

PUBLIC LECTURE

The Climate Fix

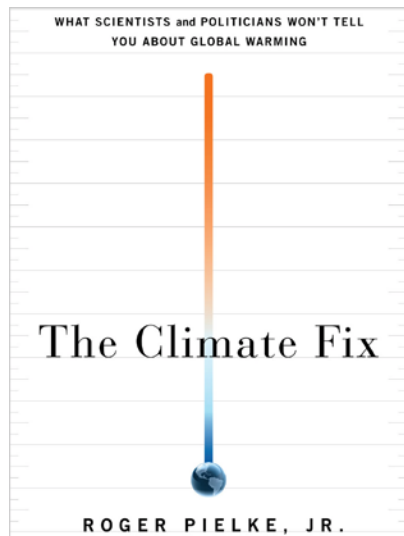
Professor Roger Pielke Jr.

Professor of Environmental Studies, Centre for Science & Technology
Policy Research, University of Colorado at Boulder

Thursday 2 February 2012 5.30 – 6.30pm

Molonglo Theatre Level 2 & 3, JG Crawford Building #132, Lennox Crossing, ANU, Canberra

**Presented by the
HC Coombs Policy Forum,
Australian National Institute of Public Policy,
Crawford School of Economics and Government, ANU**



Roger A. Pielke, Jr.
University of Colorado



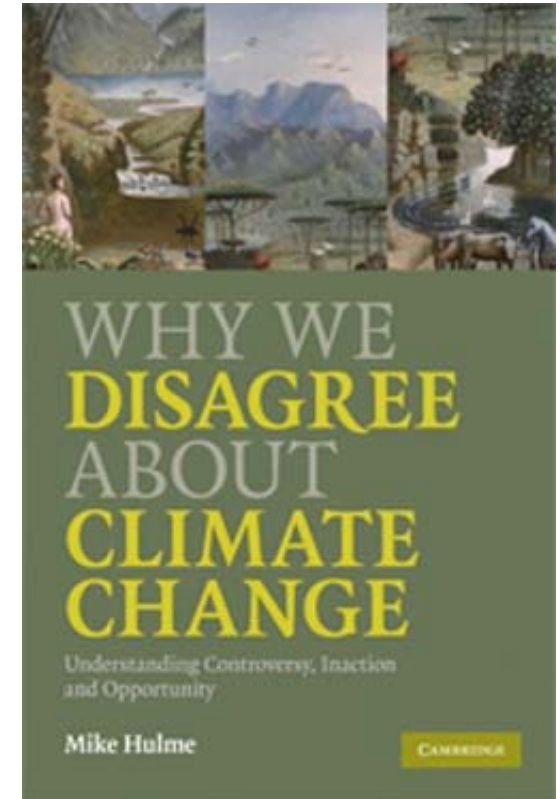
<http://sciencepolicy.colorado.edu>

Understanding the current context

- The 2011 climate negotiations in Durban ended in a decision to continue meeting but to put off decisions to 2015 or later
- Europe and the US are focused on the economy
- Australia's seemingly unending carbon drama continues, despite passage of a carbon tax
- Japan and Germany's emissions have already begun to increase sharply
- China and India keep growing, and emitting ...
- . . . And so on . . .
- How might we understand this context?

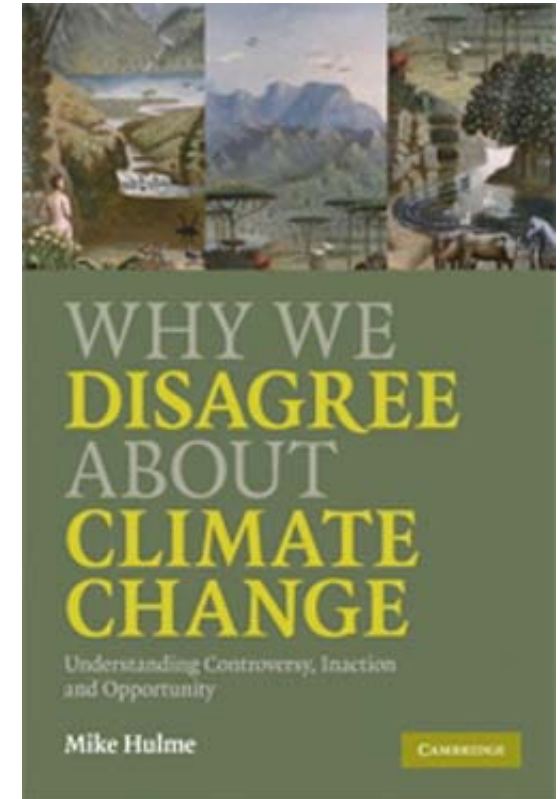
Mike Hulme, on debates about climate science

"... arguments about climate change are invested with powerful ideological instincts and interests. Solutions to climate change vary from market-based mechanisms and technology-driven innovation to justice-focused initiatives and low-consumption localism as a form of lifestyle, each carrying ideological commitments. It is despairingly naive to reduce such intense (and legitimate) arguments to the polarities of 'belief' or 'scepticism' about science."

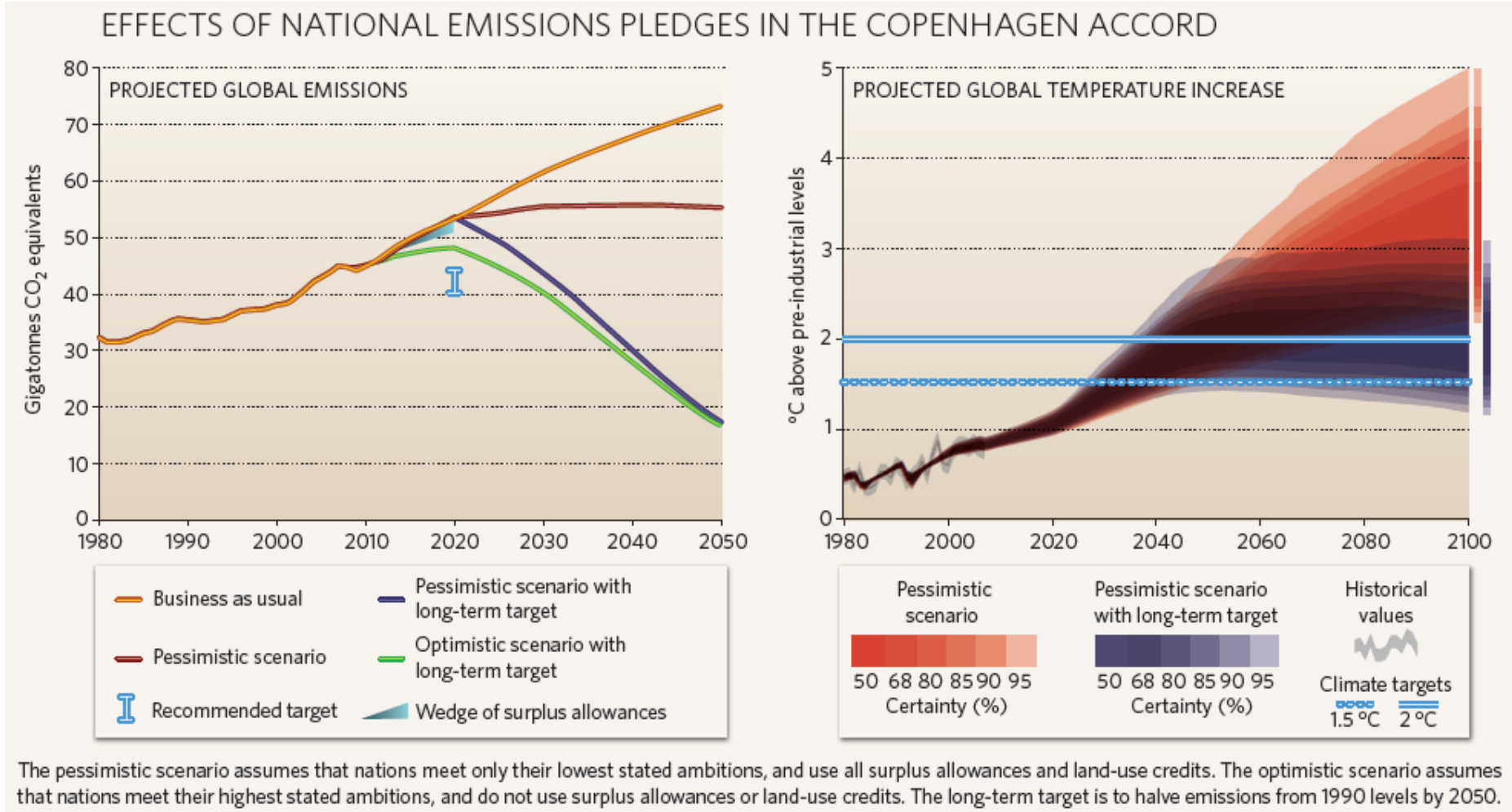


Mike Hulme, on debates about climate science

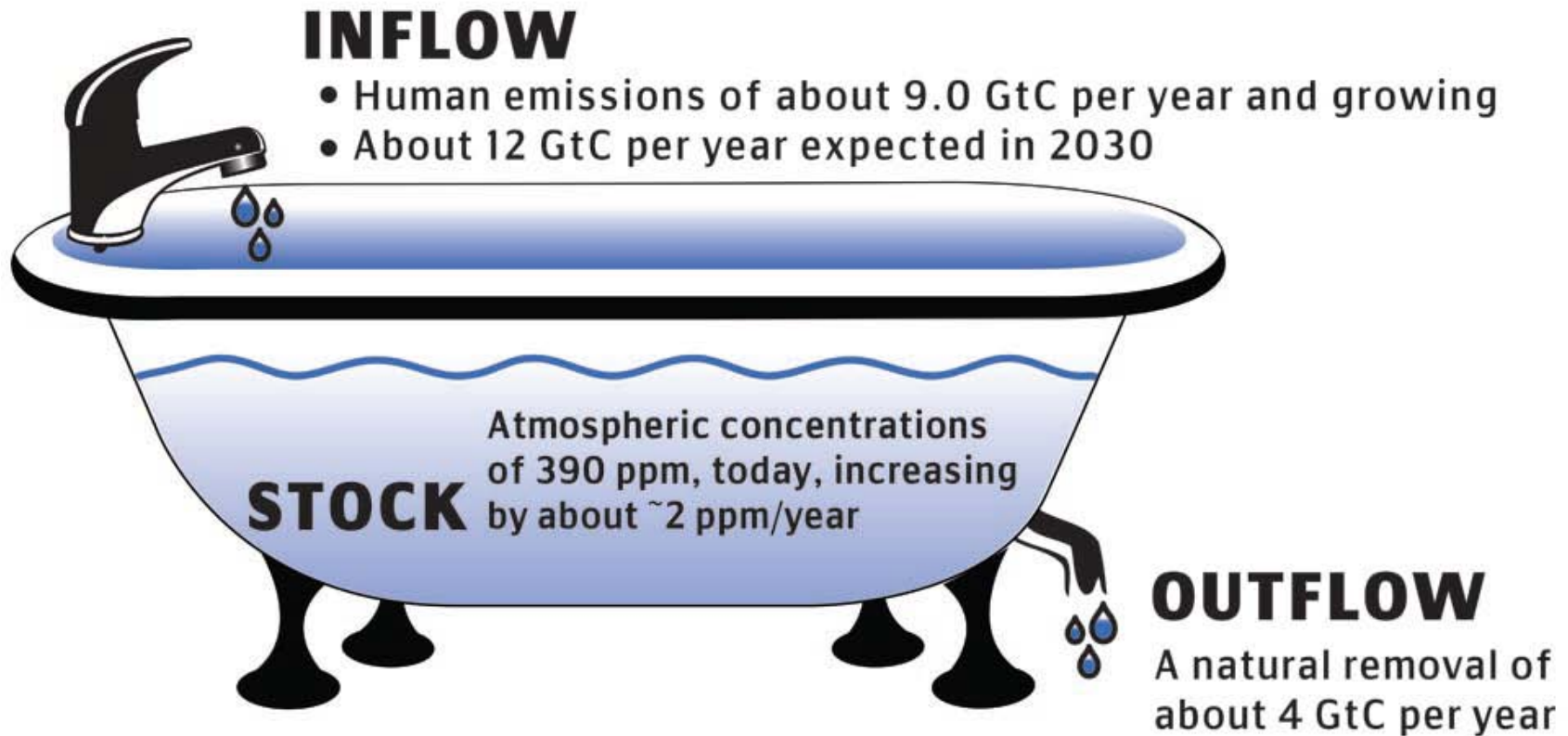
"The problem here is the tendency to reduce all these complexities into a simple litmus test of whether or not someone believes orthodox scientific claims about the causes and consequences of climate change. This is dividing the world into goodies and baddies, believers and deniers. Climate change demands of us something much more sophisticated than this..."



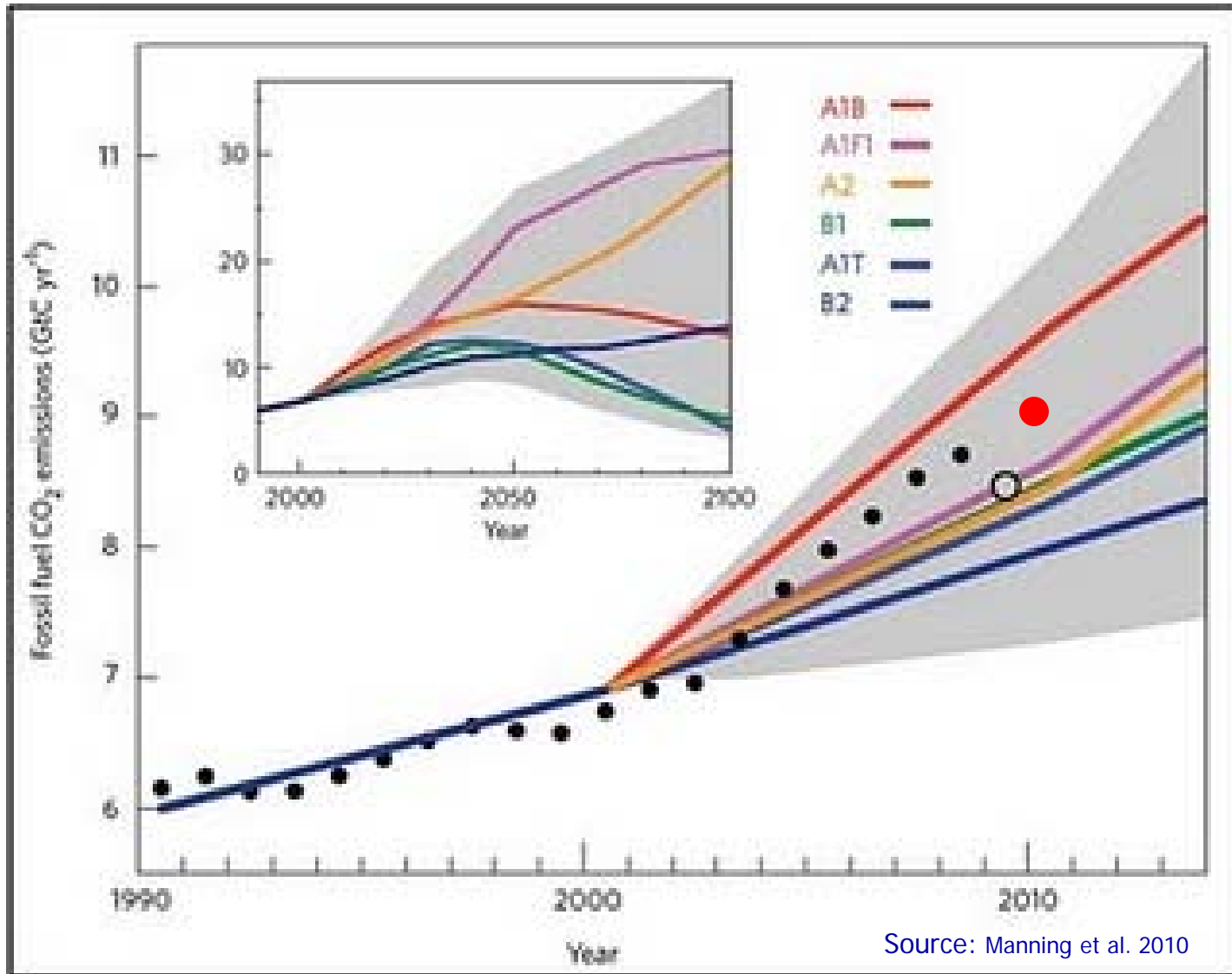
Mainstream approach – targets and timetables



Understanding the Build-Up of Carbon Dioxide



Emissions are growing faster than expected



Where do emissions come from?

**People
engage in economic activity that
uses energy
from carbon emitting generation**



Where do emissions come from?

People	Population	P
Engage in economic activity that	GDP per capita	GDP/P
Uses energy from	Energy intensity of the economy	TE/GDP
Carbon emitting generation	Carbon intensity of energy	C/TE

$$\text{Carbon emissions} = C = \cancel{P} * \frac{\text{GDP}}{\cancel{P}} * \frac{\text{TE}}{\cancel{\text{GDP}}} * \frac{C}{\cancel{\text{TE}}}$$

The “Kaya Identity”

What tools do we have to reduce emissions?

	Factor	Lever	Approach to Policy
P	Population	Less people	Population management
GDP/P	GDP per capita	Smaller economy	Limit generation of wealth
TE/GDP	Energy intensity	Increase efficiency	Do same or more with less energy
C/TE	Carbon intensity	Switch energy sources	Generate energy with less emissions

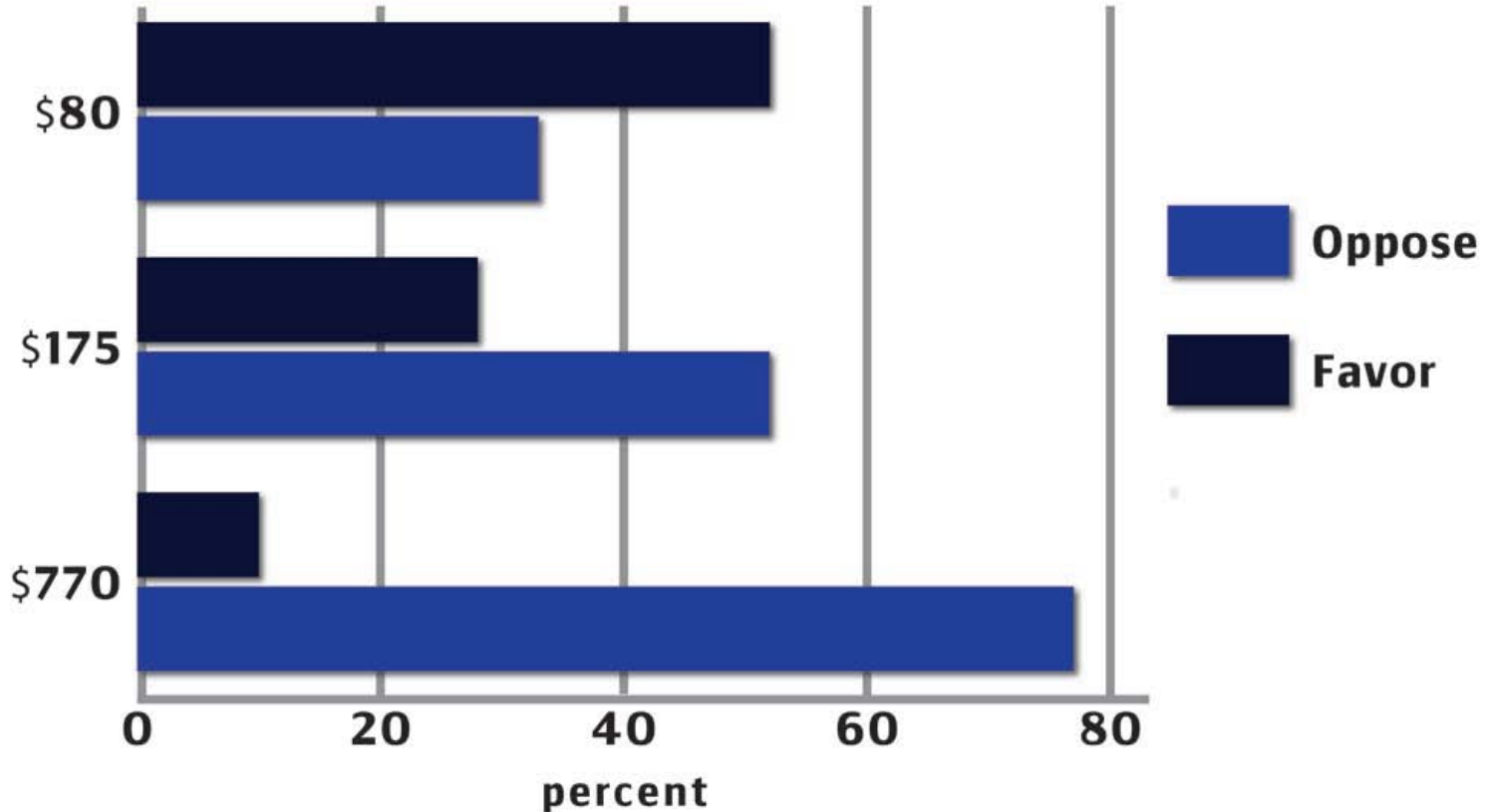
Carbon emissions = $C = \left(\frac{P * GDP}{P} \right) * \left(\frac{TE * C}{GDP * TE} \right)$

↓
↓

GDP
Technology

The Iron Law of climate policy

The Problem with Democracy
National Poll, % replying



Would you support a climate bill if the annual cost per household was?

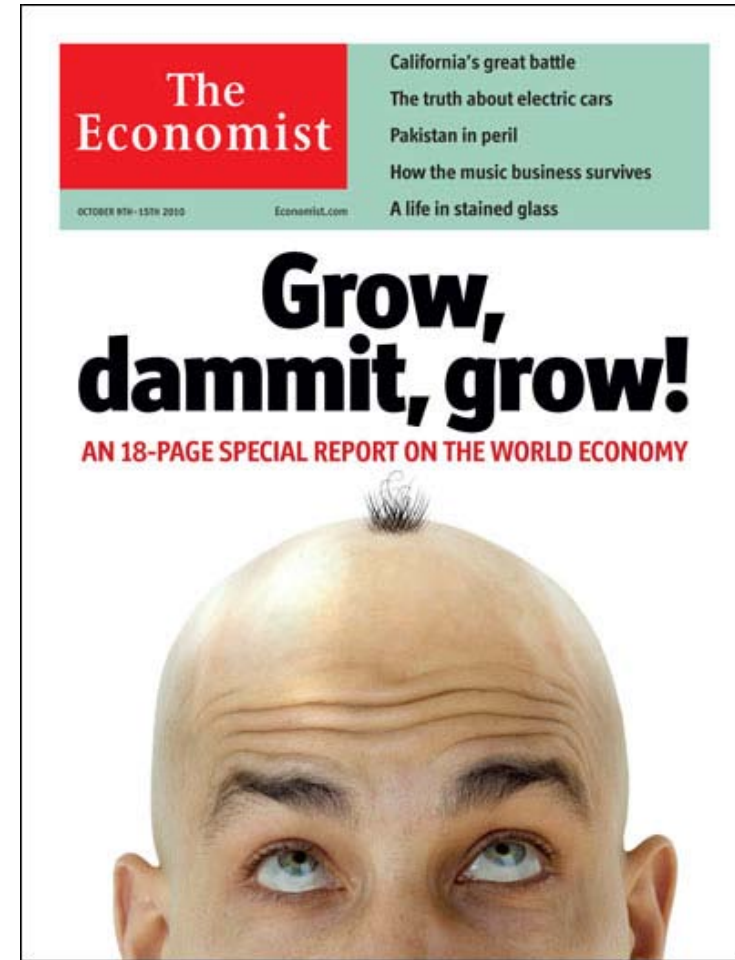
Source: YouGov/Polimetrix Poll, June 28th-30th 2009

The Iron Law of climate policy

People around the world are willing to pay some price for climate policies, but this willingness has its limits.

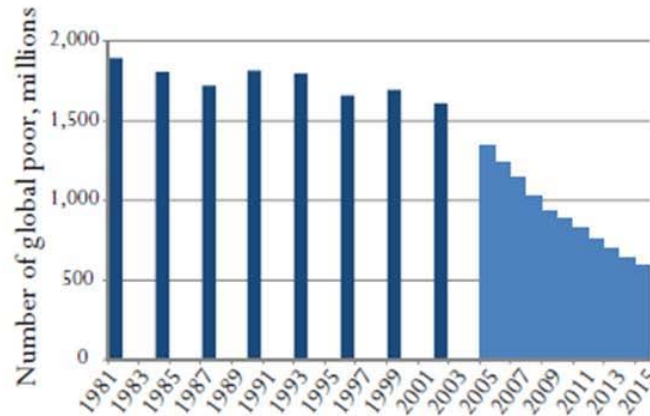
These limits mean that reducing GDP or noticeably reducing GDP growth are simply not options as a strategy of emissions reduction.

A Boundary Condition for Policy Design: Climate policies must not cost too much, better yet, they should foster economic growth

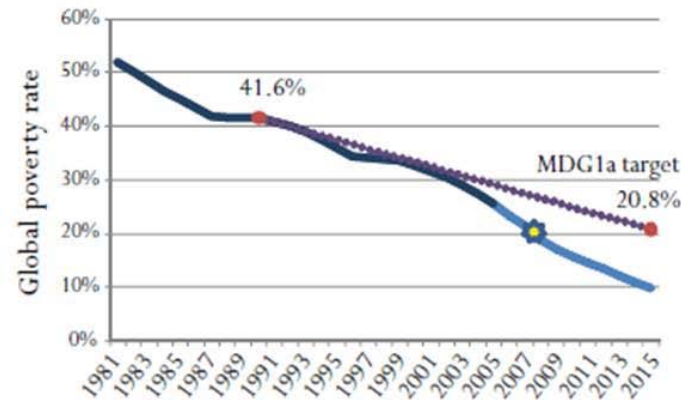


Poverty Reduction: A Success Story?

FIGURE 1: THE NUMBER OF THE WORLD'S POOR IS FALLING RAPIDLY...
...AND MDG1A MAY ALREADY HAVE BEEN ACHIEVED



Source: Ravallion and Chen (2008) and authors' calculations

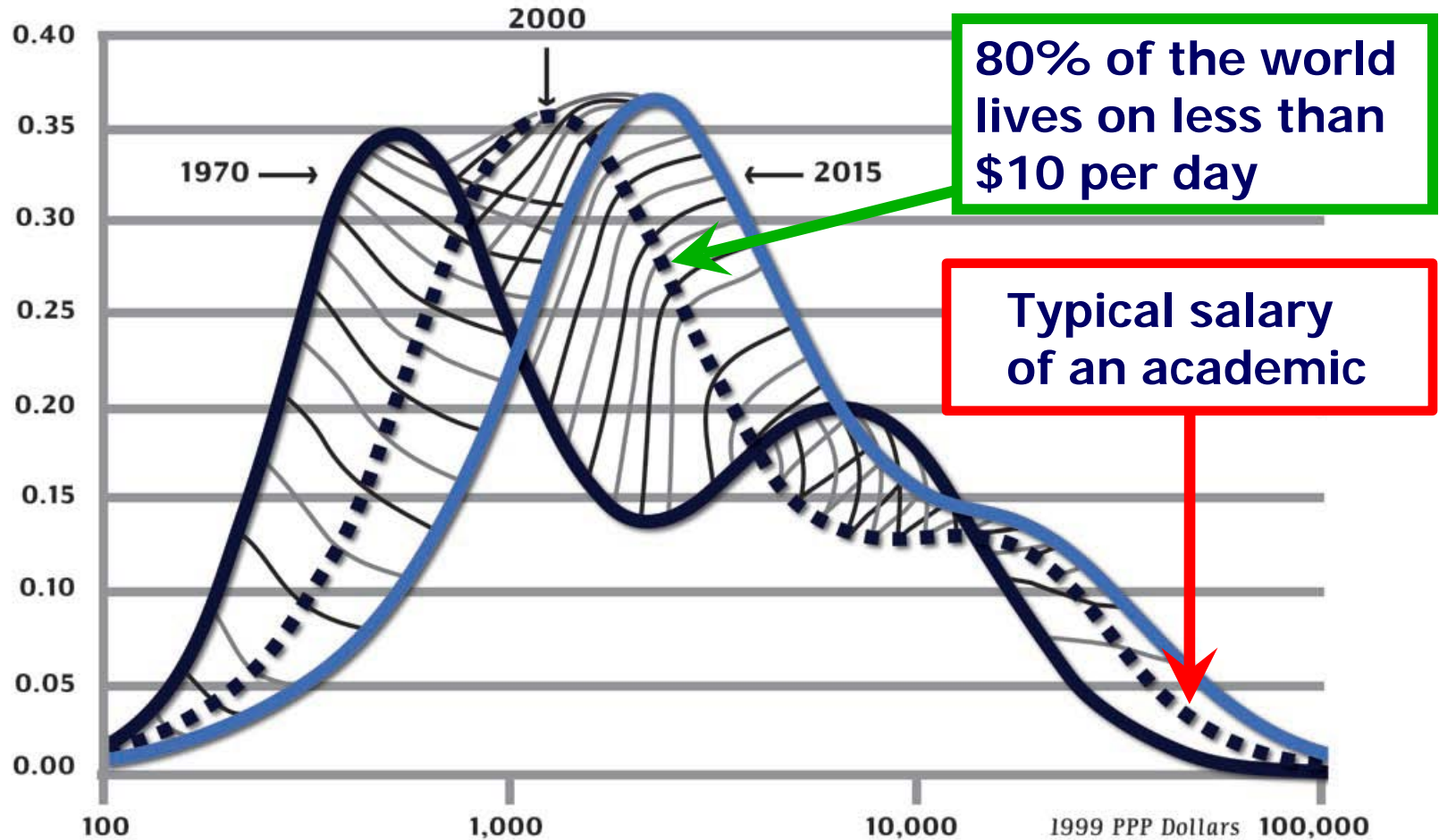


Source: Chandy and Gertz (2011, Brookings Institution)

“The new estimates of global poverty presented in this brief serve as a reminder of just how powerful high growth can be in freeing people from poverty.”

Reducing GDP or GDP growth is not an option

Evolution of global income distribution, 1970-2015
(the lines connecting the curves connect equal percentiles)



Source: Y. Dikhanov, *Trends in Global Income Distribution, 1970-2000, and Scenarios for 2015* (New York: Human Development Report Office, 2005).

Decarbonization defined

$$\text{Carbon emissions} = C = \left[\frac{P * GDP}{P} \right] * \left[\frac{TE * C}{GDP * TE} \right]$$

$$\text{Emissions} = \text{GDP} \times \text{Technology}$$

$$\frac{\text{Emissions}}{\text{GDP}} = \text{Technology}$$

Decarbonization: CO₂ per \$1,000 GDP

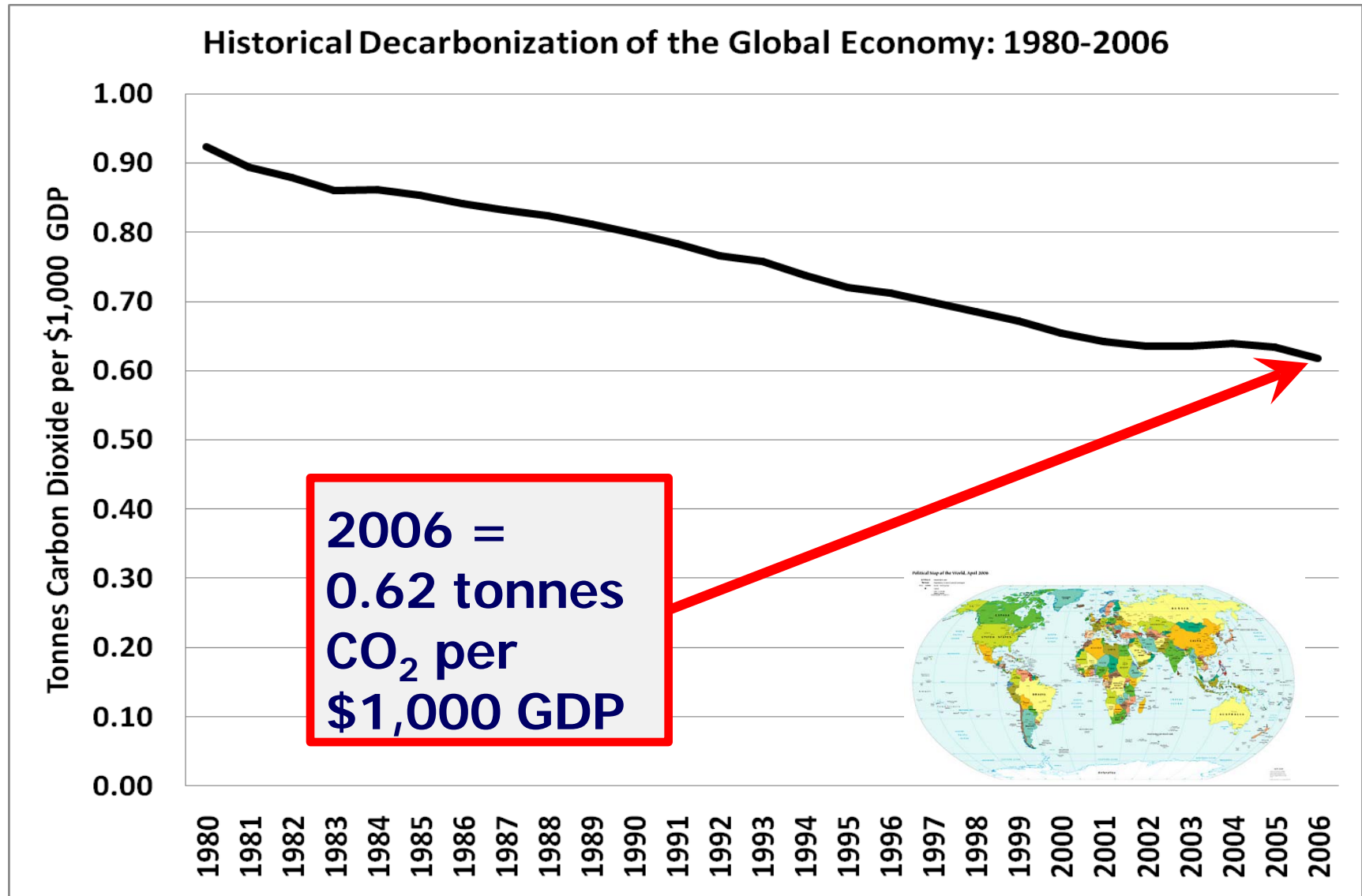
Decarbonization of the economy
is reflected in a decrease in the ratio of
carbon dioxide emissions to GDP . . .



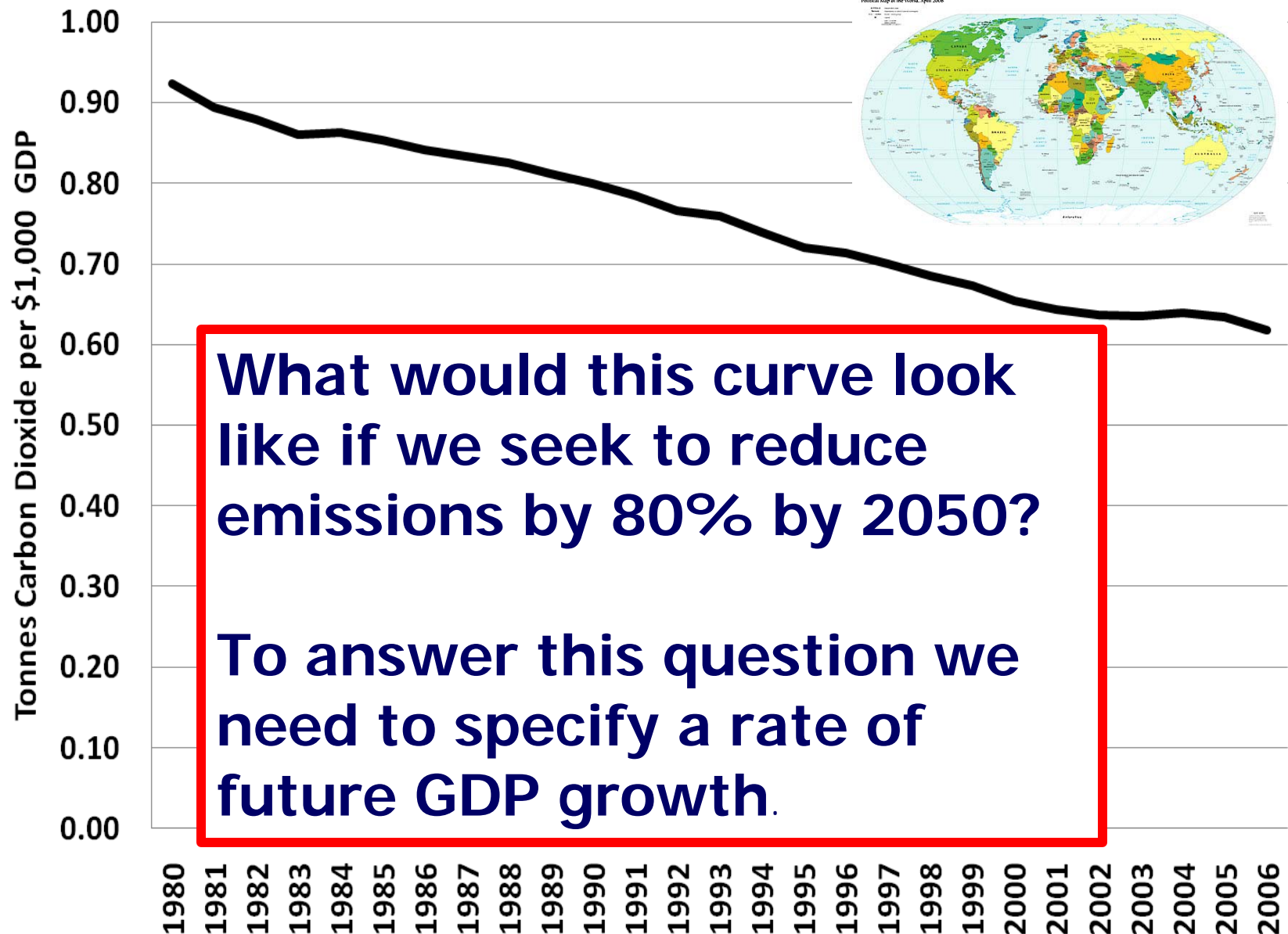
$$\text{For 2006} = \frac{29.12 \text{ Gt CO}_2}{\$47.267 \text{ Trillion}} = 0.62 \text{ tonnes CO}_2 \text{ per \$1,000 GDP}$$

. . . in a manner consistent with desired stabilization targets

First, some good news . . .

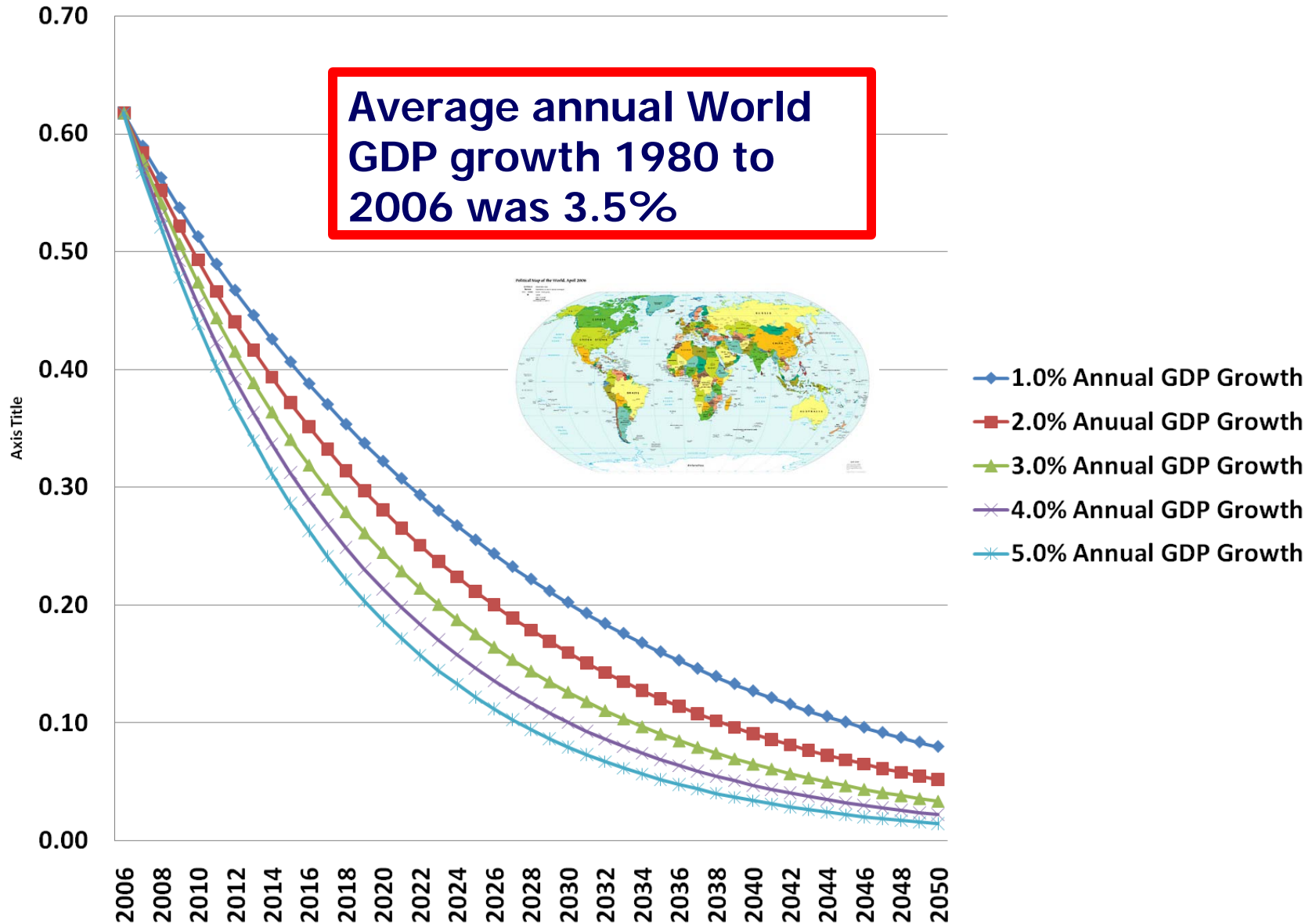


Historical Decarbonization of the Global Economy: 1980-2006



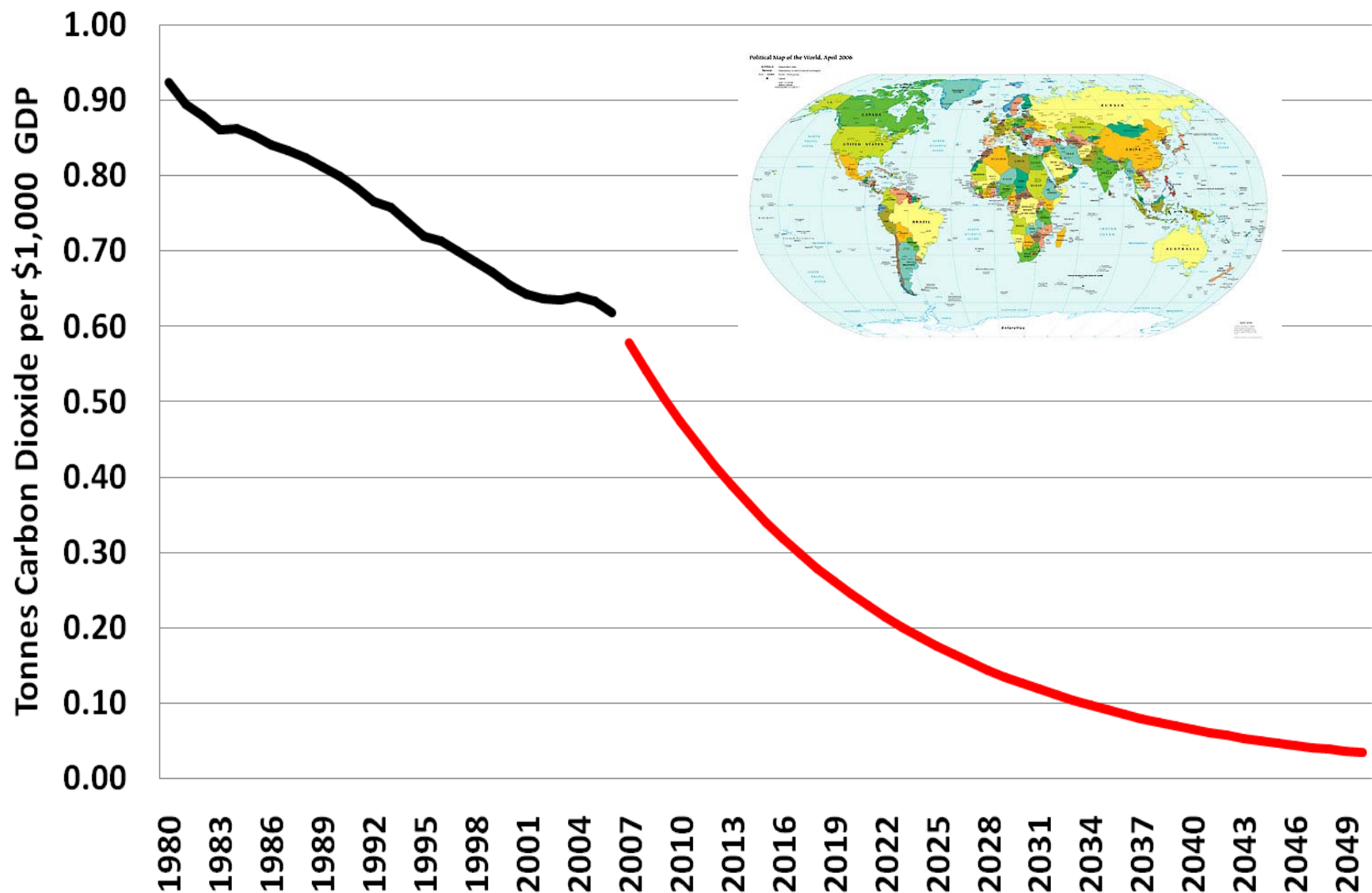
Implied Decarbonization of the Global Economy

Based on Attaining 80% below 1990 Levels by 2050: 2006-2050

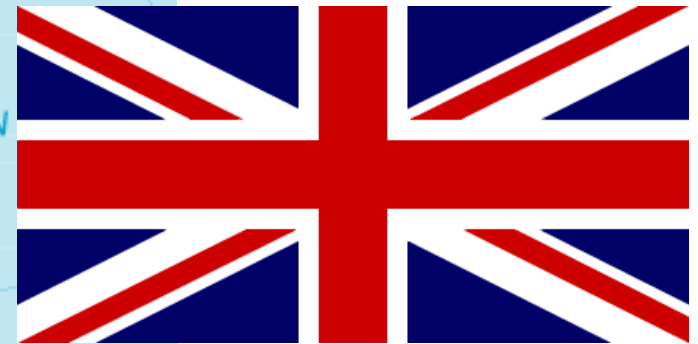


Historical and Projected Decarbonization of the Global Economy

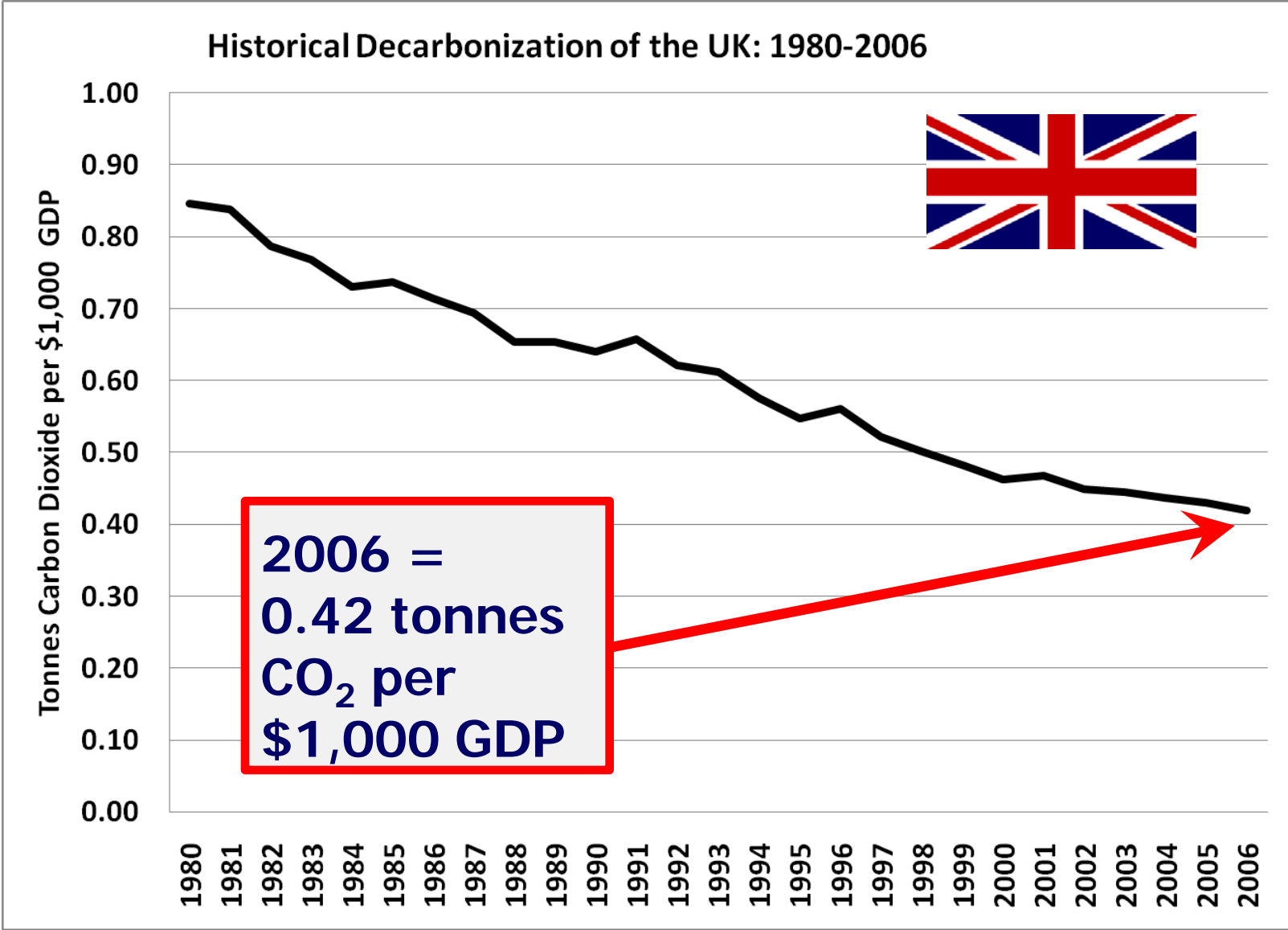
Assuming 3.0% Annual GDP Growth for 80% Reduction Below 1990 by 2050: 1980-2050



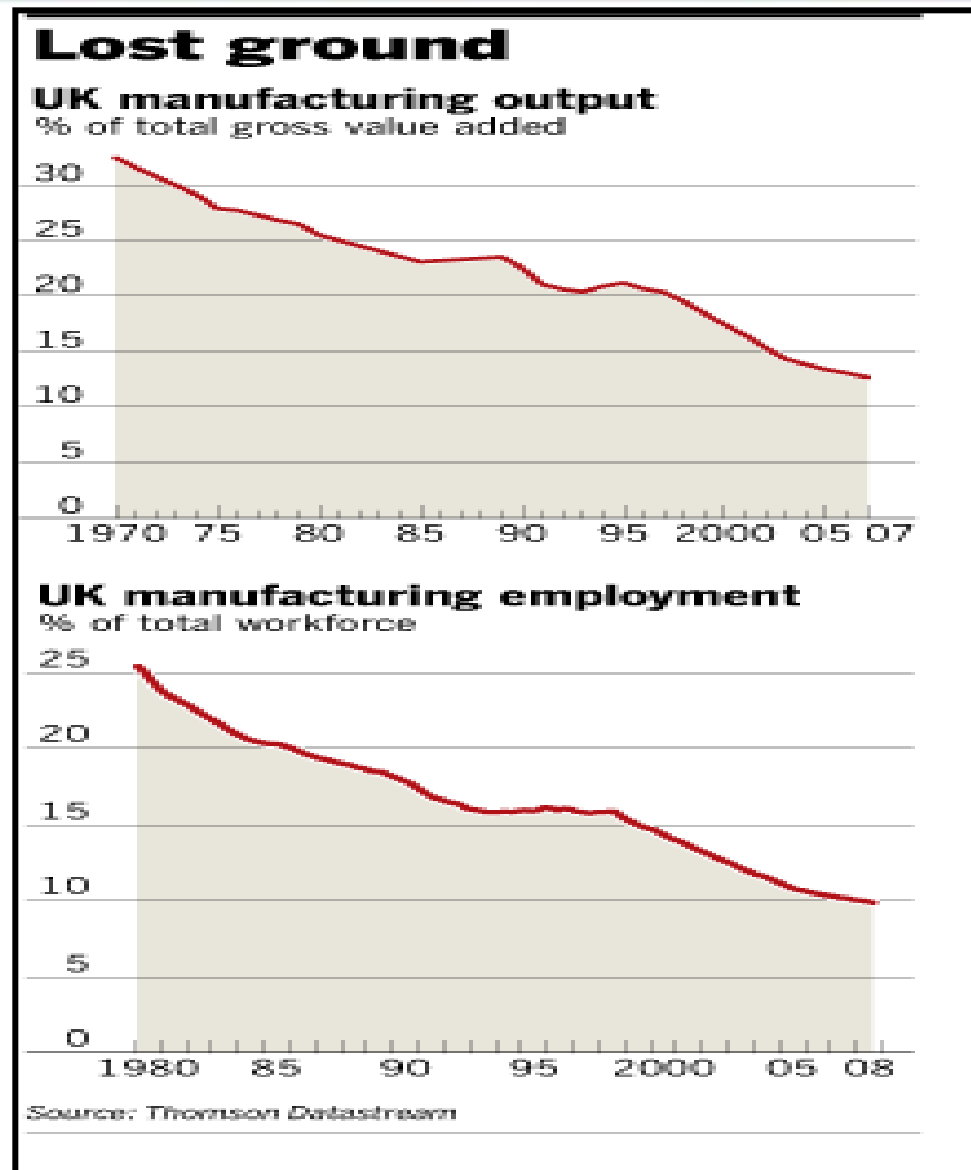
The Case of the United Kingdom



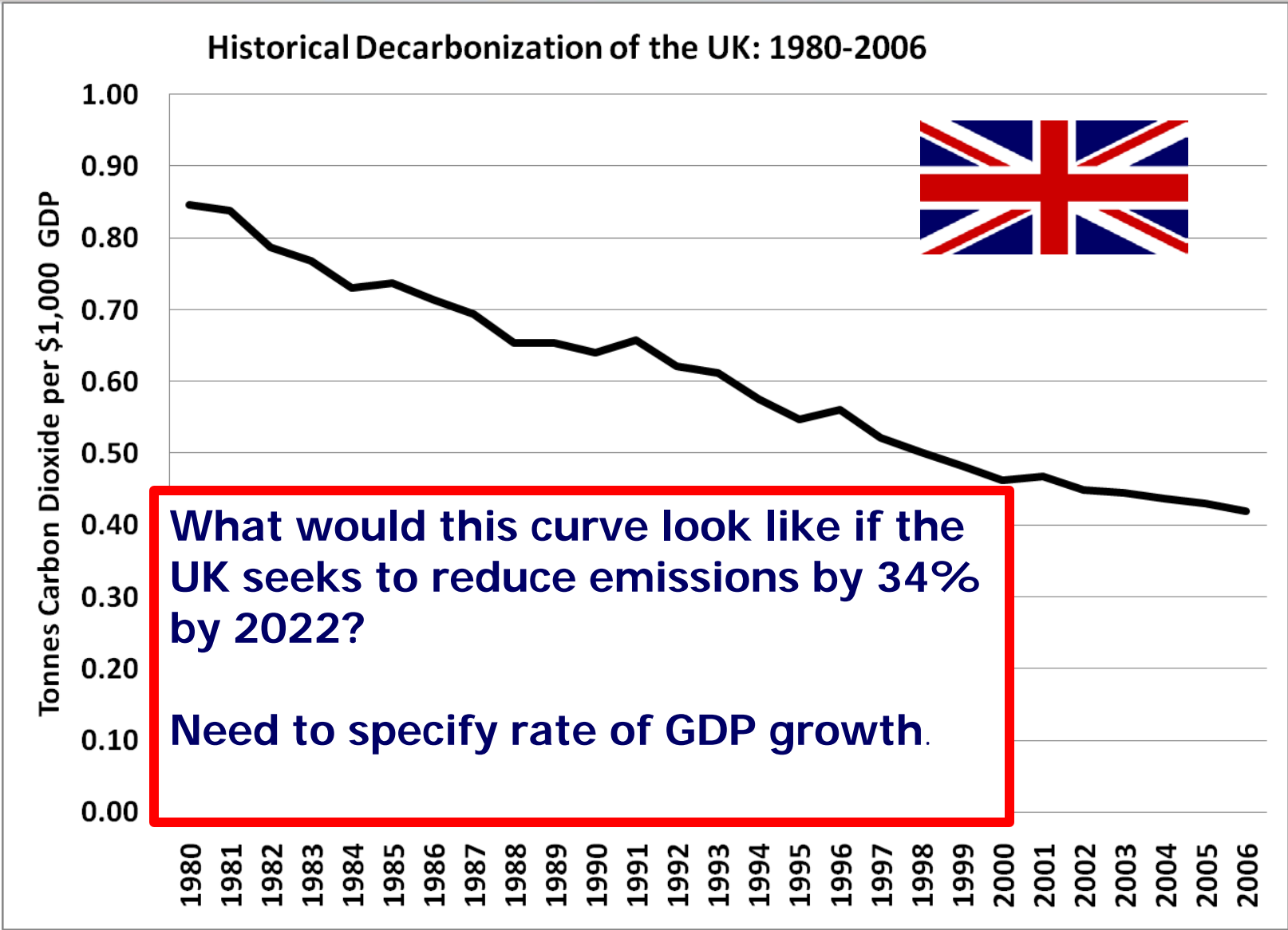
Decarbonization of the United Kingdom economy



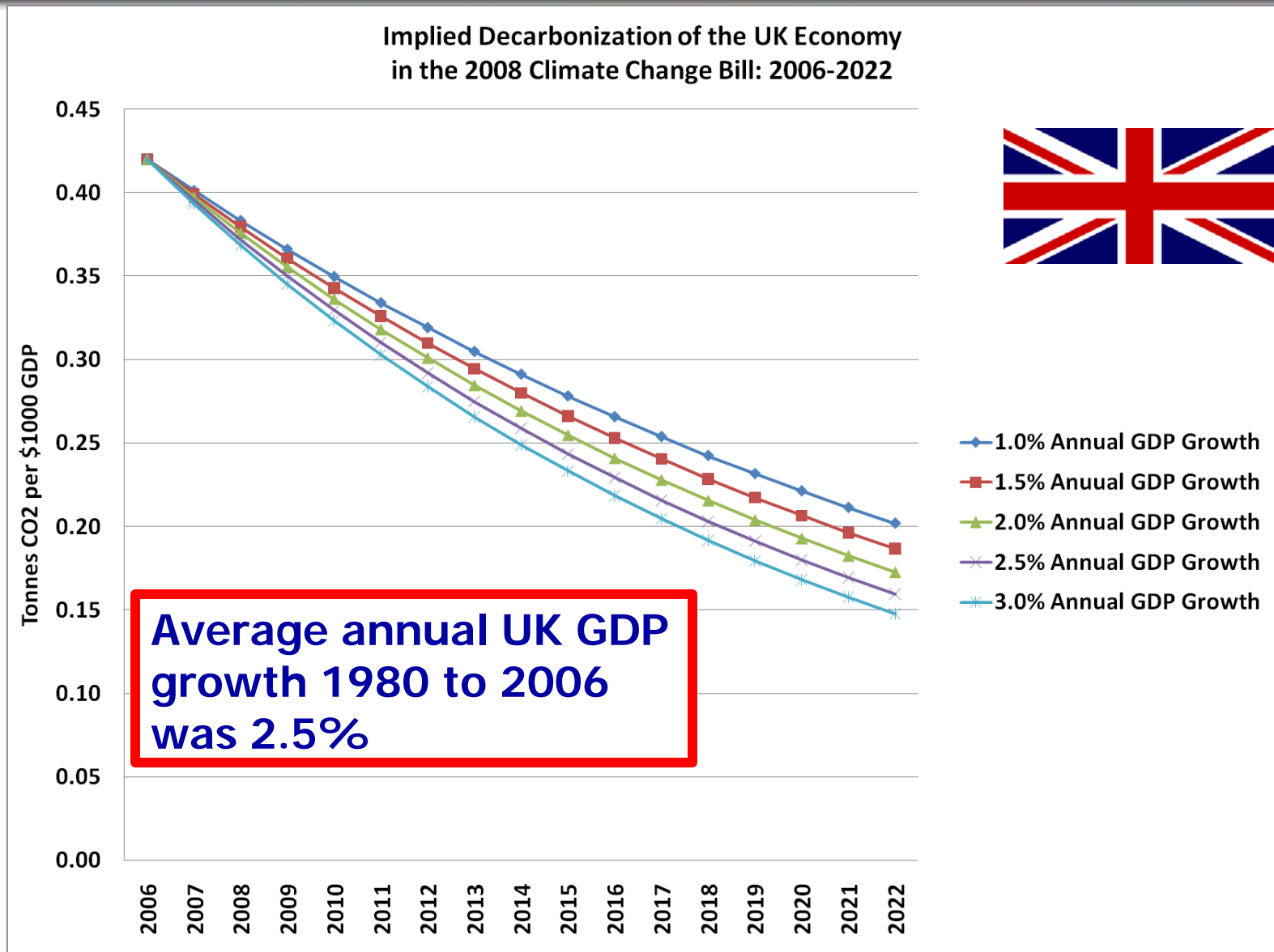
UK Decarbonization



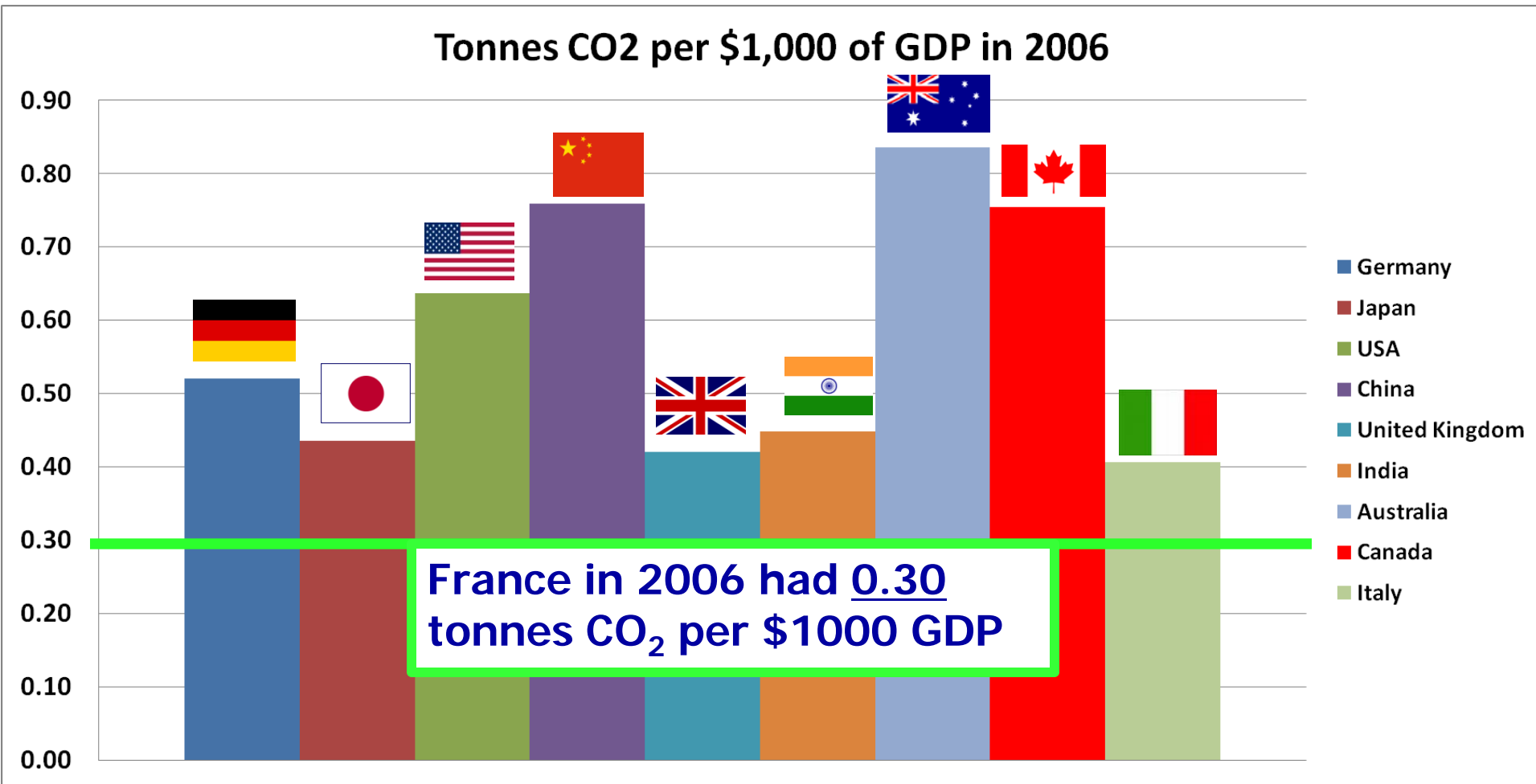
Decarbonization of the United Kingdom economy



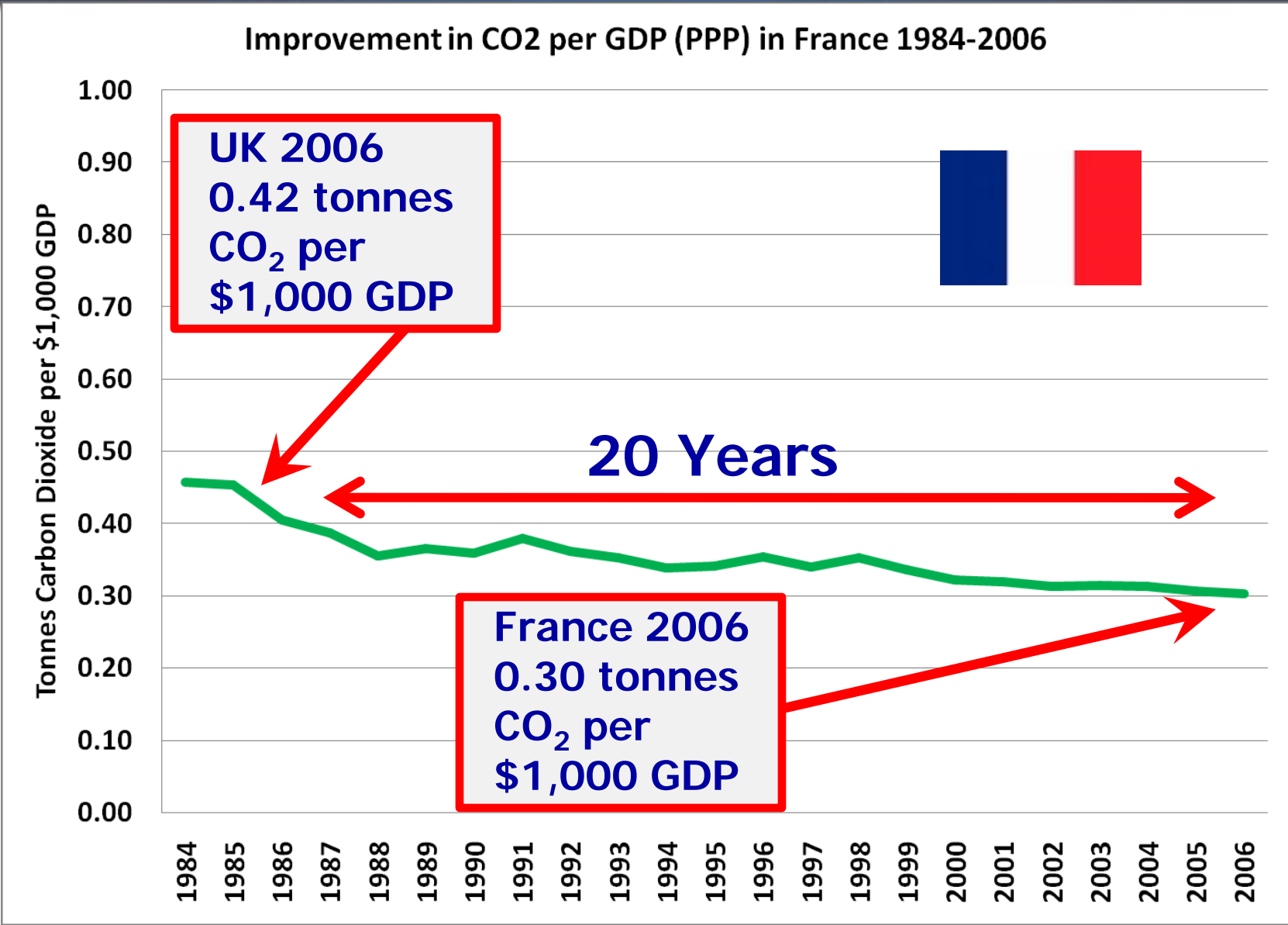
Implied decarbonization in the 2008 CC Act



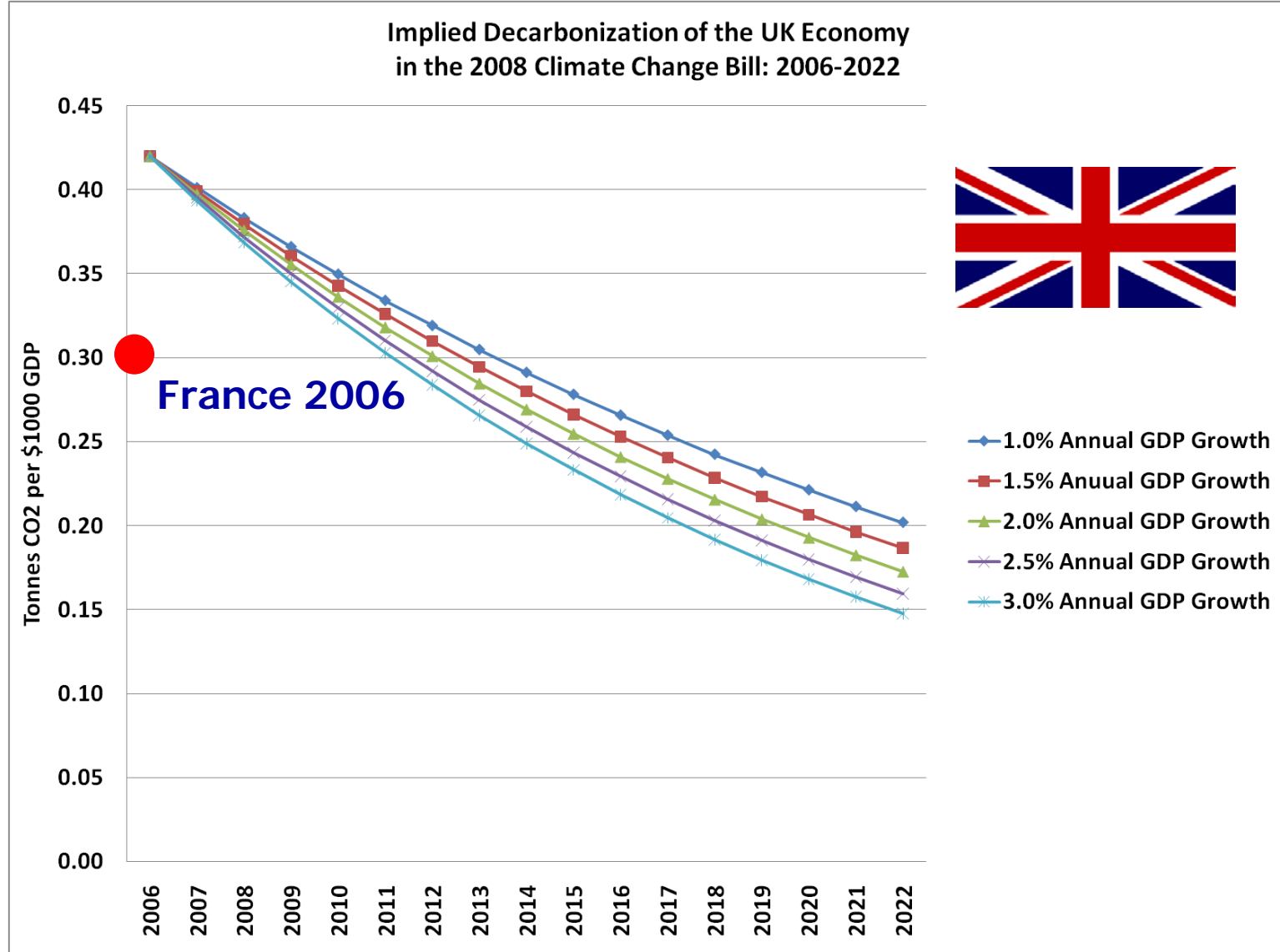
France as a point of comparison



Decarbonization in France 1984 to 2006



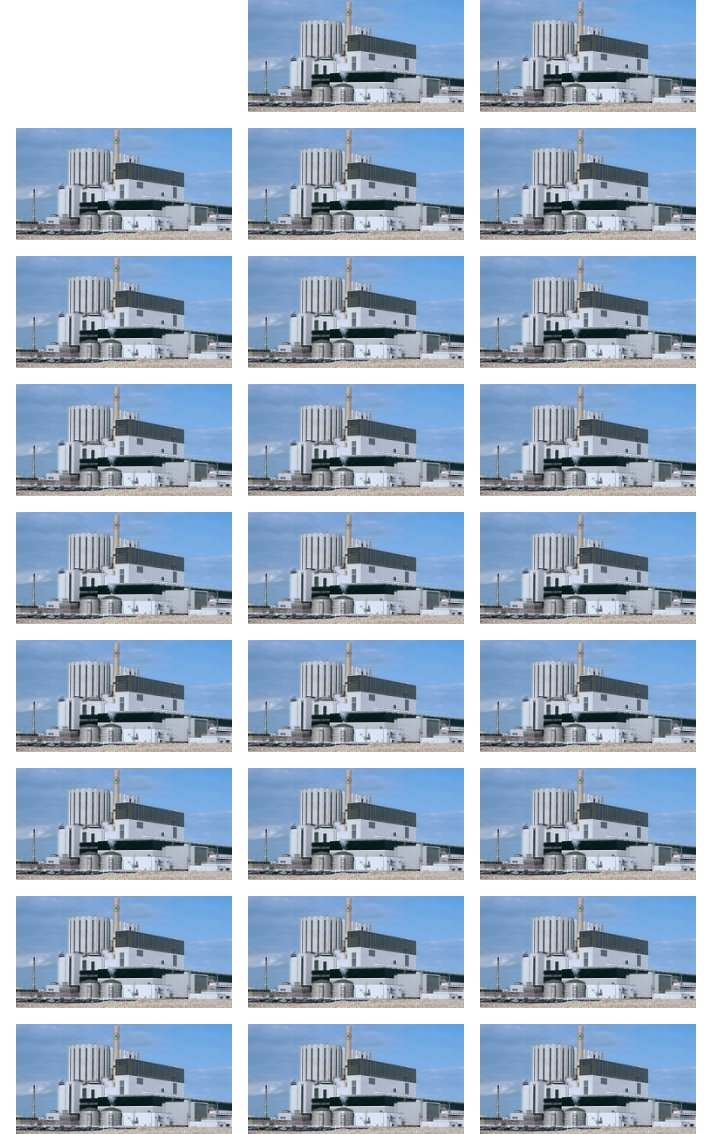
Can the UK Become France by 2015?



Dungeness B Nuclear Power Plant



The equivalent of 40 Dungeness B nuclear plants needed by 2015!



A policy maker's response . . .



"[Pielke's analysis] raises questions which I do not think have been factored into the thinking behind the Climate Change Act.

The task (of cutting emissions by 80% from 1990 levels by 2050) is already staggeringly huge and, as we have seen, well beyond our current political capacity to deliver.

Heathrow is a prime example of ducking the responsibility. It is hard to see any tough choices being made in the current climate."

Colin Challin, Member of UK Parliament

Chairman of the All Party Parliamentary Climate Change Group

11 February 2009

BBC News -- <http://news.bbc.co.uk/1/hi/sci/tech/7881868.stm>





"Professor Pielke's intervention was rejected by economist Terry Barker, a lead author for the Intergovernmental Panel on Climate Change (IPCC)."

BBC News, February 2009

BBC News -- <http://news.bbc.co.uk/1/hi/sci/tech/7881868.stm>

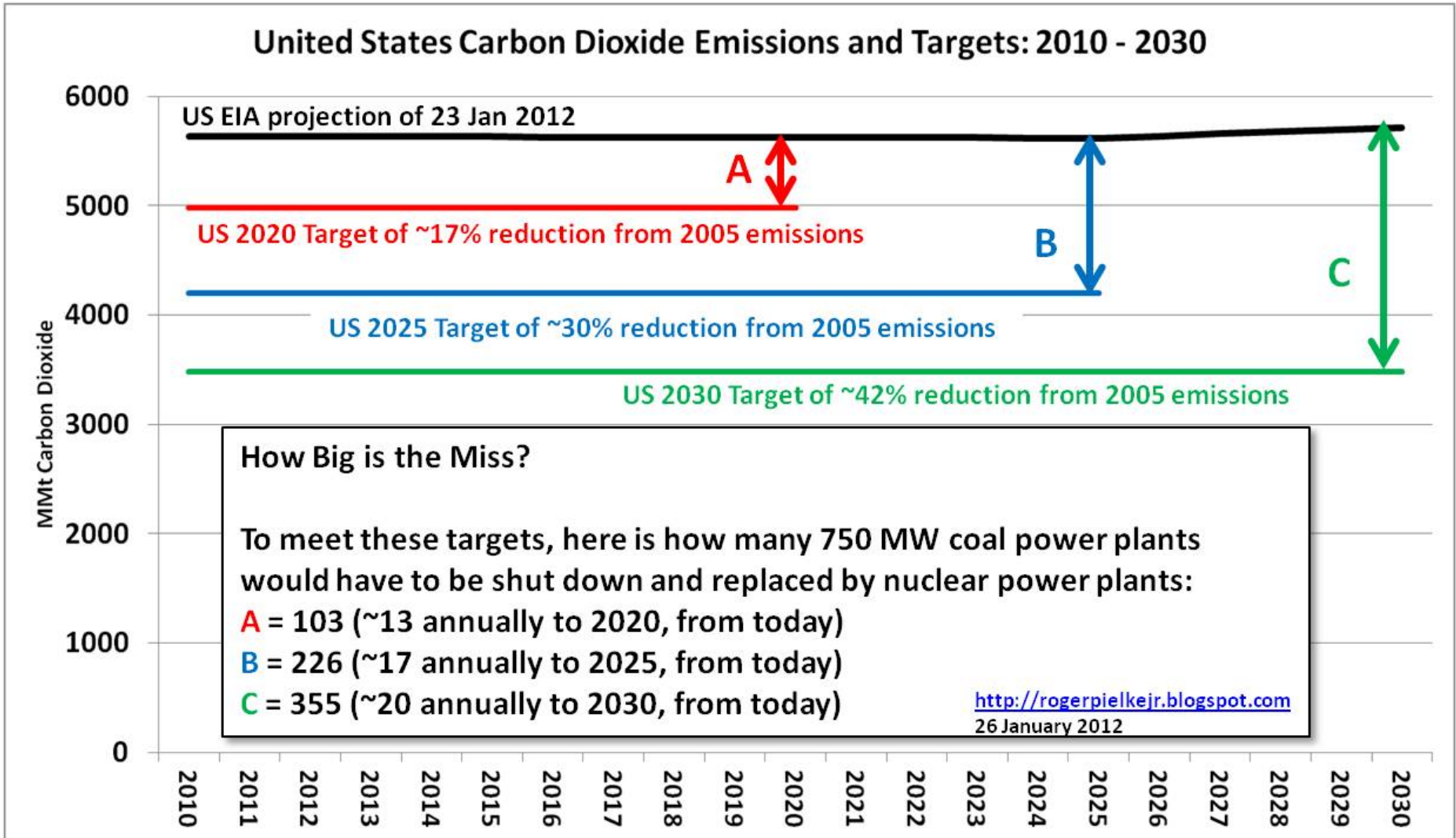
"Britain will miss government carbon targets by increasingly wide margins over the next 20 years unless it introduces radical policy measures, a report warned on Thursday. . . argues [Cambridge Econometrics], a private company owned by a charity and chaired by the Cambridge University academic, Terry Barker."

The Guardian, September 2011

<http://www.guardian.co.uk/environment/2011/sep/16/uk-miss-carbon-targets>

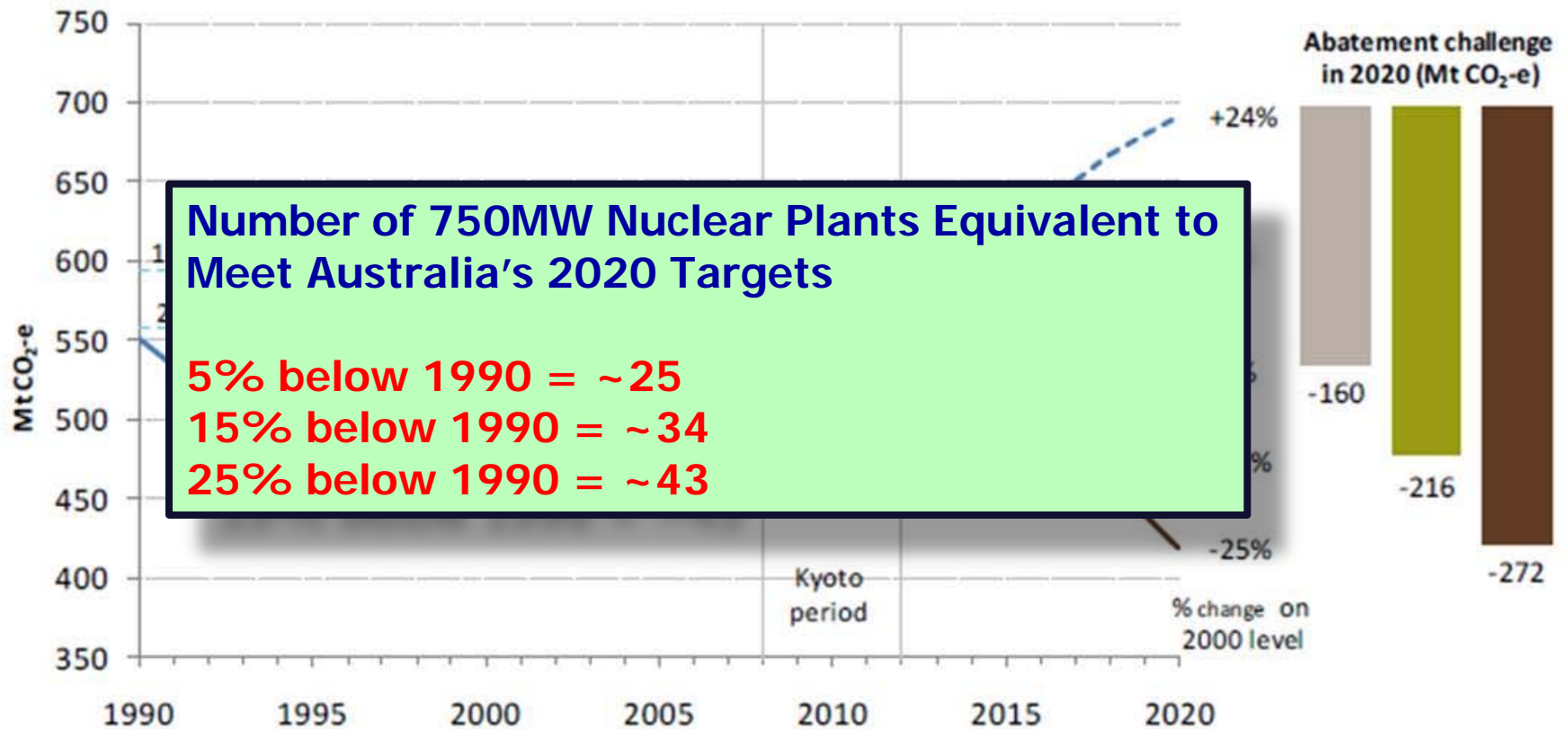
How about the United States?

United States Carbon Dioxide Emissions and Targets: 2010 - 2030



How about Australia?

Figure 1 Australia's emissions trends, 1990 to 2020



Note: Trajectories to the 2020 target range are illustrative, they begin in 2011-12 at 108 per cent of 1990 levels (consistent with Australia's Kyoto Protocol first commitment period target) and assume a straight line reduction to the target.

What about Solar Energy for Australia?

Energy and Water Utilities
The Honourable Stephen Robertson

Friday, December 02, 2011

\$6.76 million Cloncurry Solar Farm project gets green light

The Bligh Government has named Ingenero Pty Ltd as preferred tender to design, build and operate a 2.128 megawatt solar farm at Cloncurry.

Energy Minister Stephen Robertson and Member for Mount Isa Betty Kiernan made the announcement at the proposed site in Cloncurry today.

Mr Robertson said Ingenero was selected from 19 expressions of interest received from Australian and international companies.



Number of 2.128MW Cloncurry Solar Farms Equivalent to Meet Australia's 2020 Targets

5% below 1990 = ~29,868 (or about 10 solar farms per day)

15% below 1990 = ~40,509 (14 per day)

25% below 1990 = ~50,776 (17 per day)

The Heathrow 3rd runway debate . . .



... In broader context

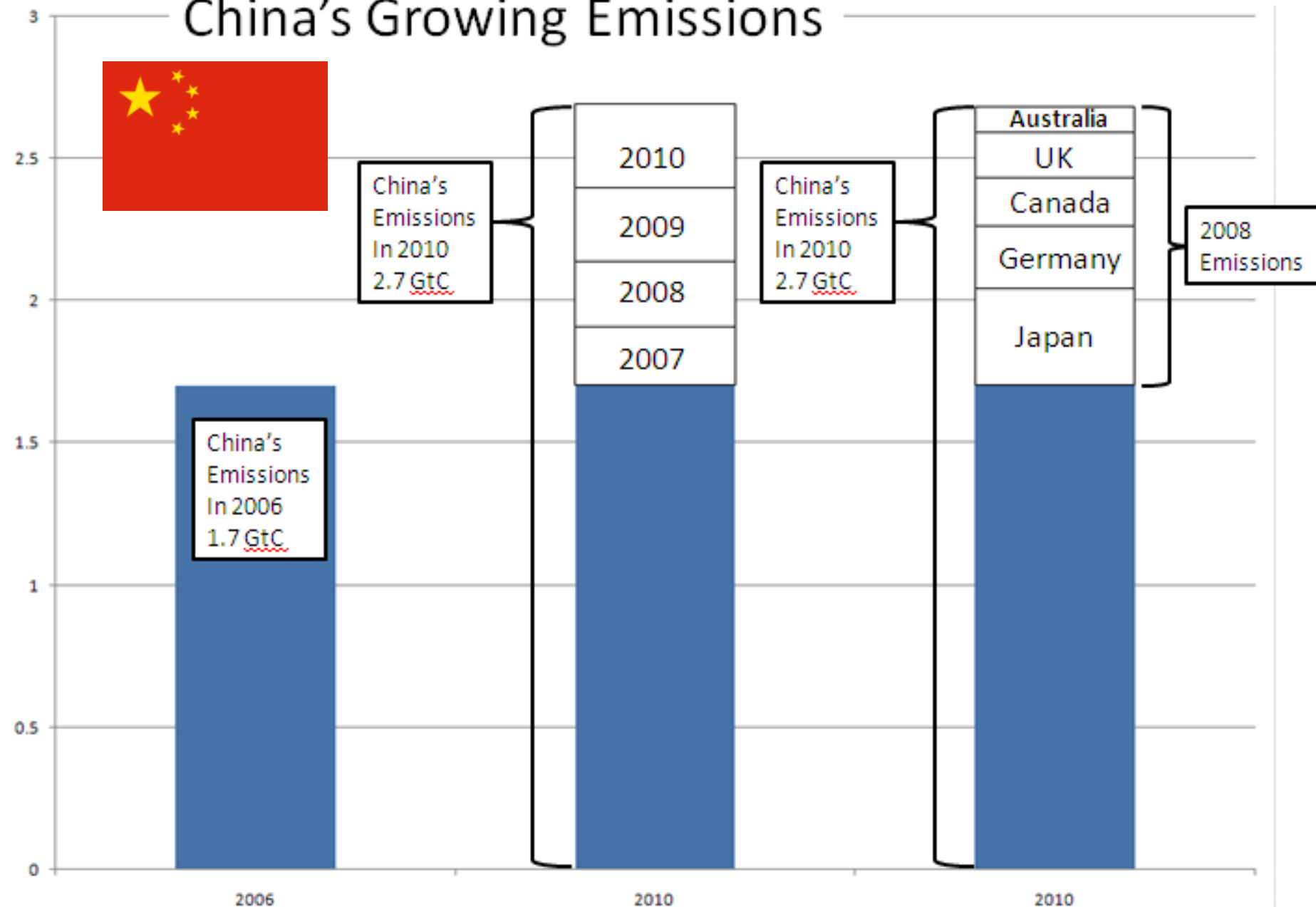


← CHINA'S AIRPORT BOOM →

To stimulate development outside of major cities such as Beijing and Shanghai, the Chinese government plans to open about **100 new airports by 2020 at a cost of some \$62 billion**. The expansion sites—from Mohe, the northernmost town in China, to Hainan island in the south to Bachu in the far west—are like a treasure map for GE's infrastructure units.



China's Growing Emissions



A Global Perspective

To achieve stabilization at a 2°C warming, we would need to install $\sim 900 \pm 500$ MW [mega-watts] of carbon emissions-free power generating capacity each day over the next 50 years. **This is roughly the equivalent of a large carbon emissions-free power plant becoming functional somewhere in the world every day.** In many scenarios, this pace accelerates after mid-century. . even stabilization at a 4°C warming would require installation of 410 MW of carbon emissions-free energy capacity each day.

Caldeira et al. 2003



1.5 billion (!) people lack access to electricity



Can we change the narrative?

- From
 - We use too much energy
 - Fossil fuels are too cheap

- To
 - We need more energy
 - Fossil fuels are too expensive

How fast can decarbonization occur?

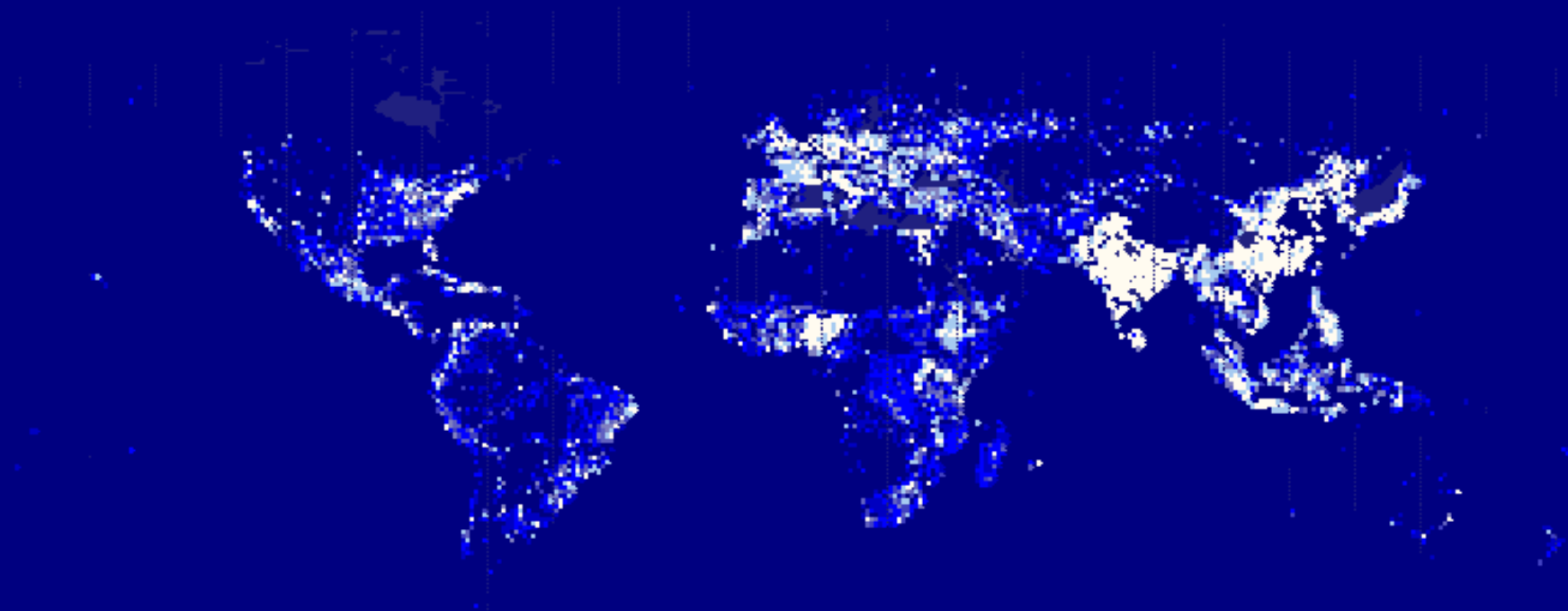
- The honest answer is "no one knows"
- Historical rates of 1-2% per year have occurred in developed countries
- For short periods some countries have achieved rates $>2\%$ per year
- Achieving 17% (for instance) reductions in US emissions by 2020 while maintaining modest economic growth requires rates of decarbonization of $>5\%$ per year (!)

What about current policy options?

- The policy logic of targets and timetables is exactly backwards
- Cap and trade cannot succeed
 - European experience
- A carbon tax cannot alone do the job
 - but is important if used wisely
- How do we deal with other “wicked problems”?
 - Advancing human life spans
 - Increasing agricultural production
 - Winning the Cold War



Ausubel and Victor 2006

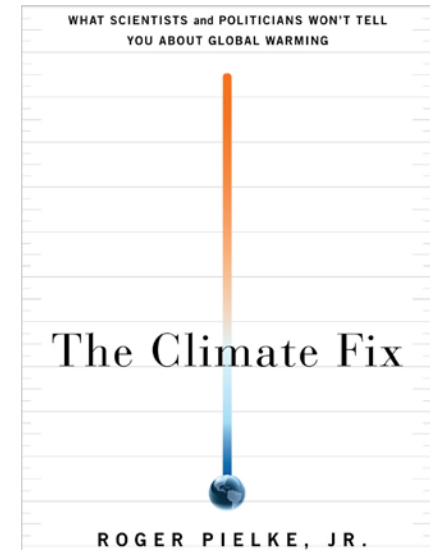
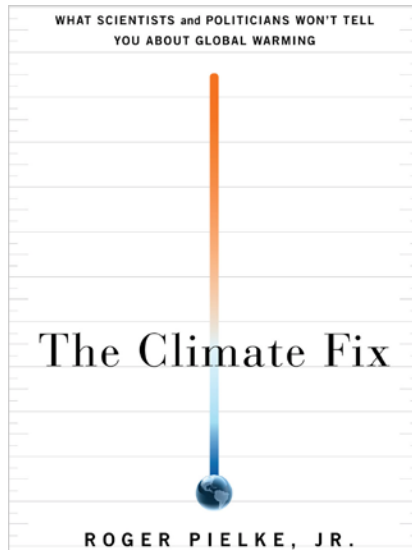


Ausubel and Victor 2006

How to provide feedback!

- pielke@colorado.edu
- Papers etc. can be downloaded from:
<http://sciencepolicy.colorado.edu>
- <http://rogerpielkejr.blogspot.com>

Thank you!



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