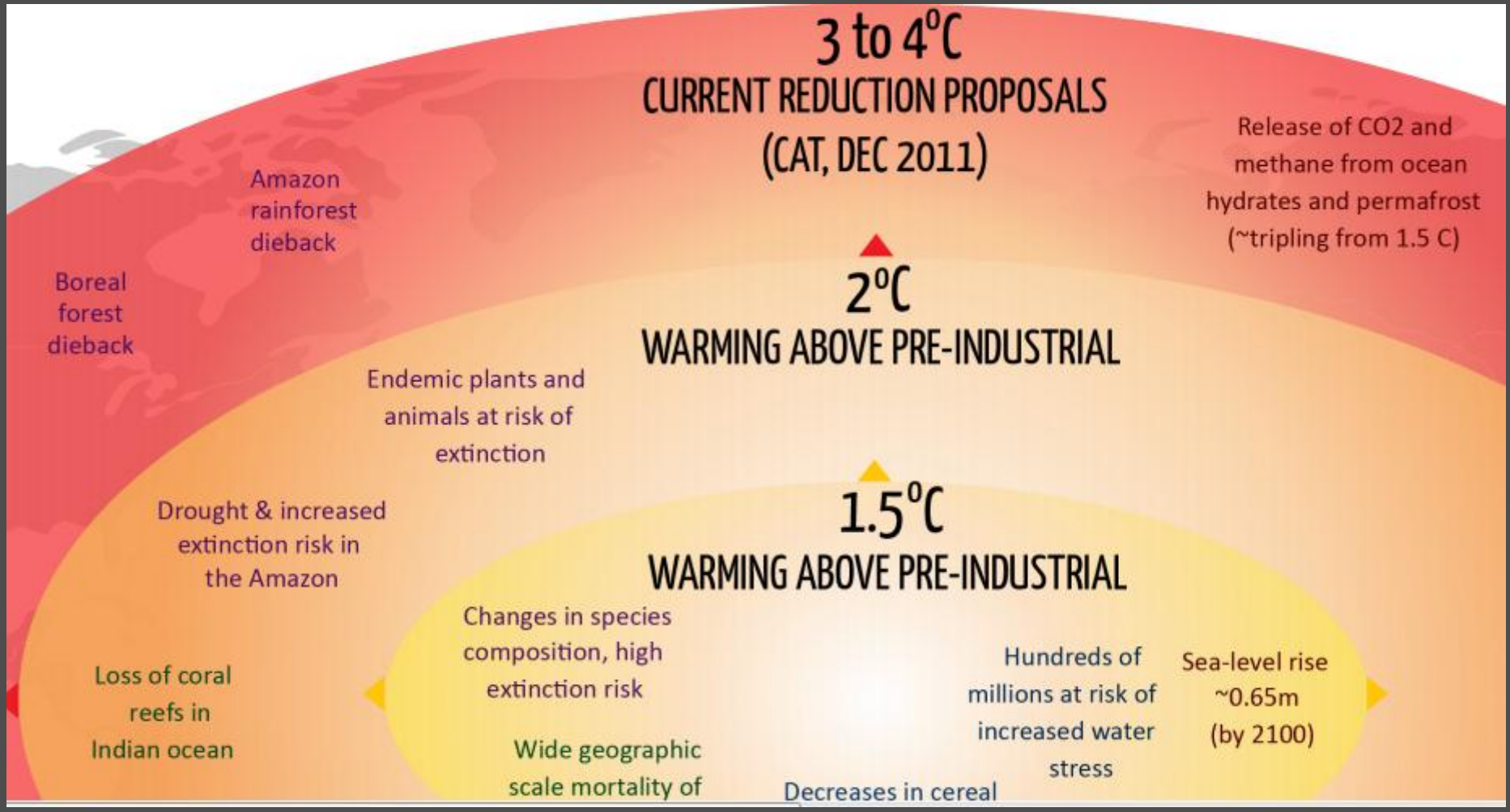
View 3:
Climate Analytics, Ecofys, Potsdam Inst.

- As of Dec 2011, their best estimate is that the world is headed for ~3.5°C by 2100
- Future warming substantially depends on pledges
- Durban agreements → main action after 2020



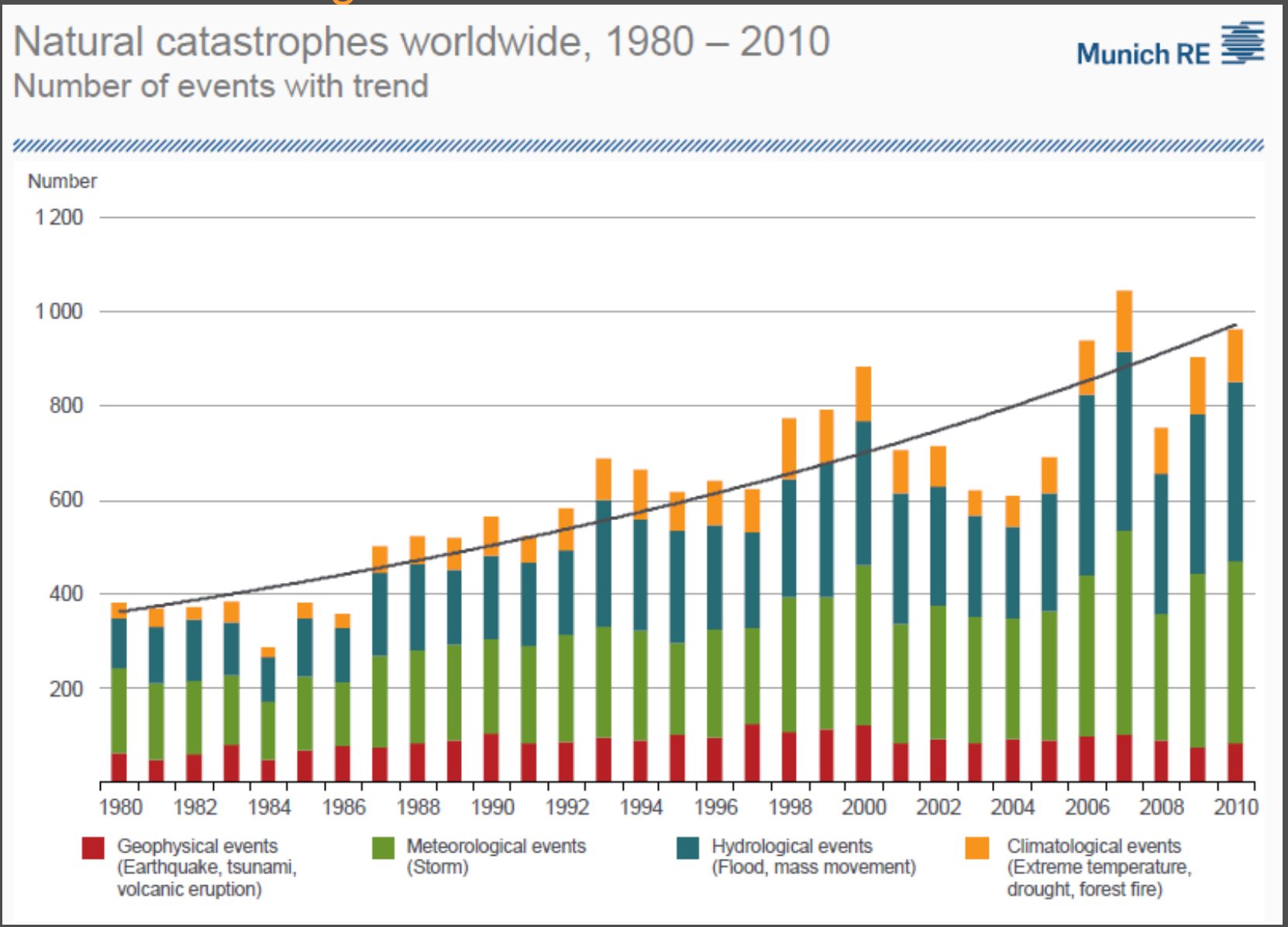
A range of impacts as temps rise

Climate Analytics (Dec 2011) [excerpt]



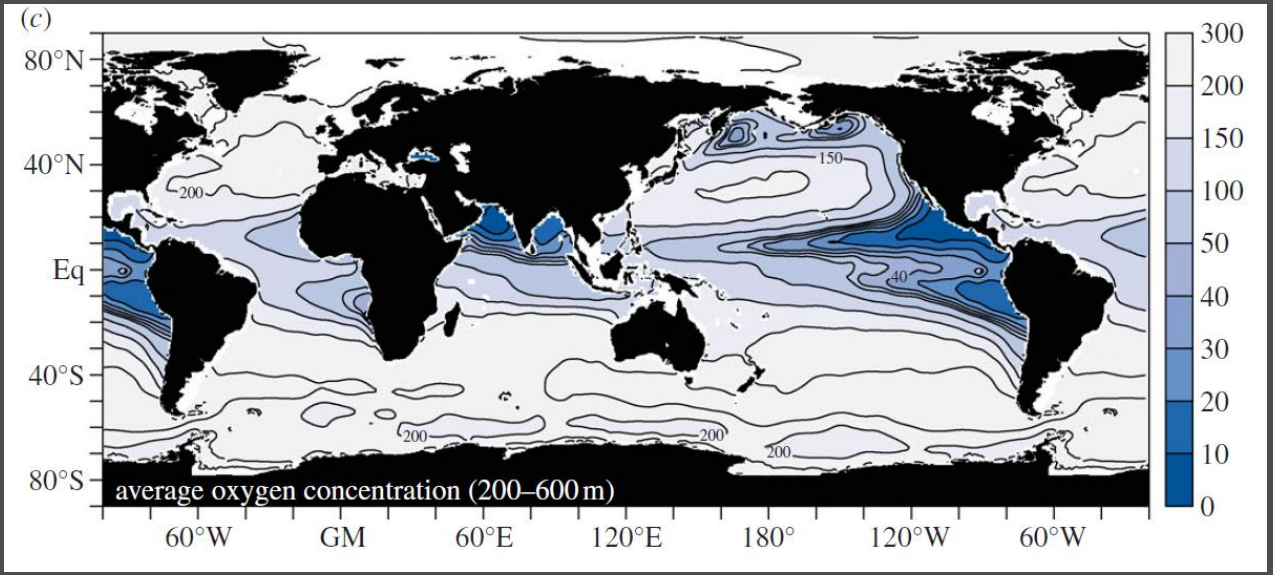
Catastrophic event numbers:

an accelerating trend…



Oceanic changes

Gruber (2011)



"The ocean is warming up, turning sour, losing breath…

"Ocean warming, acidification and deoxygenation are virtually irreversible on the human time scale. …the primary driver for all three stressors, i.e. the emission of CO_2 into the atmosphere, will cause global changes that will be with us for many hundreds, if not thousands, of years."

New concerns about the Greenland Ice Sheet

- A new estimate: warming of ~1.6°C (95% interval 0.8 - 3.2°C) is all that's needed to melt Greenland's ice sheet over time (Robinson et al, 2012)
- Crossing the deglaciation threshold does not imply rapid collapse of GIS – still at least hundreds of years. But inexorable: 'the GIS will continue to melt even if temperatures later drop below the threshold value.'

Greenland ice sheet. Source: Discovery News http://news.discovery.com/earth/zooms/new-greenland-ice-sheet-loss-estimate-120313.html

Are we keeping up?

- Not on the physical science: Changes in the climate system now appear to be outpacing the speed with which science can measure & digest the change

- Not on the impacts: "We badly underestimated the degree of damages and the risks of climate change…All of the links in the chain are on average worse than we thought a couple of years ago." – Sir Nicholas Stern, April 2008

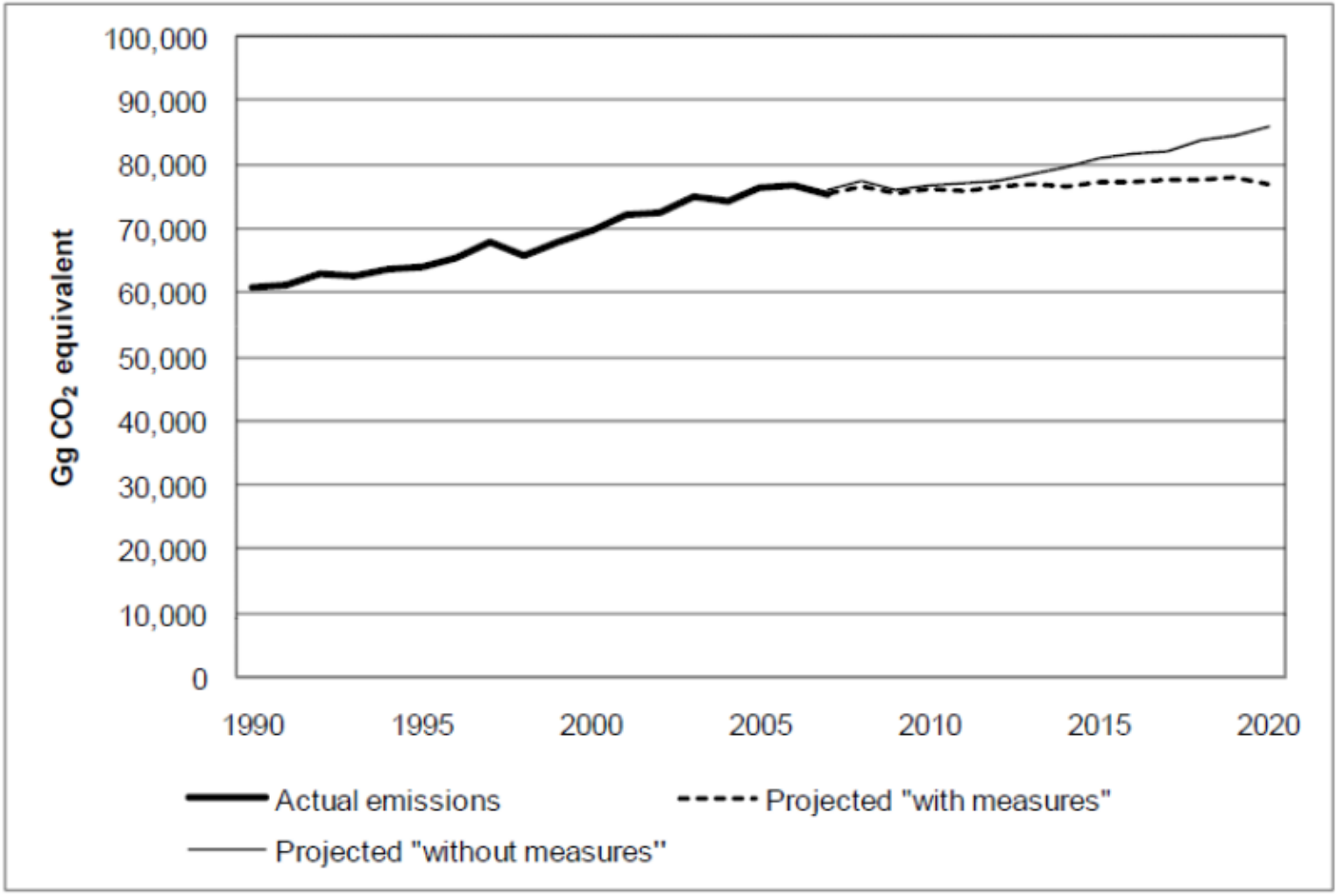
"Gentlemen, it's time we gave some serious thought to the effects of global warming."

2: Pricing carbon…losing its gloss?

Problems with NZ's ETS

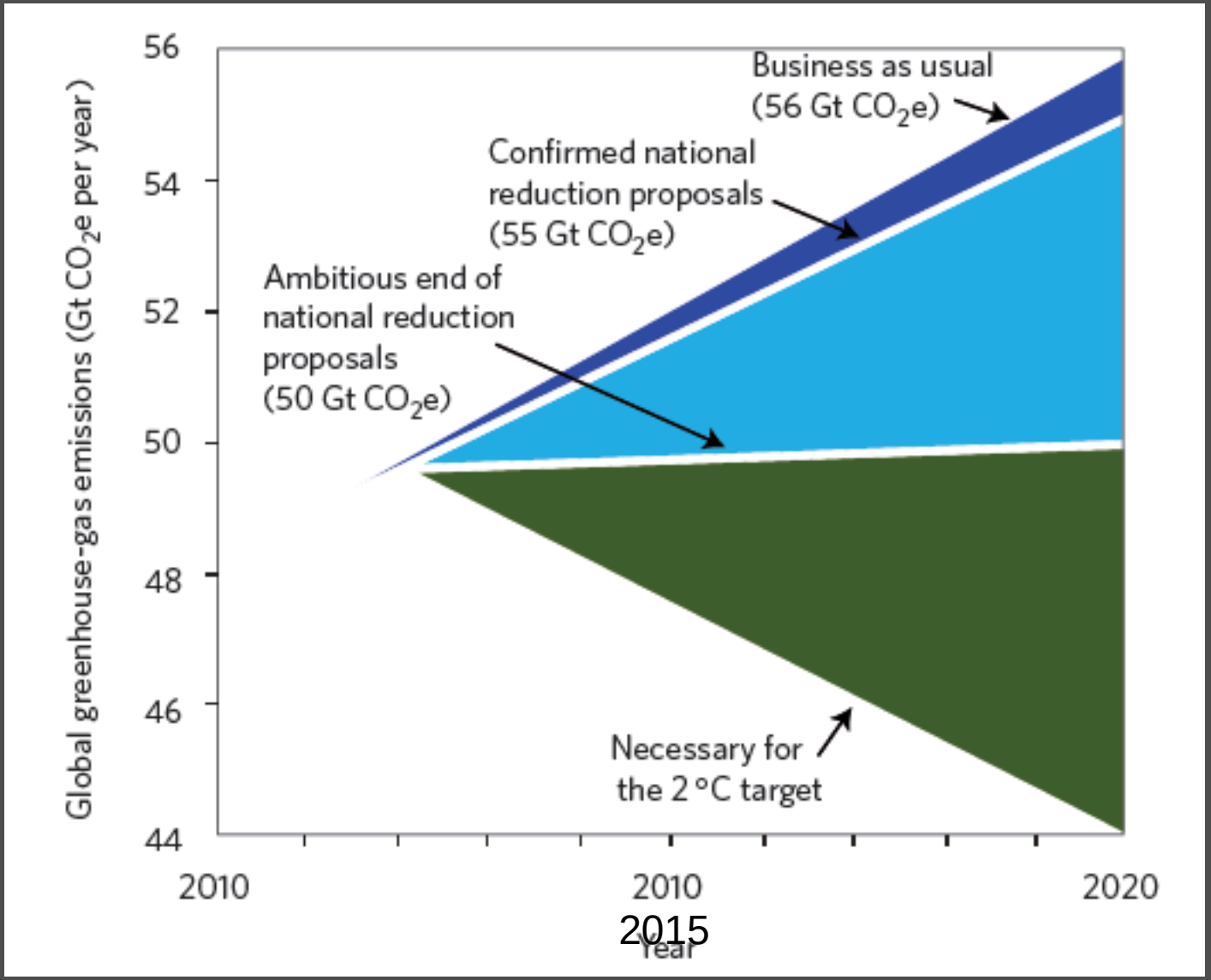
- Price is preferred mechanism among economists
- Encapsulated in NZ's ETS price on CO_2
- But international & hence NZ price has drifted down
- Even if price rose to $50 by 2015, NZ's emissions would only fall ~13% by 2020

NZ's inadequate emissions track



The paltry pledges problem

Blok et al, July 2012



The world and NZ action

- Durban (and its platform) will fail to hold the world to ‘safe’ levels of climate change
- NZ needs to contribute to greater ‘ambition’
- Despite patchy international action, it’s in NZ’s interests to act now to cut emissions
- The need to move to a low-carbon NZ economy is steadily intensifying; delaying action only increases the costs of transition
-

Why carbon pricing struggles

- The social cost of carbon is likely to be $100 - 400 per tonne (e.g. Ackerman & Stanton)
- NZ's current price evidence of this govt's assessment of the politics
- So the price of carbon might well need to be in the hundreds of dollars per tonne (e.g. up to 50c / litre of petrol): politically almost impossible?
- Institutions for a price on CO2 also act slowly (phasing)

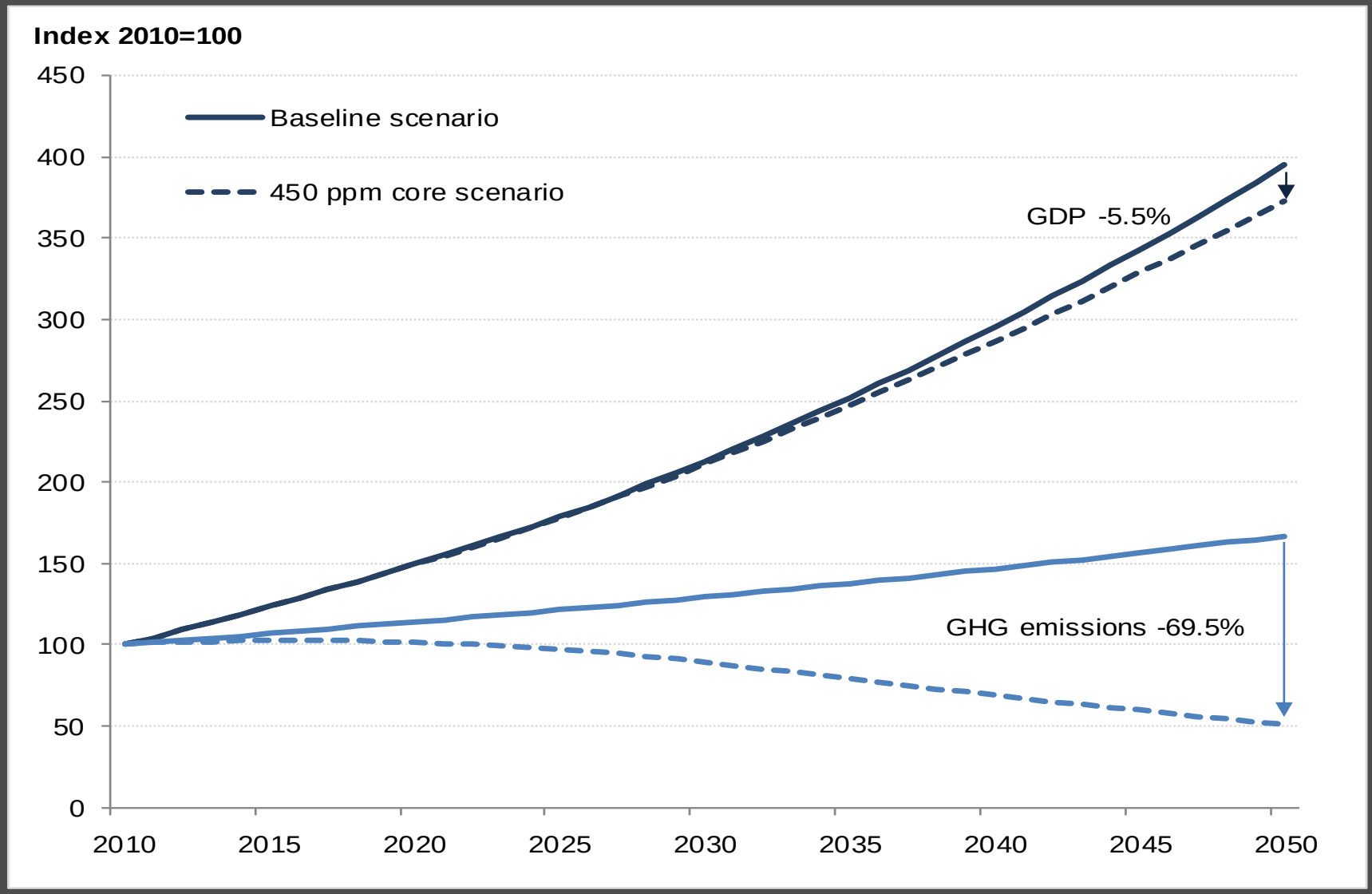
Some optimistic about pricing carbon

- A global carbon price could lower GHG emissions by nearly 70% in 2050 compared to the Baseline and limit GHG concentrations to 450 ppm. This would slow economic growth by 0.2 percentage points per year on average, costing roughly 5.5% of global GDP in 2050.
  - OECD (2011)

- This pales alongside the potential cost of inaction which "could equate to a permanent loss of over 14% in average world consumption per capita." (Stern 2006)

% cuts & costs for a 450 ppm scenario (OECD)

Figure 0.5. 450 ppm core scenario: global emissions and cost of mitigation



Source: OECD Environmental Outlook Baseline; output from ENV-Linkages.

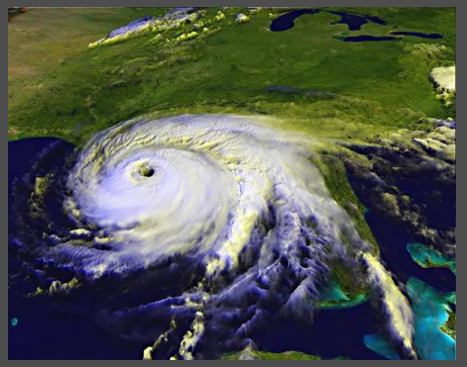
Are people aware of the time constraints?

IEA, World Energy Outlook 2011

- "…80% of the total CO2 emitted over the Outlook period in the 450 Scenario is already "locked-in" by our existing capital stock (e.g. power plants, buildings, factories), leaving little additional room for manoeuvre."

- To stay within the 2°C guardrail, all new infrastructure from 2017 would need to be zero-carbon.

So, to conclude on C price

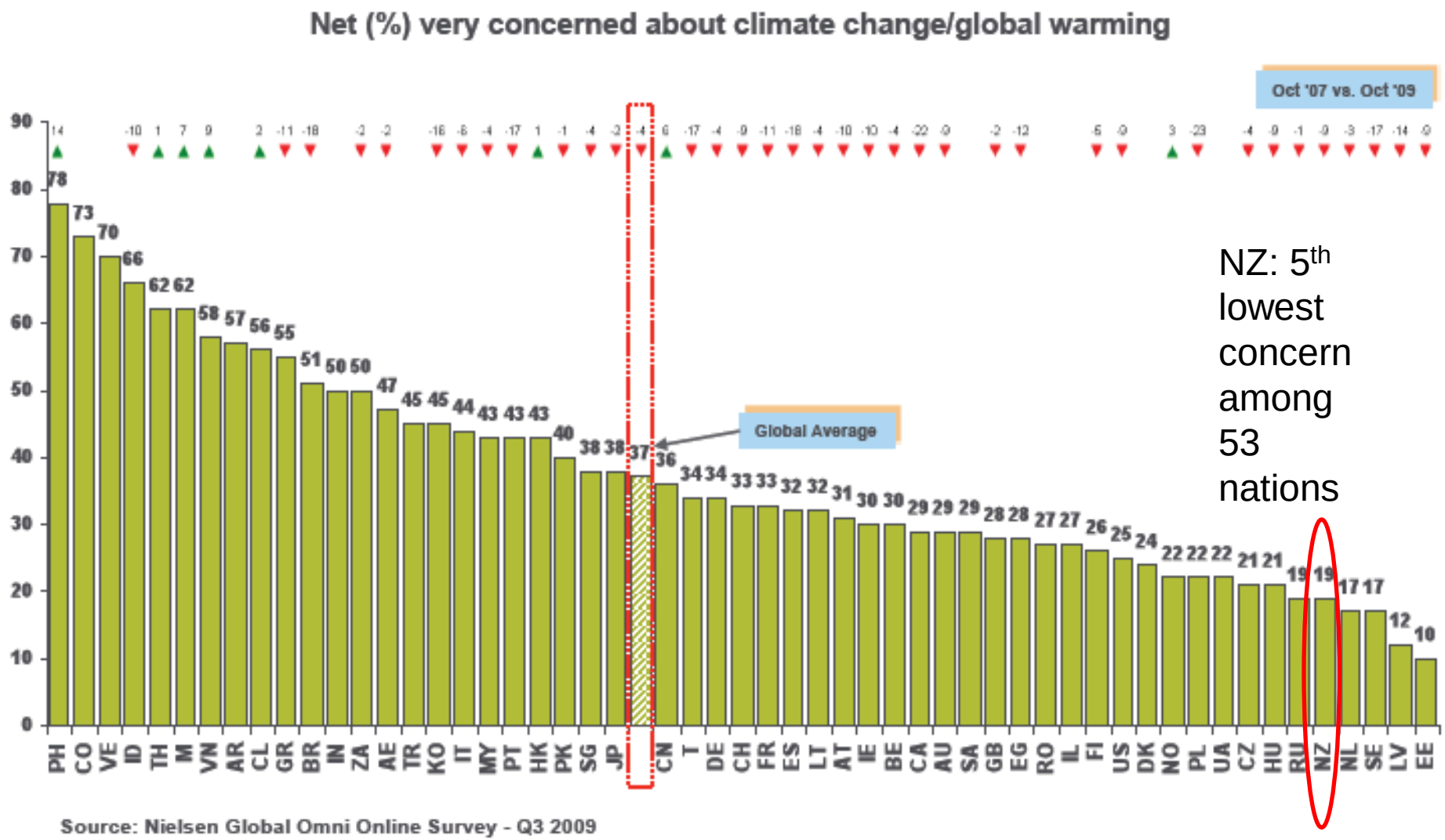


Source: NASA

- A carbon price helps, but at politically realistic levels, it will not drive decarbonisation fast enough – and time is fast running out
- A low price on carbon is not sufficient to deal with widespread market failures
- ‘Complementary measures’ are therefore critical
- These should focus on co-benefits

3 The NZ policy potential for accelerating the energy transition

NZ public is comparatively complacent about climate change…



NZ opinion – straws in the wind

- 2010 poll (n~600) limited to environmental issues
- Respondents identified climate change as the most important ‘global’ issue
- But less important for New Zealand than water pollution and water related issues (Hughey, Kerr, & Cullen, 2010).

Other opinion polls on CC - NZ

- Business Council for Sustainable Development commissioned polls over the 2007-2010 period

- 65-76% of New Zealanders believe climate change is a problem to be dealt with ‘now’ or ‘urgently’ (ShapeNZ, 2010).

Why? Interests in BAU GHGs widespread –not just fossil fuel sector

- Farming (CH_4 and N_20)
- Food industry (ditto, plus C-intensive distrib chains)
- Peri-urban land development
- Motor vehicle industry
- Road building industry – contractors…
- right across the modern economy…

Interests in extracting fossil fuels

- World can only afford to add ~565 Gt CO_2 to the atmosphere with a reasonable chance of staying 'safely' below the 2^0C guardrail
- There are already ~2,795 Gt CO_2 in the proven reserves of fossil-fuel companies & countries (e.g. Kuwait)
- i.e. **5x** as many reserves as are **safe** to burn

McKibben (Aug 12) Global warming's terrifying new math
Leaton (2011) Unburnable carbon

Action needs a strategic coalition

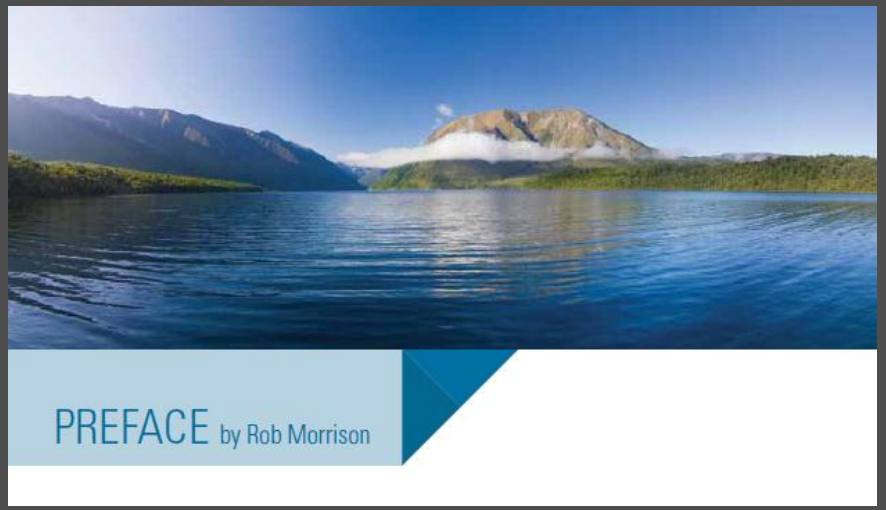
- Will need to emphasise health and other co-benefits of decarbonising the economy

- Coalition needs to encompass business, the research community, NGOs, ….

Building a strategic coalition

Pure Advantage (2012):

"…forward-looking governments and businesses are searching for ways to benefit from emerging climate change obligations. Rather than fight the changes, governments and industry leaders are getting ahead through innovation and investment in the cleantech sector."



- “Green growth strategies need to be designed on the basis of each country’s unique strengths and opportunities.

  Businesses and governments throughout the world are providing examples of how to successfully turn the new constraints listed above into opportunities.”

Which co-benefits appeal?

At present, key areas of co-benefit to emphasise are:

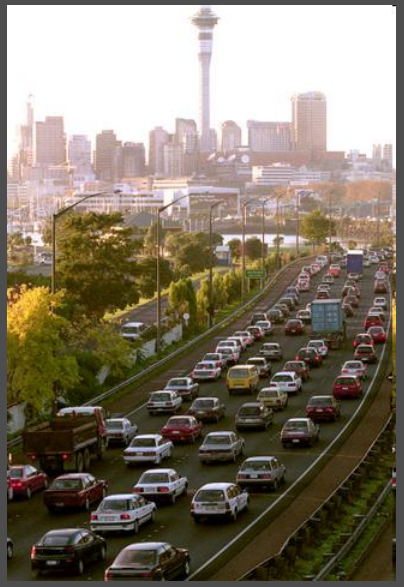
- health – because people relate strongly to health gains
- energy – because of fears about energy security and prices

Sustainable transport and renewable energy are critical policy areas offering large co-benefits

Co-benefits that appeal to NZers

Co-benefits of sustainable transport that appeal:

- cleaner air
- more attractive urban environments
- quieter and safer transport
- less congestion, if more use of public transport
- healthier physical activity levels as people combine walking with buses, light rail and even electric bikes
- less oil dependence



www.ecologic.org.nz/image/cache/Auckland_CBD_..

Co-benefits that appeal to NZers

Co-benefits of renewable energy that appeal:

- more stable energy costs
- local industry development & skilled jobs
- less dependence on foreign energy
- greater energy system diversity and stability
- reinforces New Zealand's clean green image
- convenient and efficient home heating, etc.

Being realistic about the transition path

- Important to be aware of how long energy transitions take

- “energy transitions… are inherently prolonged affairs whose duration is measured in decades or generations, not in years.” (Smil, 2011)

- Widespread PV grid parity could be as long as 20 yrs – but who knows?

Conclusion (1)

- We are rapidly running out of time on climate change: this decade is a one-off opportunity to avoid irreversible & very dangerous environmental impacts
- In NZ, there is considerable support, with minority resistance, to a range of actions needed in the transition to a green, low-carbon economy
- However, there is an awareness lag that needs attention
- NZ's low-carbon energy transition will need an 'all of the above' approach

Conclusion (2)

- So far, the understanding and awareness are too limited for govts to take rapid action
- Even a significant carbon price will need to be accompanied by a well-developed set of complementary policies across the economy and society
- The current economic track risks embedding an outdated extractive economic model
- We need a rapid transition to a green economy

Conclusion (3)

- Humans are not good at responding to threats that are distant in time and space
- Too many are currently ignoring early warning signs of climate instability
- Need to think in terms of the “Time of Useful Consciousness”.
- I suggest we act very smartly, in both senses of the word.

We need to act to avert this.

Thank you.