Climate Urgency

The looming catastrophe of feedback emissions/effects

A year ago (July 2016) John Schellnhuber et al published a Paper in NATURE in which the assumptions about feedback effects were summarised in this image.

As the image shows, projections are based on RCP scenario 2.6 from IPCC AR5 (2015). It shows the 'modelled estimate' that the big feedback effects will only begin to bear above 2.0° C around 3.0° to 4.0° C some decades into the future.

RCP 2.6 is a carbon emissions 'scenario' that was presented as 'policy-relevant'; RCP 2.6 is the lowest of the four RCP scenarios in IPCC AR5

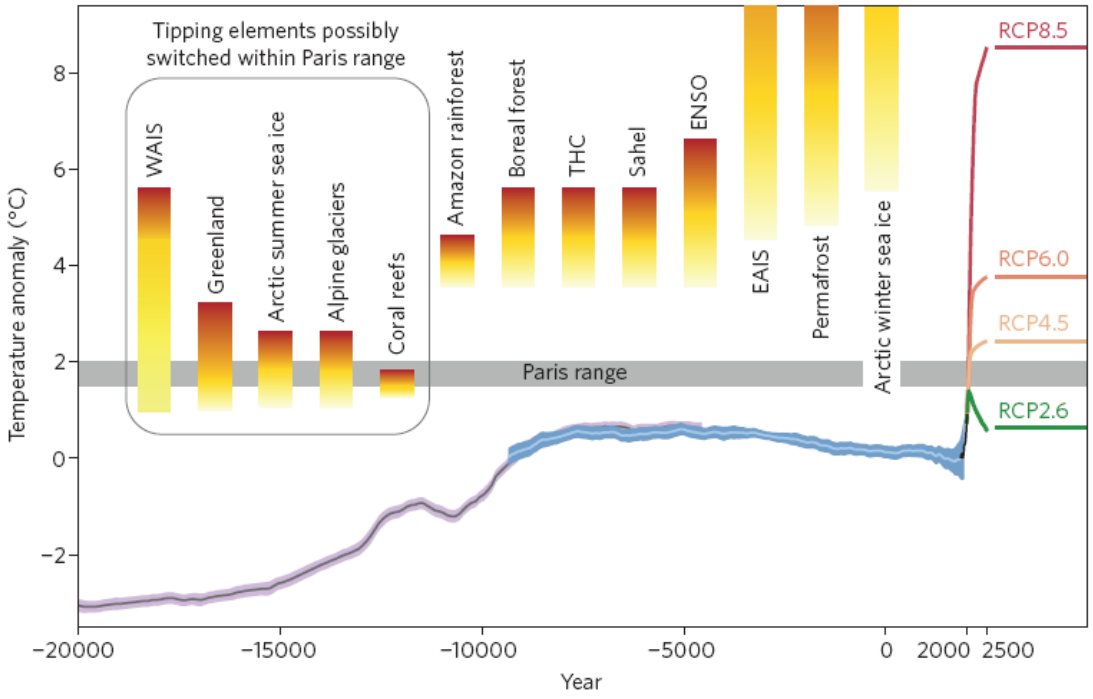
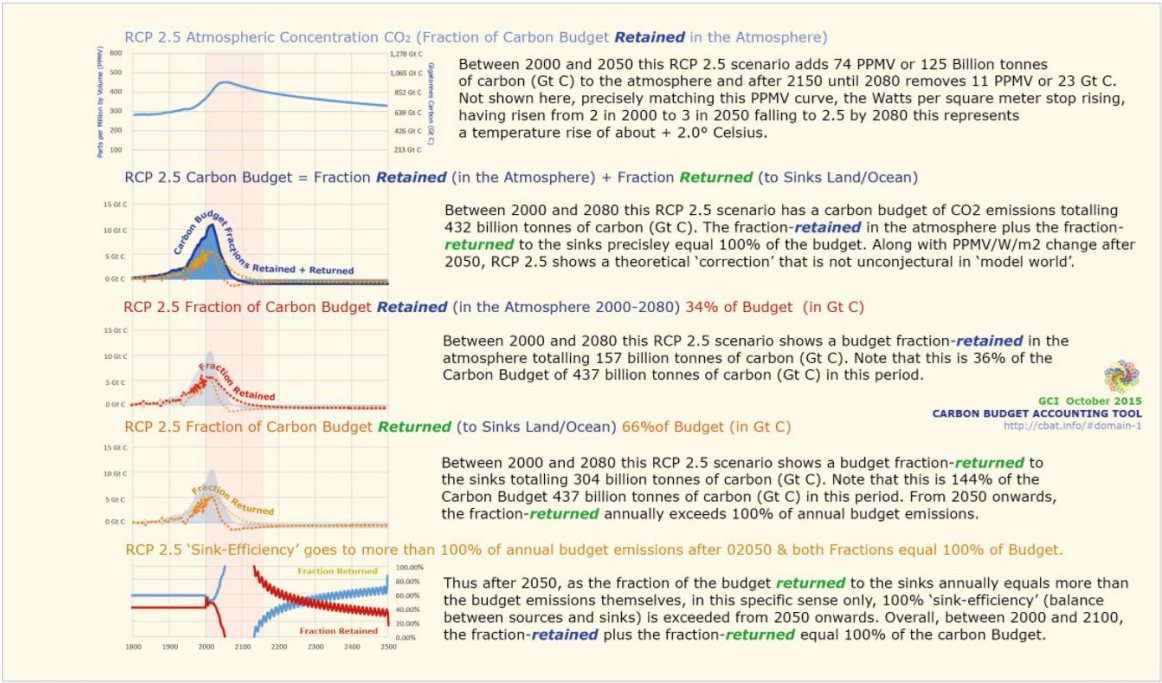


Figure 1 | Tipping elements in context of the global mean temperature evolution. Shown is the global-mean surface temperature evolution from the Last Glacial Maximum through the Holocene, based on palaeoclimatic proxy data[35,36] (grey and light blue lines, with the purple and blue shading showing one standard deviation), instrumental measurements since 1750 AD (HadCRUT data, black line) and different global warming scenarios for the future (see ref. 37 for the latter). Threshold ranges for crossing various tipping points where major subsystems of the climate system are destabilized have been added from ref. 8, 14 and 37–40. (Note that we follow the tipping point definition of Lenton *et al.*[8] which does not require irreversibility, so that sea ice cover is included here.) The range for the West Antarctic Ice Sheet (WAIS) has been adapted to account for the observation that part of it has probably tipped already[10,11]. THC, thermohaline circulation; ENSO, El Niño–Southern Oscillation; EAIS, East Antarctic Ice Sheet.

RCP 2.6 is a scenario modelled before 2010 with no positive feedbacks in it. It projects a fall in atmospheric CO2 concentrations after 2050, as it assumes a 'sink-efficiency' greater than 100% by 2050. In other words, the scenario assumes an overall negative feedback where CO2 sinks become greater than the human CO2 sources, as these are projected to fall after 2050.

GCI did not and does not agree with that projection of 'improving' sink-efficiency. We made this clear in evidence to the Environmental Audit Committee of the UK House of Commons in 2009 and again in 2013.

Much safer than the rest and also widely promulgated by UKMO/IPCC as 'policy advice', RCP 2.5 is a scenario conjecture as it shows more than 100% sink-efficiency after 2050. Triggering climate changes, rapid warming & a runaway feedback is much less likely than with the other RCP scenarios. However, it is not impossible as again significant feedback effects have been omitted. The reversal of the *'source-sink-ratio'* from 443 PPMV from 2050 is shown as a function of the budget computed (net 432 Gt C 2000-2100 i.e. 5Gt C neg).



UKMO deny this methodology was used. They also don't know how to model Rapid Interactive Feedback Effects [RIAFE] potential as future [a] human budget emissions are unknown & [b] rates of RIAFE are unknowable but can't be ignored. http://cbat.info/

The UKMO admitted on its web-site in 2010 that they had omitted feedback emission/effects; these web-pages were quoted in the evidence to EAC in 2013 on pp 13 & 14. However, during that enquiry in 2013 the UKMO denied these omissions, so GCI rebutted the UKMO's denial - tensions remain about this.

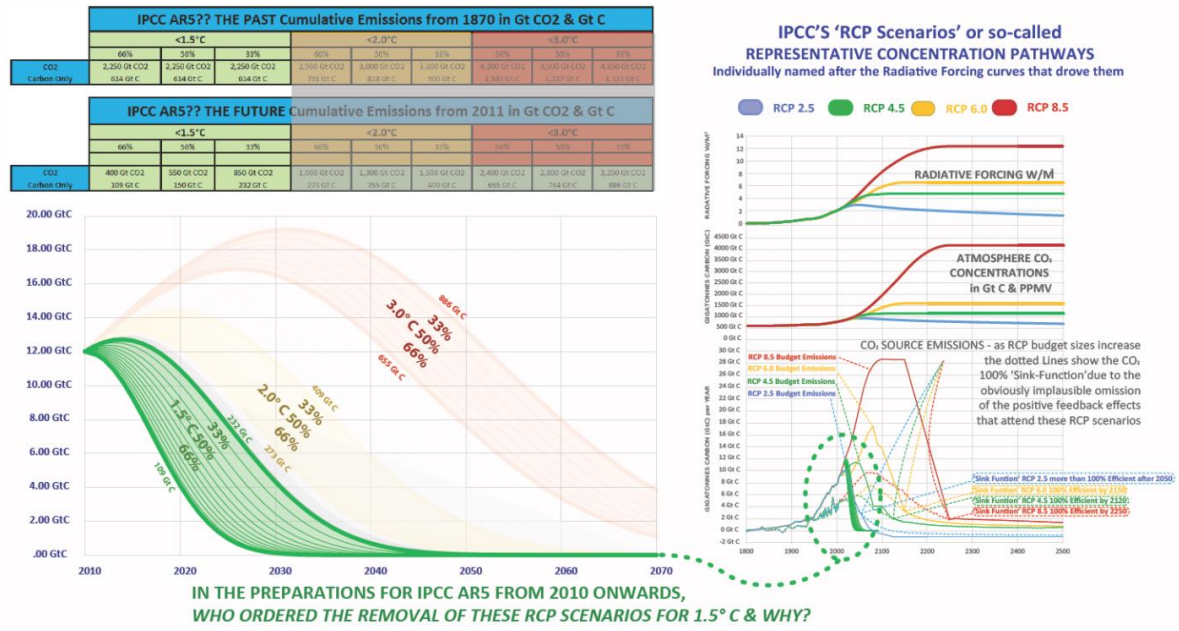
Nor did we agree with the UKMO disinforming the Parliamentary Enquiry about this whole matter to defend that omission and this is why we also introduced the Carbon Budget Accounting Tool (CBAT) into that evidence.

Separating budget emissions from feedback emissions, but linking their user-controls, CBAT has been well received.

Feedbacks and their 'sign' remain the most contentious area of climate modelling. Increased concern about the 'acceleration dangers' of rapid interactive feedback dynamics, helps explains why the Paris Agreement contained a commitment to a temperature ceiling of below 2.0° C & as near to 1.5° C as possible. This was embarrassing for the 'climate modellers' working at the UKMO as they were part of a decision as early as 2010 that any RCP policy-relevant scenarios for 1.5° C were excluded from AR5 preparations.

RCP input to IPCC AR5 (pub Dec 2014) was coordinated by UKMO between 2010 & 2014. All the CARBON BUDGETS for 1.5° C in the RCP 'Scenarios' were already avaliable in 2010. Who decided to eliminate all budgets for 1.5°C from all AR5 preparations (already in 2010) for the 'Summaries for Policy-Makers' in IPCC AR5 & substitute only 'Scenarios' for 2° C to 10° C?

The Paris Agreement (Dec 2015) now 'in force', aims to keep as near to a 1.5° C temperature maximum as is possible.
The initial removal & final concealment of this information from SPMs was culpably irresponsible.



They were re-introduced after the fact in the AR5 Synthesis Report of 2016 in response to the 1.5° C commitment in the Paris Agreement (December 2015).

B.2 Source of 'future carbon budget' data - 2011 onwards Calculation of 'future' budgets' (path-integrals) adjusted to 2014 onwards

Integrals (weight totals) for Carbon budgets are taken from the Intergovernmental Panel on Climate Change's Fifth Assessment Report (AR5); see Synthesis Report, page 64, table 2.2
https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

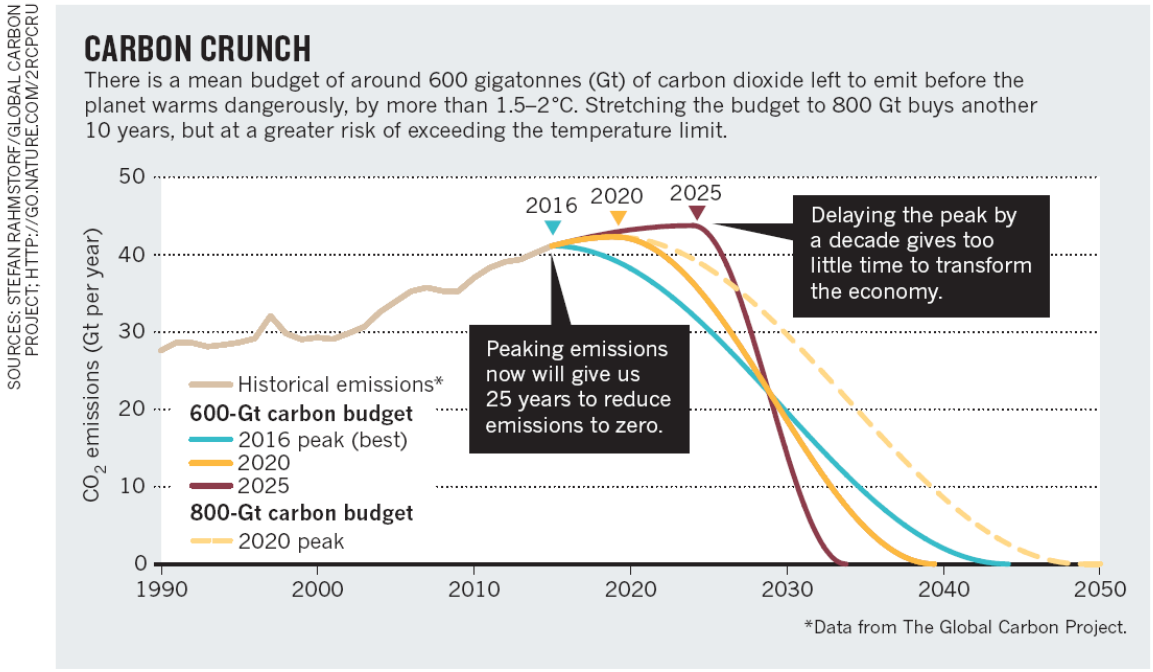
Cumulative CO_2 emissions from 1870 in $GtCO_2$									
Net anthropogenic warming	<1.5°C			<2°C			<3°C		
Fraction of simulations meeting goal	66%	50%	33%	66%	50%	33%	66%	50%	33%
Complex models, RCP scenarios only	2250	2250	2550	2900	3000	3300	4200	4500	4850
Simple model, WGIII scenarios	No data	2300 to 2350	2400 to 2950	2550 to 3150	2900 to 3200	2950 to 3800	n.a.	4150 to 5750	5250 to 6000
Cumulative CO_2 emissions from 2011 in $GtCO_2$									
Complex models, RCP scenarios only	400	550	850	1000	1300	1500	2400	2800	3250
Simple model, WGIII scenarios	No data	550 to 600	600 to 1150	750 to 1400	1150 to 1400	1150 to 2050	n.a.	2350 to 4000	3500 to 4250
Total fossil carbon available in 2011 : 3670 to 7100 $GtCO_2$ (reserves) and 31300 to 50050 $GtCO_2$ (resources)									

1. Budget 1: 550 Gt CO2, as from 2011, for 50% odds of <1.5° C
2. Budget 2: 850 Gt CO2, as from 2011, for 33% odds of <1.5° C
3. Budget 3: 1300 Gt CO2, as from 2011, for 66% odds of <2.0° C

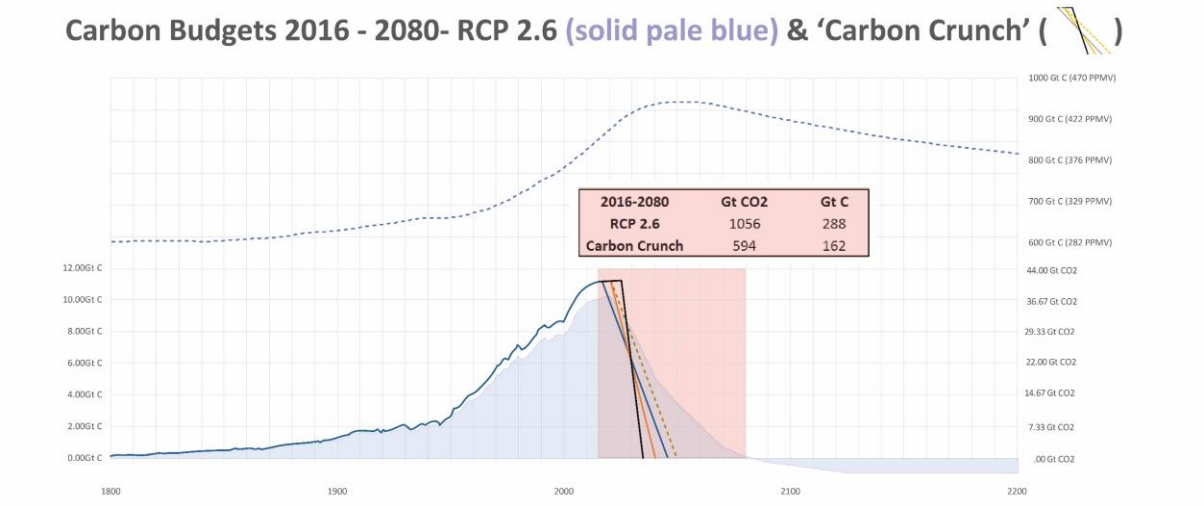
- These Budgets are expressed in Gigatonnes of carbon (i.e. a billions of tonnes).
- Here, they're converted into 'carbon only' by dividing by the conversion factor of 3.664
- So 'carbon only' budgets are: Budget 1: 150 Gt C; Budget 2: 232 Gt C; Budget 3: 272 Gt C
- 33 GtC has also been deducted from each of those three budgets, reflecting carbon already emitted 2011, 2012 & 2013, to become 117 Gt C, 199 Gt C & 240 Gt C respectively.
- These are then plotted as 'path integrals', with very slight differences in weight between the carbon integrals only from the IPCC Synthesis Report and the more information complete Green, Amber & Red 'carbon-budget-path-integrals' used in this Blueprint Report.

These now inform the Plan B report for the intended Judicial Review later this year, of the British Government's under-performance on climate change.

Now only a year later John Schellnhuber et al have just published a [Paper in NATURE] ‘Three Years to safeguard our climate’ (June 2017) in which the key summary image is this 'Carbon Crunch'.



For reasons of a heightened sense of urgency about avoiding runaway rates of climate change, the Schellnhuber projections essentially halve the weight of & double the contraction-rate of the RCP 2.6 carbon budget (comparison here).



GCI has been saying this to EAC constantly since 2009 and now finally (only in 2017 eight years later) these IPCC peers are saying this too.

These same folks have just *halved their 'safe' carbon budget* (2016-2080), down from 1,000 Gt CO2 (290 Gt C - RCP 2.6) to just 600 Gt CO2 (160 Gt C).

In summary, it is a very simple comparison

2016-2080	Gt CO2	Gt C
RCP 2.6	1056	288
Carbon Crunch	594	162

Why? What happened? This is hardly a 'marginal adjustment'. What has finally forced these actors into essaying this extent of an adjustment to their former position? Why didn't it happen much sooner, when the chances of achieving compliance were better than they are now?

What I am saying is that this performance from IPCC experts, who have only now desperately revised their carbon budgets downwards at this late stage, implies that climate modelling to date has just been a game of avoidance and bone-throwing with regard to the big feedbacks, especially when people like John Schellnhuber and his colleagues previously suggested that they only kicked-in after 3-4° C, some to many decades from now!

I don't want to believe he still holding to that. I certainly hope not.

GCI is in favour of: -

- Declaring global rates of climate change an emergency
- A demand for smaller carbon budgets reflecting 'increased urgency';
- The UK Government being legally compelled to get behind this.
  This will drive the 'food-chain-obedient' iteration of 'scientific caution' into a more candid and realistic assessment by society at large of where we now are with continued fossil fuel production and consumption in relation to feed-backs & the proximity of 'tipping points' and the climate-catastrophe that presently looms (Sir David King) if we control human emissions too little and too late.

This certainly calls into question the reliability of the conservative modelling in the IPCC - 'tipping points' to these feedback effects represent a looming catastrophe that is more imminent than these authors have been prepared to recognize. GCI recognizes this new statement as much nearer the carbon-budgets projected as the basis of the case in Blueprint Plan-B to prevent this.

We are in an emergency that should have been declared much more widely at least 25 years ago.