



Achieving Net Zero Greenhouse Gas Emissions in the UK

Background

Climate change is already causing devastating impact around the world, with a 1°C global average temperature increase so far. In 2017 alone, heavy monsoons in south Asia caused the deaths of 1,288 people and affected over 45¹ million in Bangladesh, India and Nepal. Thirty percent of the world's population experienced extreme heatwaves, so that drought caused 892,000 people to be internally displaced in Somalia, and wildfires in Portugal killed over 100 people and destroyed 520,000 hectares of forest. The Arctic saw record wintertime heat and a record low winter sea ice extent (the third new record in three years), and warming saw the calving-off of one of the largest icebergs ever recorded in the Antarctic. Coral reefs suffered the third-ever global bleaching event, with ocean acidification making it harder for reefs to recover. Such bleaching events had not been observed until as recently as 1998.¹ Even at 1°C of warming, climate impacts have been devastating.

Current international pledges to cut emissions place us on track for around 3°C of warming.²

In the 2015 Paris Climate Agreement, in an effort to limit the impacts of a warming world, 195 countries agreed both to "pursue efforts" to limit warming to 1.5°C and to achieve net zero emissions – where any emissions produced are counterbalanced by an equal amount being absorbed. Climate models generally indicate that net zero and peaking emissions quickly are prerequisites for achieving the 1.5°C goal. The Paris Agreement also requires that developed countries, like the UK, take the lead on climate action.

The UK is responding to the Paris Agreement. During the 2018 Commonwealth Heads of Government Meeting, the government announced its intention to formally request the Climate Change Committee to model and report on the implications to the UK of the Paris 1.5°C goal.³ The climate minister has previously

written: "The UK will need to legislate for a net-zero emissions target at an appropriate point in the future".⁴ Now would seem to be the appropriate time.

Why did Paris agree a 1.5°C temperature goal?

Countries highly vulnerable to climate impacts, including the small island states and Least Developed Countries, have long supported the 1.5°C goal as a means to minimise the climate impacts they will suffer. The 2°C goal, previously promoted by the EU, was agreed in 1996, and based on contemporary science. New research is shedding light on significant differences between these two temperature goals in terms of their expected impacts.

Impacts at 2°C vs 1.5°C

A recent study⁵ found that compared to 1.5°C, warming of 2°C led to:

- 36% longer heatwaves
- 10cm greater sea level rise by 2100 – 50cm vs 40cm
- Virtually all tropical reefs at risk, compared to the survival of some
- 20% less fresh water available, compared to 10% less, in the Mediterranean
- 50% reduction in maize and wheat crops in Central America and West Africa.

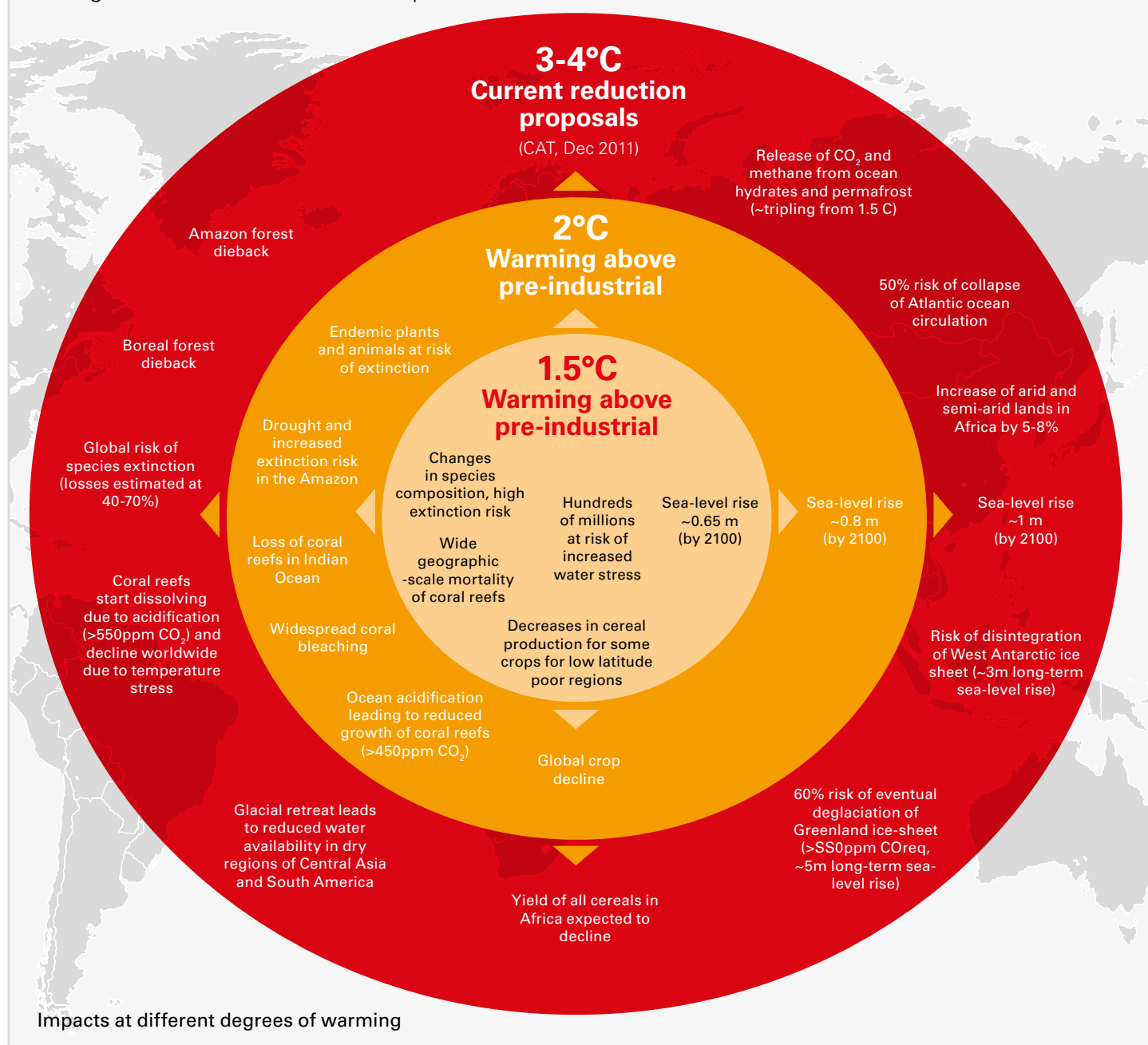
The study stated:

"[T]he additional 0.5°C increase in global-mean temperature marks the difference between events at the upper limit of present-day natural variability and a new climate regime, particularly in tropical regions."

Other studies^{6,7} have found increased flood and drought risks, depending on region, at 2°C compared to 1.5°C, with negative impacts on food security.

A snapshot of a warming world

As the agreements in Durban do not propose additional action before 2020, the risk of exceeding 2°C remains very high. Action to implement the Durban Agreements will need to be quick to increase emission mitigation, to have a chance of deviating projected warming from the current pathway leading to 3.5°C by 2100. A limit of 1.5°C will already lead to considerable impacts, and more with 2°C. But with temperature increases heading towards 3.5°C, the impacts reach a distinctly higher level of risk. The impact examples in this figure are illustrative and not comprehensive.

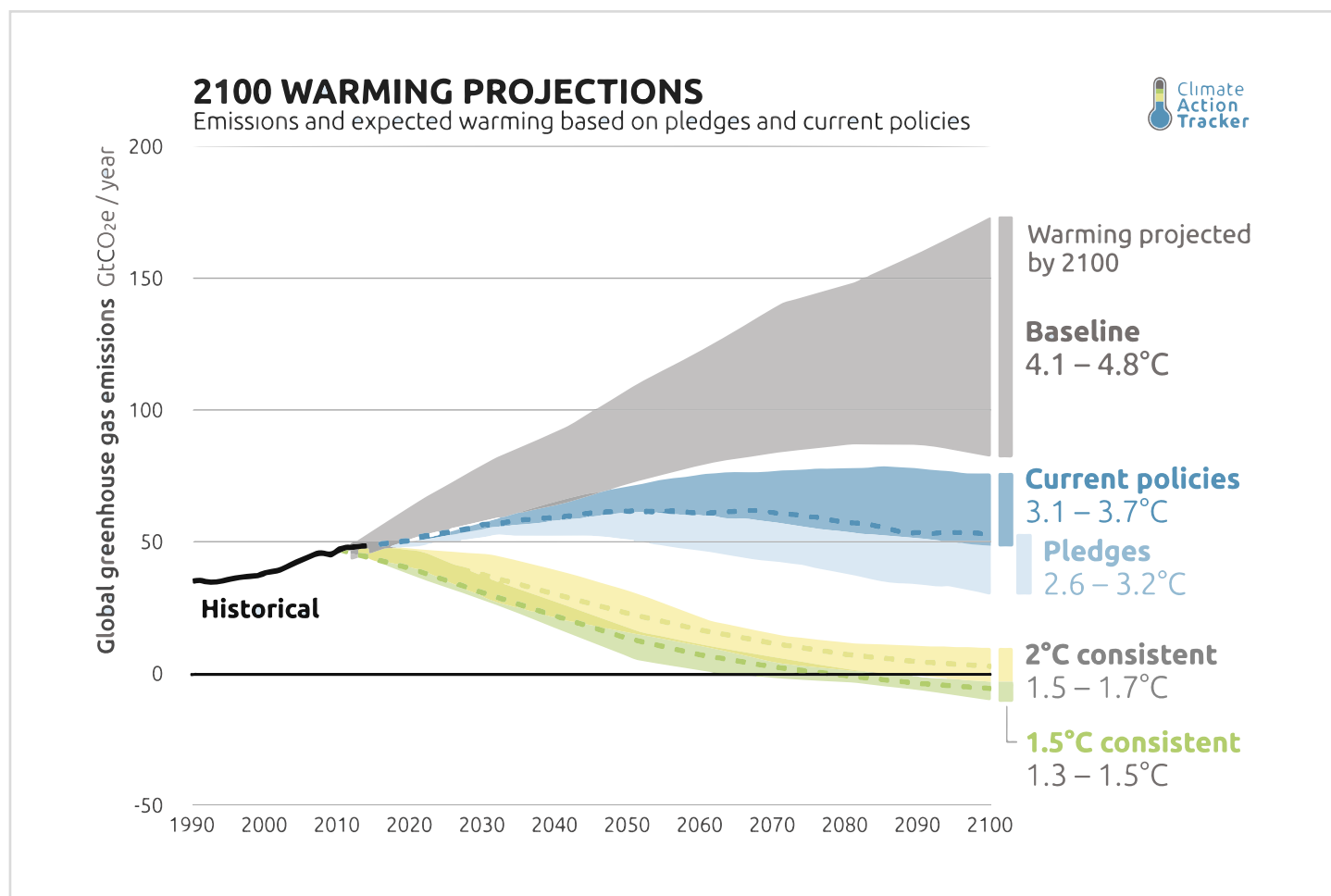


Impacts at different degrees of warming

The total ambition put forward by parties to the Paris Agreement is far from the 1.5°C they agreed to try to deliver. The totality of contributions on the table is currently consistent with over 3°C of warming, which would have disastrous consequences for life on Earth.

Why 'net zero'?

The most important factor in determining how much warming the Earth will experience is the cumulative emissions of greenhouse gases (GHG) – the stock of gases in the atmosphere, rather than the flow of emissions into it⁸. This is a function of both when emissions peak and when they reach net zero. Some modelling (below) indicates that negative emissions may well be needed in future. In other words, limiting warming to 1.5°C relies on how quickly and strongly we act.



Climate models indicate that there is a very limited global GHG budget remaining if the 1.5°C goal is to be met with a reasonable probability, and that some negative emissions may well be required.

Analogously to the waste hierarchy 'reduce, reuse, recycle' – where 'reduction' is 'better' than recycling – **Christian Aid advocates that emissions reductions are best achieved, in broad terms, by prioritising action through the hierarchy of:**

- **consuming less energy and material, with a complete end to use of fossil fuels**
- **using resources more efficiently (efficient homes, public transport, etc)**
- **using renewable energy and sustainable materials.**

This hierarchy has the effect of placing the emphasis on what is most needed: rapid and deep reductions in greenhouse gas emissions, through the most precautionary and sustainable means, to avoid the worst impacts of climate change.

Even if emissions are indeed rapidly reduced to low levels, it seems likely that negative emissions – the large-scale removal of carbon dioxide from the atmosphere – may be needed well before the end of this century. Although achieving zero, or at least very low emissions, is possible in many sectors even with currently available technologies, some sectors seem likely to still be sources of emissions by 2050. For example, for aviation and agriculture, it will be challenging to achieve zero emission.

Real discussion is needed on how to minimise aviation use and high-carbon meat and dairy consumption, while innovation in both sectors is needed to minimise emissions from both. However, it may have to be accepted that there will be residual emissions from both which need to be balanced by negative emissions. Negative emissions options should in no way be considered as an alternative to deep emissions cuts, but a probable necessity only for those areas where zero emissions are not viable.

Just as with reducing emissions, there are ways to achieve this that are more environmentally and socially sustainable than others. Not all negative emissions approaches are equal. Some are active threats to sustainable development, including food security and poverty reduction, as well as potentially causing significant environmental harm, including to biodiversity.

Achieving net zero sustainably: options for enhancing negative emissions

In Christian Aid's view, environmental integrity, as well as sustainability, must be the basis for the choices made. These must also respect social justice, such as land rights and the needs of local people. Many of the options outlined above fail to meet these basic criteria. For this reason, in order to achieve net zero emissions, Christian Aid supports the following approaches:

- **Restoration of UK ecosystems**, especially expansion of native forest ecosystems. This has the potential to have significant climate benefits through negative emissions, as well as to make partial reparation for the massive historical loss of British native forests and their biodiversity.
- **Forest plantations** may also be needed to facilitate a shift in fossil-based or other high-carbon materials (like plastics or cement) to ones that are sustainable, but will probably involve more of a cycling of carbon than long-term storage.

In each case, planetary limitations must be considered: there are limits to how much reforestation can occur in time, and forests are themselves vulnerable to climate impacts, which may make them a source, not sink, of emissions. There are also limits to how much carbon can be stored in soils. This reinforces the need to keep fossil carbon in the ground, where it has remained stably stored for over 300 million years.

Research is ongoing into technological methods of direct air capture and storage. While Christian Aid supports research into such technologies, the

thermodynamic properties of CO₂ suggest that such approaches are likely to be energy-intensive and expensive. They should not be relied on, but advanced with careful consideration of all their social and environmental implications, should their use later be required. With 30 years to achieve net zero, there is time and scope for technological innovation, but many of the solutions we need already exist.

The Paris Agreement requires that its goals be achieved with environmental integrity. This principle immediately rules out the use of "sci-fi" solutions such as solar radiation management. This group of techniques includes such notions as putting mirrors in space to reflect sunlight away from the Earth, and interfering with cloud formation to increase the reflection of radiation back to space. The problem with such "solutions" is that they do not address the underlying cause of climate change – the build-up of greenhouse gases in the atmosphere – and therefore, if implemented, will need to be implemented in perpetuity. They are the antithesis of precautionary action.

Achieving net zero domestically

Christian Aid believes the UK should achieve its net zero target solely through domestic action, i.e. emissions reductions and negative emissions within its own borders and jurisdiction. This is because of the imperative of achieving net zero emissions globally, and thus the need for the UK to show the leadership it promised in the UN Framework Convention on Climate Change in decarbonising its own economy. As well as achieving net zero domestically, the UK will need to support emissions reductions and zero-carbon development in developing countries.

Were the UK not to achieve net zero through domestic action, this would require it to take extreme caution if it were to consider buying emissions credits from other countries, as the different mechanisms and circumstances by which this may be done have their own associated problems which could make the climate problem worse. Offsetting and flexibility mechanisms in general, while perhaps attractive in theory, in practice have promoted gaming of the system, with questionable climate benefit. The UK simply needs to act so that its emissions are minimised to the greatest extent possible, also avoiding lock-in to high-emission infrastructure that will later need to be replaced. This requires the UK to act domestically.

Recommendations for the UK

Enshrining net zero in the Climate Change Act

- The UK needs to reaffirm its commitment to achieving net zero emissions before 2050, solely through domestic UK action, avoiding the complications and loopholes of claiming emissions credits from uncapped sources internationally.
- The UK needs to mandate the Climate Change Committee to model means to achieve net zero emissions within the UK that are socially and environmentally sustainable, and to also model the costs of climate inaction, as well as the costs of climate action. The Climate Change Act 2008 requires that economic considerations should not be the sole determinant for setting the UK's carbon budgets,⁹ and that considerations such as scientific knowledge, technology and circumstances at the international level must be equally taken into account.
- The UK should then set a net zero target in the Climate Change Act, as well as including legally binding social and environmental sustainability criteria in the legislation.
- To minimise the emissions the atmosphere actually 'sees', the UK needs to tighten the fourth and fifth carbon budgets in line with a 1.5°C-compatible trajectory, and ensure that the sixth budget is

consistent with emissions pathways to net zero, minimising emissions in the near term, consistent with 1.5°C-compatible carbon budgets.

Policies and measures

- To achieve net zero, the UK also needs to effect radical emissions reductions policies and/or legislation across all relevant sectors. The precautionary principle requires reducing emissions as fast and as deeply as possible, rather than trying to mop them up subsequently.
- Policies should promote the use of less energy and materials through lifestyle changes, the efficient use of materials and energy, and the use of renewable energy and sustainable materials.
- The UK must support the development of low – or preferably zero – emission approaches across all sectors to help minimise the amount of negative emissions needed to achieve net zero.
- Net zero should only be achieved in ways that are environmentally sustainable and socially acceptable, and ideally contribute to societal and environmental co-benefits.

References

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- 9 Climate Change Act 2008, s.10(2) legislation.gov.uk/ukpga/2008/27/pdfs/ukpga_20080027_en.pdf



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