

WHAT SHOULD NATIONAL EMISSIONS REDUCTION TARGETS BE?¹

*“It’s not enough that we do our best; sometimes we have to do what’s required”
– Winston Churchill²*

What do the required stabilization paths and the principles of allocating emissions mean for national targets? The existing UK emissions targets as defined in the UK *Climate Bill* and draft US legislation are set out and the possible implications of such targets are outlined. The consequences of those targets – and of no targets at all – are considered.

¹ Author: Stephen Stretton <stephen@stephenstretton.org.uk>

² (Wikiquote 2010; from Goodwin 2007)

Existing National Emissions Targets

UK

In order to prevent destabilization of the Earth's biosphere it is necessary to stabilize greenhouse gas concentrations at safe levels, in a time-scale that avoids the most dangerous risks associated with climate change. Long-term government targets, in conjunction with the necessary policy to achieve those targets, are important in achieving that goal. The UK government proposes a 80% reduction in UK CO₂ emissions on 1990 levels by 2050 (from 600 million tonnes CO₂ to 120million tonnes CO₂ or from 10 tonnes to 2 tonnes CO₂ per person per year).

The UK Climate Change Act (UK Department for Environment Food and Rural Affairs (Defra) 2008) sets out the concept of a climate change target and the concept of statutory budgets for carbon dioxide pollution . The UK Committee on Climate Change has recently published recommendations for the UK target at 2050 (UK Committee on Climate Change 2008)

The recommendations are as follows:

- A reduction in carbon dioxide emissions of 80% by 2050.
- A UK budget for the next three commitment periods as follows:

	Interim CO2 budget (MtCO2)		
	Budget 1 (2008-2012)	Budget 2 (2013-2017)	Budget 3 (2018-2022)
Traded sector	1233	1114	1011
Non-traded sector	1304	1235	1103
Total	2537	2349	2114

	Intended CO2 budget (MtCO2)		
	Budget 1 (2008-2012)	Budget 2 (2013-2017)	Budget 3 (2018-2022)
Traded sector	1233	1009	800
Non-traded sector	1304	1201	989
Total	2537	2210	1789

These were adopted by the government:

	Budget 1 (2008-12)	Budget 2 (2013-17)	Budget 3 (2018-22)
Carbon budgets (MtCO2e)	3018	2782	2544
Percentage reduction below 1990 levels	22	28	34
Traded sector (MtCO2e)	1233	1078	958
Non-traded sector (MtCO2e)	1785	1704	1559

UK government targets for the first three budget periods

These proposed targets are comparable to the Committee on Climate Change recommended 'interim' targets (targets to be adopted in the absence of international agreements to tackle climate change) and 'intended' budgets (see below). Source: (UK Committee on Climate Change 2008).

Actually the effective target is even less stringent since it excludes other greenhouse gases, the full warming effect of aviation, and entirely excludes international aviation and navigation and the energy embodied in imported manufactured goods.)

Consequences of Targets

We have now committed to approximately 2 degrees Celsius of warming³. Every decade delay in reducing emissions increases our warming commitment by about 0.5 degrees Celsius⁴. Every decade therefore also increases significantly the risks of catastrophic change. We can sum up the approximate response to the following way.

- Action over 20 years to avoid 2C (optimistic about cooperative response)
 - Action over 20 years in UK/EU to avoid 3C (realistic about cooperative response)
- Action over 40 years (current climate bill) will lead to at least 3C

Allocating Cumulative Targets According to Existing Emissions

Allocating According to existing emissions

Existing Emissions Budget

600MtCO2

UK 2% of world 3200MtCO2

Emissions Trajectory 50% by 2020; 90% reduction by 2030

That the UK should reduce emissions by around 90% by 2030.

3 The current radiative forcing from well mixed long-lived greenhouse gases is approximately equal to that expected to lead to a temperature increase of 2 Celsius above the pre-industrial level. IPCC scenarios envisage a rapid reduction to carbon balance by 2050 and a net drawing of carbon out of the atmosphere after that point.

4 0.35 in terms of directly committed radiative forcing increase, plus an estimated 0.15 degrees, to take account of the

US

The United States is likely to institute a target of 80% reduction by 2050, but from a much higher base level of approximately 20 tonnes of Carbon Dioxide per person per year. This shows how misleading percentage reductions can be.

- The US government targets a reduction in greenhouse gas emissions of 80% by 2050. It does not include all greenhouse gases or international aviation;
- The US government should be congratulated on such a dramatic cut; nevertheless, it may not be enough..

Even if every country adopted this model of development, global greenhouse gas concentrations would continue to rise at the current rate reaching 550ppmCO₂ only before 2050. This corresponds to 610-690ppmv CO₂ equivalent (all gases).

If everyone in the planet adopted the same per-capita limits, then we could stabilise global concentration of Carbon Dioxide at 550ppm Carbon Dioxide only, excluding other greenhouse gases, political lag, carbon dioxide positive feedbacks, methane positive feedbacks and social positive feedbacks (e.g. air conditioning demand).

- Collapse of the Amazon rainforest and other carbon cycle feedbacks might add 100-200ppmv CO₂e;
- Above 750ppmv CO₂e there would be a 82% chance of exceeding 4 Celsius of warming using the latest estimates or a 47% chance of exceeding 5C, according to the most up-to-date Hadley centre research.
- Methane (permafrost, wetlands and methane clathrate) feedbacks would add perhaps another 300ppmv CO₂e;
- Total greenhouse gas emissions would then reach 1100ppmv, equivalent to about 6 degrees of climate change - a level of increase widely regarded as catastrophic for human civilisation and the natural world; one of the most serious extinction events the planet has ever seen.⁵ The eventual temperature rise suggested by this target is about six degrees, a level of increase widely regarded as catastrophic for human civilisation (Stern, Lynas).

The following table summarizes the author's estimate for the committed temperature rise of different emissions trajectories.

			Remaining	ppmvCO ₂ e	Committed Temperature
ZeroC C&C no exceptions	100% by	2027	0.00%	50-475peak -> 400	1.8
C&C+Realism	90.00% by	2030	10.00%	450-475	2
Tyndall C&C	70.00% by	2030	10.00%	450-500	2-3
FOE	80.00% by	2050	20.00%	55000.00%	3.5
UKGov but incl aviation embodied en	60.00% by	2050	40.00%	650+200FB	5
Current UKGov Climate Bill	60.00% by	2050	40.00%	700+400FB	6
Business as usual	0.00%	2100	100.00%	1100+600FB	9

⁵ There is 3000GtCO₂ Methane (Permafrost & Wetlands) according to the Stern review + adding 300ppm to the atmosphere. This would lead to concentration of greenhouse gases over 1000ppm or temperatures over 6 degrees more than the pre-industrial level. At this level of temperature, we suggest the situation is very likely to destabilise the methane clathrates in the Arctic Ocean.

Conclusions

The current US and UK greenhouse gas targets are to be welcomed, but are not enough to avoid a world extinction on a scale last seen with the end of the dinosaurs. Even if we hit the target of reducing carbon dioxide pollution – and most other countries adopt a similar approach – the world could be committed to up to six degrees Celsius of climate change.

The impacts would include the collapse of the Amazon rainforest and most of the world's fertile farmland turning to desert. Rising seas would flood major cities such as London, New York, Shanghai and Calcutta. It would lead to the extinction of most life on Earth.

If the US is to lead, it must lead much more strongly. Current targets are simply not enough. We need to avoid 2°C of climate change based on convergence to safe and fair equal per-capita emissions. This may mean a 90% reduction in all greenhouse gases by 2030 in the UK.

The proposed US target is a 80% reduction in the rate of pollution by 2050, to a rate of 4 tonnes of Carbon Dioxide per person per year (our current carbon footprint is 10 tonnes of Carbon Dioxide each). If everyone in the world adopted this rate of pollution (a principle often referred to as 'contraction and convergence'), the level of Carbon Dioxide in the air should stabilize at double the pre-industrial level.

However, there are other gases which warm the planet, such as Methane. Including these, and making a rough estimate of the political lags, compromise, and slippage inevitable in global politics, the total effect is likely to be close to triple the pre-industrial level. The rise in global temperatures would then be as much as 4 or 5 degrees.

With only 3 degrees Celsius of climate change, the Amazon Rainforest would dry out, die and burn, releasing huge quantities of Carbon Dioxide into the atmosphere. The frozen bogs of Siberia are already starting to melt and this process would accelerate at releasing huge quantities of Methane into the atmosphere, a greenhouse gas 20 times more potent than Carbon Dioxide.

With a rise of 4 or 5 degrees Celsius – double that at the poles – we threaten to awake the 'sleeping giant', huge quantities methane trapped in a cage of ice on the Arctic ocean floor, accelerating global warming to a destructive crescendo.

Greenhouse gas concentrations could then reach four times pre-industrial levels, and the world would warm by at least 6 degrees, a level well understood to be effectively fatal for human civilization and the natural world.

We have seen carbon emissions on this sort of scale before: at the end of the Permian era methane releases were probably triggered by a super-volcano in an already warmed world. Life nearly died. The oceans turned anoxic – lacking oxygen and effectively dead – and only one major land animal survived. 95% of species were made extinct.

The US climate change targets need to be stronger and consistent with avoiding catastrophe. We need a 90% reduction in greenhouse gas emissions⁶. Most - if not all- of this reduction can and must be achieved by 2030. Only then will our children inherit a world without the imminent threat of global destruction.

⁶ A 10% year on year reduction in greenhouse gas concentrations. The 10/10 campaign argues for a 10% reduction in the year 2010, which would be consistent with this goal.