‘Maybe we underestimated this one’:

Climate change: rethinking and resistance

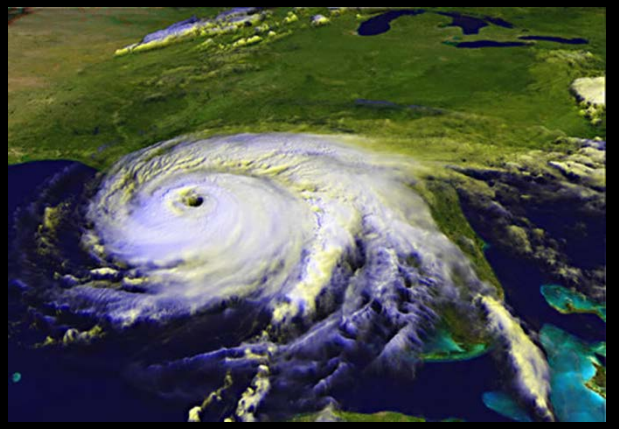
Seminar at University of Otago

Dunedin, 5 Sep 2014

Ralph Chapman, Environmental Studies, VUW

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

new zealand centre for
Sustainable Cities
te pokapū rōnaki tāone-nui



Source: NASA-GSFC

Outline

1 How have we underestimated?

2 International political recalibration?

3 Recognition and resistance in the policy world

4 In NZ, is a low-carbon economy taking hold?

1 How have we underestimated?

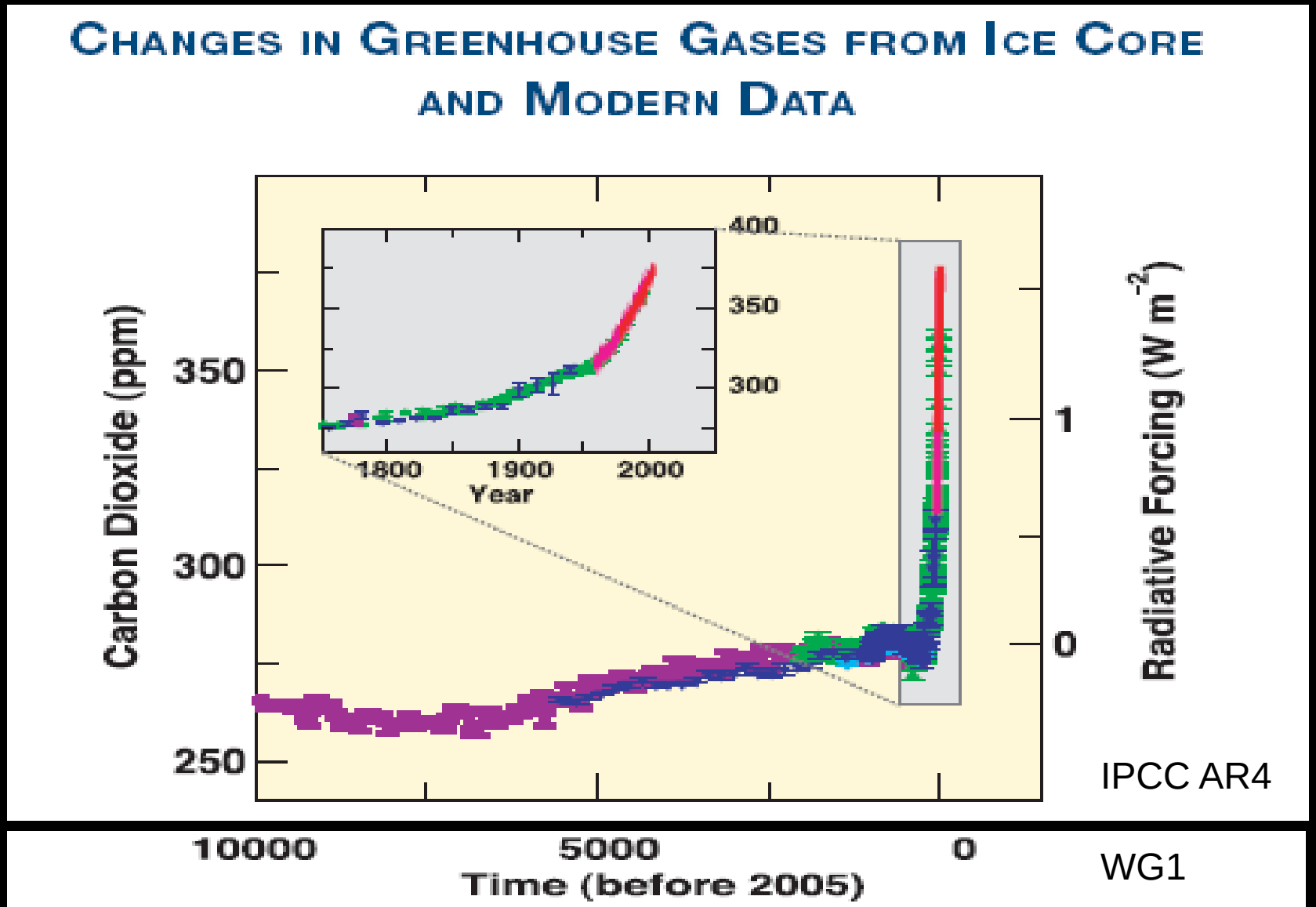
Is climate change significant?

‘[V]iewed from the perspective of geological time, human induced climate change, known more familiarly as “global warming,” is a catastrophe equal to nearly any other in our planet’s history’ –

Prof Ray Pierrehumbert, 2006

Louis Block Professor in Geophysical Sciences
Ph.D., MIT, 1980
Chevalier de l'Ordre des Palmes Academiques
Fellow, American Geophysical Union
John Simon Guggenheim Fellow

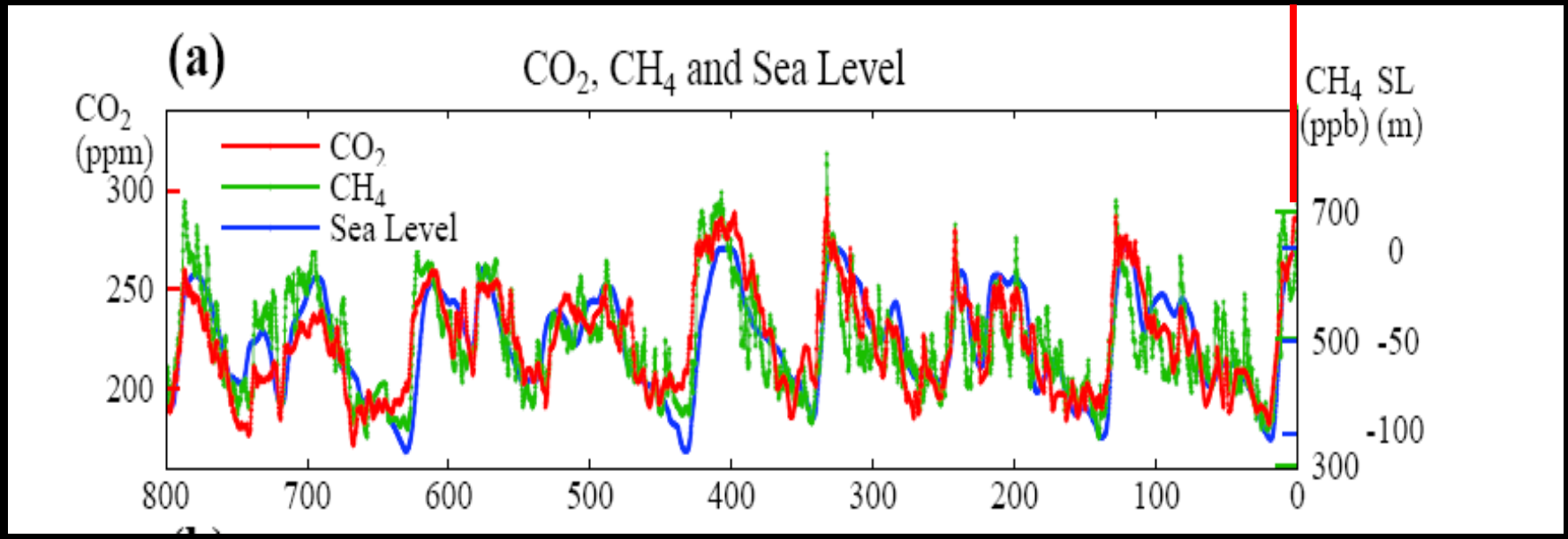
The 10,000y history: concentrations



The 800-ky carbon trend …

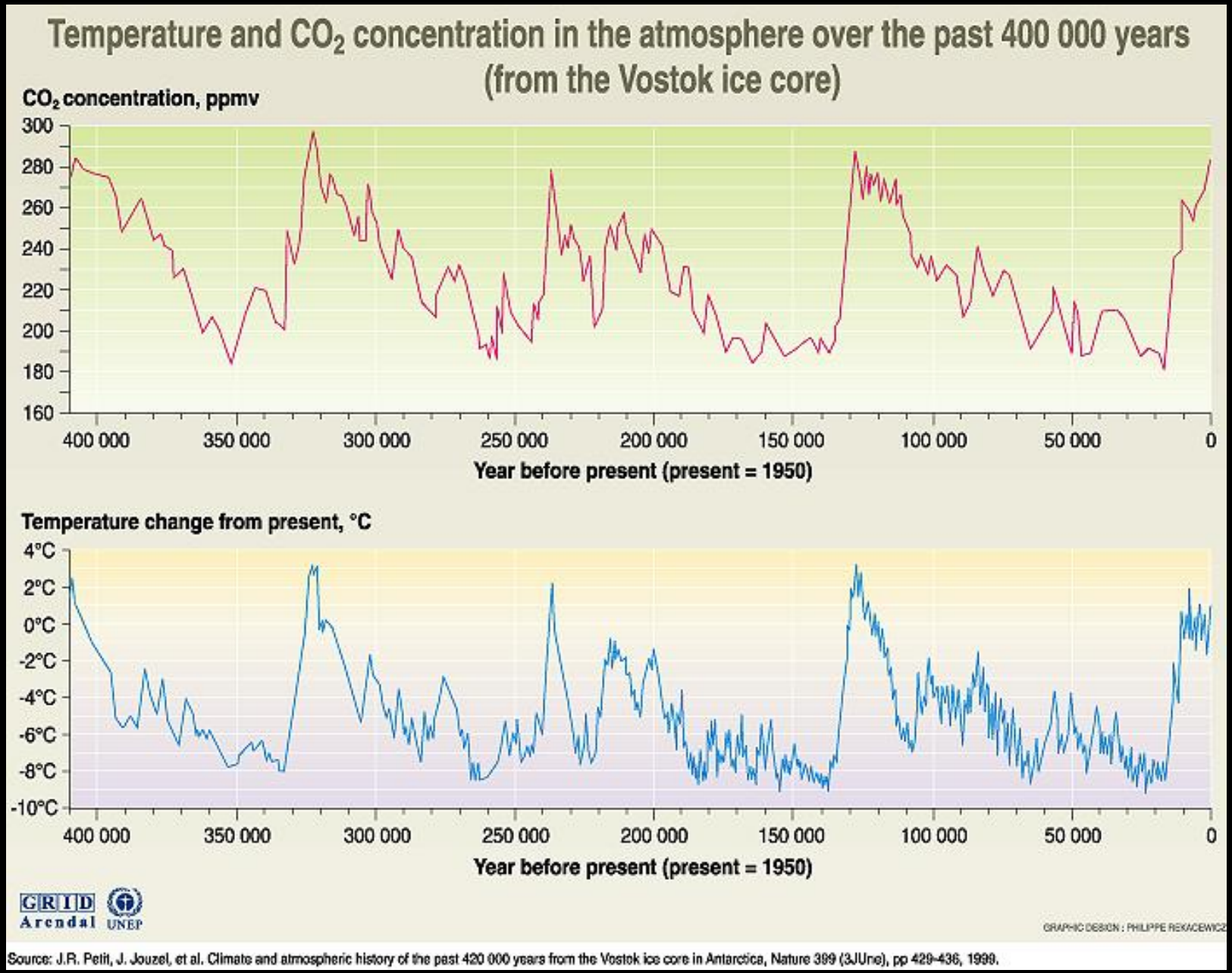
an unprecedented experiment with the atmosphere

Now 400



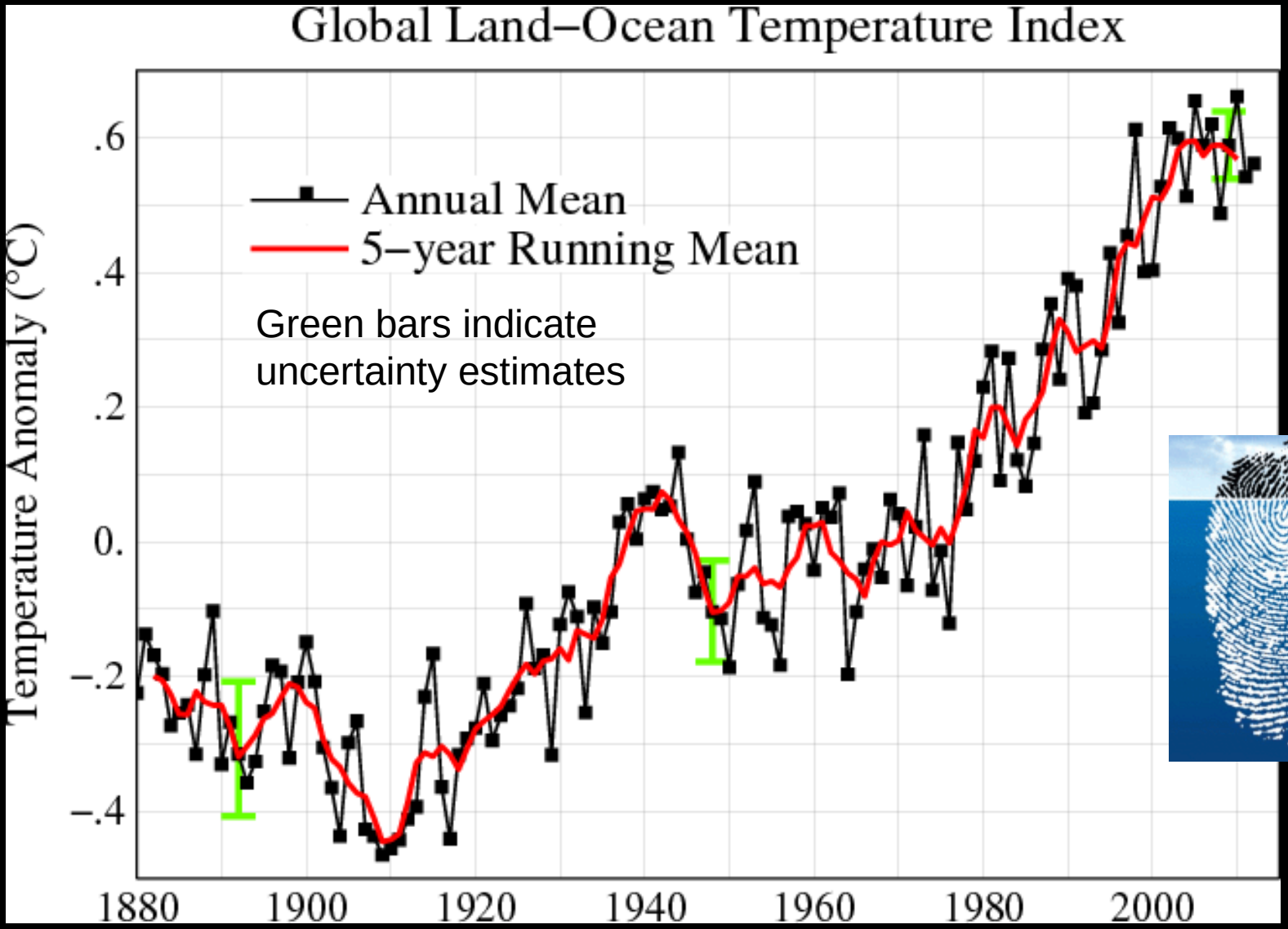
Source: Hansen et al (08)

"…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



http://www.grida.no/publications/vg/climate/page/3057.aspx

Is temperature rise slowing?



Source: The Long Thaw

Source: Sato, Columbia University/ GISS: http://data.giss.nasa.gov/gistemp/graphs_v3/

Levelling?

Here is why burning of fossil fuels and temp rise won't level off soon

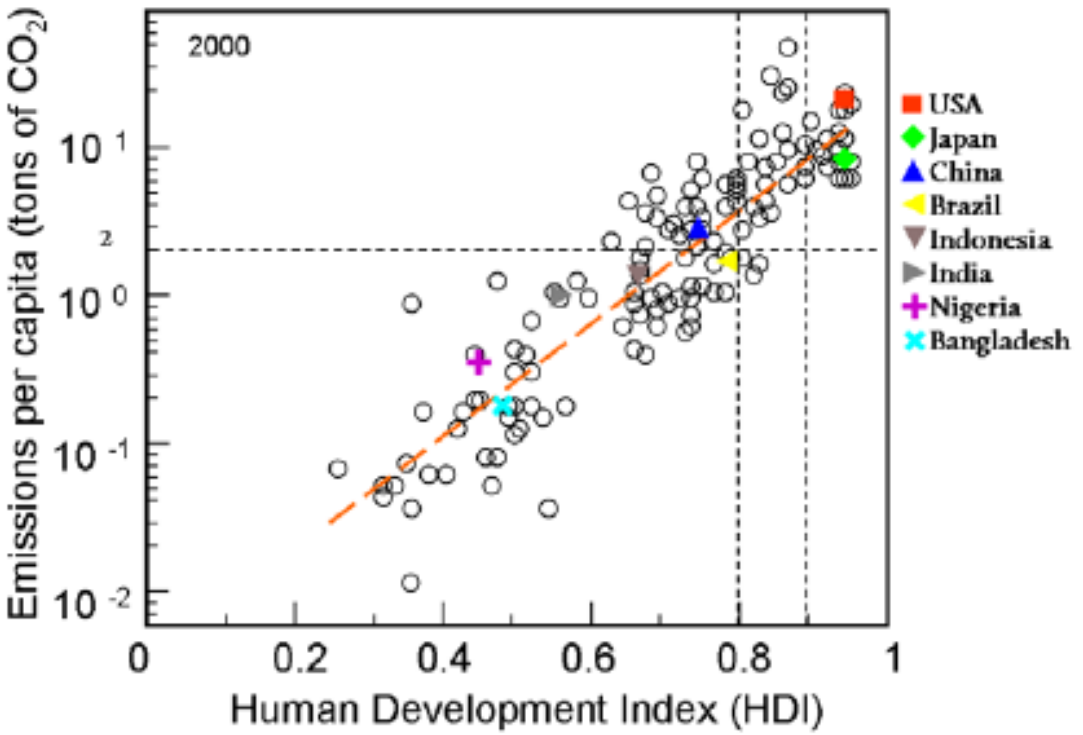
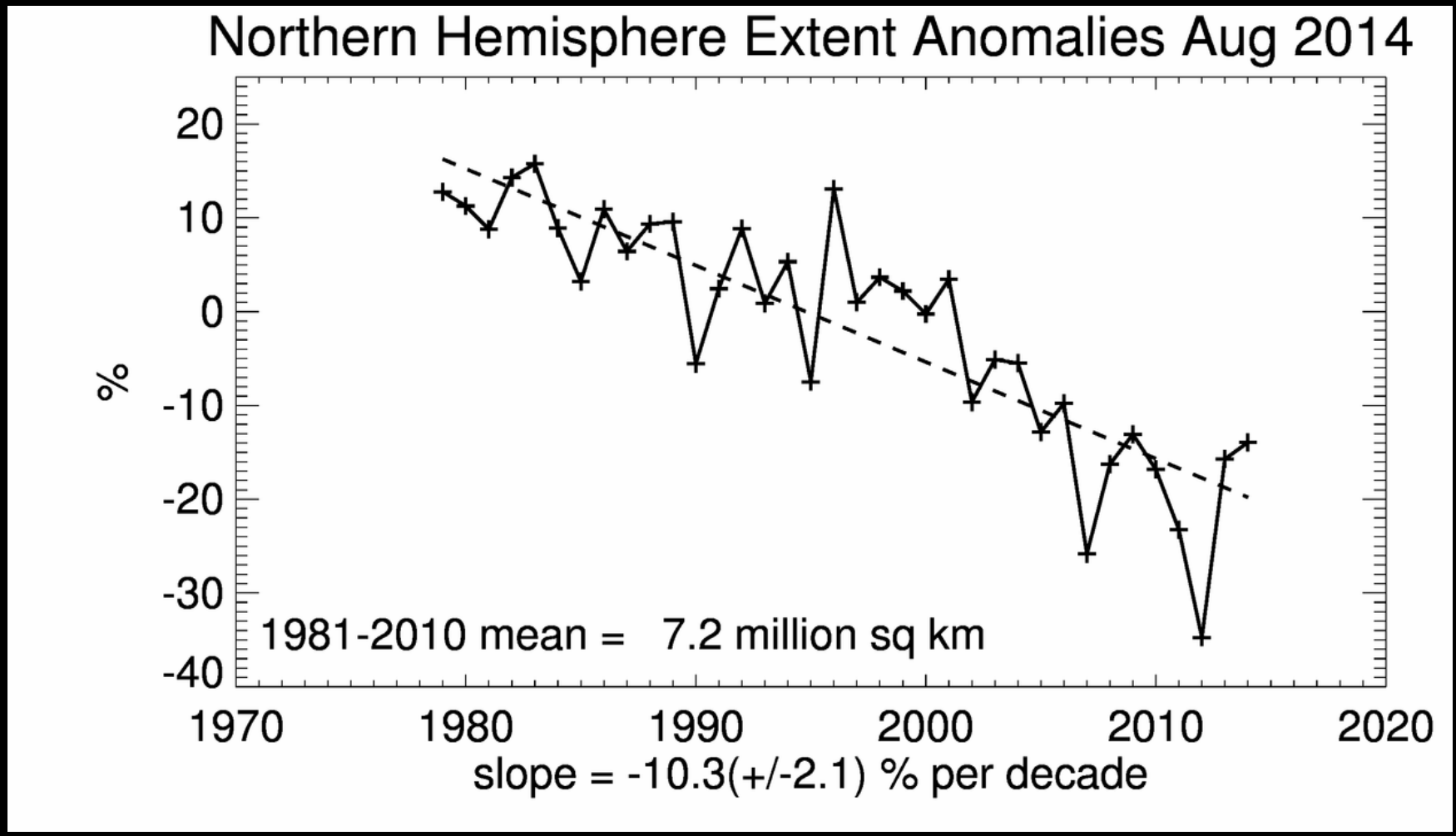


Figure 1. Correlations between HDI and CO_2 per capita emissions in the year 2000. The dashed line represents a least squares fit through all values. The coefficient of determination is $R^2 \simeq 0.81$ and the correlation coefficient is $\rho \simeq 0.90$. For some countries the values are shown explicitly. Vertical lines represent the HDI values of 0.8 and 0.9 representative of high and very high development standards respectively as expressed in the United Nations Development Report 2009 [34]. The horizontal line shows the 2 tons per capita CO_2 emissions target to limit global warming at 2°C by 2050 [7].
doi:10.1371/journal.pone.0029262.g001

Costa et al 2011

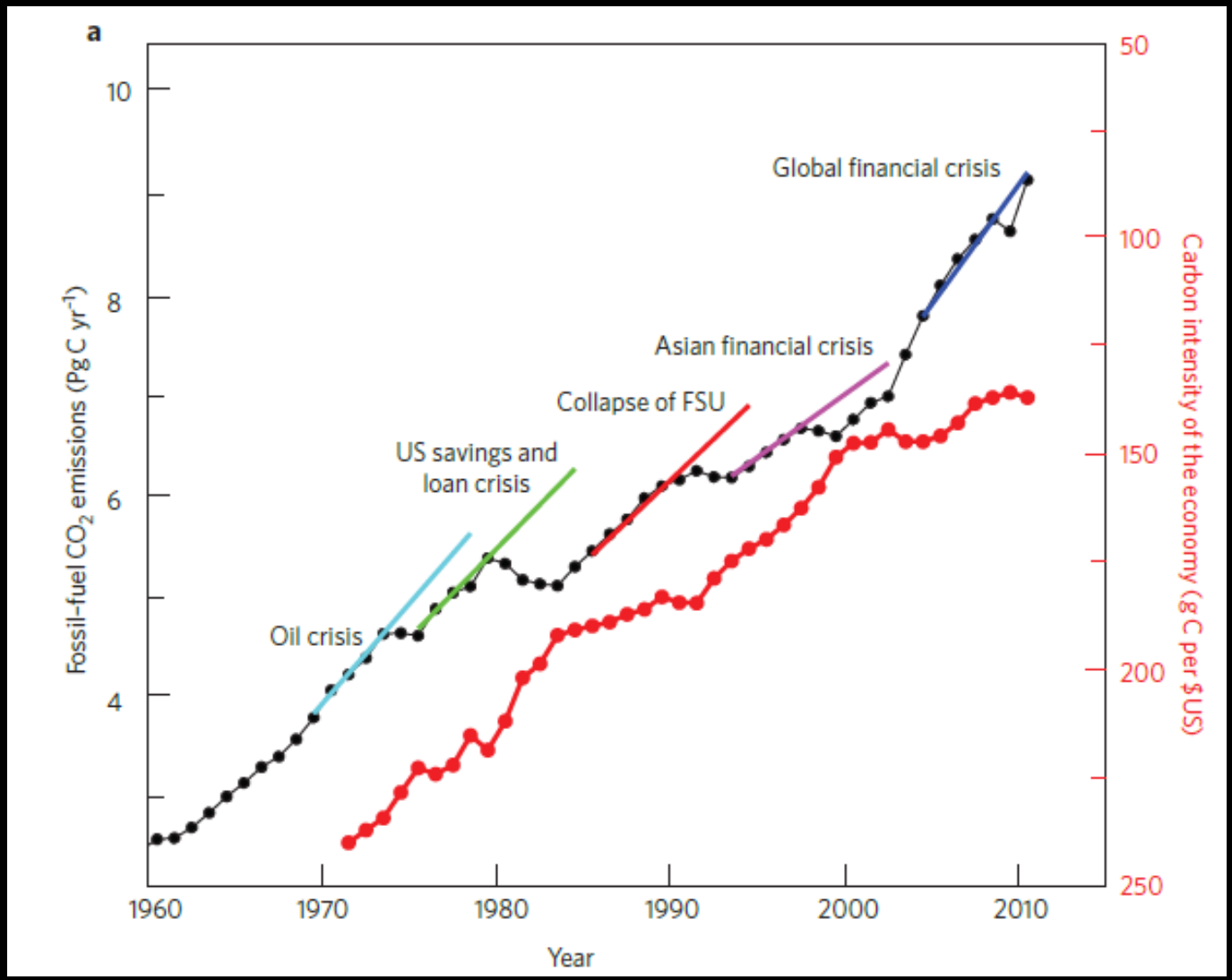
Downward drift in Arctic sea ice:

clear trend, year to year variation…



Credit: U.S. National Snow and Ice Data Center, August 2014

Are we turning it around globally?



We under-estimated: the GFC barely dented the trend – it had essentially recovered by 2010 (e.g. CO_2 emissions grew by 5.9% in 2010)

For GHG history: http://youtu.be/SAhZ1fA1AJs

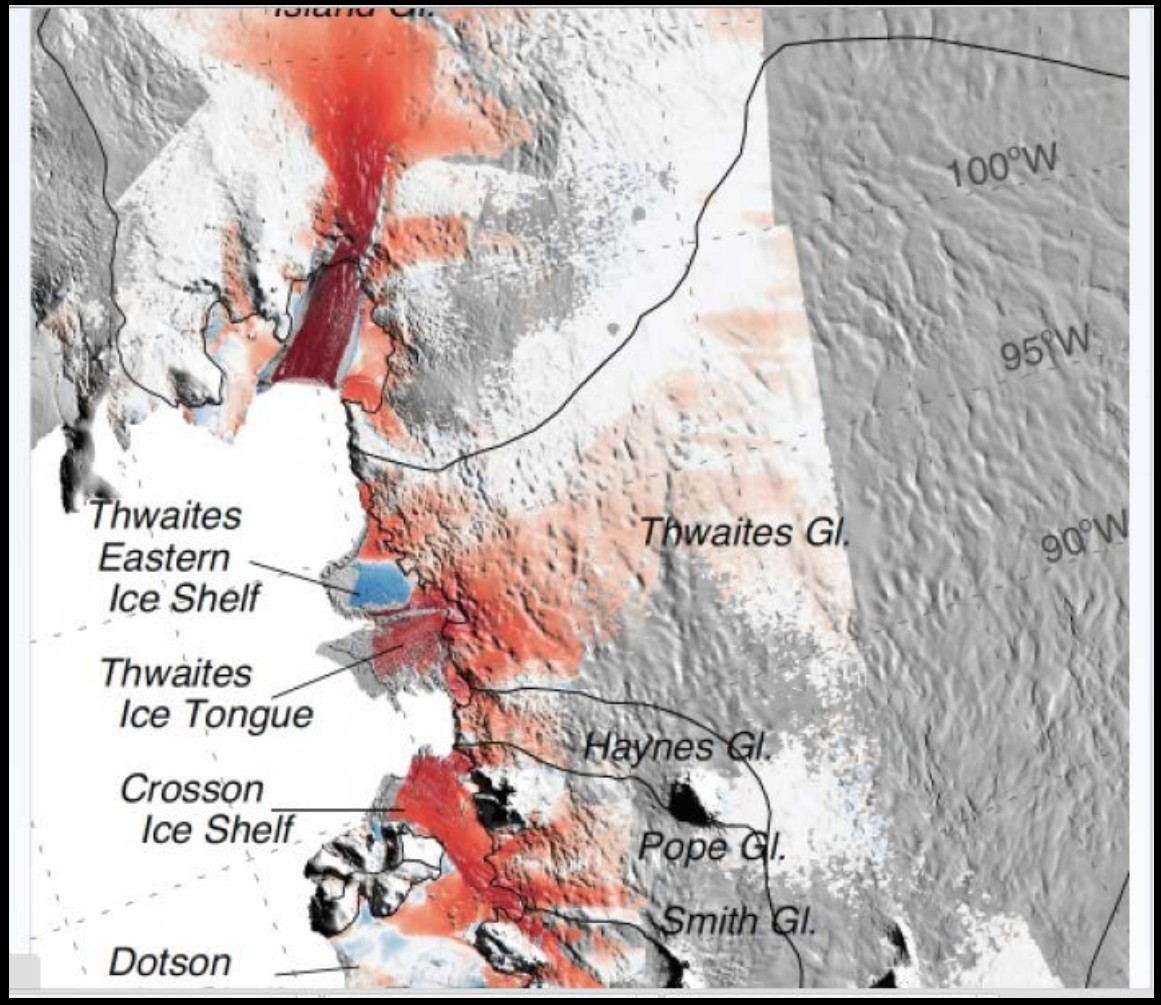
Peters et al 2012 Rapid growth in CO2 emissions after the 2008-09 GFC

Concerns about the Greenland Ice Sheet

- Robinson et al, 2012 estimate:
  warming of 1.6°C is all that's needed to melt Greenland's ice sheet over time
- 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

And the West Antarctic Ice Sheet… we underestimated its response

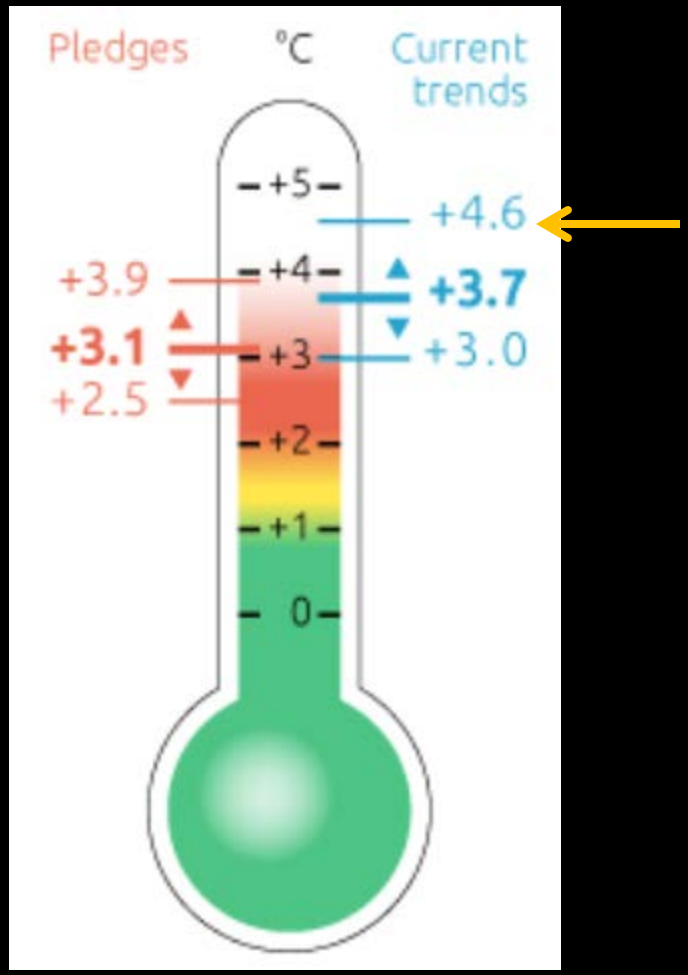


Researchers at NASA and UC Irvine:
a rapidly melting section of the WAIS
…in an irreversible state of decline…
…multiple lines of evidence,…40 years of observations …
the glaciers in the Amundsen Sea sector "have passed the point of no return" -- glaciologist and lead author Eric Rignot

What warming are we committed to?

Climate Analytics, Ecofys, Potsdam Inst.

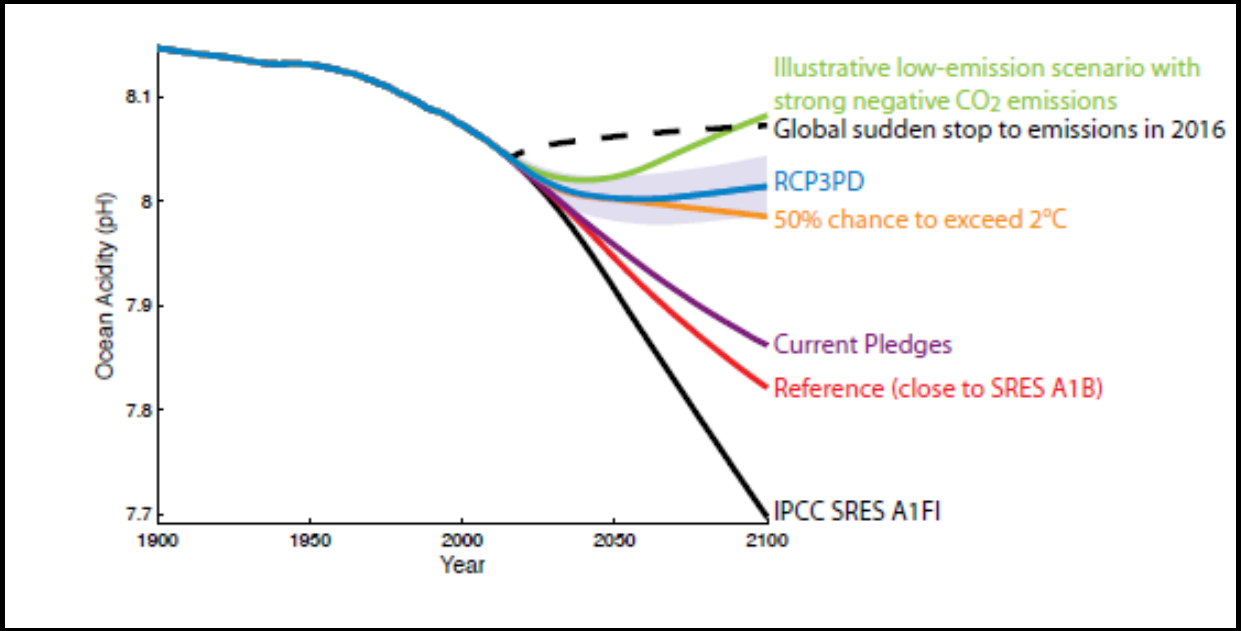
- As of Nov 2013, estimate that the world may well be headed for ~3.7°C by 2100, with a 1/3 risk of over 4C
- Future warming mainly depends on implementing pledges to cut emissions fast
- Durban agreements → main action after 2020: too late to reach 2 C except at huge cost, unless v lucky with ‘sensitivity’



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."

Oceanic changes (2)

Gruber (2011)

- E.g. “A large commitment exists for the ocean interior with regard to ocean acidification, as it takes decades to centuries for the atmospheric CO_2 perturbation to be transported to depth, so that ocean acidification will be ongoing at depth for centuries to come.”

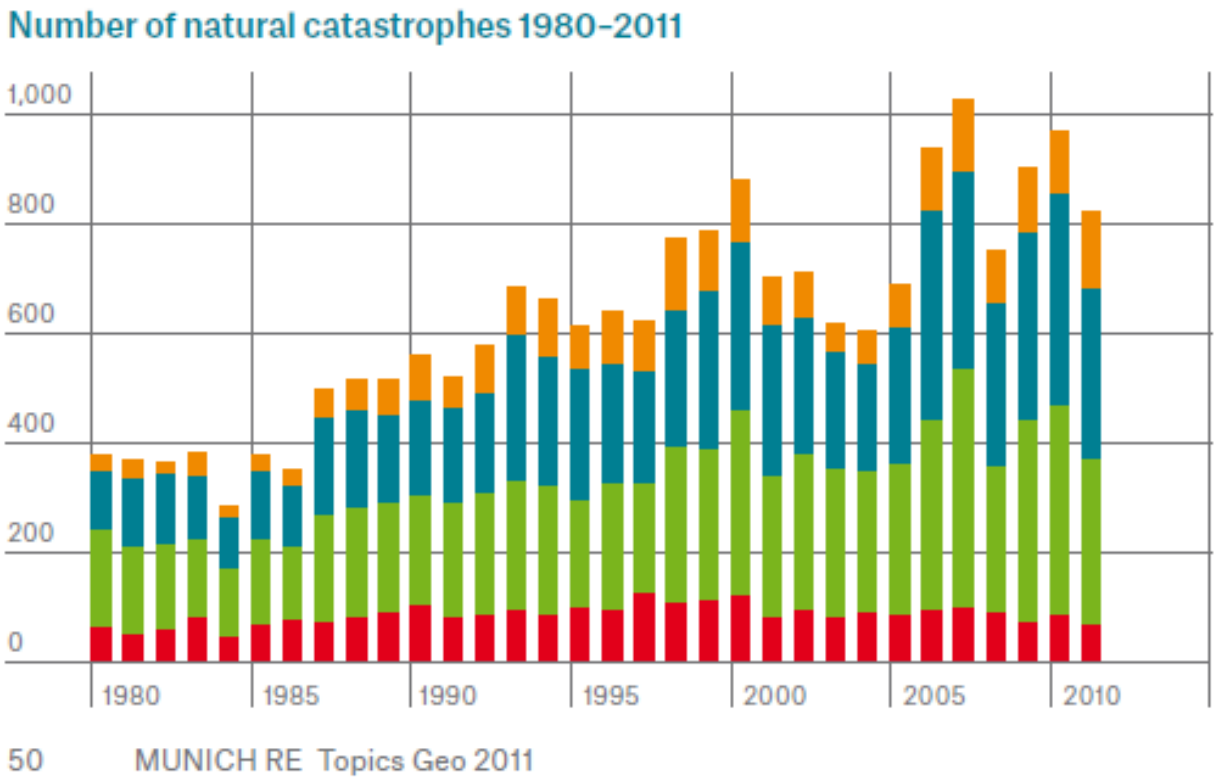
- “what is really missing is the joint perspective, where the full and synergistic effect of all three stressors acting at the same time is investigated”

Recent examples - flood impacts

Thailand Oct 2011

Catastrophic event numbers:

a worsening trend…



Munich RE 2012

2 International political recalibration: a mixed picture

Positive signs:

- Obama's 'Clean Power Plan'
- California's ETS and BC's carbon tax
- China – emissions trading in 7 provinces; etc.

Some effects of Superstorm Sandy – NYC 2012

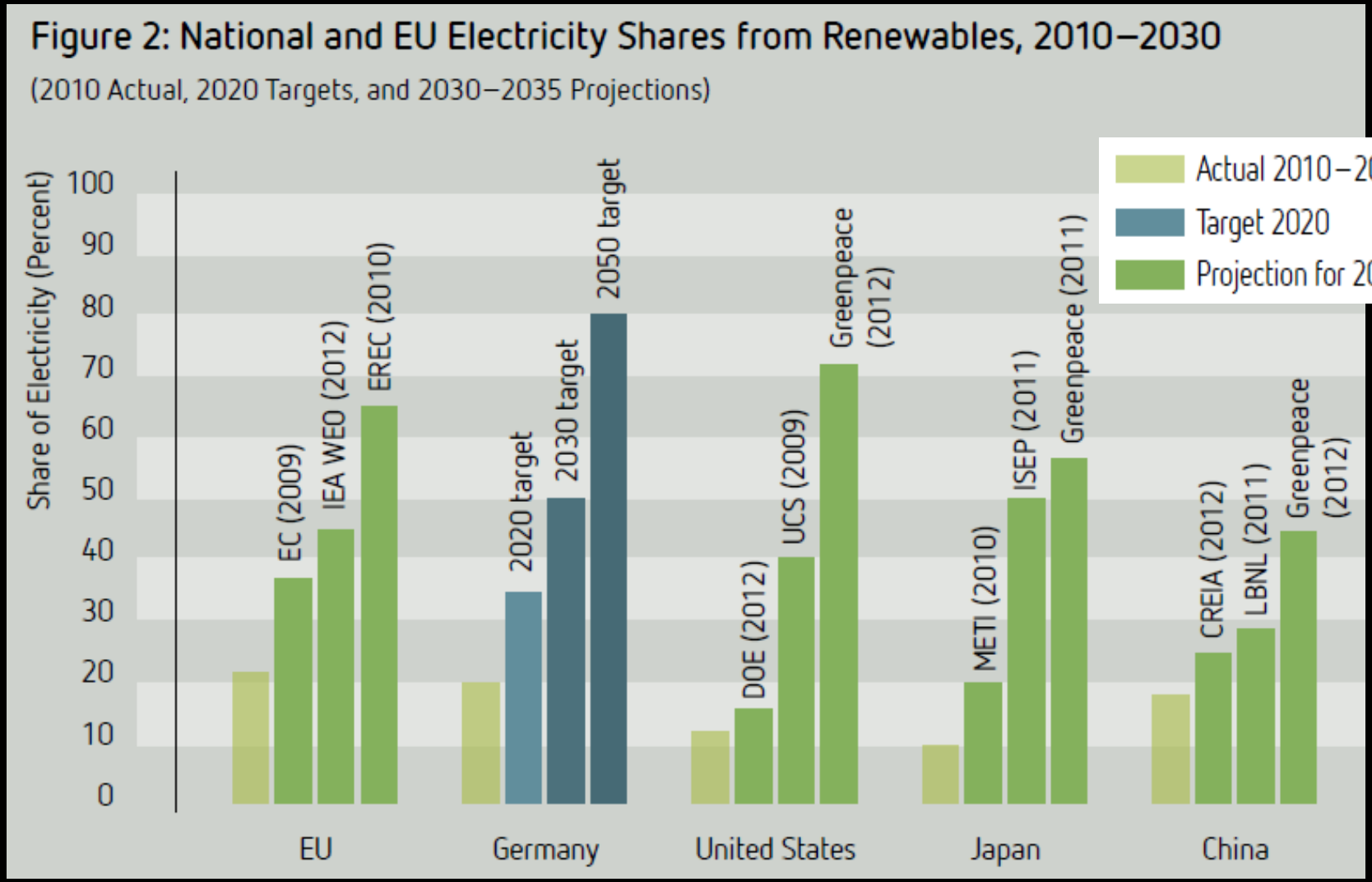
Good news on renewables

1. From 2012, over half of the new electricity generation coming on stream globally is now renewables
   - Climate Analytics, PIK, Ecofys, 2014

2. The history of energy scenarios is full of …projections for renewable energy that proved too low by a factor of 10, or were achieved a decade earlier than expected.
   - Martinot, Global Energy Futures, 2013

3. Renewables are already competitive with fossil energy in most places if “costs” are defined and counted properly, at both technology and system levels

Renewable power projections



Martinot, 2013, p.19

But two simple questions about the energy system

1. What % of global energy consumed comes from fossil fuels?
- A: 80%

2. Has this % been rising or falling recently, according to the IEA?
- A: Rising since the mid-90s

- "…a transformation will be required in the relationship between economic development, energy consumption and greenhouse-gas emissions."

Source: IEA 2013 Redrawing the Energy-Climate Map

What is needed to hit ~2C

1. In the US, the ‘Clean Power Plan’ will give a 30% cut (from 2005 levels) in emissions from power plants. But this is still insufficient to meet the US’s pledges of 17% cuts of GHGs by 2020 and is too little to meet the long-term target of 83% below 2005 level by 2050

2. Energy and industry need to stop recarbonising and fully decarbonise by ~2050

Source: Climate Analytics, PIK, Ecofys, 2014

What is needed to hit ~2C

3. Based on AR5, Annex 1 (rich countries) should be cutting ~35-55% below 1990 levels by 2030 for an equity scenario based on relative capability to mitigate

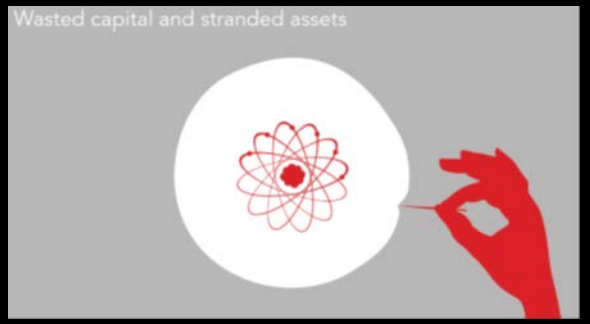
4. Non-Annex I, or developing countries, would need to maintain their emissions no higher than present levels

5. Carbon intensity needs to rapidly decrease, reaching 3% annual reductions by 2030

Climate Analytics et al. 2014

The problem of lock-in

- The world keeps building plant and equipment and motorways that are carbon-intensive
- It has a long life-time, and owners don't want it stranded
- A similar stranding problem with unburnable carbon – why find high-cost fuels if we cannot burn them and stay within 2C



- 'Unburnable carbon' work by Climate Tracker is now used by HSBC, Citigroup, and rating agency S&P in relation to valuing public coys

Increased awareness

- ‘The signs of climate change are all around us.’
- ‘Because of this market failure, public policies are needed to reduce CO2 emissions.’
- ‘Net mitigation costs increase, on average, by approximately 40 % for each decade of delay’

The White House, July 2014

A new analysis by Dietz & Stern (2014)

- Nordhaus assumed an unrealistically flat damage function (global output losses of 2.8% for a global temp increase of 3.4 °C above 1900 levels)

- Dietz and Stern (2014) believe models should account for:
  - stronger effects of climate change on economic growth/productivity
  - a more realistic damage function
  - A stochastic modelling of climate sensitivity
- "…[Nordhaus's] model dynamics were unsatisfactory."

What carbon prices should be
Dietz and Stern 2014

- At least US $32-103 (2012 prices) by 2015

  i.e. up to ~NZ $128 (2015 prices) next year!

…and then doubling within 2 decades

- To keep global warming to within 1.5-2C
- A lower rate of discounting would raise the carbon price by a bit more

Climate change risk:

Lord Stern, the archetypal policy adviser

- 'I got it wrong on climate change – it's far, far worse…'
- Stern believes we are "on track for something like 4 [C of average warming]".

- 'This is potentially so dangerous that we have to act strongly. Do we want to play Russian roulette with two bullets or one? These risks for many people are existential.

Stewart, H., & Eliot, L. (2013). Nicholas Stern: 'I got it wrong on climate change – it's far, far worse'. *Guardian.co.uk*. Retrieved from http://www.guardian.co.uk/environment/2013/jan/27/nicholas-stern-climate-change-davos

Are Americans making a climate ‘swerve’?

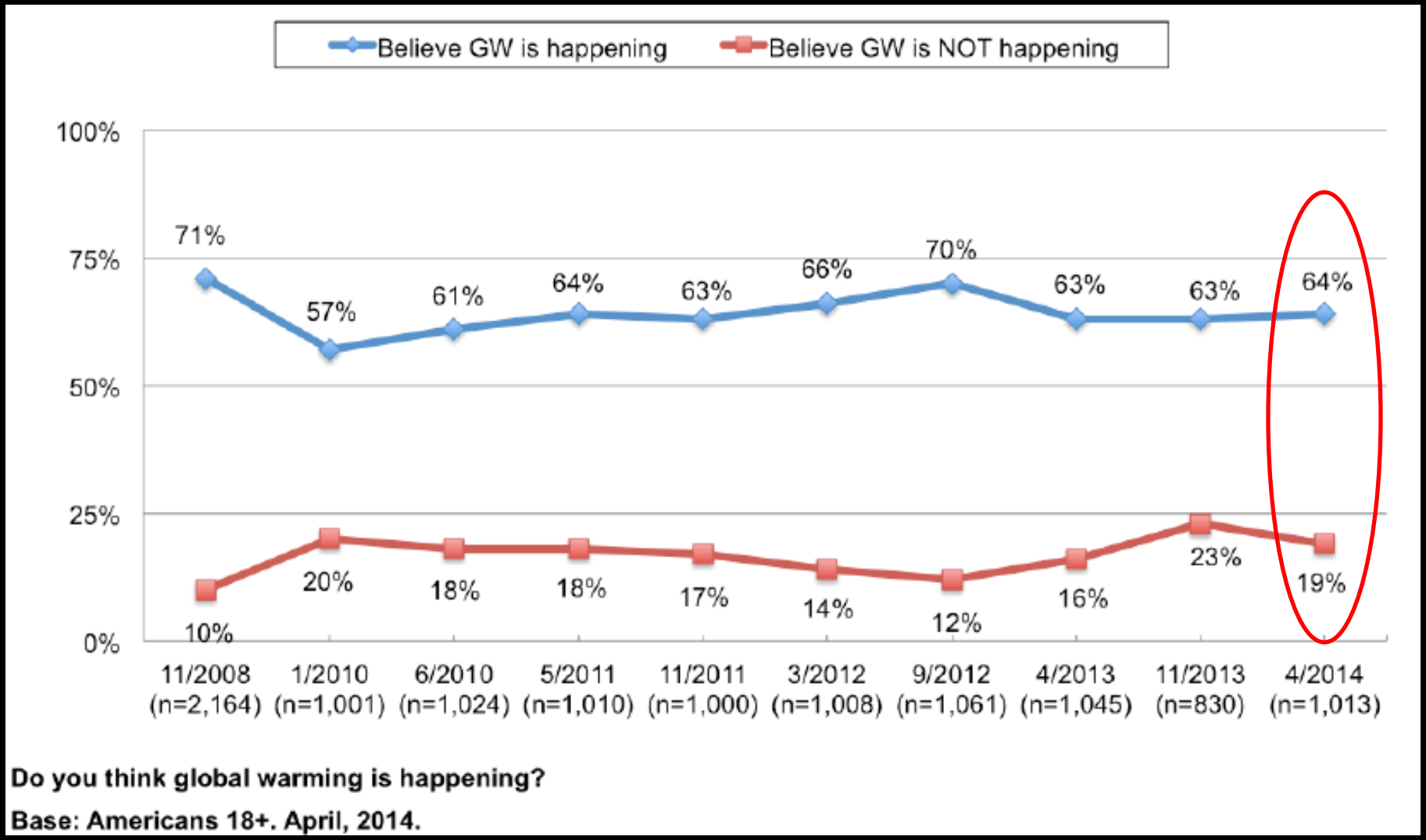
- Idea from Lifton 2014
- Faster drumbeat of climate disasters in the US media
- Clearer experiential models of impacts of CC
- Growing recognition we are all affected
- More ‘formed awareness’? – more structured, part of a wider narrative on which to base action

Fire impacts

guardian.co.uk, 4 June 2013

- ‘America's wildfire season lasts two months longer than it did 40 years ago and burns up twice as much land as it did in those earlier days because of the hotter, drier conditions produced by climate change, the country's forest service chief told Congress’… S. Goldenberg, Guardian environmental correspondent http://www.guardian.co.uk/world/2013/jun/04/climate-change-america-wildfire-season?CMP=twt_gu

Has the US passed peak denial?

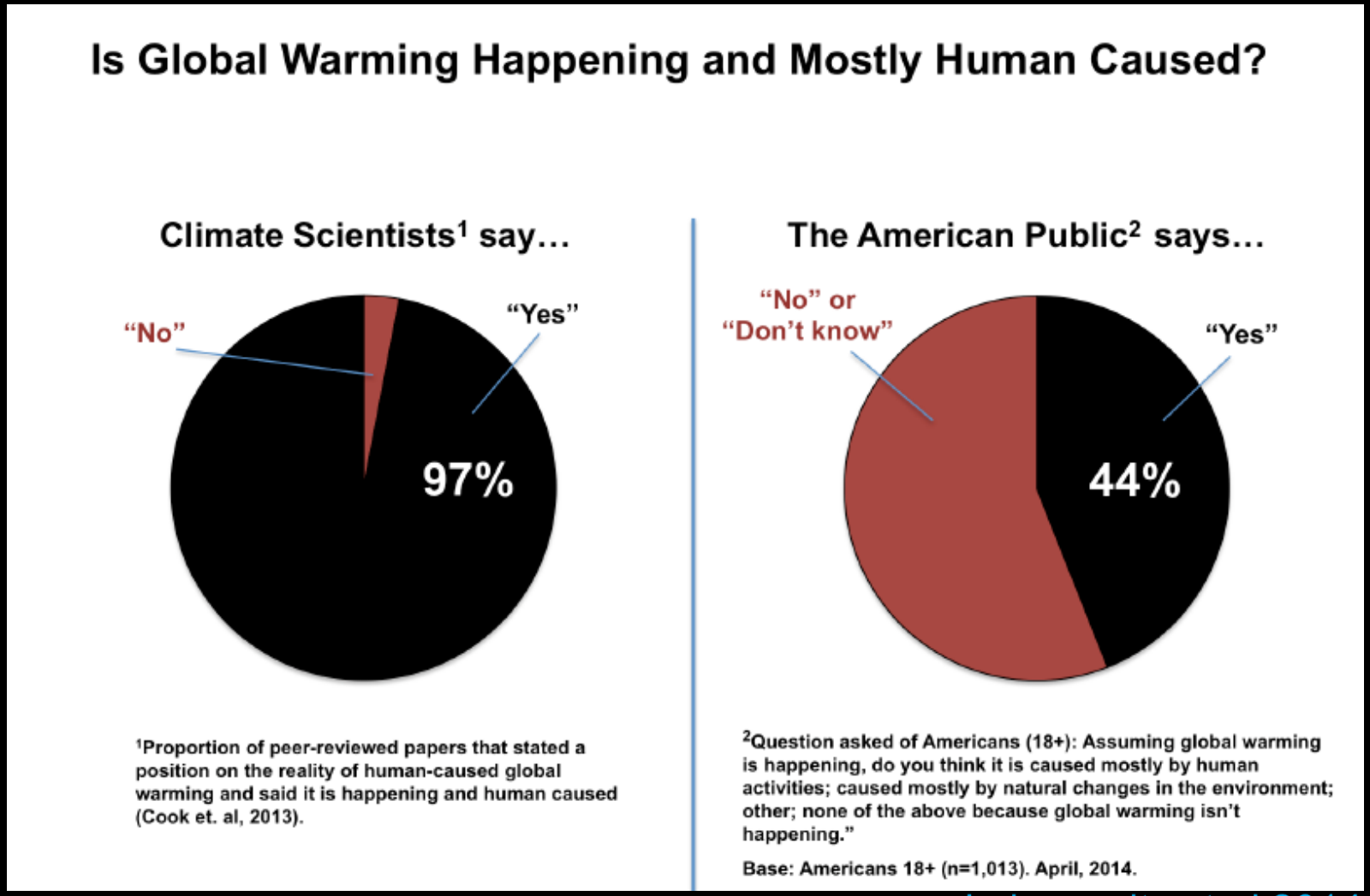


Do you think global warming is happening?

Base: Americans 18+. April, 2014.

Leiserowitz et al 2014

Americans remain well behind the scientists



Leiserowitz et al 2014

High-level awareness Robert Rubin

‘We do not face a choice between protecting our environment or protecting our economy. We face a choice between protecting our economy by protecting our environment — or allowing environmental havoc to create economic havoc.’

- Robert Rubin, ‘How ignoring climate change could sink the U.S. economy’. Rubin is co-Chair of the US Council on Foreign Relations, and was US Tsy Secy 1995-99

3 Recognition and resistance in the policy world:

some big organisations slow to respond

Some positives, e.g. the World Bank, not the most radical organisation:

‘The World Bank Group is concerned that without bold action now, the warming planet threatens to put prosperity out of reach of millions and roll back decades of development.’

THE WORLD BANK
IBRD • IDA

World Bank

Immediate action!

- '…a 4°C warmer world can and must be avoided. Immediate global action is needed to slow the growth in greenhouse gas emissions this decade and help countries prepare for a 2°C warmer world and adapt to changes that are already locked in.'

- At the Bank, we are stepping up our mitigation, adaptation, and disaster risk management work, and will increasingly look at all our business through a climate lens.'- May 2014

- http://einstitute.worldbank.org/ei/warmerworld/welcome.htm

But what about transport in cities – where > ½ the world lives?

- Transport sector consumes 20% of global energy (around 40% of which is used in urban transport)
- The usual focus appears to be on fuels and vehicle efficiency. The neglected cousins seem to be mode switching and particularly urban form
- Hence a recent research project, entitled: Is the urban transportation environment 'missing in action'? How policy options to benefit health and climate are viewed

Btw, Why does health matter?

- Co-benefits: apart from carbon emissions, the urban environment exerts a major influence on physical activity levels, air and water quality, injuries and noise, and hence people's health and well-being

- An indication of health effects of physical inactivity: around 3.2 million deaths / yr

Example 1: views of International Transport Forum

- Influential offshoot of the OECD... replaced the ECMT (Europ Conf of Ministers of Transport)
- I reviewed several typical ITF docs, e.g. ‘Transport Outlook’ (2012), ‘The Cost and Efficiency of Reducing Transport GHG Emissions’ (2009), and ‘Cost effectiveness of CO2 mitigation in transport’ (2006)
- Found patchy coverage of climate change mitigation and nothing on integrating CC and health in policy for the urban transport environment

Typical ITF document: no mention of mode switching or urban form policy options

Example: views of the IEA

- Limited recognition of urban environment and linked health and mitigation issues
- e.g. ‘Tracking clean energy progress 2013’ ‘World Energy Outlook 2012’, and ‘A Tale of Renewed Cities’ 2013
- Some mention of urban form – but little consideration of their co-benefits
- Main focus is on vehicle and fuel efficiency

Conclusions: review of docs on climate mitigation and health (1)

1. **T**he urban transportation environment not a major focus for the organisations reviewed, even WHO

2. Most orgs reviewed do not treat the evidence in a serious or systematic way. Lit reviews are often patchy

3. Various biases are at work in how some agencies see and use the evidence, e.g. the IEA emphasises fuel economy and technology change rather than behavioural and governance changes that can alter how cities work

Conclusions: review of docs on climate mitigation and health (2)

4. Even the OECD and the World Bank, which can be quite sophisticated in their reports on the evidence, have blind spots. For example, they do not appear to assess options in terms of relative costs and benefits, or commission research seeking such evidence

5. In short, these institutions could do better: they are exhibiting intellectual resistance

Conclusions: review of docs on climate mitigation and health (3)

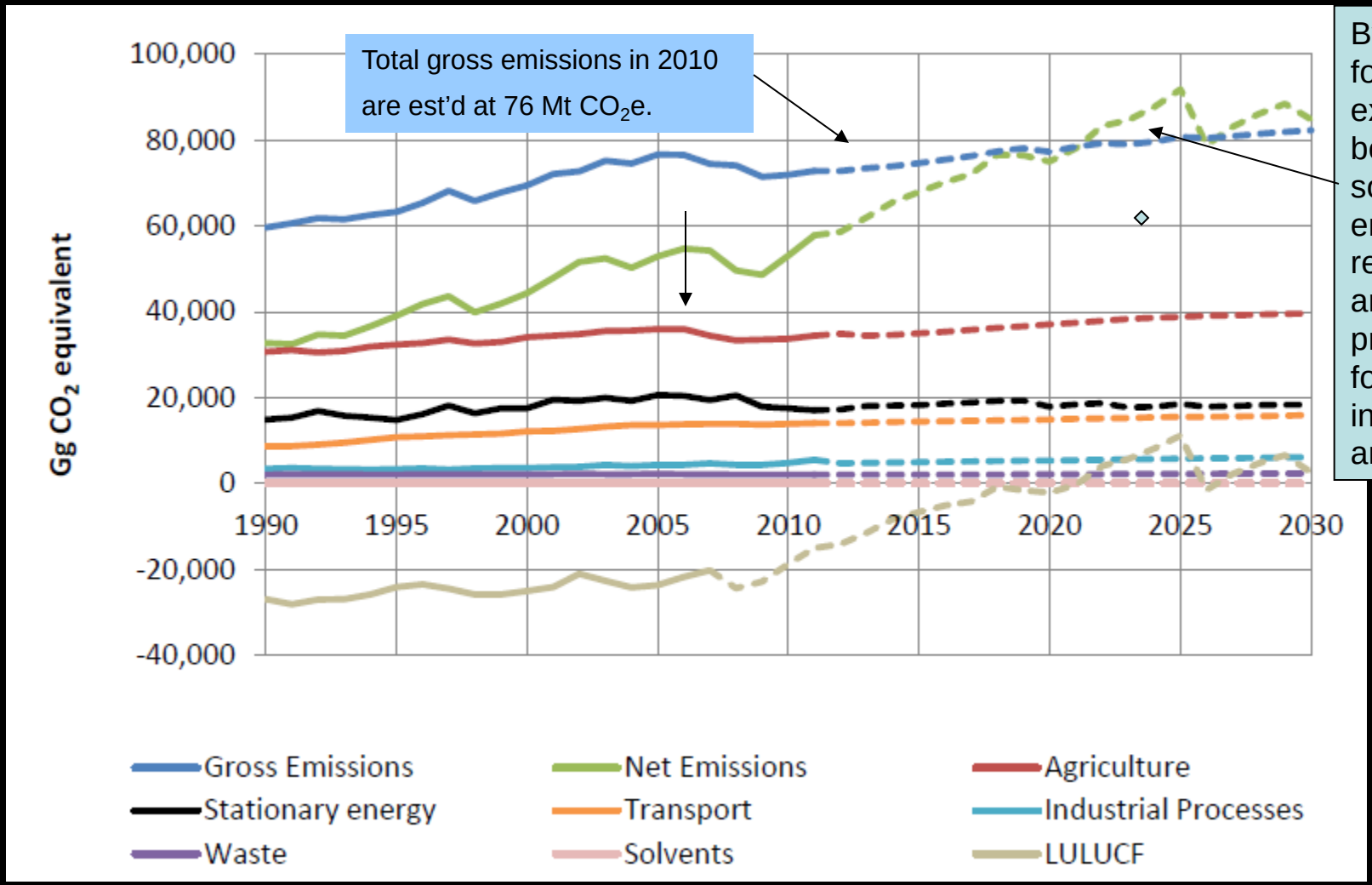
- This area matters: good policy can reap big dividends

- There is a window while countries such as China are urbanising rapidly, to avoid locking such cities into patterns of travel behaviour that are wasteful and aggravate the growth in carbon emissions, as well as being bad for health

NZ Herald

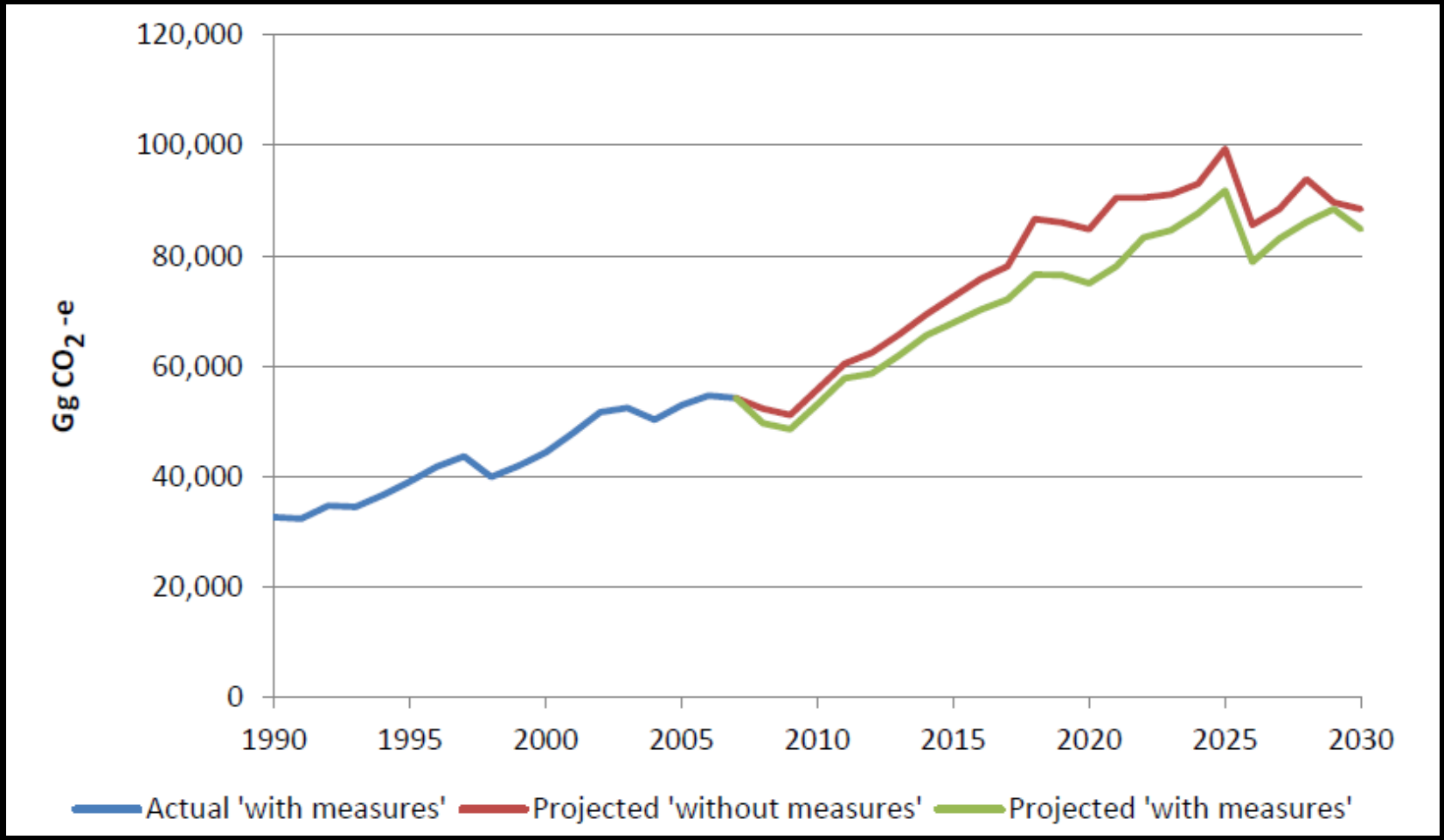
4 In NZ, is a low-carbon, green economy vision taking hold?

NZ's *gross* emissions have been rising for most of the period since 1990; now ~stable



Source: MfE: **New Zealand's 6th National Communication**

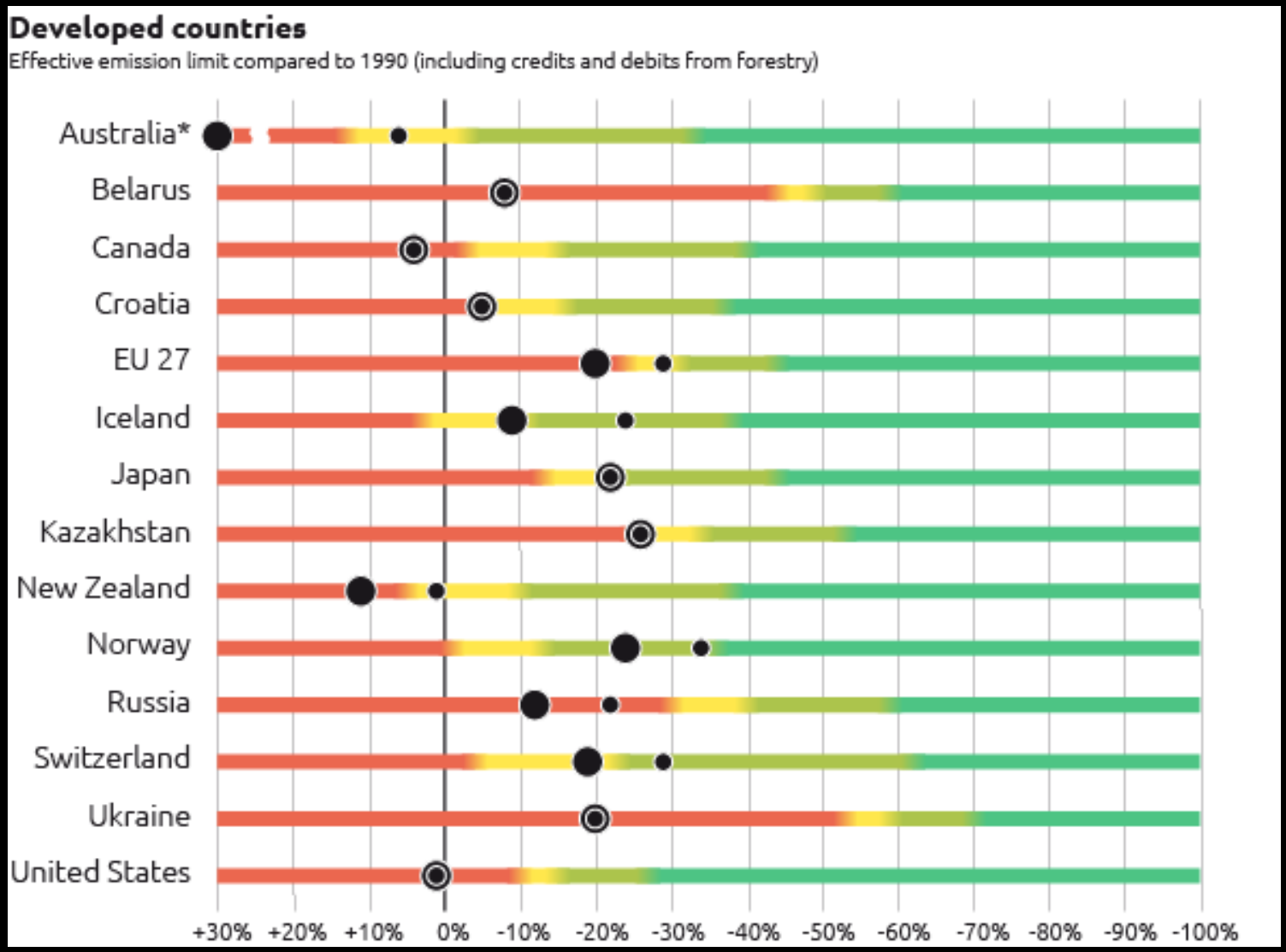
A declaration of failure of the ETS and other policies as applied



MfE 6th National Communication

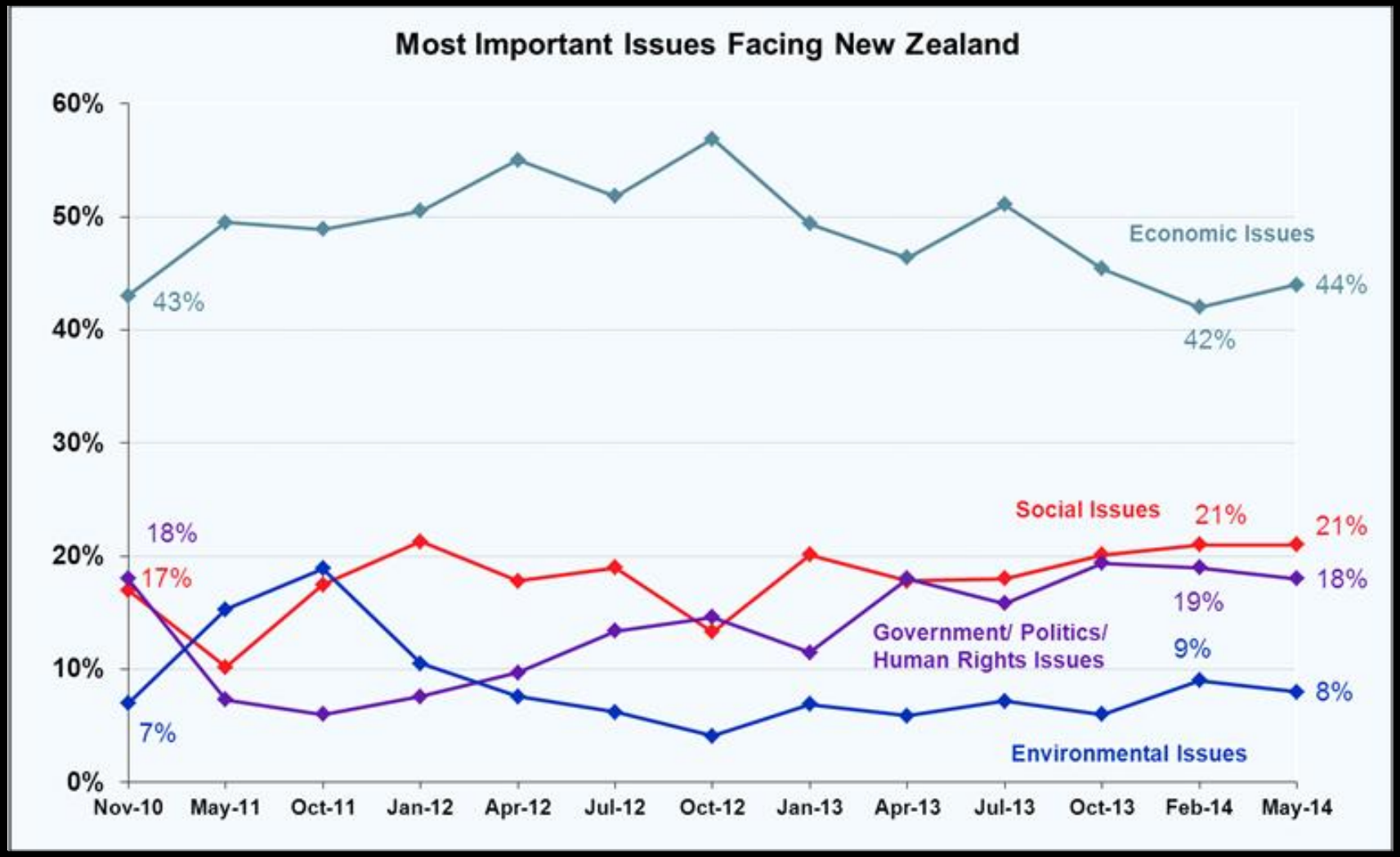
Where NZ sat mid-2013: leading?

(when we said -10-20% conditional; since then it's become -5%)



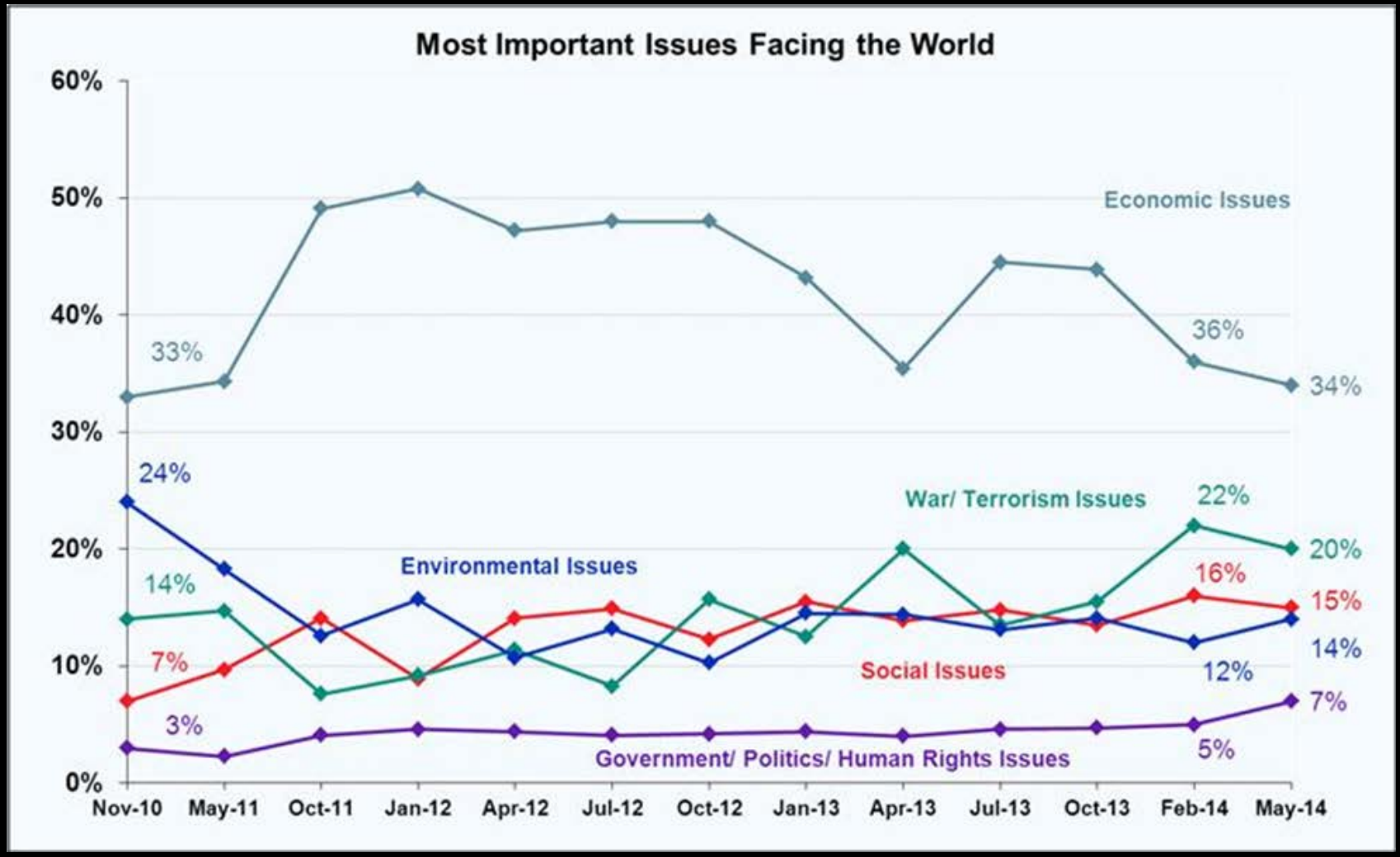
For scale, see http://climateactiontracker.org/countries.html

In NZ, envi issues low in import’ce



Roy Morgan May 2014

…even when thinking globally



Profile of CC in election?

- Not focus in leaders' debates so far
- Some placards
- The Climate Voter campaign

Policy in NZ

- Climate awareness can be raised with a concerted campaign – to build a political constituency for policy change: witness Generation Zero, 350.org, et al.

- Although NZ will have to cut emissions drastically, we can do it via:
  - Transport: EVs, bio energy, behaviour change, urban design & form, investment in public transport
  - Energy: 100% renewable electricity by 2025
  - Efficiency: in all sectors (e.g. housing insulation)

- NZ can still catch up, & encourage other countries to act.

Conclusions

- In many ways, emerging impacts of CC suggest ‘we’ underestimated the problem
- We can view our position as being in a ‘time of useful consciousness’
- Altho we are currently headed for 3-4 C, there are signs of hope internationally: increasing awareness

Conclusions (2)

- Some big and influential organisations internationally are changing
- But there is also intellectual resistance
- An example is policy advice in the area of transport and cities
- The co-benefits of good policy are too often neglected

Conclusions (3)

- NZ is currently running a two track climate policy approach (after Nicky Hager, 2014):
  - On the one hand, the public assurance that we are doing all we can, doing our fair share, setting aspirational targets
  - Second is the abrogation of trust with policy after policy contradicting our aspirations

- We can do better.