

CCC Insights Briefing 3

The UK's Net Zero target

In 2019 the UK set a legally-binding target to reduce emissions to Net Zero by 2050.

The UK Climate Change Act contains a legally binding long-term goal to reduce the UK's net emissions of greenhouse gases to zero in 2050. This 'Net Zero' goal was legislated in 2019 following advice from the Climate Change Committee (CCC), requested by Government in 2018.

The CCC recommended the Net Zero 2050 goal as an appropriate contribution from the UK to the Paris Agreement. It can be achieved with known technologies alongside improvements in people's lives, and within the expected economic cost that Parliament accepted when it legislated the previous 2050 target for an 80% reduction from 1990.

This briefing summarises the considerations behind the CCC advice, which is published in full in two reports¹ on the CCC website.

This briefing is structured in four sections:

- Defining Net Zero
- When to reach Net Zero
- The UK Net Zero 2050 target
- The impacts of the UK's Net Zero target

This briefing is one of a series on the workings of the UK Climate Change Act and the Climate Change Committee (CCC).

Box 1: CCC 'Insights' Briefings

This briefing is part of a series of eight that document the work of the UK Climate Change Committee (CCC) under the Climate Change Act. The CCC is the UK's independent advisory body on climate change mitigation and adaptation tasked with providing regular advice to Government on emissions targets and adapting to a changing climate. The CCC publishes annual assessments of progress towards meeting these targets, biennial assessments of progress in adapting to climate change, and supporting analyses on key emerging issues. These briefings are intended as a practical guide to give insights on the CCC's work and learning over the twelve years since its foundation in 2008.

The briefings in this series are:

- UK Climate Change Act
- The Climate Change Committee
- The UK's Net Zero target
- Advising on the level of the UK's carbon budgets
- Monitoring progress in reducing the UK's greenhouse gas emissions
- Conducting a climate change risk assessment
- Monitoring progress on adapting to climate change in the UK
- Past Climate Change Committee reports

1. Defining Net Zero

Net Zero emissions targets can cover different emissions depending on the type of organisation.

Since the 2015 United Nations Paris Agreement, the concept of 'Net Zero' has become established as a target for climate policy and adopted by many countries, companies and other organisations (Box 2). It means that all sources of emissions are reduced as close to zero as possible and that any emissions that cannot be avoided are compensated for by an equal amount of active removal of emissions from the atmosphere.

Net Zero targets can cover a range of sources of emissions, with the scope generally differing between the type of organisation making the commitment:

- **National targets** are generally restricted to 'territorial' emissions occurring in the physical bounds of the country, consistent with agreed international accounting rules. These targets can also include emissions from the country's share of international aviation and shipping. Many national Net Zero targets are for all greenhouse gases (GHGs), aggregated using the global warming potential metric as in international emissions reporting practice, but some targets split emissions of shorter-lived GHGs, such as biogenic methane, out from an overall Net Zero target (e.g. New Zealand), while some targets may be for CO₂ only.
- **Regional targets** can be restricted to emissions produced within a specified regional boundary or can also include emissions associated with service provision (e.g. electricity) that occur elsewhere.
- **Company, sectoral or institutional targets** can be defined with differing 'scopes'. Scope 1 includes direct emissions produced by a company (e.g. fugitive emissions from refining), scope 2 also includes indirect emissions associated with its operations (e.g. electricity use), and scope 3 covers emissions from the full supply chain, including from the use of the company's products by its customers (e.g. combustion of petrol sold by the company).

Offsets or removals are needed to balance out any emissions that cannot be directly brought to zero.

Net Zero commitments can also be defined with a variety of conditions on how to compensate for any in-scope emissions that can't be brought to zero. Some Net Zero targets allow emissions reductions 'credits' (or offsets) to compensate for residual emissions instead of true removals from the atmosphere. While in theory offsets can achieve the same effect as removals, the supply of robust credits that lead to genuinely additional emission reductions or removals may be limited in a world that is achieving the goals of the Paris Agreement.

All Net Zero commitments are valuable. Ideally they should include as many sources of emissions as possible and have well-defined robust criteria on what can be used to offset any residual emissions that cannot be brought to zero.

The UK commitment has been set to cover all greenhouse gases (GHGs) and all sectors (including international aviation and shipping) with an intention that it will be met fully in the UK without recourse to international offset credits.

The need to reach Net Zero emissions to stabilise climate warming is grounded in well-established climate science.

The scientific underpinning of the need to reach Net Zero emissions has been established for over a decade.

- Long-lived GHGs (such as carbon dioxide and nitrous oxide) steadily accumulate in the atmosphere, meaning atmospheric concentrations (and the warming they cause) continue to rise while human emissions of these GHGs continue.
- The net emissions of these GHGs must be reduced to very near zero to stabilise the global surface temperature.*

These scientific insights underpinned the global commitment to reach 'a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century' (i.e. Net Zero GHG emissions) in the 2015 Paris Agreement.

The UN Race to Zero platform brings together non-state actors committing to reach Net Zero emissions by 2050 or before.

Box 2: Net Zero targets around the world

A rapidly growing number of countries and non-state actors (regions, municipalities, corporates and institutions) have already set, are in the process of setting, or are exploring setting a Net Zero emissions target. Recent estimates suggest that taken all together, some form of Net Zero ambitions now cover around 70% of global GDP and 55% of global CO₂ emissions.

- For countries, the UK is one of a growing number with Net Zero laws passed or in the process of being drafted, with China recently committing to reach 'carbon neutrality' by 2060. Alongside, major sub-national regions (e.g. US states), and macro-regions (the EU) are also in the process of setting Net Zero targets.
- For non-state actors, the UN "Race to Zero" umbrella platform (launched June 2020) seeks to bring together a broad coalition of city, region, corporate and institutional actors committing to Net Zero emissions to support state efforts to reach Net Zero in line with the Paris Agreement. A set of minimum criteria has been set to qualify for inclusion, similar to the four-pillar structure of the UK Climate Change Act (see Briefing 1). This involves: a pledge to reach Net Zero by 2050 at the latest and preferably earlier, having a plan for the steps toward reaching Net Zero including setting interim targets, proceeding to take actions consistent with interim and Net Zero targets, and publishing annual reports on progress made.

The details of these various Net Zero targets vary due to the different positions taken relating to the factors discussed in Sections 1 and 2.

A small number of companies have recently pledged to go beyond Net Zero by targeting the removal of more CO₂ than they emit (net-negative emissions). This would allow them to begin to reduce their historical contribution to climate change and eventually eliminate it entirely.

* Shorter-lived GHGs, such as methane, don't accumulate in the atmosphere in the same way as carbon dioxide. This means that when residual (and stable) methane emissions are compensated with CO₂ removals as required for a Net Zero GHG emissions target, the warming contribution will slowly decrease.

2. When to reach Net Zero

Alongside defining the scope of a Net Zero target an appropriate date must be chosen for the commitment. The UK 2050 date is informed by the level of ambition that is needed from the world as a whole to achieve the temperature goal of the Paris Agreement as well as considering the relevant differences in circumstances at the UK level.

When is Net Zero needed globally?

The Intergovernmental Panel on Climate Change has set out emissions pathways and timings for Net Zero emissions consistent with the goals of the Paris Agreement.

The Paris Agreement set out a global goal of 'Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels'. The work of the Intergovernmental Panel on Climate Change indicates pathways of global emissions that would be expected to be consistent with this goal (Fig. 1):

- Pathways estimated to keep peak warming to around 1.5°C with ~50% probability involve global CO₂ emissions falling by about half from 2020 levels by 2030, reaching net zero around 2050, alongside deep cuts in non-CO₂ emissions. Aggregated GHG emissions fall to net zero by around 2070.
- Pathways estimated to keep warming below 2°C with >66% probability (consistent with a ~50% probability of peak warming around 1.7-1.8°C), involve global CO₂ emissions declining by about one-third from 2020 levels by 2030 and reach Net Zero around 2075, with aggregated GHG emissions approaching Net Zero towards the end of the century.

Targets to reach Net Zero emissions must be complemented by near-term ambitious emissions reductions to meet the Paris goals.

The global Net Zero date determines roughly *when* global temperature will peak, but does not by itself determine the *level* of peak temperature. Keeping warming to the long-term temperature goal of the Paris Agreement depends on cumulative emissions. This means that for a Net Zero commitment by a particular date to be consistent with the temperature goal of the Paris Agreement, it must also be combined with ambitious emissions reductions over the whole period between now and reaching Net Zero.

When could Net Zero be achieved in the UK?

The CCC's advice on the net-zero target date considered the UK's responsibility as a climate leader and its capability to reduce emissions to Net Zero.

The Paris Agreement requires all countries to follow a principle of setting targets based on their 'highest possible ambition'. This implies that all countries (and similarly companies or regions that are not formally part of the Agreement) should be aiming to reach Net Zero as soon as possible, recognising that differing responsibilities and capabilities of countries to reduce emissions means that this may be earlier for some countries than others.

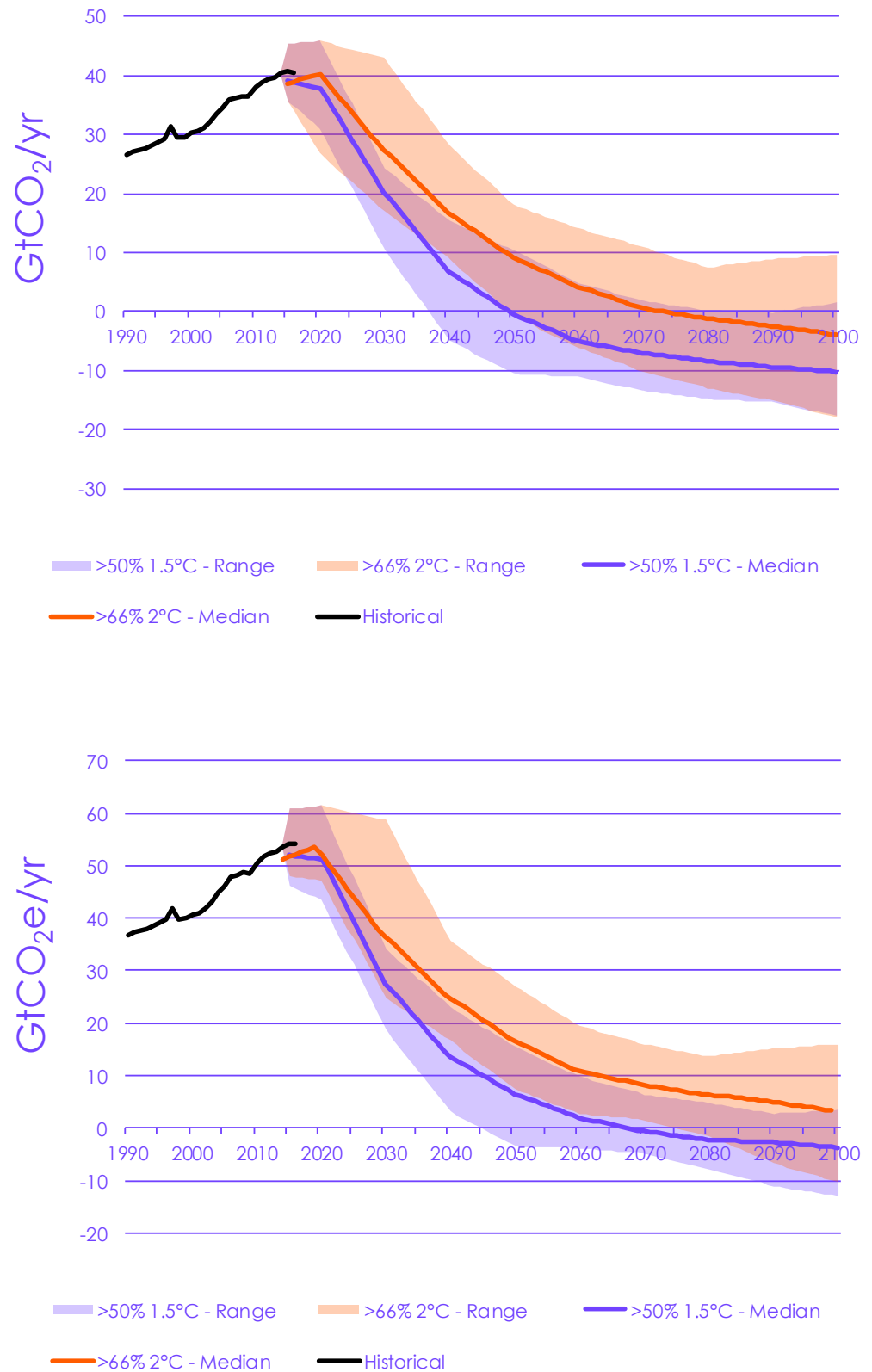
In determining a credible Net Zero date for the UK's 'highest possible ambition' the CCC considered the UK's differentiated responsibility and respective capability:

- **Differentiated responsibility.** The UK has incomes above the global average and has contributed a relatively large fraction of the climate change to date. Considerations of fairness and equity (as required under the Paris Agreement) suggest that the UK (and other high-income parts of the world) should lead the necessary global transition, including by reducing emissions to Net Zero faster than the world as a whole.

- **Respective capability.** Achieving Net Zero requires all sources of emissions to be eliminated or reduced as far as technically possible. Some emissions sources (e.g. agriculture, aviation, where known mitigation options are limited) are likely to take more time to reach low levels, while other sources will be easier and faster to decarbonise (e.g. light vehicles). Large land areas which could be enhanced or restored to capture carbon could help to reach Net Zero earlier, while other land types may increase the challenge. Similarly, sites for safe storage of carbon dioxide in geological formations (e.g. the North Sea) can be helpful, while a large existing high-carbon capital stock could be a barrier to progress. The CCC built detailed scenarios for the UK to balance these factors and established 2050 as, currently, the earliest credible date for Net Zero emissions in the UK.

Mechanisms for collaboration, such as international carbon and offset markets, climate finance, and technology sharing initiatives have been set up to help enable Net Zero commitments to be made for dates earlier than would otherwise have been possible in isolation.

Fig. 1 Global emissions pathways for CO₂ emissions (top) and aggregated GHG emissions (bottom) consistent with the Paris Agreement



Source: CCC (2019) *Net Zero: The UK's contribution to stopping climate change*.

3. The UK's Net Zero target for 2050

In 2019 the CCC recommended setting a Net Zero target for 2050 covering all GHGs including the UK share of international aviation and shipping.

In May 2019, following a request from the UK and devolved Governments, the CCC advised that the long-term target in the Climate Change Act should be revised to at least a 100% reduction in emissions, based on the different factors outlined in sections 1 and 2 (Fig. 2):

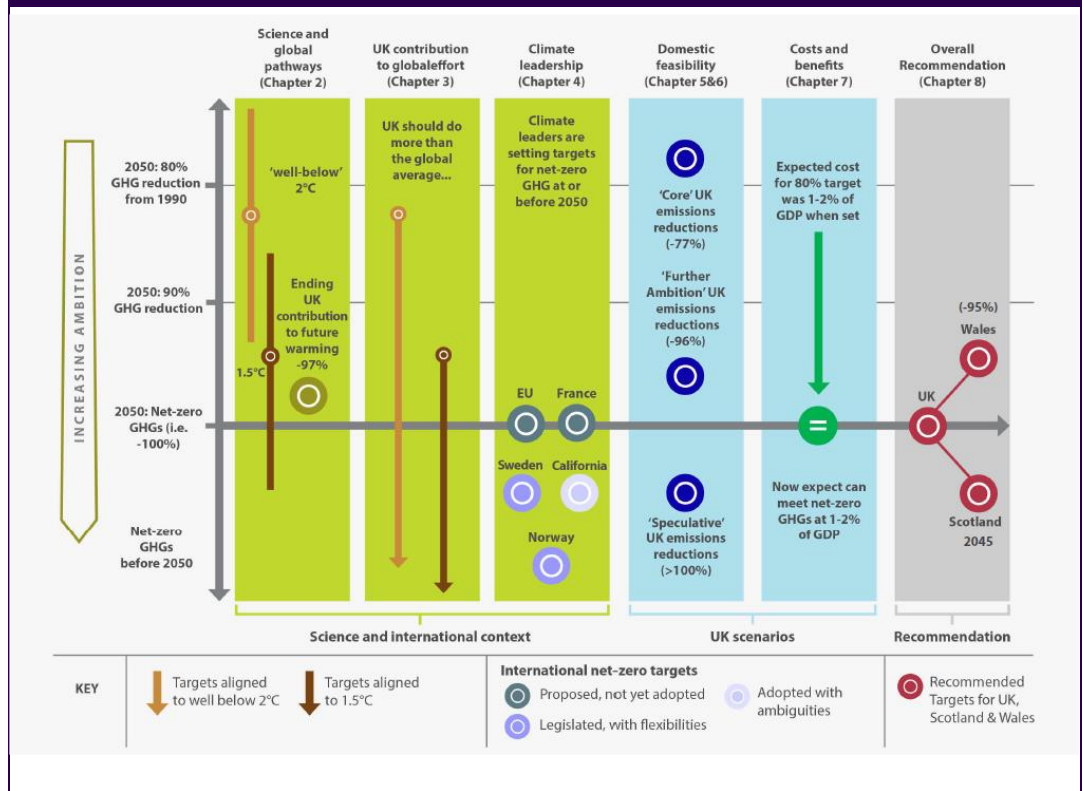
- **Scope:** The CCC recommended a UK Net Zero target covering all GHGs including international aviation and shipping. That aligns to the call in the Paris Agreement to balance sources and sinks of GHGs and recognises that all emissions matter. A 100% target covering all emissions, with no planned use of credits, also has the advantage of sending a clear signal that no sources qualify for special treatment.
- **Date:** The CCC recommended that the UK reach Net Zero by 2050. That is ahead of when the world as a whole needs to reach Net Zero GHG emissions for a ~50% probability of keeping peak warming to around 1.5°C. This would be consistent with the UK's status as a wealthy country with a large historical contribution to climate change. The CCC's scenarios indicated that 2050 was the earliest credible date by which Net Zero could be reached in the UK, with earlier dates relying on substantial amounts of more 'speculative' emissions reduction and removals and/or requiring widespread early capital scrappage. The CCC considered that a 2050 Net Zero GHG goal would help support the global drive to increase ambition in tackling climate change, by matching targets being considered by other 'climate leaders'.
- **Costs:** Based on conservative assumptions the CCC estimated that the UK Net Zero GHG target can be met at an annual resource cost of up to 1-2% of GDP to 2050 (~£50 billion in 2050, or the equivalent of losing a single year's economic growth out of 30). Rapid cost reductions in key technologies means that this is the same cost as the previous target for the original 80% reduction from 1990. Co-benefits from emissions reductions (e.g. improved air quality) could largely offset this cost, while the shift to investment and opportunities for 'green growth' mean that the overall macro-economic impact could well be a positive. The CCC emphasised that while the potential costs of the transition would be manageable they must be fairly distributed.
- **Regional targets:** The CCC also recommended separate targets for Scotland and Wales, the UK's two devolved administrations which have their own climate legislation. Scotland was advised to set a target of Net Zero emissions by 2045 reflecting Scotland's greater relative capacity for CO₂ removal. Wales was advised to target 95% emissions reductions by 2050 relative to 1990 levels reflecting the larger relative share of agriculture in Wales's emissions profile. These represent approximately equal effort in emissions reductions as in the UK as a whole and only differ from the UK-wide target due to the differing opportunities and challenges for reducing emissions in the different nations.

CCC analysis estimated the cost of reaching Net Zero emissions by 2050 to be manageable and that co-benefits could make the overall impact on the economy negligible or positive.

The UK Government accepted the CCC's advice and legislated the Net Zero 2050 target in June 2019.

In June 2019, the UK Government accepted the CCC's advice with the UK Parliament accordingly amending the long-term target in the UK Climate Change Act to a Net Zero target for 2050. This was one of the first legally-binding Net Zero targets set by a country and has contributed to the growth in Net Zero targets around the world over the last few years (Fig 2).

Fig. 2:
The CCC's recommendation for a UK 2050 Net Zero target



4. The impact of the UK's Net Zero target

The setting of the UK Net Zero target received strong public, civil society and business support generating renewed enthusiasm and interest in tackling climate change.

Tangible benefits have included:

- **Improved clarity of objective:** Stakeholders welcomed the clarity of the Net Zero target in requiring action across the whole economy and all sources of emissions to be addressed. This leaves less ambiguity than the previous 80% reduction target that all sectors would be required to reduce emissions as far as possible.
- **Business responded positively:** The Confederation of British Industry (CBI) strongly supported the Net Zero target stating 'UK business stands squarely behind the Government's commitment to achieve Net Zero emissions by 2050. This legislation is the right response to the global climate crisis, and firms are ready to play their part in combating it.² Increasing numbers of UK-based firms are setting Net Zero targets for their UK and global emission footprints.
- **Positive public reception:** Recent years have seen increasing interest and concern about climate change amongst the UK public. This helped the Net Zero target to be seen as an important and necessary step for the UK to end its contribution to global warming.

In 2020 a UK citizens' assembly was created by Parliament to provide guidance and recommendations on how to reach the target³.

- **Renewed Government focus:** The legislation of the Net Zero target has kick-started the development of new emissions reduction policies across Government, with new policy announcements expected in several important areas. There is more recognition in Government that achieving Net Zero will require action across all departments rather than just the energy and environment ministries.⁴ A cabinet committee on Net Zero, chaired by the Prime Minister, has been created to lead this coordination effort.⁵
- **International impact:** At the time it was set, the UK was the world's largest national economy, and the first member of the G20, to legislate a Net Zero target. Other major economies have since adopted their own Net Zero targets. Efforts to further accelerate the adoption of Net Zero targets internationally is an important focus of the UK Presidency of COP26 in 2021.

Endnotes

- ¹ CCC (2019) *Net Zero – The UK's contribution to stopping global warming*; CCC (2019) *Net Zero – Technical Report*
- ² CBI (2020) *Statement on UK Net Zero*
- ³ UK Climate Assembly (2020) <https://www.climateassembly.uk/>
- ⁴ Institute for Government (2020) *Net zero: how government can meet its climate change target*
- ⁵ UK Government (2019) *Cabinet Committee on Net Zero*
<https://www.gov.uk/government/news/pm-to-chair-new-cabinet-committee-on-climate-change>



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