

# Reframing Climate Change: How Recent Emissions Trends and the Latest Science change the Debate

*A talk given at Leeds Met, 24<sup>th</sup> February 2009 by Prof. Kevin Anderson (Tyndall Centre, Manchester - Research Director of Energy and Climate Change programme and manager of the Tyndall Centre's energy pathways to global decarbonisation programme). [Notes by Ian Henderson, Leeds Friends of the Earth/TINWOLF - [Ian.Henderson@zepler.net](mailto:Ian.Henderson@zepler.net). These notes do not necessarily reflect my opinion.]*

The talk and accompanying paper (Anderson and Bows, 2008 – links at end) examine emissions trends since 2000 and identify plausible pathways to emissions reduction in light of the latest science. The analysis leads the authors to reframe the climate change agenda: **work towards 2°C human-induced global temperature rise (mitigation), but prepare for 4°C (adaptation)**. The talk was followed by an interesting question and answer session, also below. Note particularly the idea that **affluent countries need to recognise the need for immediate action on demand**. Reliance on low-carbon supply is misguided because it cannot provide the radical short-term reductions required: low-carbon energy sources require significant time to build, become operational, and replace carbon-heavy energy sources.

## **Analysis of emission trends**

- **Focus on long term targets (e.g. UK's 80% reduction by 2050) very misleading as effect of emissions is cumulative** (CO<sub>2</sub> remains in atmosphere for 100+ years). **Urgent and radical reductions are therefore key**, not long term gradual reductions. The final % reduction isn't important so much as the area under the emissions abatement curve, and that's minimised by reducing emissions sooner rather than later.
- Anderson and Bows's analysis includes forestry, land use and agriculture emissions (energy and industry emissions have up till now been the focus for policymakers).
  - Forestry & Land use = 12-25% of global GHG emissions in 2000 (a lot of uncertainty about effect of deforestation – Anderson and Bows use optimistic emissions estimates)
  - Agriculture = 20-23% of global GHG emissions in 2000, and sharply growing as meat consumption is rocketing (methane from ruminants). At best Anderson thinks we can ultimately halve emissions per person – “can't get rid of feeding world”.
- **Misplaced optimism: growth in emissions from 2000-2006 used by Stern (0.96% pa CO<sub>2</sub>e) was an error**. Actual figure was 2.8% pa CO<sub>2</sub>e, based on data available to Stern at the time. **The growth in CO<sub>2</sub> emissions has been getting worse** (although this will likely dip with recession) – 2.7% pa CO<sub>2</sub> last 100 years; 3.3% pa CO<sub>2</sub> last 5 years globally. This is above the worst end of projections for the post-2000 period – our emissions are higher than ever before. **Stern's peak emissions date of 2015 is “highly optimistic”**; Stern himself now admits he doesn't think 2015 is likely.
- A more **plausible peaking date for emissions is 2020**. Using the UK's and EU's accepted “safe” threshold of 2°C human induced warming (450ppmv CO<sub>2</sub>e giving a 50:50 chance of meeting 2°C)\*, a peaking date of 2020 will require **10% pa**

**reductions in CO<sub>2</sub>e every year from 2020 onwards.** No one is prepared (politically) to contemplate this rate of reduction. The whole world's energy system must be decarbonised by 2035-45, which begs the question: "How can you carbon trade when don't have any emissions left to trade?"

- To put a 10% pa CO<sub>2</sub>e reduction rate in perspective: the UK's "dash for gas" caused a 1% pa CO<sub>2</sub> reduction, and that was excluding aviation and shipping. The nearest any society has (inadvertently) come to this level of reduction was post-break-up USSR where industrial output plummeted causing ~5% pa CO<sub>2</sub> reduction.
- Anderson and Bows examine 3°C of human-induced warming, but consider **the best we can expect is 4°C of human-induced warming** (650ppmv CO<sub>2</sub>e). 4°C is hardly business as usual – we will need to "pull out all stops" and make "step changes" just to stabilise at 4°C: **a global reduction of 3% pa in CO<sub>2</sub>e and 3.5% pa in energy and industry CO<sub>2</sub> emissions.** 4°C will probably result in the complete melting of the Greenland icesheet with a 7m sea-level rise (over 300 years), alongside the loss of the Amazon and nearly all coral reefs.

*\* Note that many people consider 450ppmv too risky – 50:50 of stopping at 2°C warming isn't very good odds. Even at this supposedly "safe" level many people in the global South will die. We have already seen 0.8C of this warming, which has been linked to changing rainfall patterns and consequent deaths in Darfur, for example.*

## **Reframing the Climate Change Agenda**

Anderson and Bows's analysis leads them to the following conclusions:

- **Keep 2°C target as the driver for mitigation policy.** We must get renewables and low carbon infrastructure in place as quickly as we possibly can. **Planned economic contraction is necessary.**
- **4°C target should be driver for adaptation policy.** This means stopping development in many coastal cities, for example. **Adaptation agenda needs completely rewriting** – we know little about what exactly 4°C rise will look like.
- Mitigation and adaptation must take place on scales with "no historic precedent", and "beyond what we've been prepared to countenance". We are entering new and uncharted territory.
- Focus on win-win situations misplaced – the enemy's already at the gates.
- There will be significant pain and many losers. How to distribute equitably? (Only 1% of world's population is responsible for 50% of world's emissions.)

## **Questions and Answer Session**

**Q. Couldn't we achieve negative carbon emissions through reforestation?**

**A. Reforestation should be done for reasons of biodiversity, but it's not reliable for CO<sub>2</sub> reduction.** CO<sub>2</sub> emissions reduction through deforestation is too ephemeral and there's uncertainty about whether it'll last because it's hard to know how weather patterns (temperatures, rainfall, droughts) in reforested areas will change. It's also hard

to predict changes in ranges of pests. For instance, if forests are killed off, damp rotting wood would release methane. We might be able to lock tree carbon away as building material providing it's locked away for 100s of years this way.

### **Q. How about burying biochar?**

A. Enriches soil and has been done historically by societies for this reason. But **how robust are soils to temperature changes we've not envisaged, like 4°C?** Temperature rises won't be uniform, what would happen to a soil if the temperature rises 7°C locally?

### **Q. Potential for technofixes, geoengineering? E.g. iron seeding of oceans.**

A. Broadly, there are two kinds of fixes: 1) Ones that absorb CO<sub>2</sub>; 2) Ones that insulate planet (e.g. space mirrors). Fixes may work in some niche ecosystems, but **need to reduce CO<sub>2</sub> emissions anyway because of ocean acidification** – what are the long-term implications of this rapid change? Also, countries who engage in geoengineering are likely to do so to protect themselves, not as a common goal [hence negative side-effects may be externalised onto other countries]. Regarding iron in oceans – we don't understand all ocean currents. It's **very hard to engineer predictable and significant changes in ecosystems**. A technofix that doesn't involve significant changes to ecosystems is the “gold-plated” approach (because it requires *lots* of energy) of using catalysts to remove CO<sub>2</sub> directly from the air, effectively producing rock. It is much easier to stop driving etc. in the first place than this! **Technofixes should be researched, but there's a danger of distracting from necessary mitigation and adaptation measures.** We need to be very cautious about such approaches.

### **Q. How can renewables scale up? Current statistics don't look good.**

A. **Supply-side solutions (alone) can't solve the problem, as they're not quick enough** – we can't get it all built and operational in the short term (e.g. will take years to replace cars with zero/low carbon alternatives), so **demand reduction is key in short term**. Supply-side solutions are more of a short-term issue for non-OECD countries, as they're often building from scratch rather than replacing existing technologies and infrastructure (e.g. China's one power station a week). We owe these countries reparations (not “aid”) to compensate them for the fact that they can't develop in the same way as we did. We must share low-carbon technology with them, and urgently.

### **Q. What hope for COP 15 (Copenhagen, December)?**

A. We **need a meaningful global emissions cap**, but it probably won't happen, a fudge is likely. Splitting the cap fairly according to nations, and individuals will make the cap become meaningful and engage everyone (supports Contraction & Convergence). Not a fan of carbon trading, but at the minimum need a global emissions cap.

### **Q. What other mechanisms can we use to reduce emissions, apart from carbon trading?**

A. **Price mechanisms are ok for small adjustments, but not step changes.** They are not an appropriate [fair?] way of allocating scarce resources, can only help a little. **We**

**need regulatory frameworks, e.g. set and enforce targets** like “all cars must produce no more than 100g/km CO<sub>2</sub>”. ABCDE rating for electrical devices – why not just prohibit lower ones? Insist all products meet A+ rating, and make this more demanding year on year. These will give a market signal. Imported goods must have a carbon footprint lower than ‘X’; the WTO is a problem here, but CO<sub>2</sub> reduction is more important. Massive reduction in CO<sub>2</sub> consumption needed in OECD countries.

### **Q. How to reduce Leeds Met’s emissions?**

A. Need to choose annual carbon budget, as long term targets not useful in practical terms. Attributing responsibilities for reduction and costs down to individual schools/buildings could be effective.

### **Q. How do politicians take Anderson’s message?**

A. Has a lot of time for them, despite disagreeing with their actions. Politicians should show leadership, but are in a dilemma as it’s likely to be unpopular to unpick what we’ve been doing over last 50 years. Scientists and public need to bolster them, help give them support and democratic mandate to make necessary changes. Critical of media for failing to inform public properly, including newspapers like the Guardian and the Independent.

### **Q. Thoughts on the “Obama Effect”?**

A. **US is good technically - driven forward a lot of beneficial technologies – but atrocious behaviourally.** Danger of US holding out for a technical solution. Obama could be a distraction, but is better than predecessor. **Continental Europe is better on behavioural change; less good technically. Technical changes absolutely essential to help non-OECD countries [supply-side emissions reduction]; behavioural changes essential to OECD countries [demand-side emissions reduction].**

### **Q. Growth of social disorder? Any modelling of effect on emissions?**

A. No. Upcoming conference on what 4°C rise means, worth sketching this out, see what it looks like, to show that it is not an appropriate aim – we should prepare for it (adaptation), but not work towards it (mitigation). Problem of increasingly short-term thinking, **need regard to intergenerational equity** (praises Stern on this count for using a 0% discount rate). **Global South will suffer, in relative silence** as far as North is concerned, as it lacks the weapons to change that. The discrepancy between who’s causing the problem and where it will hit/is hitting first is a real problem. **Very deep change is required, at philosophical and cultural levels.**

*A powerpoint presentation similar to the one presented at Leeds Met is available here:*  
[http://www.crisis-forum.org.uk/events/Workshop1\\_presentations/Anderson.pps](http://www.crisis-forum.org.uk/events/Workshop1_presentations/Anderson.pps)

*Paper on which the talk is based:*

Anderson, K. and Bows, A. (2008) Reframing the climate change challenge in light of post-2000 emission trends. *Phil. Trans. R. Soc. A.* 366: 3863-3882. URL: [http://www.tyndall.ac.uk/publications/journal\\_papers/fulltext.pdf](http://www.tyndall.ac.uk/publications/journal_papers/fulltext.pdf), Accessed: 24<sup>th</sup> February 2009.