

So, first of all an introduction to myself...

- I am a Professor of Climate Science at the University of Bristol, and have been at the University for 18 years, since doing a PhD in Meteorology at Reading, and a degree in physics before that at the University of Oxford.
- I am a Lead author on the recent United Nations Intergovernmental Panel on Climate Change (IPCC) report, that came out last month.

Reason for giving evidence

- I thought it would be useful context to highlight some of the findings from this recent IPCC report that are relevant to this inquiry.
- So, will start with introduction to the IPCC, then make 3 points, which in brief are:
 - (1) To remind the enquiry of the UK's obligations under the Paris Agreement to limit warming to well below 2 degrees, and preferably to 1.5 degrees.
 - (2) The science shows that that every ton of carbon that is emitted increases temperatures, and that in order to reach our Paris obligations, immediate, rapid and large-scale reductions in greenhouse gas emissions are needed. Increases in emissions take us further from these targets, that are enshrined in law.
 - (3) The science shows that additional warming means additional risks and impacts associated with climate change, including flooding, sea level rise, and heat waves. There is a marked difference between, for example, 1.5 and 2.0 degrees – every bit of warming counts.

IPCC

- Intergovernmental Panel on Climate Change, or IPCC, is a United Nations body set up to provide policymakers with assessments of the science related to climate change, its impacts and future risks, on a ~7 year cycle [*IPCC Press release*; https://www.ipcc.ch/site/assets/uploads/2021/08/IPCC_WGI-AR6-Press-Release_en.pdf].
 - Most recent report, 6th Assessment report, came out in 9th August this year.
 - Written by over 200 scientists from more than 60 countries
 - The report received over 78,000 review comments
 - Approved by governments of the UN, including the UK.

Point 1: The Paris Agreement

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. [*UNFCCC; United Nations Framework Convention on Climate Change*; <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>]

Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels [*UNFCCC*].

The UK has signed up to this agreement.

In addition, UK is committed to bring all greenhouse gas emissions to net zero by 2050 [<https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>]. UK has enshrined in law a new target to cut emissions by 78% by 2035 [<https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>].

1 or 2 degrees may not sound a big number, but it is in fact huge from a climatological sense. To put it into context, the last ice age was about 5 degrees colder than modern [Tierney et al, 2020], a time when much of the UK was covered with 1 km of ice [Britice reconstructions]. We have already warmed by about 1 degree over the last ~150 years – equivalent to 20% of an ice age!

Point 2: Every ton of carbon important

The report states that *“This Report reaffirms with high confidence...that there is a near-linear relationship between cumulative anthropogenic CO₂ emissions and the global warming they cause [D.1.1]”*. This means that every ton of CO₂ emitted leads to additional warming.

The report also states that *“This relationship implies that reaching net zero anthropogenic CO₂ emissions is a requirement to stabilize human-induced global temperature increase at any level [D.1.1]”*. This means that we need to achieve net zero in order to stop the earth warming.

The report goes on to state that in order to stay below 1.5 degrees of warming by the end of this century, we need to achieve net-zero by 2050. [Key messages document, B.1.3]. This means that to reach this target agreed by the UK, we need to cease emissions by 2050. The message from the report is that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5°C will be beyond reach. [Key messages document].

Point 3: Additional warming is additional impacts

The message of the report is that recent changes in the climate are widespread, rapid, and intensifying, and are unprecedented in thousands of years. It is indisputable that human activities are causing climate change. Human influence is making extreme climate events more severe [Key messages document].

The key thing is that every bit of warming counts. The report states that *“every additional 0.5°C of global warming causes clearly discernible increases in the intensity and frequency of hot extremes, including heatwaves, and heavy precipitation, as well as agricultural and ecological droughts [B.2.2]”*.

It goes on say *“Additional warming is projected to further amplify permafrost thawing, and loss of seasonal snow cover, of land ice and of Arctic sea ice [B2.5]”*. At 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health [IPCC press release].

Impacts will be felt in the UK. The report shows that extreme precipitation and flooding is projected to further increase at global warming of 1.5 degrees [Regional Fact Sheet Europe]. More locally, sea level rise is of crucial concern in Somerset, including of course in Weston Super Mare. A study in 2013 by Quinn et al from our department at the University showed that with a 1 metre sea level rise the hazard was of the order £10 million per year in North Somerset, which is where we could be by 2100 in a high-emissions scenario.

[<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/jgrc.20412>]

But, the science shows that the most severe impacts will be felt by the most vulnerable around the world – whereas it the developed world that contribute by far the most to the emissions that cause these impacts. By reducing, not increasing, our carbon footprint, we can make a difference, not only locally but globally and for the most vulnerable.