Climate Change Committee Sixth carbon budget

Summary for Confor members

Dr Eleanor Harris
Policy Researcher

Introduction

The UK's path to net zero

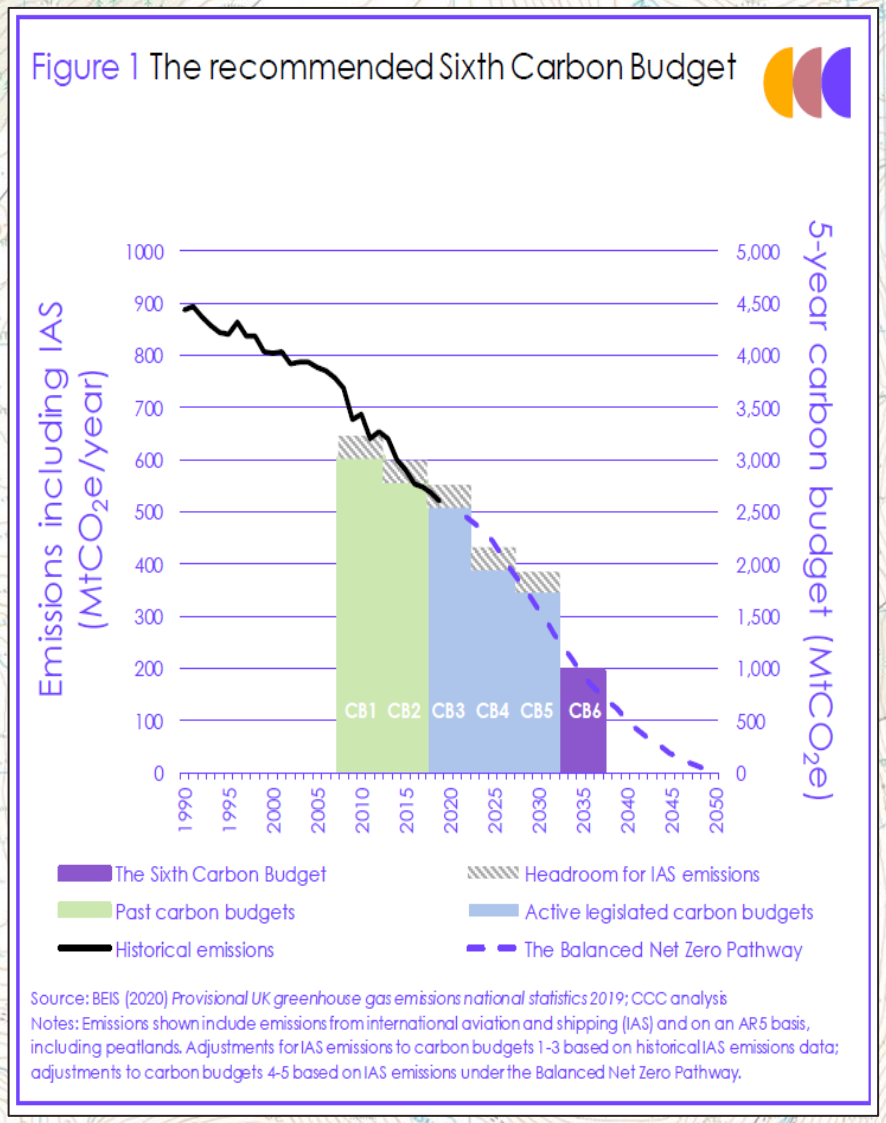
The UK Carbon budgets are prepared by the Climate Change Committee to advise the UK governments on pathways to net zero by 2050.

The sixth carbon budget provides advice up to 2035, requiring a reduction in UK greenhouse gas emissions of 78% by 2035 relative to 1990, or 63% reduction from 2019.

Introduction

This shows the decarbonisation pathway for the whole economy, on an 'S-shaped curve':

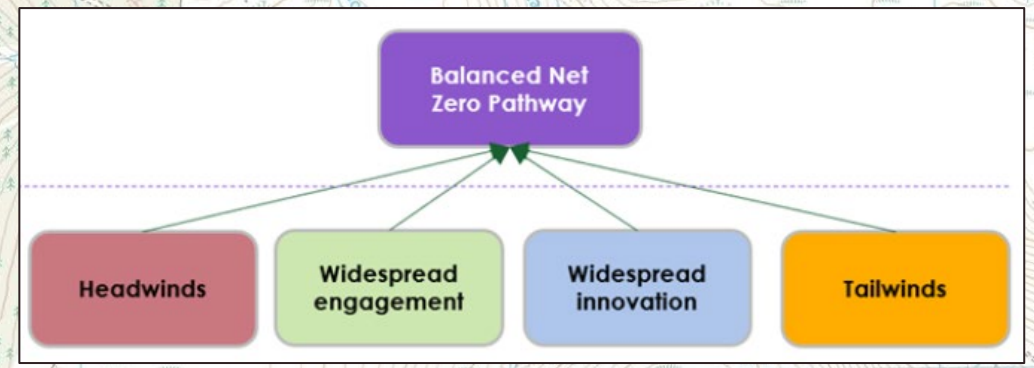
- in the 2020s, low-carbon technologies are being scaled up;
- in the 2030s they start to deliver at scale;
- in the 2040s the curve slows as the low-hanging fruit has been used up.



Introduction

The CCC have developed five scenarios for a pathway to net zero

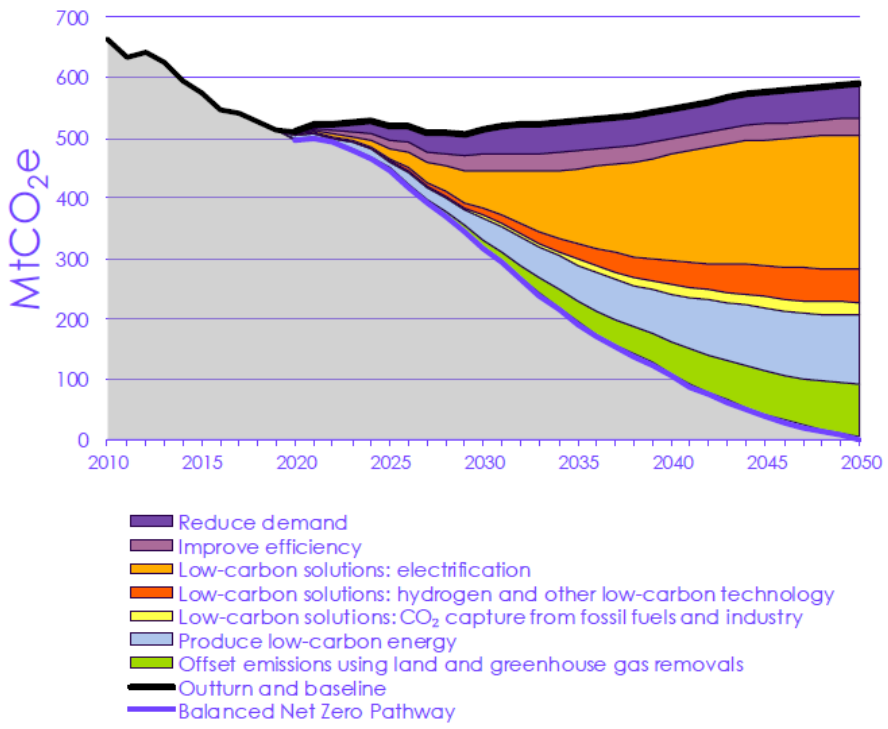
1. 'Headwinds' – policy-driven, with barriers to engagement or innovation, and reliant on CCS.
2. 'Widespread engagement' – consumer-driven, in which people are more willing to accept changes to their lives.
3. 'Widespread innovation' – technology-driven, in which there is greater success in developing low-carbon solutions enabling more electrification, efficiency and cost-effective CCS.
4. 'Tailwinds' – an optimistic scenario with high levels of technical and societal development. This reaches net zero by 2045.
5. Balanced net-zero pathway – the CCC's recommendations, based on elements of the four scenarios above.



Overall priorities for emissions reduction

Introduction

Figure 4 Types of abatement in the Balanced Net Zero Pathway



1. Reducing demand (10%) diet shift, waste reductions, less travel.
2. Improved efficiency (5%) better insulation, improved efficiency in vehicles and industry.
3. Low carbon solutions (50%) electric vehicles, low-carbon HGVs, industry powered by electricity/ hydrogen, CCS.
4. Greenhouse gas removal. 260,000 ha new mixed woodland, 260,000 ha agricultural land to bioenergy including short rotation forestry, peatland restoration, low-carbon farming.

Introduction

Some key dates

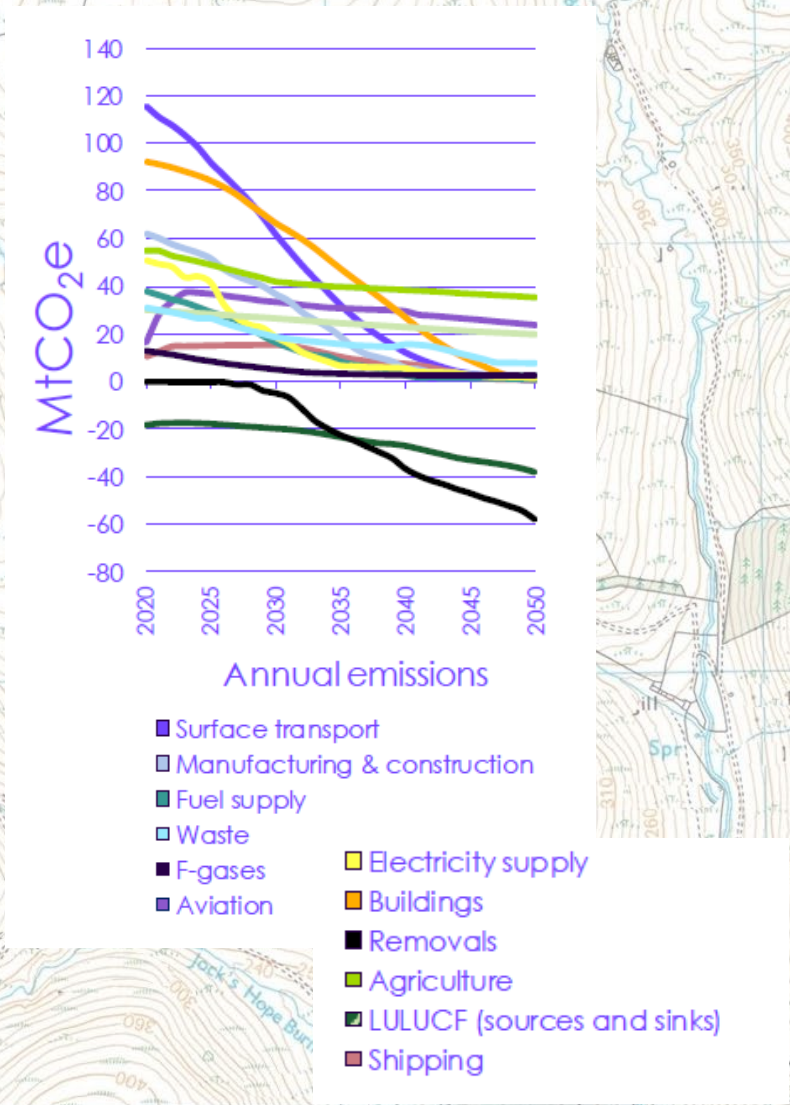
2019: 13% woodland cover, 25% peat area restored

2025: 50% of new cars should be electric, 14% woodland cover

2030: 97% of new cars should be electric, 47% peat area restored, no new sales of oil boilers

2035: 15% woodland cover, most HGVs should be zero-carbon

2050: 18% woodland cover, 79% peat area restored



Forestry, agriculture, land

10% of cuts will be made through agriculture policies.

Priorities are:

- strengthened regulatory baseline to ensure low-regret measures are adopted
- afforestation incentives
- addressing skills and supply chains
- cutting food waste and consumption of meat and dairy.

Combined agriculture and land greenhouse gas (GHG) emissions were 67 MtCO2e in 2018, which could fall to 40 MtCO2e by 2035 in the Balanced Net Zero Pathway.

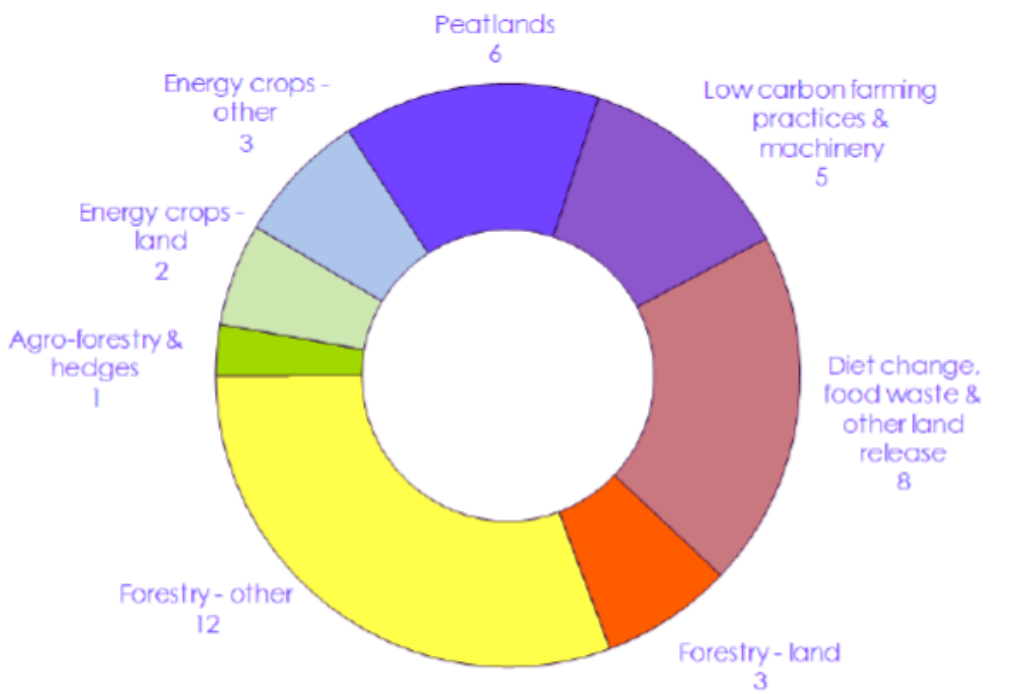
By 2050 residual emissions reach 16 MtCO2e under the Balanced Pathway but fall to Net Zero by 2047 in the Wider Innovation and Tailwinds scenarios.

Forestry, agriculture and land use

Forestry, agriculture, land

As this chart shows, forestry plays the major role in emissions reduction, while other reductions including peatland restoration, diet change (to free up land), and low carbon farming practices will raise important opportunities and challenges for parts of the sector.

Figure 3.6.a GHG savings from measures to Reduce agriculture and land use emissions, 2035 ($MtCO_2e$)



Forestry, agriculture, land

Scaling up land use change

The core pathway involves scaling up afforestation to 30,000 hectares per year by 2025 (in line with existing commitment), rising to 50,000 by 2035.

Planting ‘a mix of tree types that focus on broadleaves’ will increase forest from 13% to 18%.

There is also ‘full restoration of upland peat by 2045 (or stabilisation if degradation is too severe to restore)’. This suggests forestry needs to demonstrate that afforested peatland is ‘stable’ and delivering a carbon sink.

Perennial energy crops including miscanthus and short rotation coppice and forestry, will increase to at least 30,000 ha/year by 2035.

The core pathway requires 9% of land to be released from agriculture by 2035, more than enough to accommodate woodland creation.

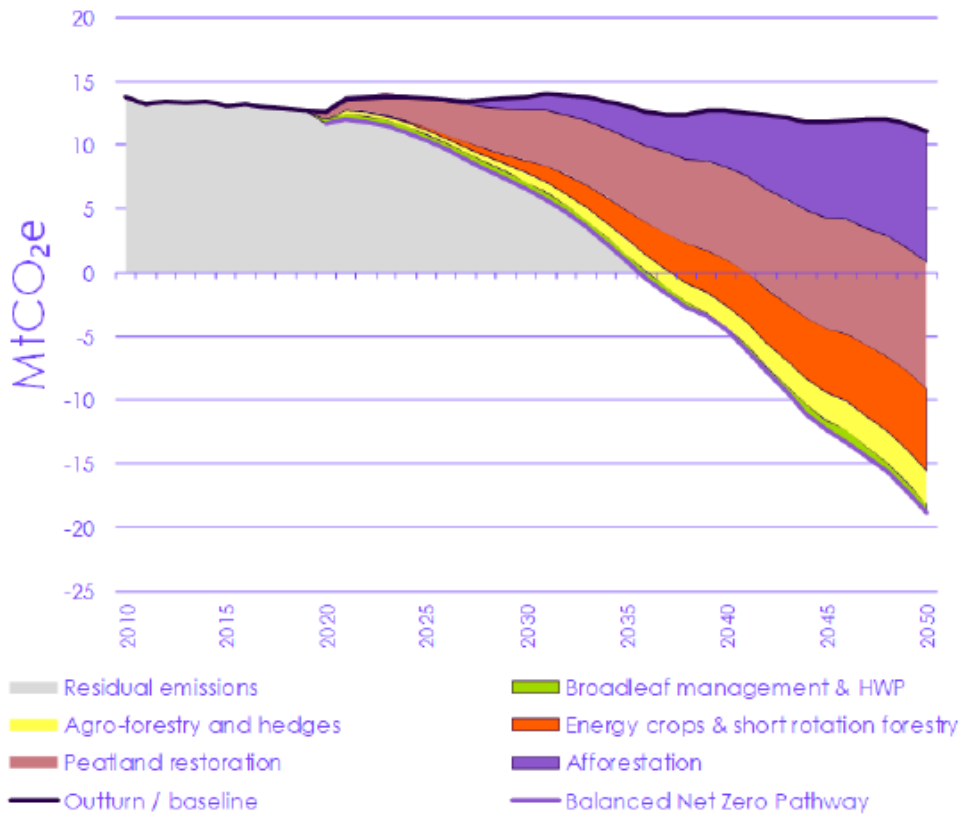
Forestry, agriculture, land

Rates of delivery

The graphic shows that afforestation (purple) is not expected to deliver significant carbon reduction for the first ten years.

This is due to conservative assumptions about rates of tree growth, discussed further on p.28-9.

Figure 3.6.d Sources of abatement in the Balanced Net Zero Pathway for the LULUCF sector



Forestry, agriculture, land

Alternative forestry scenarios

Summary of key differences in the economy-wide scenarios					
	Balanced Net Zero Pathway	**Headwinds**	**Widespread Engagement**	**Widespread Innovation**	**Tailwinds**
Tree-planting rates	**50,000 ha/year from 2035**	30,000 ha/year from 2025	70,000 ha/year from 2035	50,000 ha/year from 2030	70,000 ha/year from 2035

The 'widespread engagement' scenario involves more land being released through greater diet shifts for a 70,000 hectare tree-planting programme, but a greater focus on 'biodiverse woodlands (eg. higher broadleaf mix) over productive forestry. This results in *1MtCO2e extra emissions* in 2035 than the balanced pathway.

The 'widespread innovation' scenario has a greater component of wood-producing and short rotation forestry. It results in *4MtCO2e extra savings in 2035*.

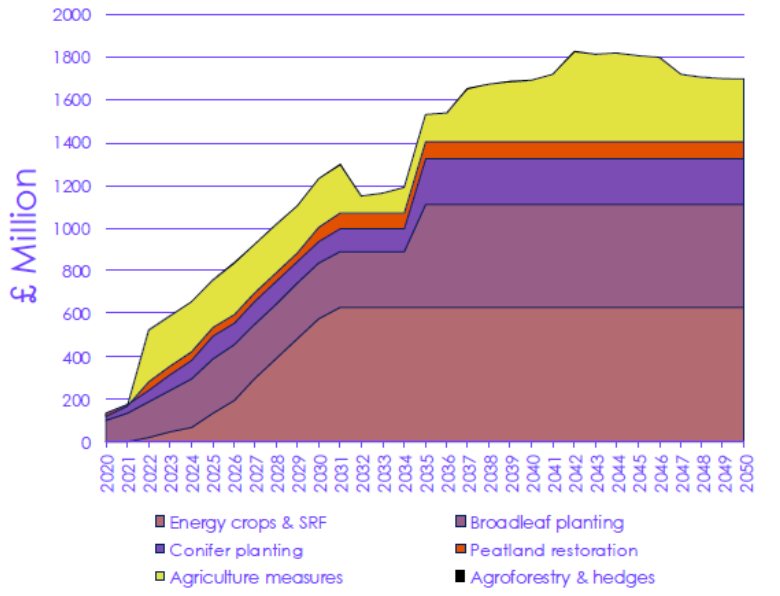
This suggested trade-off between carbon capture and biodiversity, and evidence behind it, is discussed further on p.28-9.

Forestry, agriculture, land

Cost of transition

The recommended balanced pathway is estimated to require net investment of £1.5bn by 2035 for agriculture, land use and forestry. This includes a scaling up of supply chains and investment in training, skills and R&D to overcome non-financial barriers. Sales of harvested fibre from energy crops, existing broadleaf woodlands and thinnings from new planting are estimated at £0.1bn by 2035. Bringing broadleaf woodland into management is not noted as a cost.

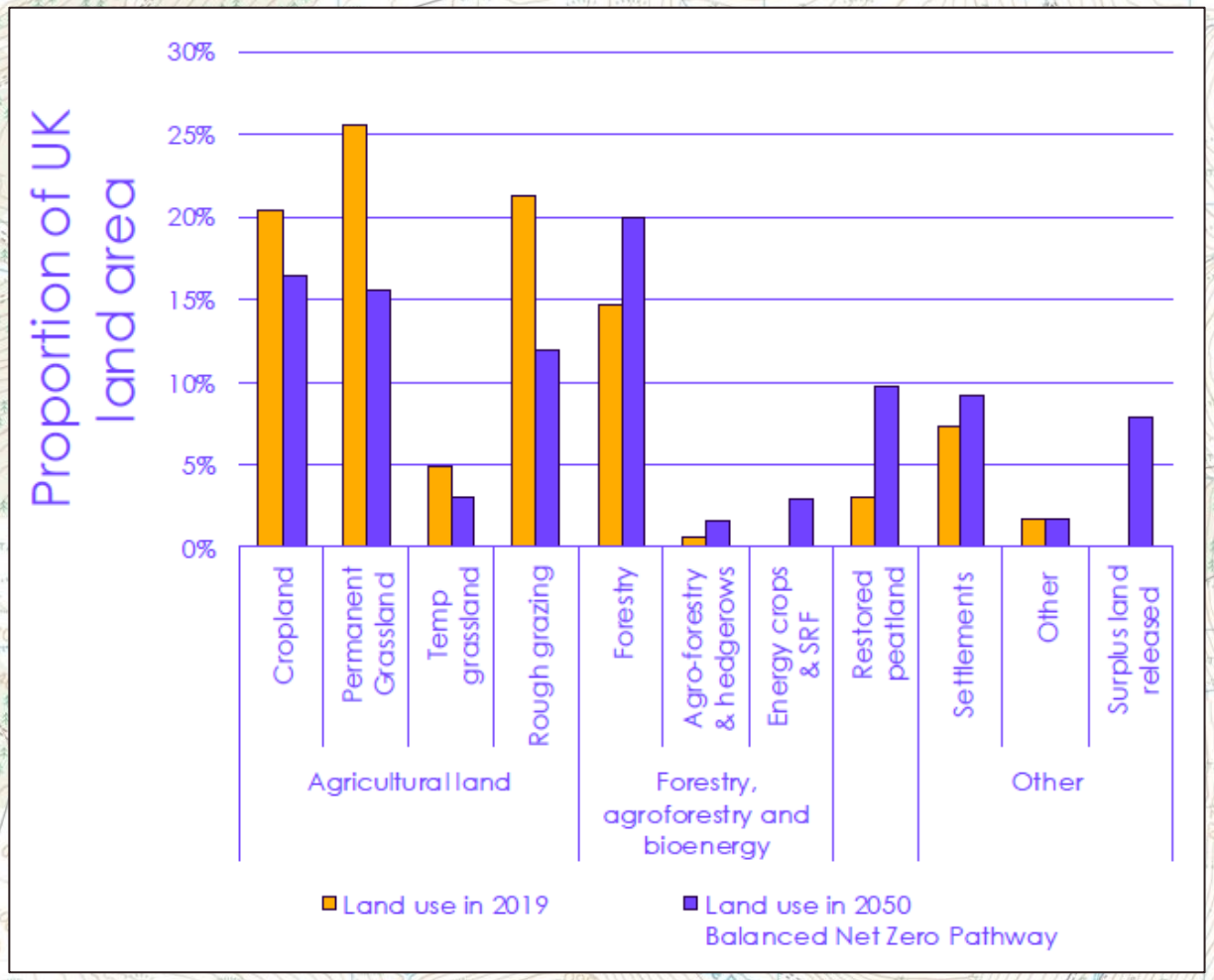
Figure 3.6.f Net investment costs in the Balanced Net Zero Pathway



Forestry, agriculture, land

Land use change

This graphic gives an overview of how land use will change.



Manufacturing and construction

Manufacturing, construction and fuel supply industries will contribute 20% of reductions, through a comprehensive transition framework which does not drive manufacturing overseas.

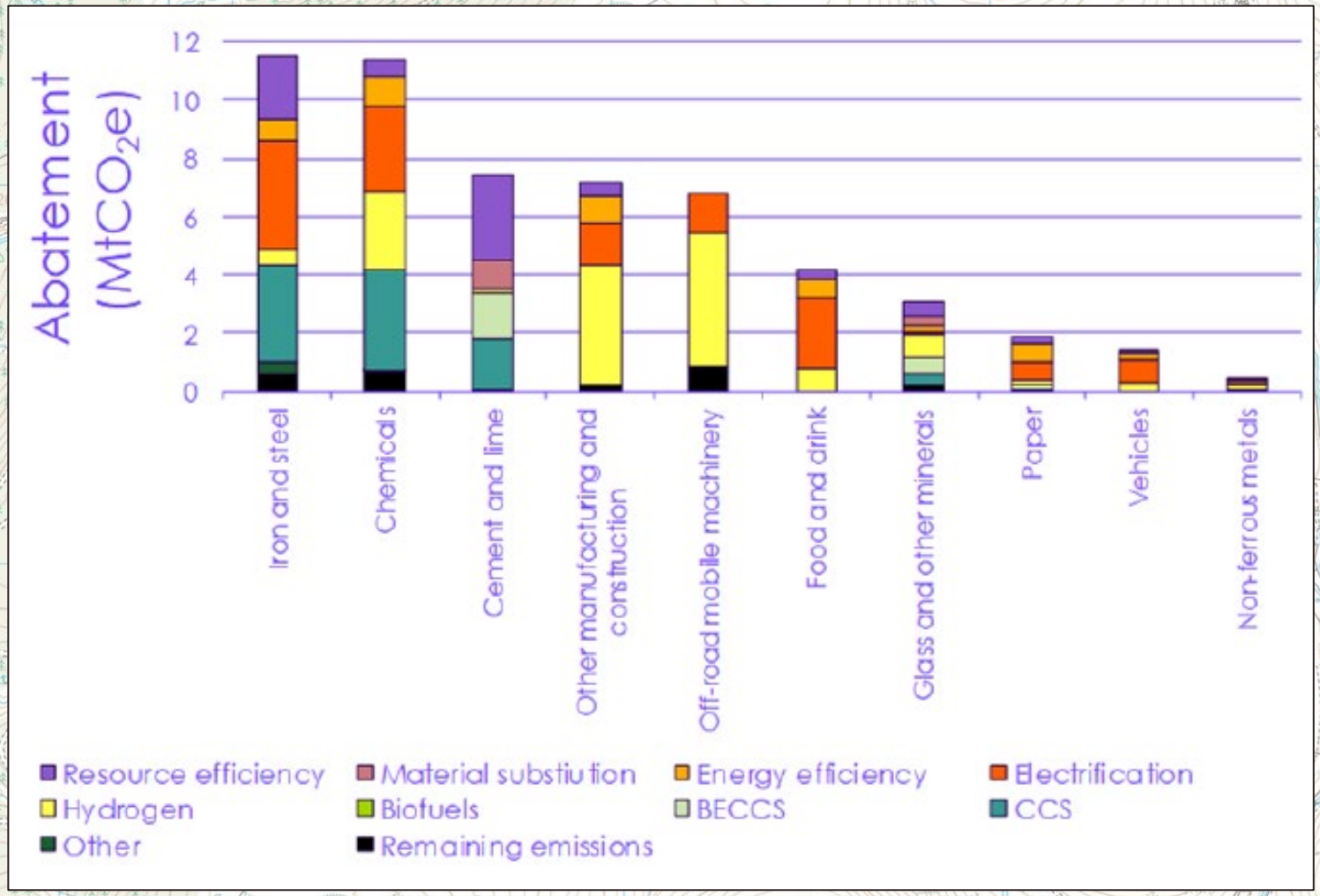
This pathway has faster reductions than the previous pathway, reflecting improved knowledge of technological options.

Bioenergy will reduce fossil emissions by 2 $MtCO_2e$ per year by 2035 increasing to 2.5 $MtCO_2e$ in 2045. Its use is prioritised for sectors already using bioenergy, such as cement and pulp, or with the potential to fit CCS.

CCS will be applied to deliver 5 $MtCO_2e$ per year of abatement in 2045 from processes where alternative options to reduce emissions have not been found. This includes fertiliser, steel, and cement production.

Manufacturing and construction

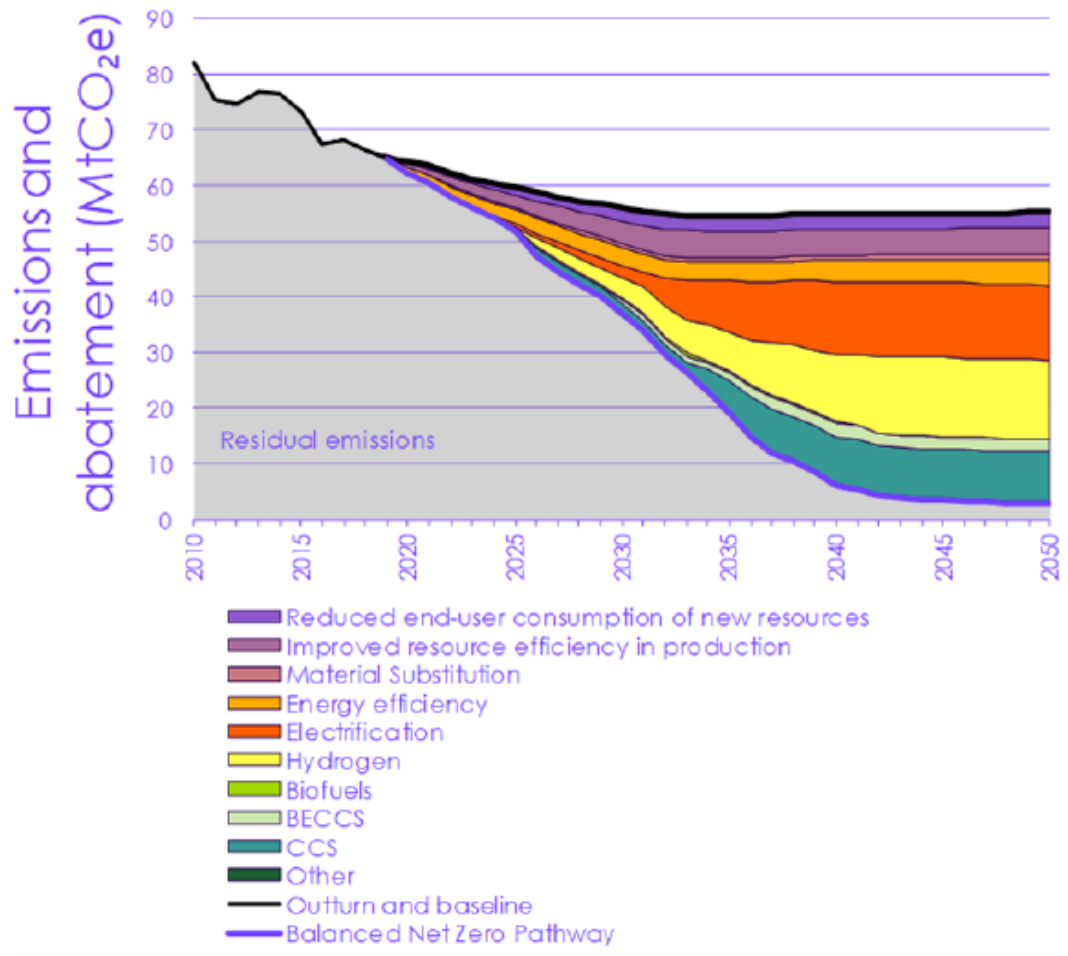
This graphic shows the bundle of measures for each industrial sector.



Manufacturing and construction

This graphic shows how abatement is achieved across the manufacturing and construction sector, including the role of material substitution.

Figure 3.3.a Sources of abatement in the Balanced Net Zero Pathway for the manufacturing and construction sector



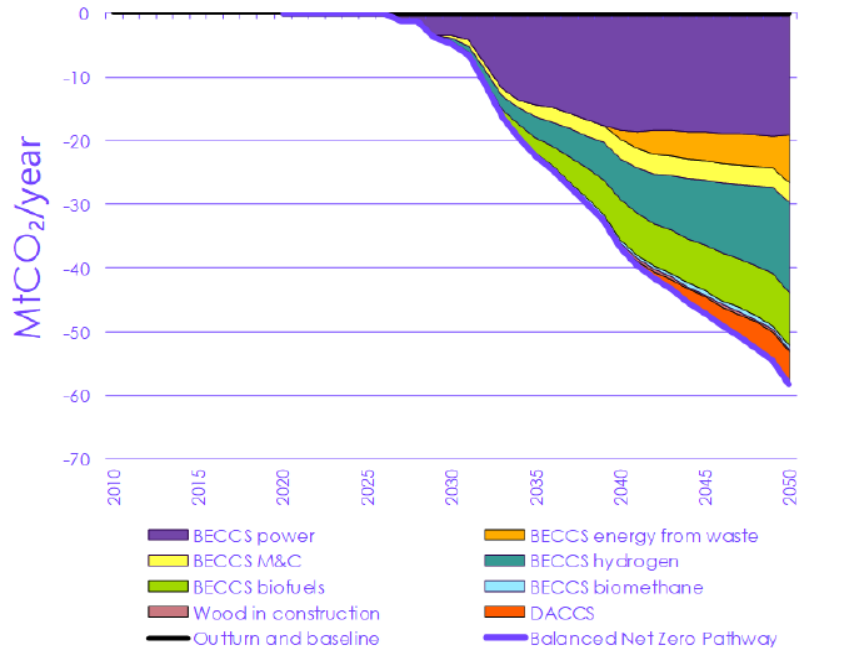
Greenhouse gas removals

The Balanced Pathway takes into account:

- time needed to scale-up BECCS (bioenergy with carbon capture and storage)
- need to demonstrate DACCS (direct air capture) for scale-up late in the 2030s
- the new-build market potential for wood in construction.

Wood in construction (above the red DACCS) is dwarfed by BECCS. Increase of timber-framed houses and engineered wood systems from 15-28% of total construction materials to 40% by 2050 is estimated to remove 0.25 MtCO2/year by 2035 and 0.44 MtCO2/year by 2050 on top of the wood product GHG savings already accounted for in the land-use sector.

Figure 3.11.a Sources of abatement in the Balanced Net Zero Pathway for the GHG removals sector



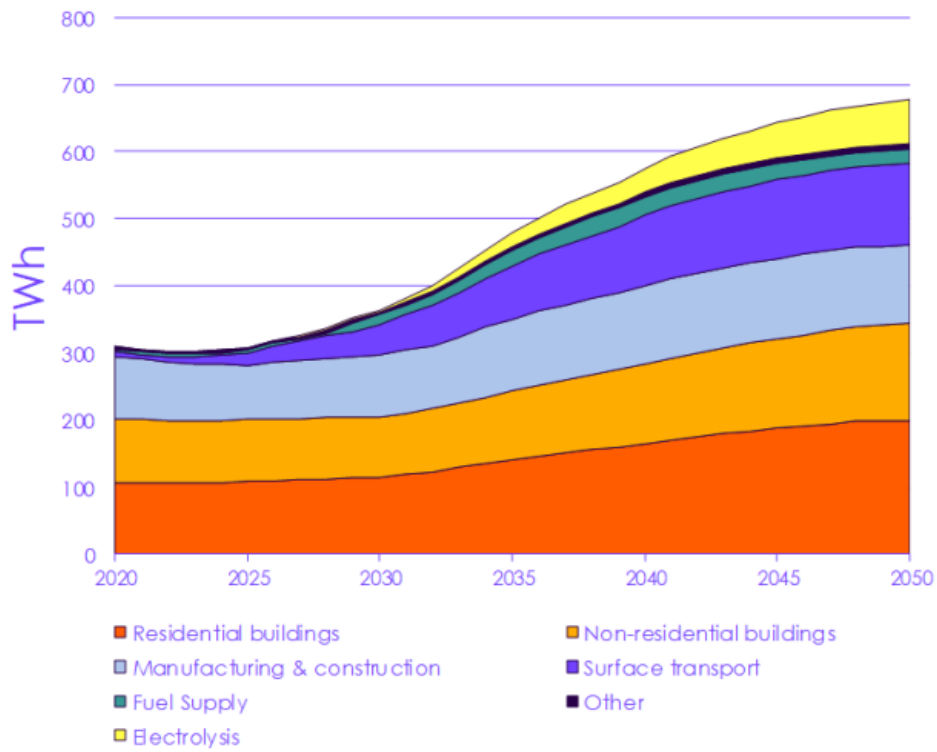
Other sectors

Electricity generation

Net-zero requires a lot of electrification and therefore a lot more generation.

Renewable technologies such as wind are well developed, but flexible low-carbon generation will be essential. This would be either gas or bioenergy with carbon capture, or hydrogen. Bioenergy with CCS is more expensive – and relies on tree planting – but delivers actual carbon removals.

Figure 3.4.a Electricity demand by sector in the Balanced Net Zero Pathway (2020-50)



Other sectors

Transport

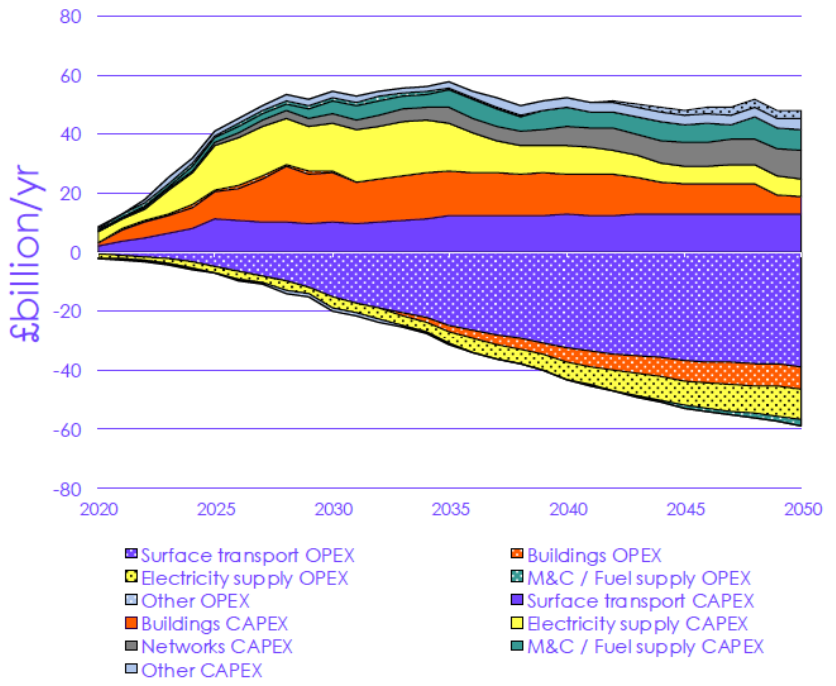
The recommended phase-out date for diesel HGVs is 2040.

It is not yet clear whether the replacements should be hydrogen, electrification or a combination.

Given lead-times for infrastructure and to turn over vehicle stocks, decisions will be needed from the Government by 2029, with commercial-scale technology trials before 2025.

This graphic shows that across the economy, investment costs of low-carbon transition are more than offset by savings in fuel costs.

Figure 3 Capital investment costs and operating costs savings in the balanced pathway



Other sectors

Fuel supply

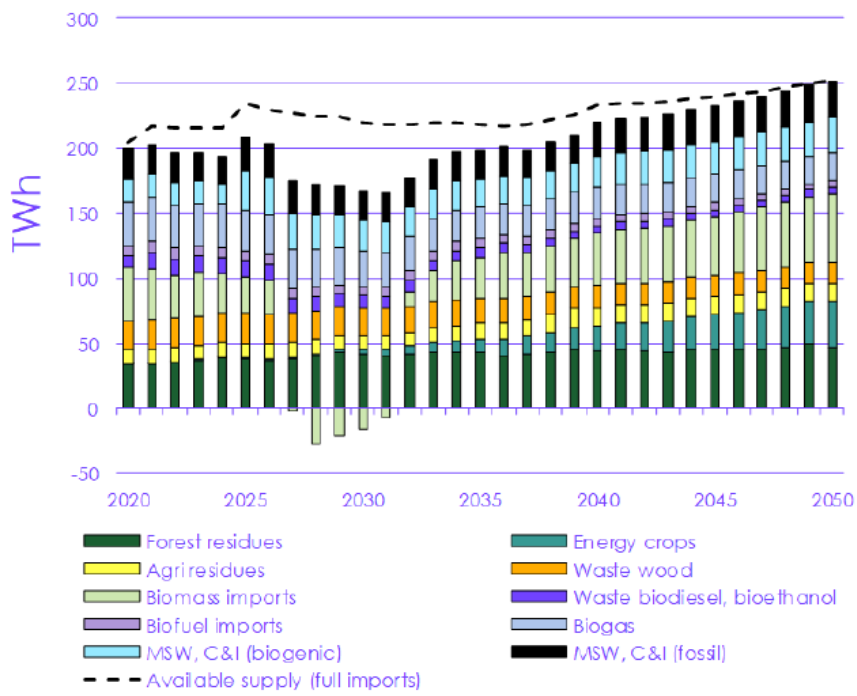
For non-electrified energy, the pathway involves a transition from:

- 2018: 1,100 TWh of fossil fuels and 170 TWh of bioenergy
- 2050: 425 TWh of low-carbon hydrogen and bioenergy in 2050

Bioenergy resources increase in line with expanding UK production of forestry residues and perennial energy crops, with combined CCS accelerating during the 2030s.

Bioenergy with CCS (BECCS) requires biomass to undergo gasification to produce biohydrogen, with the biogenic CO2 being captured and stored. This route provides 5% of supply by 2035 and 11% by 2050.

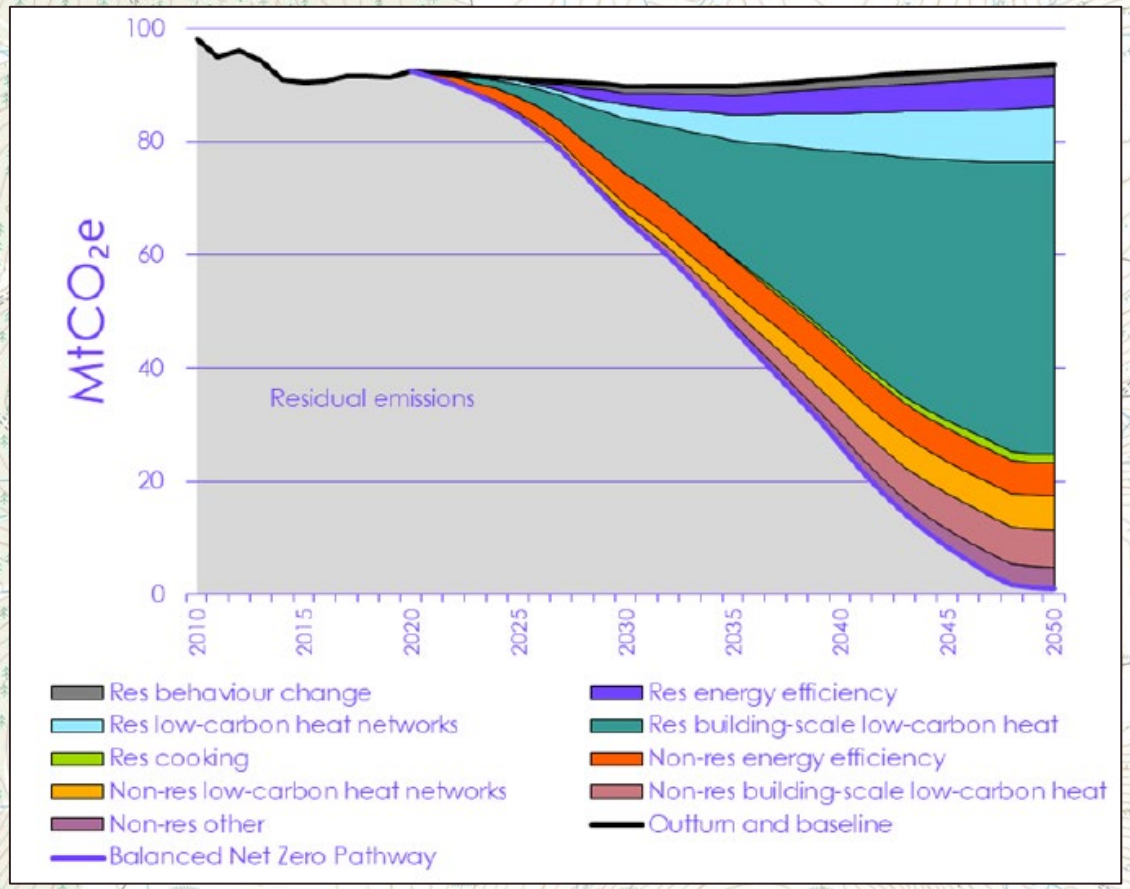
Figure 3.5.e Bioenergy and waste supply in the Balanced Net Zero Pathway



Other sectors

Energy use in buildings

Decarbonisation of buildings will be delivered chiefly through energy efficiency, heat pumps, low-carbon heat networks, and hydrogen. There is a timetable for all homes to meet Energy Performance Certificate C standard.



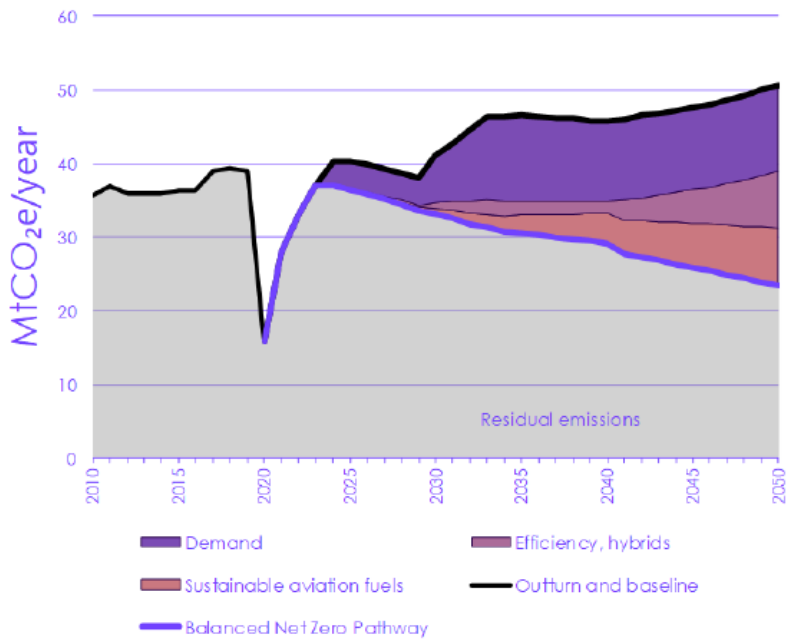
Other sectors

Aviation

Cuts to aviation emissions will be made through demand reduction, efficiency, and sustainable aviation fuels.

A 'widespread innovation' scenario, linking to the equivalent land use scenario, demonstrates that higher production of sustainable biofuel could enable deeper cuts in this sector.

Figure 3.7.a Sources of abatement in the Balanced Net Zero Pathway for the aviation sector



Waste

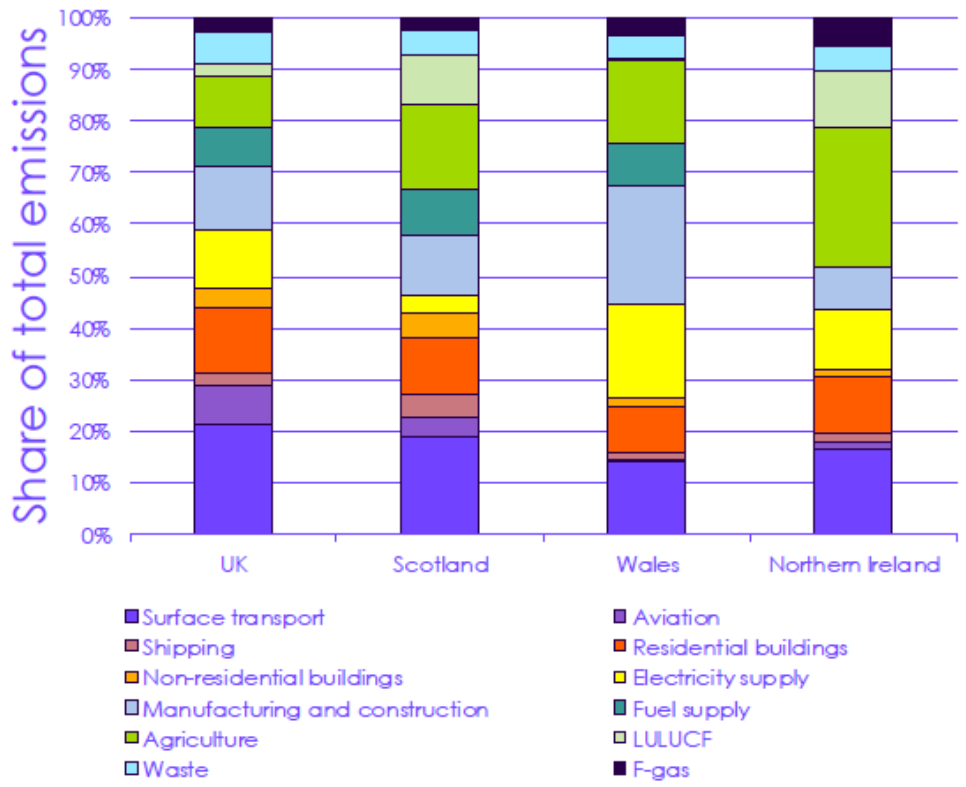
Emissions can be reduced by 75% by 2050, through waste prevention, recycling, landfill methane capture, wastewater treatment and composting, and CCS in energy-from-waste.

Devolved governments

Agriculture and land use is more significant for all the devolved governments than for England.

At this stage, the report does not set tree planting targets for the devolved nations.

Figure 4.1 Sectoral emissions in 2018 for Scotland, Wales and Northern Ireland compared to the UK



Manufacturing

Sawmills and CCAs

The adoption of the Net Zero target means a step-change in ambition for decarbonisation of UK industry.

CCC recommends that Government should reform overall energy and carbon pricing incentives to switch to lower-carbon energy sources in the non-traded (non UK-ETS) manufacturing sectors. Two options presented: (1) Extend the UK ETS to the existing non-traded sectors; (2) reform the Climate Change Levy towards reflecting carbon content, so that electrification is clearly incentivised. If this approach is taken, the CCC state "there may be value in reviewing the role of Climate Change Agreements as the mechanism to incentivise electrical energy efficiency and protect sectors at risk of carbon leakage."

Government is challenged to set a vision for decarbonisation of manufacturing:

> The design of policies to reduce UK manufacturing emissions must ensure that it does not damage UK manufacturers' competitiveness and drive manufacturing overseas.
>
> - In the near term, taxpayer funding should be used to support deep decarbonisation in manufacturing sectors at risk of carbon leakage.

Commentary and implications

The sixth carbon budget makes welcome connections between forestry and other sectors of the low-carbon economy, including the benefit of material substitution and wood in construction.

Some aspects of the zero-carbon pathway which will challenge our industry along with others, such as targets for decarbonising machinery and industrial processes. Sawmill and wood panel businesses are already making good progress through Climate Change Agreements - Confor would argue this successful incentivised approach should continue beyond 2025 (current timeframe for CCAs)

The report's detail of the type of woodland that could be created requires further assessment. The focus on broadleaves implies a trade-off between wood production/ carbon and other benefits which does not take account of evidence on biodiversity in mixed forests, or the effect of education on what forests people will find 'acceptable'. It also does not take account of devolved administrations' forestry policies.

Commentary and implications

Assumptions for broadleaf woodland are based on sycamore, ash and birch at 2,000 stems/hectares, with 67-80% broadleaf woodlands managed sustainably by 2030. These assumptions appear unrealistic.

In England, much existing broadleaf native woodland is not managed. If additional planting, as well as existing woodland, are to deliver the carbon, biodiversity and social benefits assumed in the report it will require a major effort to tackle damage by grey squirrel and deer. This ongoing cost is not factored in (see p.12), nor the effort required to secure public acceptance of control measures. Red squirrel project teams calculate that £1m/year would be required in Cumbria alone to keep grey squirrel suppressed. Forestry & Land Scotland spend around £10/hectare/year on deer management on their 650,000 hectare estate, which has far greater efficiencies than would be possible in English broadleaf woodland. Sycamore is not considered a native tree, and Ash is disappearing due to a dieback disease which could result in the loss of 95% or more of Ash trees.

Commentary and implications

We advise the Climate Change Committee to consider a more balanced approach in England focused on modern mixed forests such as Doddington North and Jack's Wood. These include a strong component of high-yielding conifers, and will deliver significant benefits for biodiversity and people, rapid carbon sequestration, and the quantity and quality of wood we need to produce low-carbon construction materials.

These new woodlands have been welcomed by local communities, whose understanding of what they will look like and what they will deliver is an indicator of the public's ability to go beyond general assumptions about 'conifers' and 'broadleaves'.

The latest measurements in tree growth, due to be incorporated into the Woodland Carbon Code next year, demonstrate that modern productive species capture carbon earlier and faster than previously thought. This suggests that these kinds of forests can deliver over-and-above what is described in the Carbon Budget pathways.

Commentary and implications

The 6th Carbon Budget demonstrates clearly that forestry and wood production is not just a land use issue. Our sector will be affected by, and contribute to, almost every area of decarbonisation:

- Agriculture: Forest nurseries will work with the horticulture sector to increase efficiencies.
- Agriculture. A strengthened regulatory baseline is regarded as essential to deliver agriculture emissions cuts. The UK Forestry Standard and independent UK Woodland Assurance Standard provide sophisticated models of environmental land use regulation, for example regulating water and soil management, cultivation, drainage, chemicals and buffer zones, which minimise soil carbon loss as well as avoiding other environmental damage. These could provide models for wider integrated low-carbon land management.
- Machinery: Forestry machinery will be essential to delivering reductions in agricultural machinery.

Commentary and implications

- Peatland restoration: Forestry schemes on mixed sites already deliver peatland restoration alongside woodland creation as part of an integrated land use design using the same managers, contractors and machinery.
- Forest carbon sink: The budget suggests that carbon benefits from afforestation would not be significant until 2030, however, a tree-planting programme which incentivised landowners to plant mixed forests including a significant fast-growing conifer component on non-organic soils would already have a significant onsite carbon stock by 2030, and could be beginning to deliver wood fibre from thinnings to other sectors of the low-carbon economy. The estimates of YC14 for new planting, rising to YC18 in 2030, are extremely conservative for newly-planted private-sector forests.
- Short rotation forestry (SRF) in construction: SRF is expected to deliver greenhouse gas removal through bioenergy with carbon capture and storage (BECCS). This will be important; however it should be noted that SRC can also deliver GHG removal by being used for engineered construction materials (such as board or wood-fibre insulation).

Commentary and implications

- Waste. Wood products are easily and already widely recycled: for example pallets and construction timber at the end of life can be recycled into chip for biomass and construction board, both of which deliver important carbon benefits of their own.
- Buildings: Wherever insulation materials are made from wood (window frames, insulation fibre, batons, board), there will be Harvested Wood Product (HWP) carbon storage, and potential material substitution.
- Material substitution: The carbon benefit of substituting wood for other materials is implied but not fully explored. This includes benefit at manufacture (reducing costly measures to decarbonise concrete/ steel) construction (wood is a lighter and lower-carbon material to transport and work with) and disposal (wood is easily recycled into further low-carbon uses, unlike concrete or plastic).

What happens next?

The carbon budget recommends:

- A major nationwide investment programme, led by government but funded and delivered by business.
- Inclusion of aviation and shipping for the first time.
- Delivery policies in place in early 2021.
- Acceleration of existing commitments (up to 2032).
- Grabbing the opportunity of ‘spare capacity’ in the economy resulting from the covid pandemic to invest for low-carbon recovery.

Across all scenarios, cost of implementation will be less then 1% of GDP.