The UK's fair carbon budget will run out in 2027: here's the evidence

Dr Ian Campbell shows how, on current trends, Britain's carbon emissions will, within two years, exceed its fair share of the estimated global total that will breach the 1.5°C Paris target. He outlines the key implications for policy-makers and society as a whole.

There is much agreement that CO_2 emissions must be markedly reduced in order to limit climate change, but less agreement on how fast this must be done, with the UK government having a Net Zero 2050 policy,[1] and others advocating a 2040[2] or 2030[3] limit.

Proper planning requires policies to be based on robust scientific evidence. This article summarises the science of carbon budgets and the choices that the UK has concerning the speed of its emission cuts.

The science of carbon budgets

About half of the CO_2 released from burning fossil fuels and deforestation remains in the atmosphere for centuries or millennia, so the concentration of CO_2 is steadily rising. As the atmospheric CO_2 rises, the average global temperature rises. From the amount of CO_2 emitted in the past, and the effect that it has had, we can estimate how much more CO_2 can be emitted if global heating is to be kept below a particular limit such as 1.5°C. This is known as the CO_2 budget, or carbon budget.

In the Paris Agreement of 2015,[4] countries committed to restrict global temperature change to well under 2°C, and pursue efforts to keep it below 1.5°C. This translates to limiting further global CO_2 emissions to the appropriate carbon budget. Greenhouse gases other than CO_2 are of much less importance in the long term because of either their relatively short persistence in the atmosphere or their low proportion of overall emissions. Regarding division of the global carbon budget between countries, the Paris Agreement specifies that developing countries can increase emissions for a period to facilitate economic development and poverty alleviation, while developed countries must reduce emissions immediately (i.e. faster than the global total), and specifies equity between nations, which is usually interpreted as an equal share for each person of the global carbon budget.

The scientific consensus is that we can be 67% confident that global heating will be limited to 1.5°C if total global emissions since the start of 2020 are limited to 400 billion tonnes CO_2.[5] This budget of 400 billion tonnes has been used as the starting point of several analyses of possible pathways of UK emission reduction.[6, 7, 8] However, the UK's failure to cut emissions means that all of the UK's share of this 400 billion tonnes will be used up in 2025, and it no longer makes sense to discuss how the UK might use this share. We have to accept this as a policy failure, and instead consider a larger global carbon budget that will be less certain to keep the planet within the 1.5°C commitment, namely the 500 billion tonnes that has only a 50% chance of achieving the 1.5°C aim.[5] This 500 billion tonnes is approximately 63 tonnes per person on the planet. This is a lifetime limit, which at current rates, will run out in a country with average emissions in 2033.

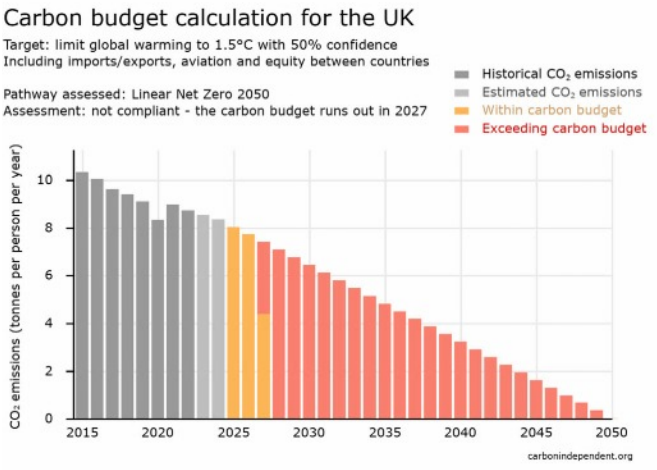
The UK's fair carbon budget for 1.5°C

The UK's CO_2 emissions are currently just over eight tonnes per person per year,[9, 10] and the UK has already used around 43 tonnes of its per capita budget of 63 tonnes in the five years to the end of 2024. This leaves a residual budget from ≫

the start of 2025 of 20 tonnes CO_2 per person. If emissions continue with little change, this will run out in just over two years from the start of 2025, i.e. in 2027, much sooner than generally discussed.

Below are a number of pathways for emission reduction which illustrate the choices in the UK. The carbon budget charts have been generated by the calculator at the Carbon Independent website,[11] and can be replicated there via a user interface. Similar calculations and conclusions have been published in academic reports[6, 12, 13] – demonstrating that many in the climate science community already understand and accept the validity of this sort of analysis.

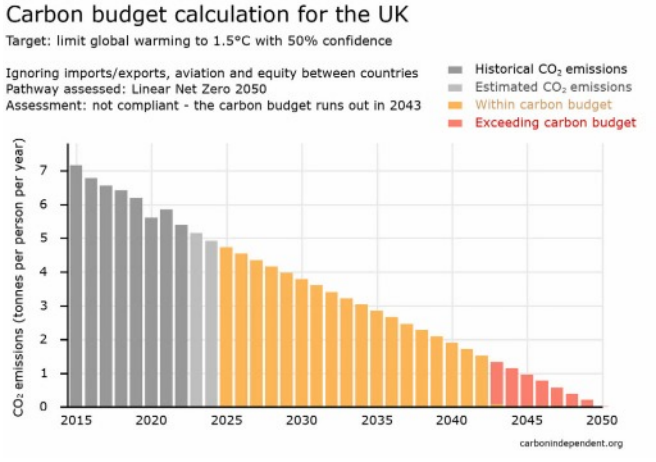
1. Net Zero 2050 (linear decline): not compliant with the carbon budget



A pathway often discussed is 'Net Zero 2050', where net CO_2 emissions are reduced to zero in 2050.

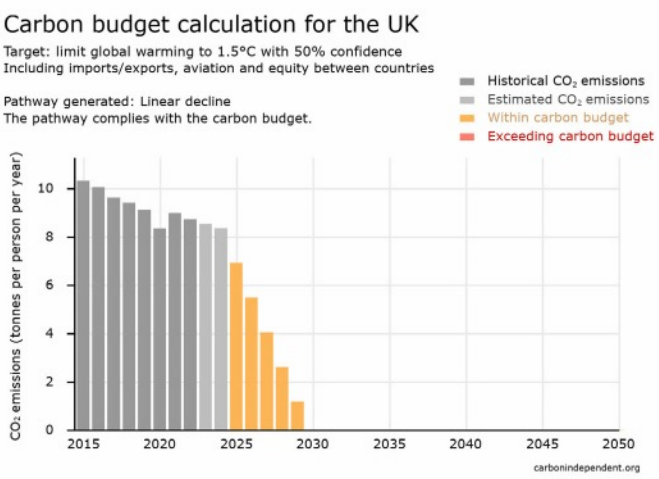
One version of this is to cut emissions steadily, by the same amount each year, which gives a sloping straight line on a chart of annual emissions. This can be termed 'linear decline'. The carbon budget runs out in 2027, and so the pathway is not compliant with the residual carbon budget. In fact, it would emit nearly three times as much CO_2 as the carbon budget of 63 tonnes per person.[6, 11]

2. Net Zero 2050 (linear decline) ignoring imports/exports, aviation and equity between nations



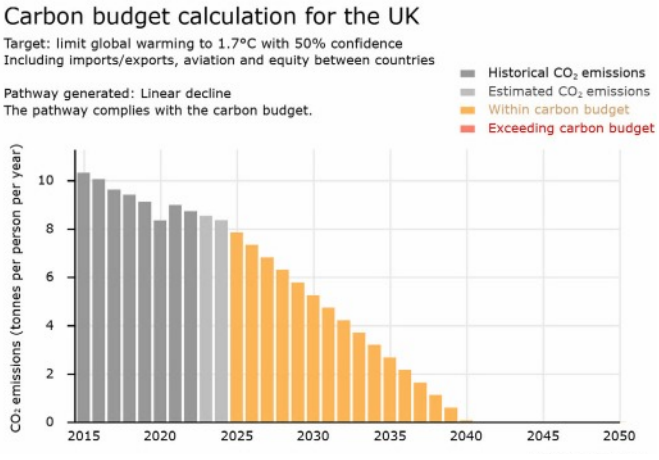
Some published carbon budget calculations ignore emissions generated in imports/exports and also ignore aviation emissions and the Paris commitment to equity between nations. By using these accounting methods, and taking more than the UK's fair share of the global budget and ignoring some of its emissions, the UK's budget lasts almost until 2050 (see chart). This is essentially the UK government's approach.

3. Compliant linear decline for 1.5°C



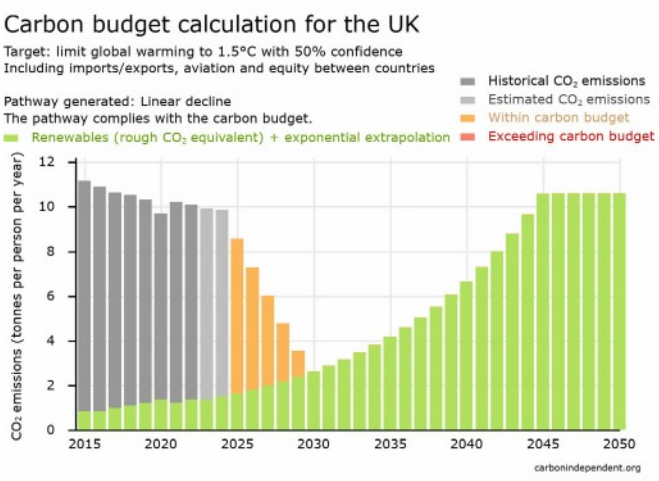
The third chart shows how fast emissions need to be reduced in order to comply with a fair UK carbon budget, if falling as a linear decline. Emissions must reduce to zero in 2030. This is the demand of the campaigning group Just Stop Oil.[3] So the demand of Just Stop Oil is in line with the Paris Agreement, whereas the UK Government's strategy is not.

4. Compliant linear decline for 1.7°C



With the lack of honest accounting and proper discussion, we must consider scenarios where the 1.5°C fair budget is exceeded. This chart shows a pathway compliant with a 1.7°C fair UK carbon budget. Emissions fall to zero in 2040.

5. Compliant linear decline for 1.5°C with renewable energy



UK renewable energy use has increased by 60% in the last five years,[14] which equals a 10% compound annual increase.

The final chart shows this UK renewable energy use as a 'CO_2 equivalent', together with extrapolation on the basis that this 10% annual growth continues.

Clearly, rapid phasing out of fossil fuels means a radical reduction in total energy use, but this need only be temporary.

Conclusions

The conclusions from the calculations are as follows.

- The UK's fair carbon budget for aiming to limit global warming to 1.5°C will run out in two years at current emission levels.
- The UK's current Net Zero 2050 timescale of emission cuts is grossly inadequate – it is derived by ignoring the commitment to equity between nations, ignoring emissions generated in the manufacture of imports, and ignoring aviation.
- If the UK wants to keep its promises under the Paris Agreement, urgent radical reduction in fossil fuel use is necessary, i.e. over 90% by 2030.

While these conclusions are based on the scientific consensus, they are not widely understood, let alone discussed.

Given the very limited timescale, technologies with long lead times for deployment such as carbon capture and storage are not viable solutions. The main focus needs to be on rapid expansion of existing renewable energy technologies (such as wind and solar), energy efficiency measures, and behaviour change. Strong action to curb fossil fuel extraction is also essential.

Political and industrial decision-making on climate change has failed, and needs major reform.

In order to make good decisions on climate change, there must be an honest debate based on robust scientific evidence, and an understanding of the immense harm being done to people and planet by the current lifestyles of the world's wealthier groups.

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This is a shortened version of the blog at: https://www.carbonindependent.org/177.html

References

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