

Proposed methodology for the Seventh Carbon Budget advice November 2023

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Chapter 1: Introduction to carbon budgets

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Introduction

In early 2025 the Climate Change Committee (CCC) will advise the UK on the level of its Seventh Carbon Budget, the legal limit for UK net emissions of greenhouse gases over the years 2038 to 2042.

The CCC has now started the analytical work that will underpin the Seventh Carbon Budget advice. This document sets out our intended methodological approach to this advice, including plans to assess the impact on the UK economy and costs and benefits of the transition to Net Zero.

It also sets out how we intend to build our evidence base through communication and engagement. Part of this is the call for evidence accompanying this document, with specific questions that can be found on our webpage.¹ We will take responses to these questions into account before finalising our methodology for the Seventh Carbon Budget.

The rest of this chapter provides an introduction to carbon budgets under the Climate Change Act and gives an overview of the UK's past and future emissions reduction targets.

Following this, Chapter 2 lays out our methodological approach for determining the appropriate level of the Seventh Carbon Budget. Chapter 3 lays out our approach for considering the economic, fiscal and wider social implications of the transition to Net Zero. And finally, Chapter 4 lays out our plans for engagement.

1.1 Carbon budgets under the Climate Change Act

The Climate Change Act sets in law the long-term goal of reaching Net Zero UK greenhouse gas emissions by 2050 as well as intermediate steps defined by the level of the carbon budgets.

The Climate Change Act 2008 (the Act) is the UK's legal framework for tackling and responding to climate change.² The Act sets in law the long-term goal of reaching Net Zero UK greenhouse gas emissions by 2050 as well as binding intermediate steps defined by the level of the carbon budgets. The carbon budgets are caps on UK greenhouse gas emissions over five-year periods. The first six carbon budgets have been legislated, covering the period 2008 to 2037.

The CCC is the UK's independent expert advisor on climate change.³ Part of the CCC's role is to advise the Government on the level of each carbon budget. The advice also includes the extent to which each carbon budget should be achieved via reducing UK emissions or the use of carbon units (also called carbon credits). Emissions accounting for the UK's targets is explained further in Box 1.1.

The Act has helped drive the UK's decarbonisation to date. The CCC's advice on targets has been accepted and, so far, all carbon budgets have been met.

The UK Government must set in law the level of each carbon budget no later than the 30th of June in the twelfth year before the beginning of the period in question. This is done after first considering the Committee's advice and any representations made by the Scottish and Welsh Governments and the Northern Ireland Executive. Prior to setting it in law, the UK Government's proposed level of each carbon budget is laid before and agreed by Parliament. Subsequently the UK Government must prepare the policies and proposals required to achieve the target.

Scotland, Wales and Northern Ireland all have their own legal frameworks and their own decarbonisation targets.

Scotland, Wales and Northern Ireland all have their own legal frameworks and their own decarbonisation targets.^{4,5,6} The CCC provides separate advice to each of the devolved administrations on their targets.

1.2 Current and future targets

1.2.1 Why Net Zero?

Net Zero by 2050 was legislated in 2019 following advice from the CCC which concluded that it was feasible and necessary, given the latest climate science and the UK's Paris Agreement obligations.

The UK target for reaching Net Zero greenhouse gas emissions by 2050 was legislated in 2019 following advice from the CCC.⁷ This advice reviewed the latest scientific evidence, assessed the costs and available decarbonisation options for reaching Net Zero greenhouse gas emissions and considered the UK's commitments as a signatory to the 2015 Paris Agreement. The advice concluded that as well as being necessary to respond to the latest climate science and meet the UK's Paris Agreement obligations, reaching Net Zero greenhouse gas emissions by 2050 is feasible for the UK.

Since the legislation of this target, the following developments have reinforced the Committee's 2019 recommendation that Net Zero greenhouse gas emissions by 2050 is the appropriate long-term target for the UK:

- The Intergovernmental Panel on Climate Change (IPCC) completed its Sixth Assessment Report cycle, concluding that halting human-caused global warming will require global CO₂ emissions to be close to Net Zero and for strong reductions in other greenhouse gas emissions to be made.⁸ Keeping peak levels of warming close to 1.5°C above pre-industrial levels (or well below 2°C) will mean tight limits on future global cumulative CO₂ emissions and substantial reductions in the levels of other greenhouse gases. The UK's Net Zero target is for all greenhouse gases, so Net Zero CO₂ emissions should be reached prior to 2050.
- Modelled IPCC pathways that limit warming to 1.5°C (with >50% probability) reach global Net Zero CO₂ in the early 2050s. These pathways see global greenhouse gas emissions peak between 2020 and 2025 and assume deep and immediate cuts in emissions are made across most sectors this decade.
- National Net Zero targets and ambitions now cover approximately 90% of present global emissions and major economies, including the EU and the United States, are also targeting Net Zero greenhouse gas emissions by 2050.⁹ These international targets are increasingly accompanied by ambitious policy packages designed to incentivise take-up of low-carbon technologies and boost domestic energy security and low-carbon competitiveness. Major low-carbon transition programmes are underway in the world's largest economies; the EU, US and China.

The evidence remains consistent between IPCC reports and supports the UK's legislated 2050 Net Zero target. This is therefore the long-term goal towards which our advice on the Seventh Carbon Budget will set the path.

1.2.2 Current intermediate targets

The five-year carbon budgets act as the legal path to Net Zero in the UK. They are necessary to ensure the UK is on track to decarbonise by 2050.

The five-year carbon budgets act as the legal path to Net Zero in the UK. They are necessary to make clear the required level of emissions reductions in the short and medium term to ensure the UK is on track to decarbonise by 2050.

- The first two carbon budgets were achieved. The Third Carbon Budget will be assessed in 2024 and is very likely to have been achieved. The Fourth, Fifth and Sixth Carbon Budgets, and all future budgets, will be assessed two years after the last year in the budget period, once reported emissions data are available (Figure 1.1).
- The Sixth Carbon Budget (2033-2037) is the first budget set at a level consistent with a pathway to Net Zero by 2050. It is also the first budget that includes the UK's share of emissions from international aviation and shipping, which are also included in the Net Zero target (Box 1.1).
- For 2030, the UK has an international commitment to reduce emissions by 68% compared to 1990 levels (excluding emissions from international aviation and shipping).^{*} This is the UK's 2030 Nationally Determined Contribution (NDC), that was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) and it is also consistent with a pathway to Net Zero by 2050.¹⁰

1.2.3 The Seventh Carbon Budget (2038-2042) and the 2035 NDC

The CCC's advice on the Seventh Carbon Budget will be consistent with trajectories for Net Zero emissions by 2050 and will consider the Paris Agreement principles for countries' efforts to reflect their highest possible ambition and capabilities.

The CCC's advice on the level of the Seventh Carbon Budget will be consistent with trajectories for reaching Net Zero emissions by 2050 and will consider the Paris Agreement principles for countries' efforts to reflect their highest possible ambition and capabilities. It will consider both the latest scientific evidence on climate change, including the outputs from the IPCC's Sixth Assessment Report cycle, and international climate progress and developments in key low-carbon technologies.

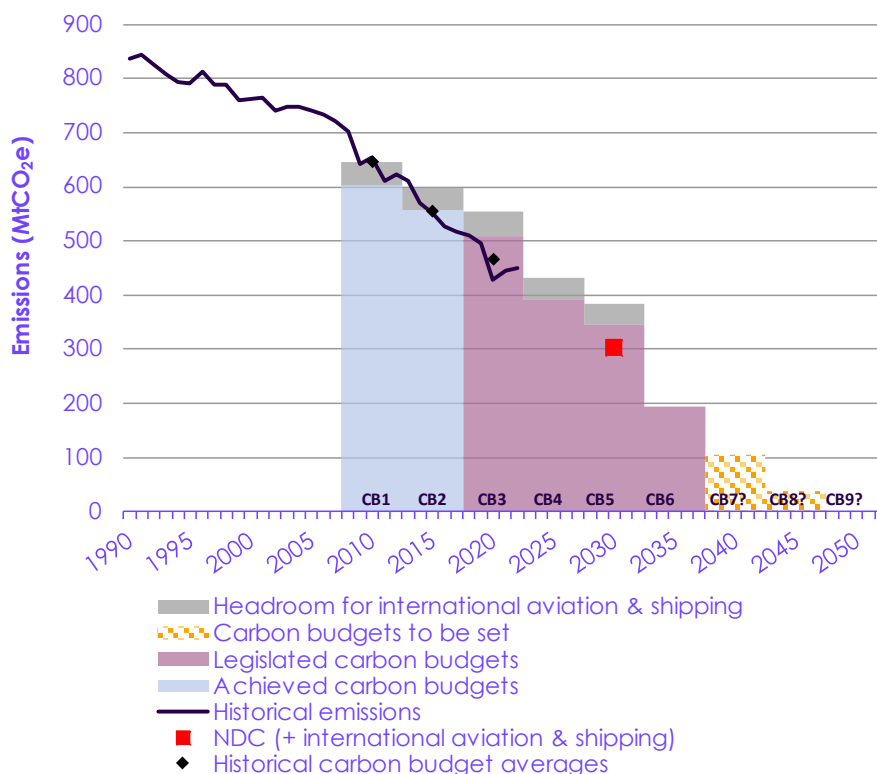
The Seventh Carbon Budget will include emissions from international aviation and shipping (Box 1.1) and advise on how the UK could help to further worldwide climate action, such as measures to address UK consumption emissions (Chapter 2, Section 2.8).

As part of this work, the CCC will also prepare advice on the 2035 NDC that considers the emissions reduction required over the Sixth Carbon Budget period and the UK's obligations under the Paris Agreement (Box 1.2).

^{*} The UK's share of emissions from international aviation and shipping were excluded from the scope of the UK's NDC in common with all other countries' 2030 NDC targets. If these emissions are included, the 2030 NDC target corresponds to a 64% reduction on 1990 emissions.

The First and Second Carbon Budgets have been achieved. The UK's 2030 NDC and the Sixth Carbon Budget are the first targets consistent with Net Zero.

Figure 1.1 UK historical emissions and the UK's targets



Source: CCC analysis.

Notes: (1) International aviation and shipping emissions are not included in the first five carbon budgets. Their actual or expected contribution is shown as 'Headroom for international aviation & shipping' so that a direct comparison can be made to historical emissions, where these emissions are included. (2) For the First, Second and part of the Third Carbon Budget targets (up to the end of 2020), emissions in the traded sectors is fixed to the UK allocation of EU ETS credits, which means that any increase or decrease in territorial emissions by buying or selling credits from emitters elsewhere in the EU is not considered when assessing UK emissions against the target. This results in a small (less than 5%) adjustment to emissions in the First and Second Carbon Budgets that is not shown in this chart.

Box 1.1

Emissions accounting in the UK's targets

Territorial emissions. The UK's emissions targets cover territorial emissions. These are defined as emissions that take place within the UK's borders. They do not cover emissions in other countries, even if these emissions result from the production of goods or services which are consumed within the UK (See Chapter 2, Section 2.8 on consumption emissions).

Traded and non-traded sectors. For the First and Second Carbon Budgets, and partway through the Third Carbon Budget (up to and including 2020), emissions in the traded sectors (i.e. emissions which were covered by the EU Emissions Trading Scheme (ETS)) were covered in a different way to those in the non-traded sectors. The emissions that were counted against the targets were those allocated to the UK in the EU ETS. When UK emitters produced more or less emissions than their collective allocation (buying or selling EU ETS allowances accordingly), these increases or decreases in emissions were not counted in assessments of whether the target was met. From 2021 onwards, this is not necessary as the UK left the EU ETS in 2020.

International aviation and shipping. The Sixth Carbon Budget and the Net Zero target include international aviation and shipping emissions in their scope. This demonstrates that all emissions must be reduced, and there is no special treatment compared to other sectors. The UK is a key player in driving strong international mechanisms for reducing emissions in these sectors. Details on our advice on the inclusion of international aviation and shipping emissions in the target scope is in our Sixth Carbon Budget advice report.¹¹ We continue to advise that all future targets should include these emissions.

Carbon units/credits. The Climate Change Act allows for the purchase of carbon units (also known as carbon credits) to contribute to the achievement of carbon budget targets. Following the CCC's advice, the Government has previously decided that units/credits would not be allowed to contribute, as there has always been sufficient potential to reduce emissions via domestic action. There are also potential issues over the verification and integrity of international carbon credits.

Banking and borrowing. The Climate Change Act allows for over-achievement against carbon budget targets to be carried over to the next carbon budget period, allowing emissions in that period to be correspondingly higher than the original target (banking). It also permits emissions to be borrowed from future carbon budgets, allowing emissions in that period to be higher but resulting in the target for the future carbon budget being correspondingly lower. The Committee has consistently advised that an over-achievement of a budget should not be carried forward unless it can be demonstrated that it was due to policy action significantly ahead of schedule and that the carry forward would pose no risk to the long term goal of Net Zero. This is particularly important when considering the over-achievement of the carbon budgets that were not set in line with Net Zero (i.e. the First to the Fifth Carbon Budgets). To ensure that the UK remains on track for a smooth transition to Net Zero it is essential that carry forward of surplus does not loosen the trajectory to Net Zero. This is essential to avoid the need for unrealistic actions as we approach 2050.

Box 1.2

The UK's 2035 Nationally Determined Contribution

Commitments to the international effort to limit global warming in line with the Paris Agreement are made through Nationally Determined Contributions (NDCs) submitted to the UNFCCC every five years. The UK's 2030 NDC was set on the advice of the CCC in line with a pathway to the UK's Sixth Carbon Budget and Net Zero by 2050.¹²

As part of the next cycle of the Paris Agreement, the UK Government will need to produce its 2035 NDC. This is to be submitted to the UNFCCC by February 2025 at the latest (nine months before the COP30 climate conference).

As part of its work on the Seventh Carbon Budget, the CCC will prepare advice on the 2035 NDC that considers the emissions reduction required over the Sixth Carbon Budget period and the UK's obligations under the Paris Agreement.

- The Paris Agreement sets out the requirement that NDCs reflect countries' highest possible ambitions and their common but differentiated responsibilities and respective capabilities, while accounting for their national circumstances. These principles will also be considered in the setting of the Seventh Carbon Budget pathway and in the accompanying advice.
- The CCC's 2035 NDC advice will provide options for target ambition and will consider how emissions from international aviation and shipping could be reflected in the UK's 2035 NDC, noting both their inclusion in the Sixth Carbon Budget and that they are currently not included in UNFCCC territorial emissions accounting rules.

Endnotes

- ¹ Climate Change Committee (2023) *Calls for evidence*, <https://www.theccc.org.uk/climate-action/calls-for-evidence/>
- ² Climate Change Act (2008), <https://www.legislation.gov.uk/ukpga/2008/27/contents>.
- ³ Climate Change Committee (2023) *About the Climate Change Committee*, <https://www.theccc.org.uk/about/>.
- ⁴ Climate Change (Scotland) Act (2009), <https://www.legislation.gov.uk/asp/2009/12/contents>.
- ⁵ Environment (Wales) Act (2016), <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted>.
- ⁶ Climate Change Act (Northern Ireland) (2022), <https://www.legislation.gov.uk/nia/2022/31/enacted>.
- ⁷ Climate Change Committee (2019) *Net Zero – The UK’s contribution to stopping global warming*, <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>.
- ⁸ Intergovernmental Panel on Climate Change (2023) *Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf.
- ⁹ Net Zero Tracker (2023) *Net Zero Stocktake 2023*, https://ca1-nzt.edcdn.com/Reports/Net_Zero_Stocktake_2023.pdf?v=1696255114.
- ¹⁰ Department for Business, Energy and Industrial Strategy (2022) *UK’s Nationally Determined Contribution, updated September 2022*, <https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc>.
- ¹¹ Climate Change Committee (2020) *Sixth Carbon Budget*, <https://www.theccc.org.uk/publication/sixth-carbon-budget/>.
- ¹² Department for Business, Energy and Industrial Strategy (2022) *UK’s Nationally Determined Contribution, updated September 2022*, <https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc>.



Chapter 2: Methodological approach

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Introduction and key messages

In this chapter we lay out our approach for determining the appropriate level of the Seventh Carbon Budget. This will be guided by determining a feasible and cost-effective pathway for emissions reduction in the UK from 2025 to 2050. Our key messages are:

- We will present two pathways, based on the latest available data and evidence on technology feasibility and costs, and considering the current status of policy progress in the UK:
 - An updated 'Balanced Pathway' that meets the UK's current targets cost-effectively and is used to determine the level of the Seventh Carbon Budget; and
 - An 'Additional Action Pathway' that lays out the additional actions required should the UK choose to decarbonise faster.
- A Balanced Pathway and an Additional Action Pathway will also be provided for Scotland, Wales and Northern Ireland, taking consideration of each of their specific circumstances and drawing from available data.
- During the Seventh Carbon Budget period the UK's emissions are likely to be dominated by the buildings, aviation and agriculture sectors, balanced by a significant contribution from both nature-based and engineered removals. As part of our advice, we will be building our evidence base for the removals sector to bring more clarity to what is feasible in the UK.
- We will quantify the uncertainty from some key assumptions and present these as a range on emissions and costs in the Balanced Pathway.
- In order to increase resilience to uncertainty and unforeseen circumstances, we will develop a contingency framework, where further or alternative decarbonisation options (which may be drawn from or guided by the Additional Action pathway) are developed so that they can be implemented, in good time, should the UK become off-track for its targets.
- We will consider two key aspects of energy security within our pathways: the position in relation to energy imports and geopolitical aspects of energy security and ensuring that the UK energy system is reliable and resilient.

The rest of this chapter is laid out in eight sections:

2.1 Considerations for setting carbon budgets under the Climate Change Act

2.2 Pathways

2.3 Uncertainties and contingency plans

2.4 Baselines

2.5 Pathways for Scotland, Wales and Northern Ireland

2.6 Pathway indicators and spatial information

2.7 Energy security

2.8 Consumption emissions

2.1 Considerations for setting carbon budgets under the Climate Change Act

The Climate Change Act 2008 (the Act) stipulates the following matters that should be considered in connection with carbon budgets.¹ We indicate where in this document each is discussed:

- Scientific knowledge about climate change (Chapter 1).
- Technology relevant to climate change (Chapter 1 and Chapter 2, Section 2.2).
- Economic circumstances, and in particular the likely impact of the decision on the economy and the competitiveness of particular sectors of the economy (Chapter 3, Section 3.1).
- Fiscal circumstances, and in particular the likely impact of the decision on taxation, public spending and public borrowing (Chapter 3, Section 3.2).
- Social circumstances, and in particular the likely impact of the decision on fuel poverty (Chapter 3, Section 3.2).
- Energy policy, and in particular the likely impact of the decision on energy supplies and the carbon and energy intensity of the economy (Chapter 2, Section 2.7).
- Differences in circumstances between England, Wales, Scotland and Northern Ireland (Chapter 2, Section 2.5).
- Circumstances at European and international level (Chapter 1 and Chapter 2, Section 2.2).
- The estimated amount of reportable emissions from international aviation and international shipping for the budgetary period or periods in question (Chapter 1, Box 1.1).

2.2 Pathways

2.2.1 Number of pathways

As part of our Sixth Carbon Budget advice, we developed a total of five pathways to Net Zero. There were four exploratory scenarios, spanning different assumptions about future innovation and societal change, with the Balanced Pathway being the recommended most cost-effective and feasible path, designed to drive progress while maintaining optionality.

We will produce two pathways: an updated Balanced Pathway to inform the level of the Seventh Carbon Budget and an Additional Action Pathway, setting out further actions required should the UK choose to decarbonise faster.

Multiple scenarios were useful in 2020 to explore options for the path to the then-new Net Zero target, but for our Seventh Carbon Budget advice we plan to take a different approach. The option space is now narrowing, and we intend to produce only the following two pathways, directly quantifying and showing the effect of some key uncertainties on projected emissions and costs (see Section 2.3 on uncertainties and contingency plans):

- **Balanced Pathway.** Our advice on the level of the Seventh Carbon Budget will be informed by an update to the Balanced Pathway, using up-to-date evidence and data.
 - This pathway should meet the targets to which the UK is already committed: the Fourth (2023-2027), Fifth (2028-2032) and Sixth (2033-2037) Carbon Budgets, the UK's 2030 Nationally Determined Contribution (NDC) and Net Zero by 2050 (Chapter 1).
 - Due to delays in decarbonisation in some areas since we originally developed this pathway, some further action is likely to be required to speed up delivery and ensure these targets are all achieved.
- **Additional Action Pathway.** We also plan to produce an Additional Action Pathway that sets out the further action required should the UK choose to decarbonise faster.
 - The Additional Action Pathway will include all measures in the updated Balanced Pathway, along with additional actions that could speed up the journey to Net Zero. These additional actions could also be used as contingency options should progress towards the Balanced Pathway be slower than required (see Section 2.3 on uncertainties and contingency plans).
 - This may include measures such as accelerated scrappage of high-carbon capital assets, more ambitious demand reductions that would require greater policy effort, and more expensive technological ways of reducing emissions.
 - This pathway is different to the exploratory pathways from our Sixth Carbon Budget advice, which included a combination of different types and levels of action, and different assumptions about future innovation and societal change. The purpose of the Additional Action Pathway is to make clear what would be needed to go further in terms of additional action from government (rather than make assumptions about further innovation or societal changes without additional interventions).

2.2.2 General analytical approach

The analytical approach we intend to take for our Seventh Carbon Budget advice is similar to that for the Sixth Carbon Budget.

Our two pathways will be developed by dividing the UK's emissions into sectors of the economy and determining emissions for each from 2025 to 2050.

- Our two pathways will be developed by dividing the UK's emissions into sectors of the economy and determining emissions for each from 2025 to 2050 (Figure 2.1 shows this for our Sixth Carbon Budget Balanced Pathway).
- The starting point for each sector's pathway is a projected baseline of emissions representing a hypothetical world without further decarbonisation in the UK (see Section 2.4 on baselines). In some sectors the starting point will be behind the pathways from our Sixth Carbon Budget advice due to delays in action to reduce emissions. These delays will need to be compensated by either speeding up delivery in that sector or by faster decarbonisation in other sectors.
- Emissions reduction options are then considered for each sector. These are discussed below.

2.2.3 Emissions reduction over the Seventh Carbon Budget period and beyond

By the end of the Sixth Carbon Budget period, emissions in the UK should be around a third of levels in 2022.

By 2037, the end of the Sixth Carbon Budget period, emissions in the UK should be around a third of levels in 2022.

Sectors expected to decarbonise by 2050. Many of the sectors that currently dominate the UK's emissions, including surface transport, buildings, industry, and electricity and fuel supply, will need to decarbonise almost completely by 2050 (Figures 2.1 and 2.2).

- In our Sixth Carbon Budget analysis, emissions in surface transport, energy supply and industry are projected to have reduced by between around 80% and 90% by 2037 compared to levels in 2022. For these sectors, the key question for the Seventh Carbon Budget period is how fast the tail-end of emissions are reduced.
- For buildings, emissions are projected to have reduced by just over half by 2037. How fast the remaining slightly less than half of buildings decarbonise will be a key driver of the level of the Seventh Carbon Budget.

In 2050, emissions are expected to remain in sectors with no credible way to completely decarbonise (agriculture, aviation, waste and land use sources).

Sectors with residual emissions in 2050 and removals. In 2050, emissions are expected to remain in sectors with no credible way to completely decarbonise (agriculture, aviation, waste and land use sources). These are balanced by greenhouse gas removals, both 'nature-based' removals via carbon sequestration in land use sinks and 'engineered' removals (e.g. approaches utilising carbon capture and storage) to reach Net Zero by 2050. These emitting sectors will be starting to dominate over the Seventh Carbon Budget period, and greenhouse gas removals will be becoming increasingly important to ensure a sufficient reduction in net emissions (Figures 2.1 and 2.2).

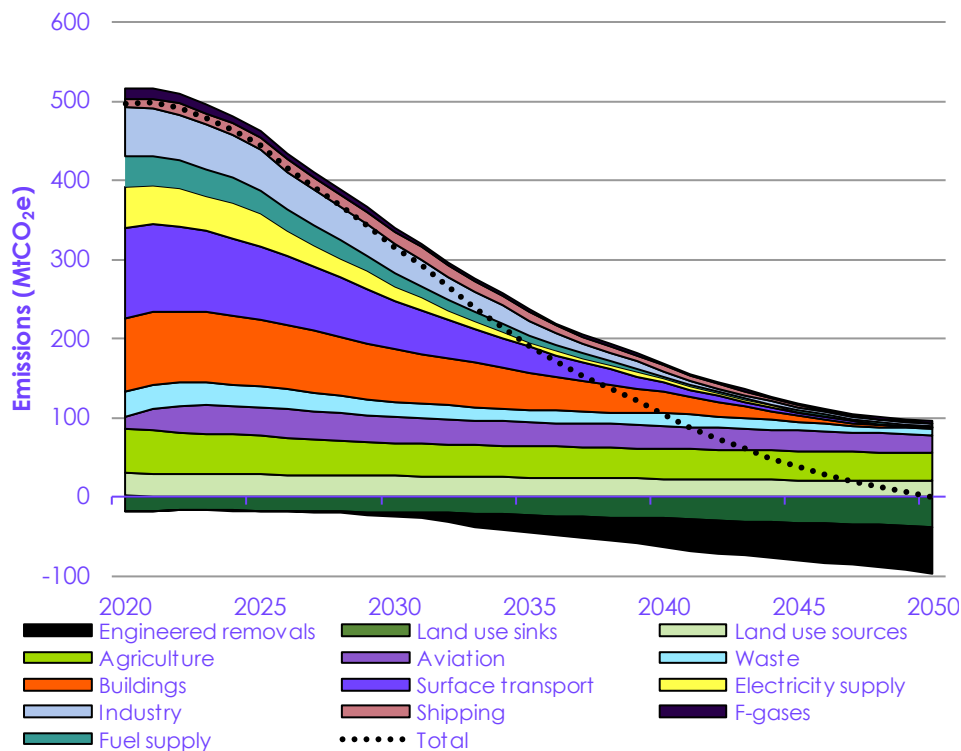
For 2050, we will determine the balance between residual emissions and greenhouse gas removals.

- For 2050, we will determine the balance between residual emissions and greenhouse gas removals by considering what is feasible in each of these sectors, and what is feasible in removals. We will consider the trade-offs between the costs and other co-impacts.

- For the Seventh Carbon Budget period we will consider both what is feasible and what is required to ensure each of these sectors is on track for the emissions reduction required by 2050, taking consideration of cumulative emissions.

Many of the sectors that currently dominate the UK's emissions, including surface transport, buildings, industry, and electricity and fuel supply, will need to decarbonise almost completely by 2050.

Figure 2.1 Emissions by sector in the Balanced Pathway from the CCC's Sixth Carbon Budget advice

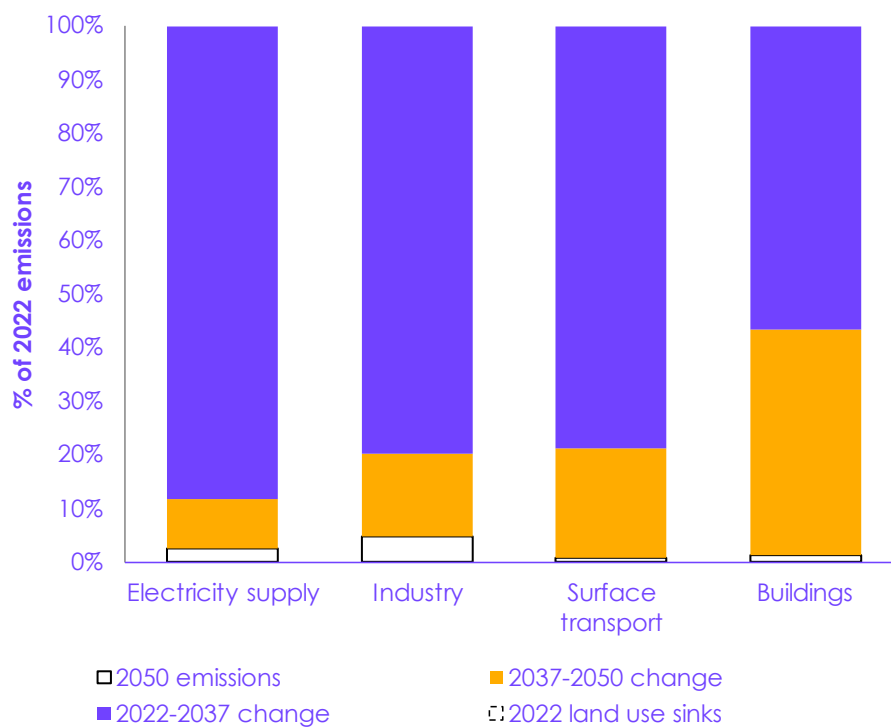
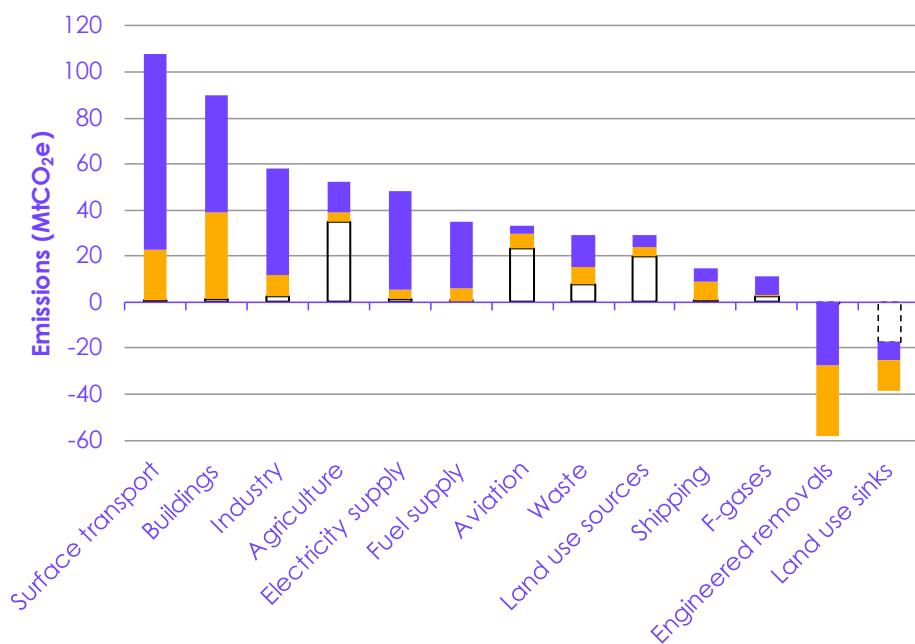


Source: CCC analysis.

Notes: Global warming potentials from IPCC AR5 with feedback are used.

The dominant sectors by the end of the Sixth Carbon Budget period and by 2050 will be different from today, with a significant contribution from removals of CO₂ from the atmosphere.

Figure 2.2 Sectoral emissions reduction 2022-2037 and 2037-2050



Source: CCC analysis.

Notes: (1) Emissions estimates are taken from the Balanced Pathway in the Sixth Carbon Budget advice. (2) Global warming potentials from IPCC AR5 with feedback are used.

2.2.4 Decarbonisation options

Decarbonisation options involve a combination of switching to low-carbon technologies and practices, and reductions in high-carbon activities.

Decarbonisation options involve a combination of switching to low-carbon technologies and practices, and reductions in high-carbon activities. We will be pragmatic about what solutions are feasible in the real world, driven by updated empirical evidence wherever possible. We will consider the state-of-play internationally, especially where progress has been faster than in the UK, to inform us on what is feasible. Nearly all the key technologies we need for Net Zero already exist. We can also expect developments to result in improvements to existing technological solutions and to offer new options. We avoid relying heavily on potential speculative future technological advances lacking a firm evidence base. We look to reasonable demand reduction options where a key technology cannot be relied upon in the future, and where demand reduction offers the potential for more efficient use of resources and/or significant co-benefits.

(i) Technology choices and rate of roll-out

Our approach aims to develop pathways that achieve the Net Zero transition in a feasible, cost-effective manner, whilst considering other benefits.

Our approach aims to develop pathways that achieve the transition to Net Zero in a feasible, cost-effective manner, whilst also considering other benefits. There are three key components to this: a 'snapshot' of cost-effectiveness, 'dynamic' cost-effectiveness and assessments of feasible installation and roll-out rates.

- **Snapshot of cost-effectiveness.** When constructing the pathways, consideration is given to the most cost-effective choice between alternative credible low- or zero-carbon technologies and emissions reduction (abatement) measures, and to the timing of roll-out:
 - Cost-effectiveness is determined by comparing the cost per tonne of abatement (£/tCO₂e) each year between alternative options and to the carbon value for that year.
 - The cost of abatement is determined by considering both the capital and operating expenditure of the low-carbon measure, relative to the high-carbon alternative, if relevant.
 - The carbon values are monetary values placed on reductions in emissions. We use the UK Government's 'target-consistent' carbon values, developed to be consistent with the 2050 Net Zero target and to take a least-cost approach to minimising cumulative greenhouse gas emissions over the period to 2050.²
 - In some cases, co-impacts of a measure can be quantified and included in the cost of abatement (for example by putting a monetary value on health benefits). In other cases, co-impacts can be harder to quantify, and a judgement needs to be made on whether the measure should be deployed at a certain time. The Climate Change Act requires explicit consideration of social circumstances and the impact on fuel poverty that may put greater weight on certain measures than would result purely from considering quantifiable factors (Chapter 3).
 - While the carbon values are a good starting point for deciding which measures should contribute to emissions reduction and their timing, the actual timing of measures may differ from this, for reasons of dynamic cost-effectiveness and considerations around feasible roll-out rates (discussed below).

The cost of abatement is taken together with other considerations when determining a feasible roll-out rate.

- **Dynamic cost-effectiveness.** While the carbon values provide a snapshot view of cost-effectiveness in reducing emissions, taking this approach alone can miss the benefits of early action in opening up additional opportunities for emissions reductions later on and/or cost reductions that could reduce the overall cost of achieving Net Zero. Therefore, where key early actions are not cost-effective according to the carbon values in a given year, but result in lower future costs, these may be included. Examples of such action can include development of infrastructure or installation and roll-out of technologies that are currently commercially immature, but can be expected to become more competitive with increasing roll-out.
- **Feasible roll-out rates.** The cost of abatement is taken together with the following considerations when determining a feasible roll-out rate, with the importance of each depending on the sector:
 - **Maturity of technology.** How well-established a given technology is and how this is expected to change in the future (e.g. for engineered removals).
 - **Skills, supply-chains and resources.** The need for a sufficiently skilled workforce and sufficient manufacturing capacity and supply chains to deliver the technology at the scale and pace required. This includes consideration of required resources, including the reliance the UK will have on international resources.
 - **Low-carbon infrastructure.** Considering availability of current infrastructure and the time taken to build additional infrastructure.
 - **Planning.** Practicalities in land and marine planning.
 - **Preferences and feasible consumer behaviour.** This considers the pace at which the public can be expected to purchase and use low-carbon technology (e.g. electric vehicles and heat pumps) effectively. This will include consideration of the options and cost reductions the market may be able to provide and of the fact that social norms may shift to low-carbon choices, especially when the high-carbon alternative is less desirable.
 - **Feasible private sector action.** The pace of purchase decisions and changes in practices that businesses can reasonably be expected to make.
- **Additional considerations.** As well as the cost and feasibility, we will consider the following when deciding between measures:
 - **Imported emissions.** Consideration of emissions arising from the supply chain of the technology or fuel that are not included in the UK's territorial emissions.
 - **Resilience to a changing climate.** For example, on the need to avoid overheating when making home efficiency improvements and the risks to infrastructure from droughts, floods and extreme weather conditions.

- **Integrity and verifiability.** For measures including greenhouse gas removals and biomass and carbon capture and storage, consideration of the monitoring, reporting and verification systems that will be required to ensure that accounting is accurate and robust.

Planned scrappage of capital assets will be considered when it is cost-effective and practical, and with consideration of embedded emissions.

In our Sixth Carbon Budget advice the lifetime of existing assets was an important constraint on the roll-out rates of new technologies. In many cases, assets were assumed to be replaced at the end of their physical lifetime. A key difference in our upcoming advice will be a reconsideration of this constraint, allowing for planned scrappage where assets, for example fossil-fuel boilers, can be replaced earlier than their physical lifetime. This will assess when scrappage is cost-effective and practical, and with consideration of embedded emissions. This is particularly important during the Seventh Carbon Budget period when existing high-carbon assets may be uneconomic/undesirable and accelerated scrappage may be sensible.

When considering the trade-offs between alternative technologies we will be mindful that projected costs are uncertain, and the cost of currently expensive technologies may fall significantly in the future. However, if cost-effective alternatives are unlikely to be available in the near future, we will develop pathways on the basis of a more limited set of available technologies.

(ii) Reducing high-carbon activities through empowering low-carbon choices

Our approach aims to develop pathways with a feasible shift from high-carbon activities through empowering low-carbon choices.

Our approach aims to develop pathways with a feasible shift from high-carbon activities through empowering low-carbon choices.* Low-carbon choices can be enabled by technological and market-driven shifts in consumer habits, changing societal norms and public policy price incentivisation and regulation.

- We consider low-carbon choices as an option for reducing emissions either where there is no technological solution to removing emissions (e.g. aviation and emissions associated with meat and dairy); or where there is a technological solution, but where more efficient alternative approaches help us reduce emissions while on the pathway to Net Zero (e.g. reducing waste, increasing the longevity of product use, switching from car and van journeys to public transport). We also consider the co-benefits in demand reduction measures.
- Reducing high-carbon choices can constitute a switch to a low-carbon alternative (e.g. switching from flying to taking the train), or a reduction in high-carbon activity (e.g. buying fewer products), or a combination of the two. When considering a switch, we will consider what would need to be in place for the low-carbon choice to be easy, attractive and affordable to enable households and businesses to shift habits. These habitual shifts can be technology, market and societally driven.
- For sectors where emissions will remain in 2050 (in particular aviation and agriculture), trade-offs between removals and low-carbon choices will be considered. Where practical we will seek to assess how the cost associated with a reduction in an activity (e.g. the lost utility of someone not taking a flight) compares with the relevant carbon value.

* This covers repeated choices. It does not include one off purchases of low-carbon technology (e.g. purchase of heat pumps and electric vehicles), which fall within considerations for the technology choices and roll-out rate.

What is considered a feasible reduction in high-carbon activities will be based on observed societal change, social science research, data on public attitudes as well as wider societal impacts.

What is considered a feasible reduction will be based on observed societal change elsewhere and historically, behavioural and social science research, data on public attitudes as well as wider societal impacts. We will also assess the extent to which policy could address market failures and enable the market to offer attractive and affordable low-carbon choices, including through improved infrastructure, technological innovations for alternatives and price incentives. Where it is challenging to quantify, we will draw on qualitative evidence.

2.3 Uncertainties and contingency plans

2.3.1 Uncertainties

We aim to quantify some key sources of uncertainty on both emissions and costs in the Balanced Pathway, presenting them with a central value and a range.

In a decarbonisation pathway a set of assumed measures, such as roll-out rates of low-carbon technologies, are translated to a projection of expected emissions. There is uncertainty in pathways, including uncertainty on whether the assumed measures will happen and uncertainty on how these measures translate to reported emissions. We aim to quantify some key sources of uncertainty on both emissions and costs in the Balanced Pathway, presenting them with a central value and a range. These may include uncertainties on future projections for:

- The UK population.
- The UK's gross domestic product (GDP) and how this affects consumption.
- The UK climate.
- Changes to greenhouse gas emissions reporting methodologies, including the global warming potentials used to compare the emissions from different gases.
- Assumed fuel and technology costs.
- Other sector-specific assumptions.

These uncertainties can either increase or decrease projected emissions, with the possibility of the former putting the UK's targets at risk.

2.3.2 Contingency plans

We plan to develop a contingency framework to limit the risks to meeting emissions targets.

We plan to develop a framework to limit the risks to meeting emissions targets from the uncertainties described above, as well as risks associated with policies achieving the assumed emission reductions in the pathway. This is likely to comprise the following steps:

1. Develop contingency options for further action beyond the Balanced Pathway. These may be drawn from, or guided by, the Additional Action Pathway, as well as considering alternative options. These options are likely to include measures such as accelerated scrappage of capital assets, more ambitious demand reductions that would require greater policy effort, and more expensive technological ways of reducing emissions. We will consider the cost implications of some of these contingency options.
2. Determine the lead-time required to implement contingency options in a sensible and fair way for the required mitigation of risk for a given emissions reduction target.
3. Identify indicators to track progress over time to determine if, and when, a certain measure in the Balanced Pathway is off-track for each of the UK's targets and consider the time required in step 2 to implement the contingency option. The indicators should track progress against the required measures in the pathways, but also monitor the key assumptions that affect emissions (discussed in the uncertainty section above).

2.4 Baselines

We use baseline projections to compare a pathway to Net Zero with a hypothetical path that does not include further climate action, enabling us to calculate the required abatement and costs associated with the actions to reduce emissions.

The baselines will be a projection of emissions representing a hypothetical world without further decarbonisation in the UK.

The baselines for each sector in our analysis will be a projection of emissions representing a hypothetical world without further decarbonisation in the UK. This means that low-carbon technologies would remain at today's stock levels and today's efficiencies. Projections for emissions over time are based on projected changes to population, GDP, the warming climate and fuel prices. Overall, this usually leads to a gradual increase in emissions over time, although there are differences in each sector.

The purpose of this definition of baseline is to demonstrate what actions are required to reduce emissions from today, without taking a view on whether these will be driven by policy or the markets, and without any assumptions about what existing or planned policies will achieve. It is therefore not a projection of what may happen based on current trends or markets. This differs from other baseline definitions:

- The Government's Carbon Budget Delivery Plan uses a baseline derived from their Energy and Emissions Projections (EEP), which includes estimated emissions reductions from existing and some planned policies.^{3,4}
- Some baseline definitions include a projected uptake of low-carbon technologies in the absence of new policy. For example, they would predict a rise in the sale of electric vehicles.

In reality, emissions reductions will be driven by a combination of existing and new policies and contributions from market developments and consumer choices that may occur in the absence of any policy.

2.5 Pathways for Scotland, Wales and Northern Ireland

As well as the UK-wide pathways, we will produce a Balanced Pathway and an Additional Action Pathway for Scotland, Wales and Northern Ireland.

As well as the UK-wide pathways, we will produce a Balanced Pathway and an Additional Action Pathway together with associated costs and indicators (see Section 2.6 on pathway indicators and spatial information) for Scotland, Wales and Northern Ireland.

In addition to their contribution to meeting the UK's targets, Scotland, Wales and Northern Ireland each have their own legal framework for reducing emissions (Chapter 1). Our updated pathways will form the basis for our future advice, including on the level of Wales's Fourth Carbon Budget (2031-2035) and Northern Ireland's Fourth Carbon Budget (2038-2042), both of which will come shortly after the UK's Seventh Carbon Budget advice in 2025.

When determining the fair share of emissions reduction from each nation to meet the UK's target, we will draw from available data and consider specific circumstances.

- When determining the fair share of emissions reduction from each nation to meet the UK's target, we will draw from available data and consider specific circumstances, including:
 - Levels of emissions and activity in each sector today.
 - Existing infrastructure.
 - Existing use of land and opportunities for land-based removals.
 - Access to potential geological storage for Carbon Capture and Storage (CCS) and engineered removals methods using CCS.
 - Different geographies and demographics.
- Wales's currently legislated carbon budgets are in line with our advice and with the Balanced Pathway from our Sixth Carbon Budget analysis. However, both Scotland's 2030 target, of a 75% reduction in emissions compared to 1990 levels, and Northern Ireland's Net Zero by 2050 target go further than our Balanced Pathway and our advice.^{5,6} It is unlikely that our updated pathways for Scotland and Northern Ireland will be consistent with these targets.
- We will consider contingency options for Scotland, Wales and Northern Ireland to go further, particularly in areas with devolved policy powers. These may be used should there be delays in action, including from the UK Government, that put either the UK's or the devolved administration's targets at risk.

2.6 Pathway indicators and spatial information

As well as emissions pathways and associated costs, we will provide pathways for indicators that allow progress towards meeting the targets to be tracked.

As well as emissions pathways and associated costs (Chapter 3), we will provide pathways for indicators in each sector that allow progress towards meeting the targets to be tracked. These are based on the required outcomes and enablers in our Monitoring Maps, described in our Monitoring Framework, and include things such as changes in land use, the roll-out of low-carbon technologies and shifts in consumer choices.⁷

2.6.1 Spatial information

We intend to develop a set of area archetypes, resembling types of areas that can typically be found in any given local authority, providing information about how key indicator pathways may vary between them.

As well as indicators for the UK, and where possible for Scotland, Wales and Northern Ireland, we intend to develop a set of area archetypes, resembling types of areas that can typically be found in any given local authority, and to provide information about how key indicator pathways may vary between them.

These archetypes will consider factors that could drive significant differences compared to our national decarbonisation pathways, for instance rural versus urban geographies and the make-up of the housing stock. We will then explore how the optimal choices to deliver these pathways might vary based on such factors, for example different balances between the use of electric vehicles and shifts to public transport and varying shares of properties using different heating technologies. This should help local authorities to understand the pace of change and timing of actions needed across different parts of their jurisdictions to achieve our decarbonisation pathways and will be accompanied by advice to local authorities, similar to that in our 'Local Authorities and the Sixth Carbon Budget' report.⁸

2.7 Energy security

We will consider two key aspects of energy security: the position in relation to energy imports and geopolitical aspects of energy security, and ensuring that the UK energy system is reliable and resilient.

The analysis for the Seventh Carbon Budget will consider two key aspects of energy security: the position in relation to energy imports and geopolitical aspects of energy security, and ensuring that the UK energy system is reliable and resilient.

As for our advice on the Sixth Carbon Budget, the analysis will consider a range of international fossil fuel prices and determine how the decarbonisation pathways will reduce the UK's exposure to them. Given recent volatility in international fossil fuel markets, we expect to consider a wider range of fossil fuel prices than previously.

Consideration of the reliability and resilience of the UK energy system will build on the detailed work published in the Committee's March 2023 report 'Delivering a reliable decarbonised power system', which showed how reliability of the system can be maintained while moving to a system that is fully dependent on decarbonised generation.⁹

2.8 Consumption emissions

The UK's targets under the Climate Change Act and UNFCCC process are based on territorial emissions (Boxes 1.1 and 1.2) and do not consider emissions associated with imports. A consumption-based approach, also referred to as the UK's carbon footprint, includes all emissions that occur as a result of UK consumption of goods and services, wherever those emissions happen globally.

Taking measures to reduce our consumption emissions is an opportunity to accelerate global action on climate change beyond our domestic targets.

Emissions from imports are likely to become an increasingly significant share of the UK's contribution to climate change as the UK's territorial emissions fall. Taking measures to reduce our consumption emissions is an opportunity to accelerate global action on climate change beyond our domestic targets. Such measures would also make the UK's consumption emissions less tied to the rate of international decarbonisation.

In our Sixth Carbon Budget analysis, we concluded that the UK can and should aim to reduce the level of emissions occurring overseas as a result of UK consumption as part of its contribution to reducing global emissions, and we presented several of the policy levers available. For the Seventh Carbon Budget advice, the CCC intends to build on this in the following areas:

We intend to consider consumption emissions when developing our pathways, ensuring that measures reducing emissions in the UK do not lead to increases elsewhere in the world.

- Taking a systematic approach to ensuring that, when developing domestic emissions pathways, measures reducing emissions in the UK do not lead to increases elsewhere in the world.
- An updated indicative pathway for consumption emissions, with the aim to quantify the impact of potential UK actions on consumption emissions (e.g. Carbon Border Adjustment Mechanisms, product standards, reduced demand for high-carbon imports).
- Case studies exploring the available policy levers for particular commodities.

Endnotes

- ¹ Climate Change Act (2008) *Carbon Budgeting*, <https://www.legislation.gov.uk/ukpga/2008/27/part/1/crossheading/carbon-budgeting>.
- ² Department for Business, Energy & Industrial Strategy (2021) *Valuation of greenhouse gas emissions: for policy appraisal and evaluation*, <https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation>.
- ³ Department for Energy Security and Net Zero (2023) *Carbon Budget Delivery, Plan* <https://www.gov.uk/government/publications/carbon-budget-delivery-plan>.
- ⁴ Department for Energy Security and Net Zero (2023) *Energy and emissions projections: 2022 to 2040*, <https://www.gov.uk/government/publications/energy-and-emissions-projections-2022-to-2040>.
- ⁵ Climate Change Committee (2022) *Progress in reducing emissions in Scotland: 2022 Report to Parliament*, <https://www.theccc.org.uk/publication/scottish-emission-targets-progress-in-reducing-emissions-in-scotland-2022-report-to-parliament/>.
- ⁶ Climate Change Committee (2023) *Advice report: The path to a Net Zero Northern Ireland*, <https://www.theccc.org.uk/publication/advice-report-the-path-to-a-net-zero-northern-ireland/>.
- ⁷ Climate Change Committee (2022) *CCC Mitigation Monitoring Framework*, <https://www.theccc.org.uk/publication/ccc-monitoring-framework/>.
- ⁸ Climate Change Committee (2020) *Local Authorities and the Sixth Carbon Budget*, <https://www.theccc.org.uk/publication/local-authorities-and-the-sixth-carbon-budget/>.
- ⁹ Climate Change Committee (2023) *Delivering a reliable decarbonised power system*, <https://www.theccc.org.uk/publication/delivering-a-reliable-decarbonised-power-system/>.



Chapter 3: The economy, costs and benefits

<u>3.1 Economy and competitiveness</u>	36
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Introduction and key messages

In this chapter we lay out our approach for considering the economic, fiscal and wider social implications of the transition to Net Zero. This is in line with the Climate Change Act (Chapter 2, Section 2.1).

Our key messages are:

- Our analysis will calculate the whole-economy costs and cost savings over the period 2025 to 2050. We will consider both capital expenditure and operating expenditure of measures to reduce emissions, compared to our baseline.
- We will seek to quantify, where possible, the co-impacts (non-monetary costs and savings) associated with the transition.
- We will make a high-level assessment of the wider macro-economic dynamics of the transition and identify key potential risks and opportunities for the UK economy and to competitiveness in emissions-intensive and trade-exposed sectors.
- The distribution of costs and benefits during the transition will be shaped by policy. We will assume illustrative policy packages for delivering the transition, to assess potential costs and savings across different households and impacts on the Exchequer.
- We will consider potential financial and non-financial impacts on those in fuel poverty and on other groups, including those with protected characteristics (such as sex, age and race).
- We will consider how costs and prices look from the perspective of different actors, including households and businesses.

The rest of this chapter is laid out in two sections:

3.1 Economy and competitiveness

3.2 Distribution of costs, benefits and expenditure

3.1 Economy and competitiveness

The Climate Change Act (the Act) requires consideration of “economic circumstances, and in particular the likely impact of the decision [on the level of the carbon budget] on the economy and the competitiveness of particular sectors of the economy”. Below, we set out our plans for how to consider these questions.

3.1.1 Whole-economy costs and costs savings

The difference in costs between the decarbonisation pathways and the baseline, will be calculated for the economy as a whole.

The difference in costs between the decarbonisation pathways and the baseline, will be calculated for the economy as a whole (see Chapter 2, Section 2.4 on baselines). We will assess both the additional capital expenditure required for low-carbon technology compared to its high-carbon alternative, and the difference in operating expenditure between the two technologies or practices. Our analysis will consider whole-economy ('social') costs in line with the Green Book.¹ This doesn't include transfers of money from one actor within the economy to another, but just considers what costs will be to the economy as a whole.

The high-carbon technologies and associated costs we assume will be those that are in the baseline. The baseline does not capture the costs of the impacts of climate change due to inaction, as the impacts of climate change on the UK are driven by global, not just UK, emissions.

The methodology will be largely based on the methodology adopted for the advice on the Sixth Carbon Budget, with some minor adjustments.²

- As in the Sixth Carbon Budget advice, we will calculate both the in-year change in costs (i.e. what additional capital expenditure is required in a given year) as well as the additional expenditure on a new low-carbon technology spread over its lifetime.
- As in the Sixth Carbon Budget advice, we will calculate the abatement cost (i.e. cost per tonne of abatement) of each abatement measure to identify its cost-effectiveness and compare this to other measures, as well as to the Government's carbon values (see Chapter 2, Section 2.2 on pathways).
- Where possible we will assess costs in line with the Green Book, including the application of a social discount rate.
- We will adopt a wider range of approaches to testing our cost assumptions, to make them as robust as possible. We will revisit what expenditure falls within scope, including expenditure relating to efficiency upgrades and any costs associated with a reduction in high-carbon goods and services.

Our analysis will determine the set of measures on the path to Net Zero that carry the overall least cost to the economy.

The analysis will enable us to determine the set of measures on the path to Net Zero that carry the overall least cost to the economy. It will also help us assess the costs and savings associated with accelerated scrappage. As noted in Chapter 2, minimising costs will be considered alongside a range of other criteria, particularly feasibility. The analysis will also enable us to assess at an economy-wide level what the overall costs to the economy will be, including the additional capital investment needs, and how these will change over time, and the difference in additional cost between our two pathways. We plan to include similar aggregations to those in the Sixth Carbon Budget to summarise this analysis.

We will estimate the co-impacts that result from taking up low-carbon measures.

3.1.2 Co-impacts

We will also estimate the co-impacts (non-monetary benefits and costs) that result from taking up low-carbon measures in areas such as buildings, surface transport, and diet change, including on health. We will review the state of the evidence on other co-impacts that might not be quantifiable.

3.1.3 Wider macroeconomic impacts

We will set out a high-level analysis of the main macroeconomic dynamics of the transition and consider potential impacts of competitiveness on our pathways.

Beyond our consideration of whole-economy costs, we will set out a high-level analysis of the main macroeconomic dynamics of the transition. As the trajectory of the economy will be dependent on a huge range of factors, of which efforts to reduce greenhouse gas emissions is just one, we intend to describe the high-level nature and scale, as well as key drivers, of macroeconomic impacts rather than quantitatively modelling expected impacts on employment or gross domestic product (GDP).

3.1.4 Competitiveness

For sectors that are emissions-intensive and exposed to international competition, we will consider the potential impacts of competitiveness on our pathways, noting where this is particularly contingent on international progress to decarbonise. We will seek to identify, at a high level, any sectors that will be needed to deliver Net Zero where there may be opportunities to develop or expand domestic industries.

3.2 Distribution of costs, benefits and expenditure

While economy-wide or 'social' costs are relevant for assessing what is optimal for society as a whole, we also need to consider where these costs could fall.

While economy-wide or 'social' costs discussed in Section 3.1 are relevant for assessing what is optimal for society as a whole, we also need to consider where these costs could fall (e.g. households, the Exchequer) which is affected by policy.

The Act requires consideration of “fiscal circumstances, and in particular the likely impact of the decision on taxation, public spending and public borrowing” and “social circumstances, and in particular the likely impact of the decision on fuel poverty”.

The Public Sector Equality Duty (PSED) requires those exercising 'public functions' to pay due regard to the need to “eliminate unlawful discrimination, harassment and victimisation and other conduct prohibited by the Act; advance equality of opportunity between people who share a protected characteristic and those who do not; and foster good relations between people who share a protected characteristic and those who do not.”

The following sections set out how we plan to fulfil these functions in our Seventh Carbon Budget analysis.

3.2.1 Fiscal circumstances

We will seek to model how the Exchequer will be affected by our pathways and to assess what costs and cost savings different households could experience.

We will seek to model how the Exchequer will be affected by our pathways. We will consider changes in tax receipts from specific policies – both explicit and implicit carbon taxes – that might be affected by the change in goods and services, as a result of our pathways. However, we do not plan to consider the economy-wide effect of growth and investment resulting from our pathways on tax receipts. We will also consider how public finances would be affected by public expenditure implied by the policy packages mentioned below.

It is for the Government to determine how the costs of the transition are met and the benefits allocated, including what is met by public expenditure or leveraging private spending. However, we are planning a high-level assessment of which abatement measures are most likely to require public or private expenditure. This will indicate the range of possible splits of additional expenditure between the Government, businesses and households.

3.2.2 Distribution of costs, benefits and expenditure

We will assess what costs and cost savings different households could experience under low-carbon technology roll-out and shifts away from high-carbon goods and services in our pathways. This will be based on a range of household archetypes, grouped by characteristics such as income, rural/urban location, vehicle ownership and building type. The impact on household bills of technology roll-out and shifts away from high-carbon goods and services is also affected by policy decisions, such as which costs are passed on through energy bills, general taxation etc. We will therefore postulate several policy packages that are compatible with our pathway and test how policy can redistribute the costs and cost savings across different households. This will consider the impact on low-income households with poor energy efficiency, which we will use as a proxy for those in fuel poverty. Where it is possible to do so, we will consider how the distribution of benefits and costs (discussed in Section 3.1) vary between actors and are dependent on policy.

3.2.3 Impacts on different social groups

We will consider how our pathways will affect and involve different social groups. This will include identifying which aspects of our pathways are most likely to affect groups with protected characteristics or particular communities.

3.2.4 Actors' incentives

We will consider the respective roles of government, business, financial institutions and households, among others, in delivering our pathways. We plan to identify the key actions that households and businesses would need to take to be in line with our pathways.

We will consider incentives facing households, businesses and investors to determine what prices and other factors would need to be in place for the technology roll-out in our pathways to take place. This is likely to be through case studies, and so will not be comprehensive.

Endnotes

- ¹ HM Treasury (2022) *The Green Book: Central Government Guidance on Appraisal and Evaluation*, <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>.
- ² Climate Change Committee (2020) *Sixth Carbon Budget*, <https://www.theccc.org.uk/publication/sixth-carbon-budget/>.



Chapter 4: Engagement

A crucially important part of our analysis is the engagement that will inform our evidence base.

Introduction and key messages

In addition to the expertise of our Committee members, a crucially important part of our analysis is the engagement that will inform our evidence base. Evidence will be gathered in the following ways.

(i) Call for evidence

Our call for evidence can be found on our webpage and is open until the 16th of January 2024. We invite feedback on our approach via responses to these questions.

(ii) Commissioned independent research

We are commissioning pieces of external independent research in several areas. These will be published alongside our advice.

(iii) Other stakeholder engagement

The CCC will be engaging with stakeholders throughout the commissioning and modelling of analysis as well as the publishing of the Seventh Carbon Budget and associated documents.

- Engagement will take place both virtually and around the UK, to ensure we are reflective of views across the country.
- The organisations and bodies we engage with will be listed in the final publication to showcase transparency.
- In order to deliver against our remit, we will look to engage with:
 - UK and devolved government Ministers and their departments, MPs, MSPs, MSs, MLAs and representatives from the devolved governments as well as regional and local leaders.
 - Academics and experts, both in the UK and elsewhere.
 - Senior representatives in business and finance.
 - Leaders from relevant UK bodies, including but not limited to the National Infrastructure Commission, the Future System Operator, the Competition and Markets Authority and regulators for relevant sectors.
 - Relevant non-governmental organisations and charities.
 - Trades unions.
 - Relevant international organisations, including other countries' Climate Councils tasked with providing similar advice to their governments.
 - Members of the public.
- The CCC will deliver this engagement through either hosting and/or participating in expert advisory groups, broad stakeholder groups, roundtables, citizens panels and events.

Proposed methodology for the Seventh Carbon Budget advice
November 2023

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