



The Sixth Carbon Budget

Greenhouse gas removals

This document contains a summary of content for the greenhouse gas removals sector from the CCC's Sixth Carbon Budget Advice, Methodology and Policy reports.

Introduction

The Committee is advising that the UK set its Sixth Carbon Budget (i.e. the legal limit for UK net emissions of greenhouse gases over the years 2033-37) to require a reduction in UK emissions of 78% by 2035 relative to 1990, a 63% reduction from 2019. This will be a world-leading commitment, placing the UK decisively on the path to Net Zero by 2050 at the latest, with a trajectory that is consistent with the Paris Agreement.

Our advice on the Sixth Carbon Budget, including emissions pathways, details on our analytical approach, and policy recommendations for the greenhouse gas removals sector is presented across three CCC reports, an accompanying dataset, and supporting evidence.

- **An Advice report:** *The Sixth Carbon Budget – The UK's path to Net Zero*, setting out our recommendations on the Sixth Carbon Budget (2033-37) and the UK's Nationally Determined Contribution (NDC) under the Paris Agreement. This report also presents the overall emissions pathways for the UK and the Devolved Administrations and for each sector of emissions, as well as analysis of the costs, benefits and wider impacts of our recommended pathway, and considerations relating to climate science and international progress towards the Paris Agreement. Section 11 of Chapter 3 in that report contains an overview of the emissions pathways for the greenhouse gas removals sector.
- **A Methodology Report:** *The Sixth Carbon Budget – Methodology Report*, setting out the approach and assumptions used to inform our advice. Chapter 12 of that report contains a detailed overview of how we conducted our analysis for the greenhouse gas removals sector.]
- **A Policy Report:** *Policies for the Sixth Carbon Budget and Net zero*, setting out the changes to policy that could drive the changes necessary particularly over the 2020s. Chapter 11 of that report contains our policy recommendations for the greenhouse gas removals sector.
- **A dataset** for the Sixth Carbon Budget scenarios, which sets out more details and data on the pathways than can be included in this report.
- **Supporting evidence** including our public Call for Evidence, 10 new research projects, three expert advisory groups, and deep dives into the roles of local authorities and businesses.

All outputs are published on our website (www.theccc.org.uk).

For ease, the relevant sections from the three reports for each sector (covering pathways, method and policy advice) are collated into self-standing documents for each sector. A full dataset including key charts is also available alongside this document. This is the self-standing document for the greenhouse gas removals sector. It is set out in three sections:

- 1) The approach to the Sixth Carbon Budget analysis for the greenhouse gas removals sector
- 2) Emissions pathways for the greenhouse gas removals sector
- 3) Policy recommendations for the greenhouse gas removals sector

Chapter 1

The approach to the Sixth Carbon Budget analysis for the greenhouse gas removals sector

The following sections are taken directly from Chapter 12 of the CCC's Methodology Report for the Sixth Carbon Budget.¹

Introduction and key messages

This chapter sets out the method for the greenhouse gas (GHG) removals sector's Sixth Carbon Budget pathways.

The scenario results of our costed pathways are set out in the accompanying *Advice report*. Policy implications are set out in the accompanying *Policy report*.

For ease, these sections covering pathways, method and policy advice for the GHG removals sector are collated in *The Sixth Carbon Budget – GHG removals*. A full dataset including key charts is also available alongside this document.

The key messages from this chapter are:

- **Background.** There have been no GHG removals recorded to date in the UK via the engineered GHG removal technologies within scope of this chapter. Wood in construction abatement has to date been partially counted within the Land Use, Land Use Change & Forestry (LULUCF) sector.
- **Options for reducing emissions.** Options for GHG removals include bioenergy with carbon capture and storage (BECCS), Direct Air Capture of CO₂ with storage (DACCS) and wood in construction. BECCS and DACCS involve long-term geological storage of captured CO₂, whereas wood in construction involves a decades/centuries-long temporary store of biogenic CO₂ in the buildings stock.
- **Analytical approach.** Based on the results of an updated analysis on the best use of bioenergy, we have allocated bioenergy and waste resources to conversion routes and sectors to maximise GHG savings and fit within the scenario framings of other end-use sector choices. CO₂ capture rates have then been applied to calculate BECCS removals in a bottom-up analysis. DACCS deployment has been calculated based on remaining aviation gross emissions. Wood in construction savings are based on increased use in new-build houses, less the harvested wood product removals already accounted for in the Land Use sector.
- **Uncertainty.** We have used the scenario framework to test the impacts of uncertainties, to inform our Balanced Net Zero Pathway. The key areas of uncertainty we test relate to domestic and imported biomass availabilities, different allocations of bioenergy between sectors and hence different counterfactuals being displaced by BECCS. We also test different capital, operating and fuel costs for DACCS (given its relative immaturity).

We set out our analysis in the following sections:

1. Sector emissions
2. Options for reducing emissions
3. Approach to analysis for the Sixth Carbon Budget

1. Sector emissions

a) Breakdown of current emissions

Engineered GHG removals are currently not a sector in the UK GHG inventory (land-based removals are covered in Chapter 7). There are therefore no emissions or savings from engineered GHG removals in 2018, or in previous years.¹ They are only expected to be deployed from the 2020s onwards.

b) Emissions trends and drivers

In a Net Zero 2050 context, engineered GHG removals will be driven by remaining gross emissions across the economy that need to be offset (after LULUCF sinks accounted for), and the willingness of these gross emitting sectors, consumers or Government to pay for these GHG removals. Before 2050, the level of GHG removals will depend on any sector-specific targets, and market or policy design incentivising a ramp-up in GHG removals over time. Other key drivers will be availability of CCS infrastructure, supplies of sustainable, low cost biomass feedstocks for BECCS, supplies of low-carbon hydrogen for DACCS, and the rate of new house building for wood in construction.

¹ Wood use in construction is a carbon store that is currently used in the UK. To date there has been no explicit tracking of this as a dedicated pool of carbon but some of the changes to this pool have been captured (and will be captured going forward) within the Land Use, Land Use Change and Forestry (LULUCF) parts of the GHG inventory.



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