

The UK route map to net-zero greenhouse gas emissions

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UK statistics

Now(ish)



- Population 66 million
- Energy per person = 25 MWh
- % electricity from renewables = 42%
- No vehicles per person = 0.58
- Electric heating in homes = 8% (86% gas)

2050(ish)



- Population ~ 77 million
- Energy per person = ???
- % electricity from renewables = 80%
- Vehicles per person = 0.51 (96.5% BEVs)
- Electric heating in homes = 60%

UK Climate Change Act

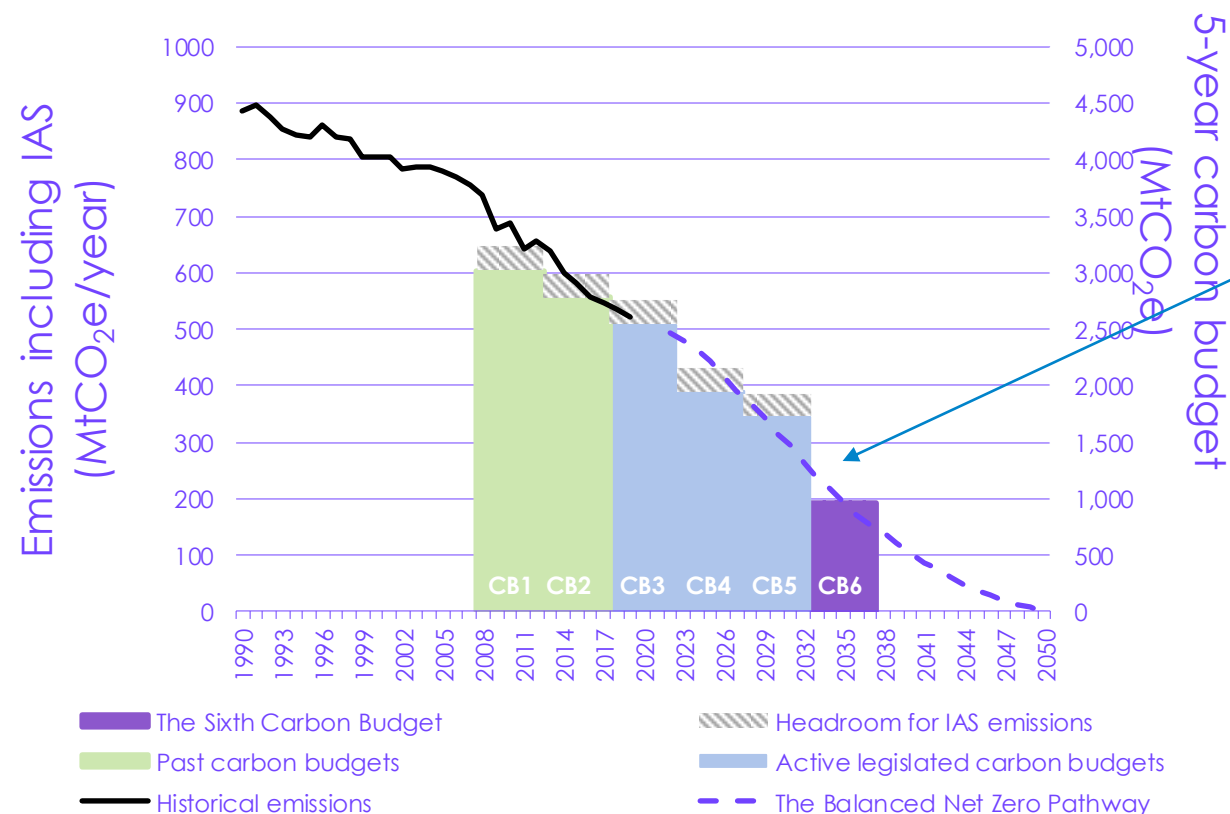
“It is the duty of the Secretary of State to ensure that the **net** UK carbon account for the year 2050 is **at least 100% lower** than the 1990 baseline.”



Climate Change Act 2008

The UK Carbon Budget to 2038

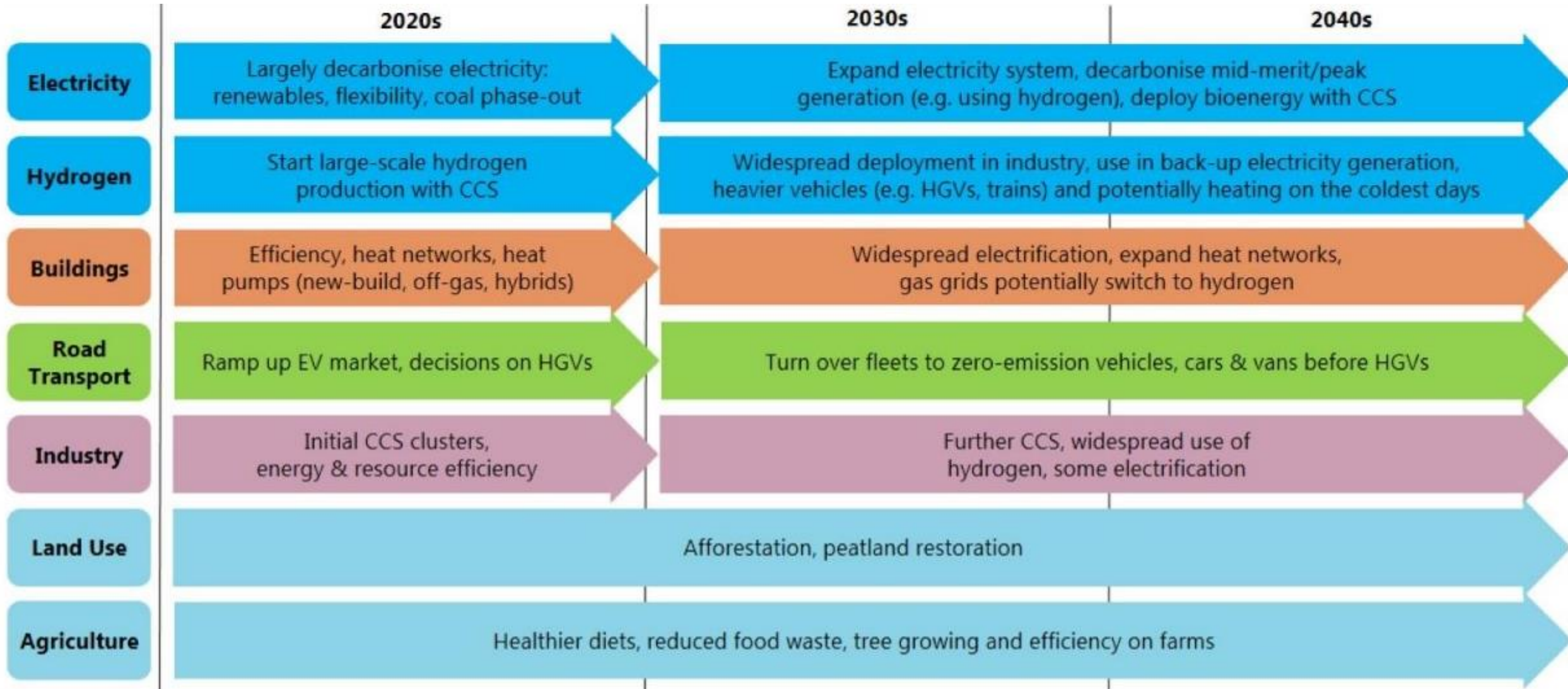
Figure 1.1 The recommended sixth carbon budget



Source: BEIS (2020) *Provisional UK greenhouse gas emissions national statistics 2019*; CCC analysis.

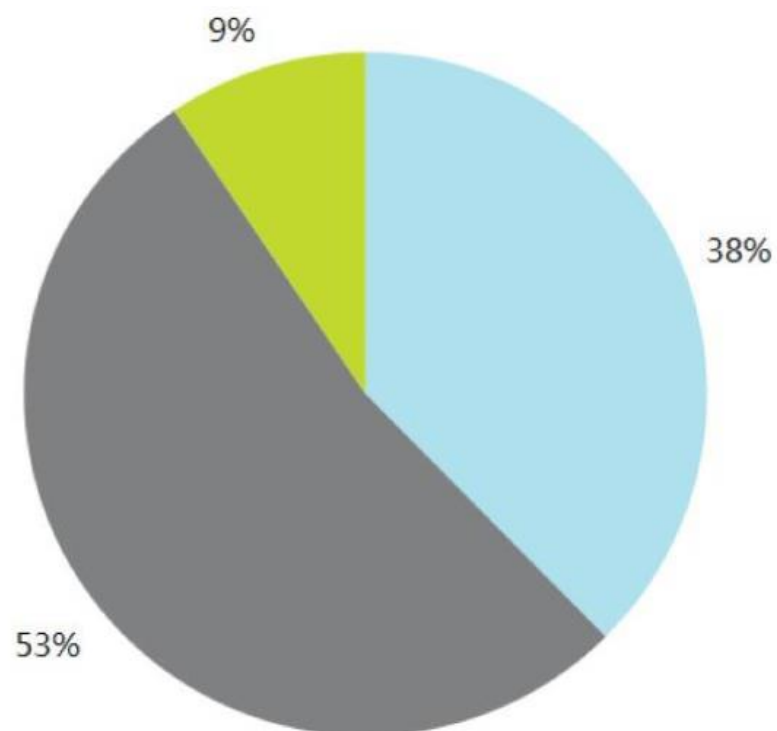
Notes: Emissions shown including emissions from international aviation and shipping (IAS) and on an AR5 basis, including peatlands. Adjustments for IAS emissions to carbon budgets 1-3 based on historical IAS emissions data; adjustments to carbon budgets 4 and 5 based on IAS emissions under the Balanced Net Zero Pathway.

Climate Change Committee advice on priorities



Technology can't do everything

Role of societal and behavioural changes



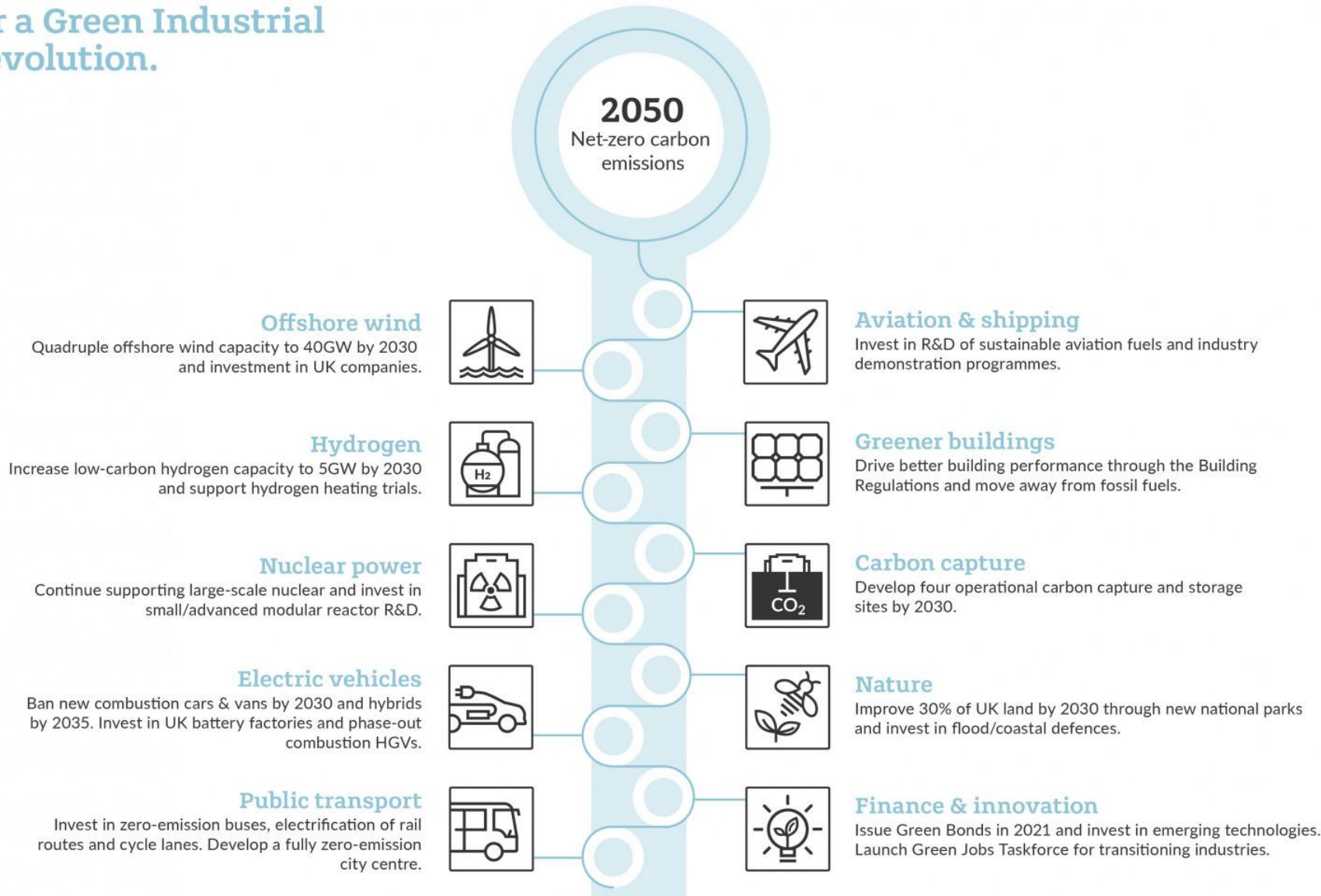
■ Low-carbon technologies or fuels not societal / behavioural changes

■ Measures with a combination of low-carbon technologies and societal / behavioural changes

■ Largely societal or behavioural changes

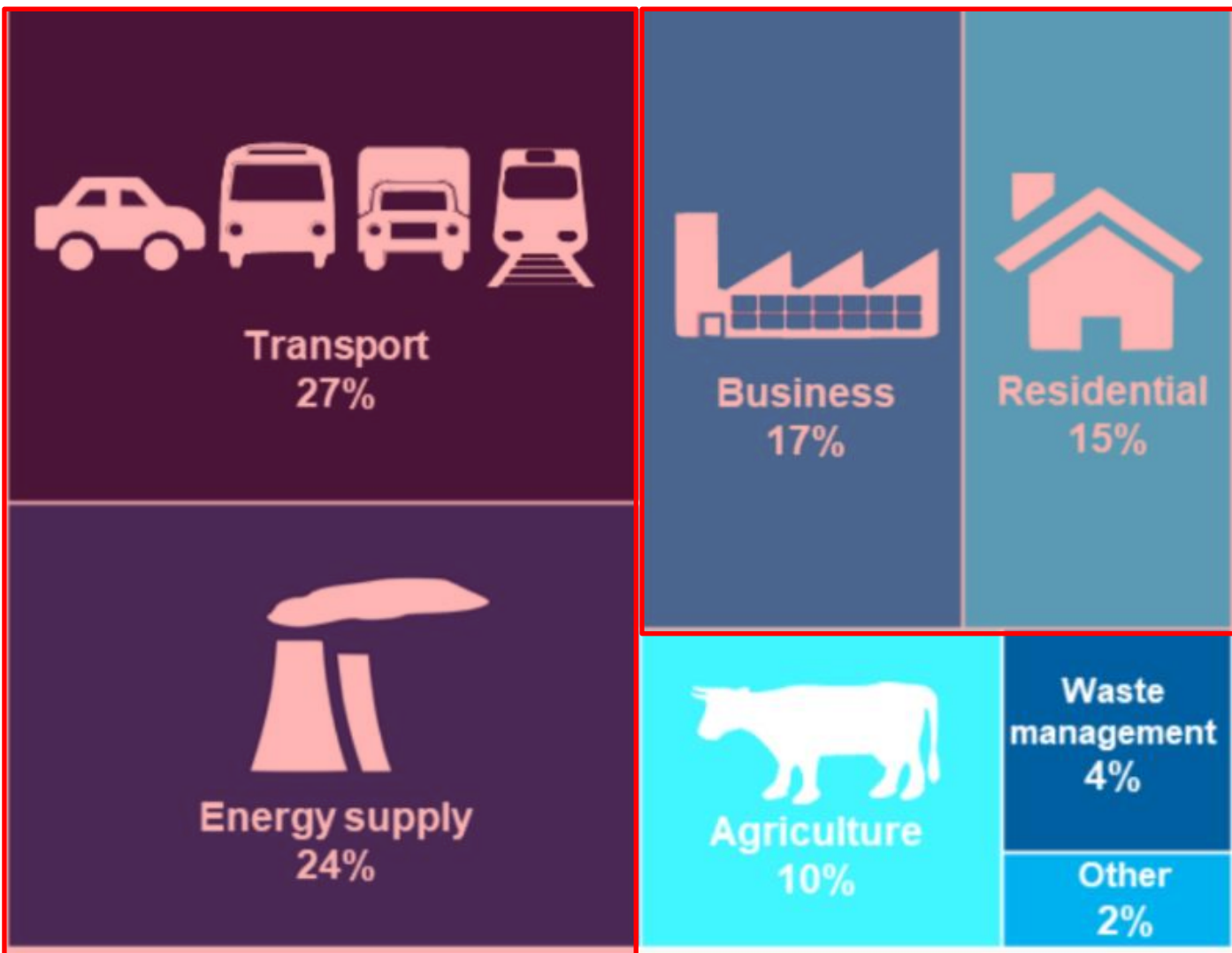
Source: CCC analysis

The Ten Point Plan. for a Green Industrial Revolution.



<https://hoarelea.com/2021/03/30/what-does-uks-net-zero-ten-point-plan-mean-for-buildings/>

Energy is 83% of UK GHGs



Progress on mitigation

Electricity ✓

Transport 😐

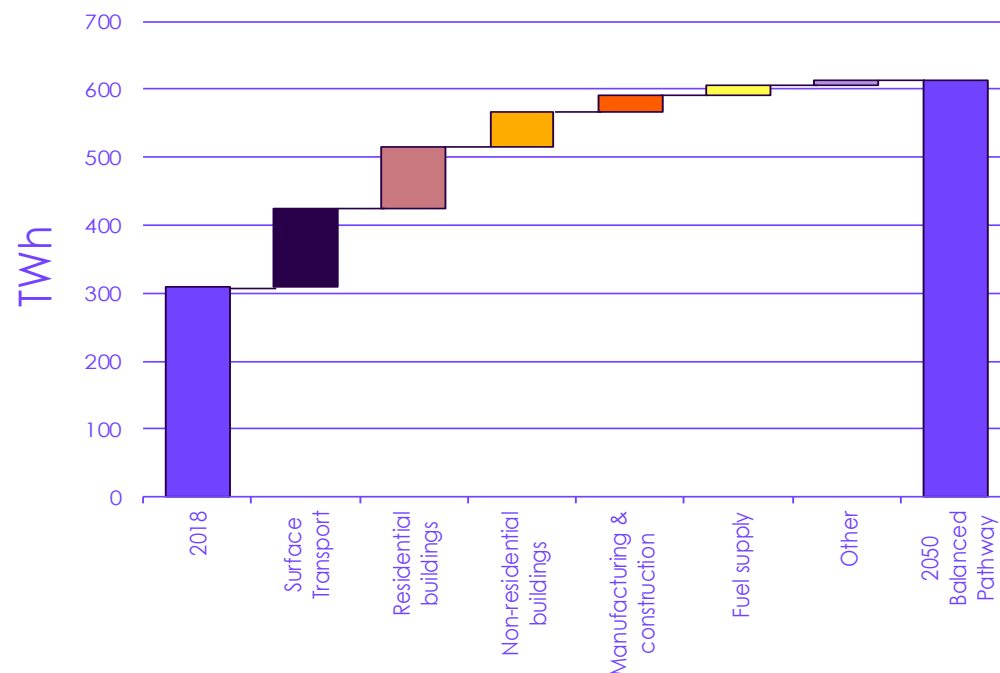
Heat ✗

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776083/2017_Final_emissions_statistics_one_page_summary.pdf

Electricity

Electricity demand vs. carbon intensity

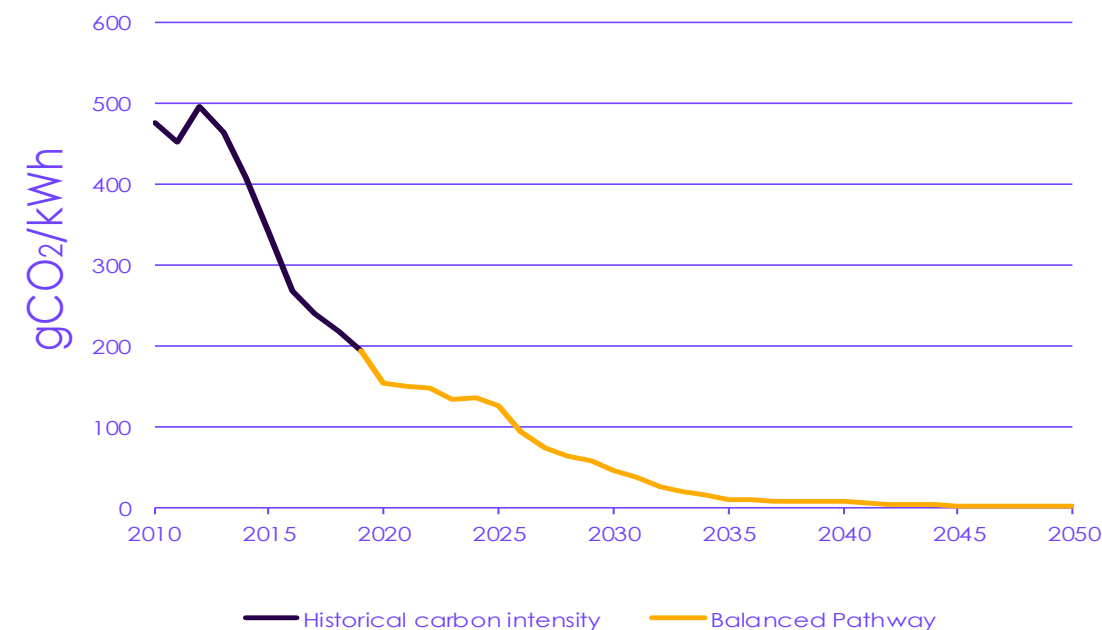
Figure 5.5 Contribution by sectors to increased electricity demand in the Balanced Pathway (2018-50)



Source: CCC analysis

Note: Other category includes agriculture, aviation, direct air capture, shipping, and F-gases.

Figure 3.4.b Carbon intensity in the Balanced Pathway (2010-50)

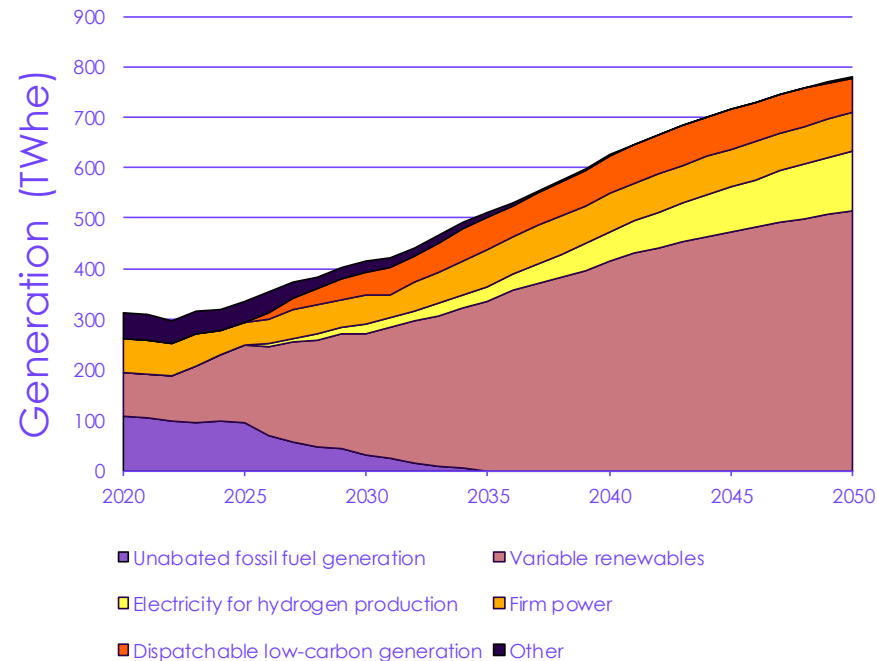


Source: BEIS (2020) 2018 UK greenhouse gas emissions: final figures, BEIS (2020) 2019 UK greenhouse gas emissions: provisional figures, CCC analysis

Note: Rate of reduction in carbon intensity accelerates from 2025, reflecting a rapid expansion of low-carbon generating capacity.

Electricity supply

Figure 3.4.c Illustrative generation mix for the
Balanced Pathway (2020-50)



Source: CCC analysis

Notes: Chart reflects UK electricity generation. Additional capacity is available through interconnection. Unabated fossil fuel generation includes coal and gas. Variable renewables include wind and solar. Firm power includes nuclear. Dispatchable low-carbon generation includes gas CCS, BECCS, and hydrogen.

Dispatchable low-carbon generation 70 TWh

Firm power 74 TWh

Electricity for hydrogen production 120 TWh

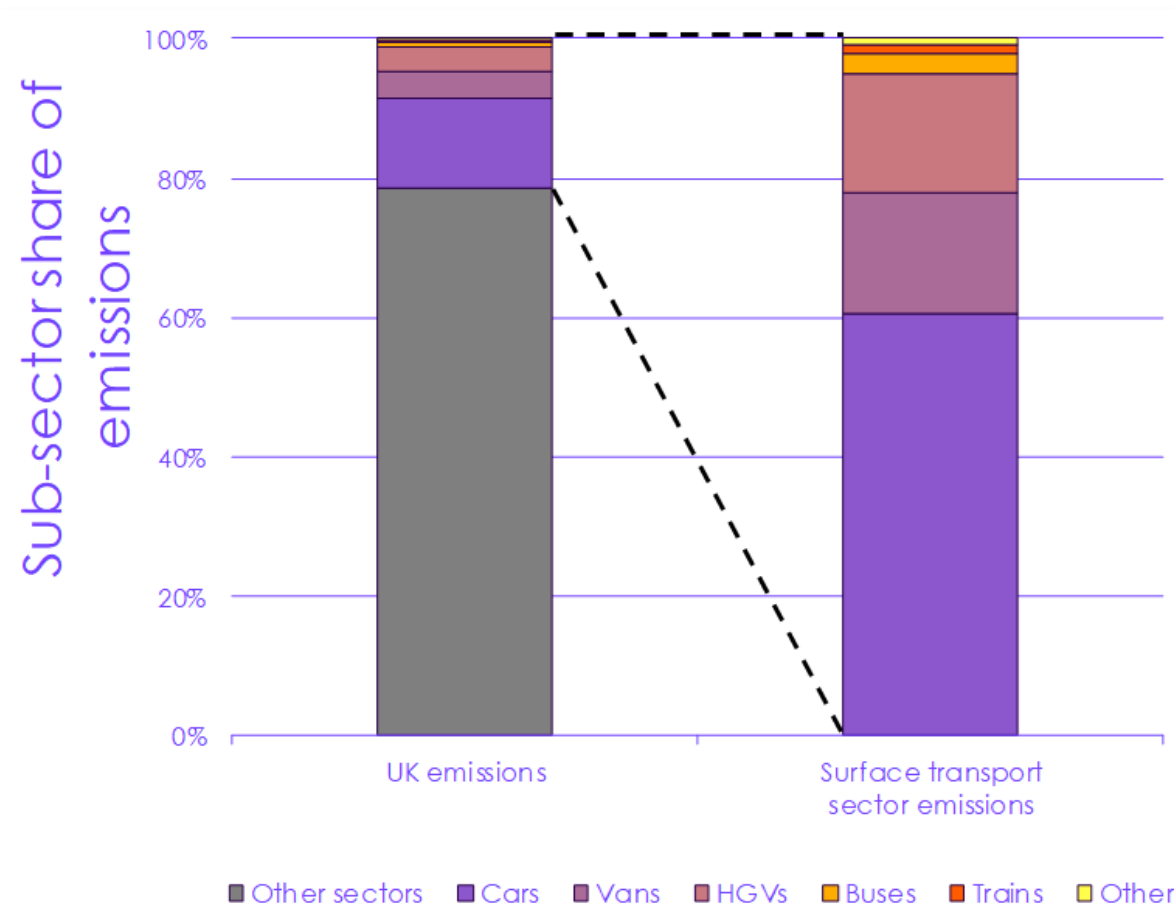
Variable renewables 514 TWh

Transport

Breakdown of UK surface transport emissions

Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

Figure 2.1 Breakdown of surface transport sector emissions (2019)

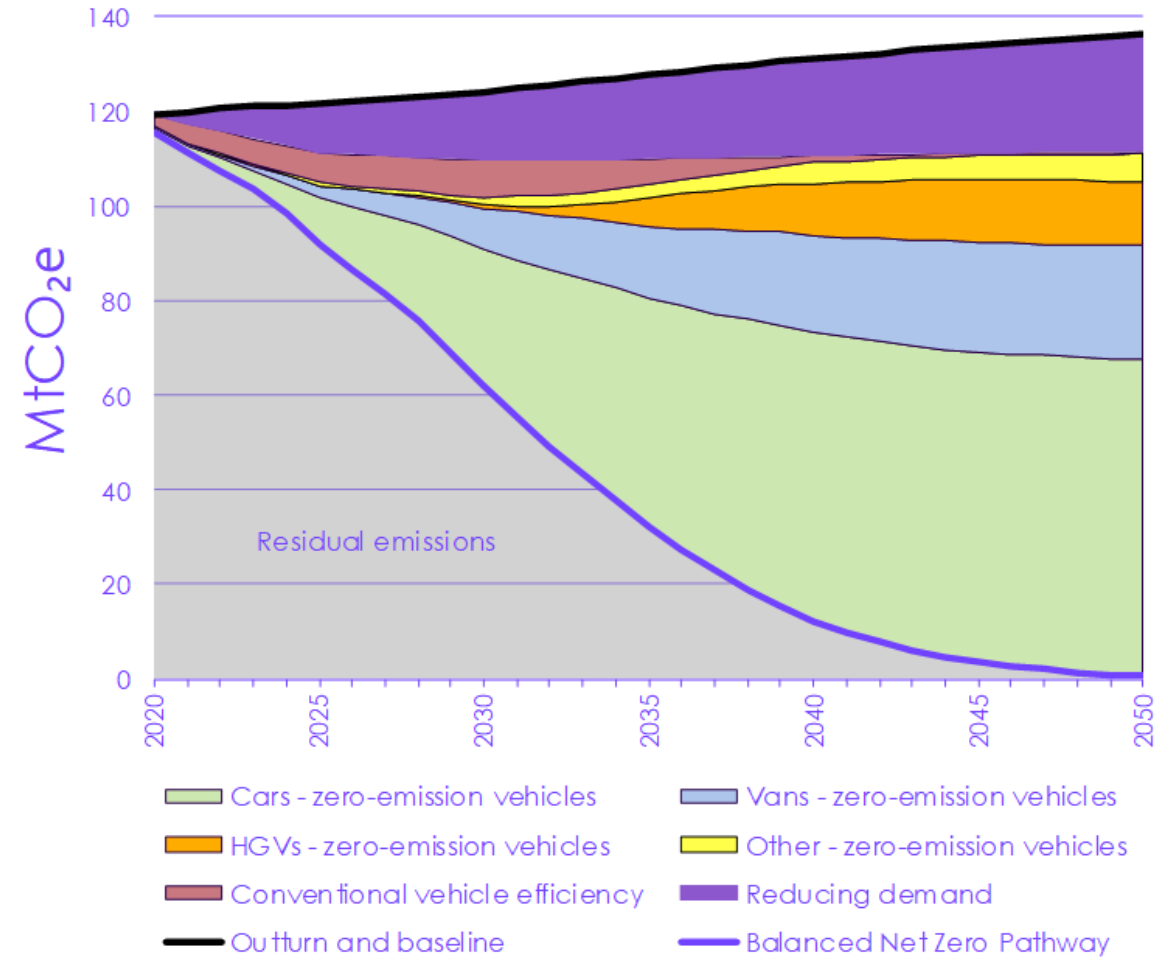


Source: BEIS (2020) Provisional UK greenhouse gas emissions national statistics 2019; CCC analysis.

Sources of abatement in balanced net-zero pathway for surface transport sector

Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

Figure 3.1.a Sources of abatement in the Balanced Net Zero Pathway for the surface transport sector

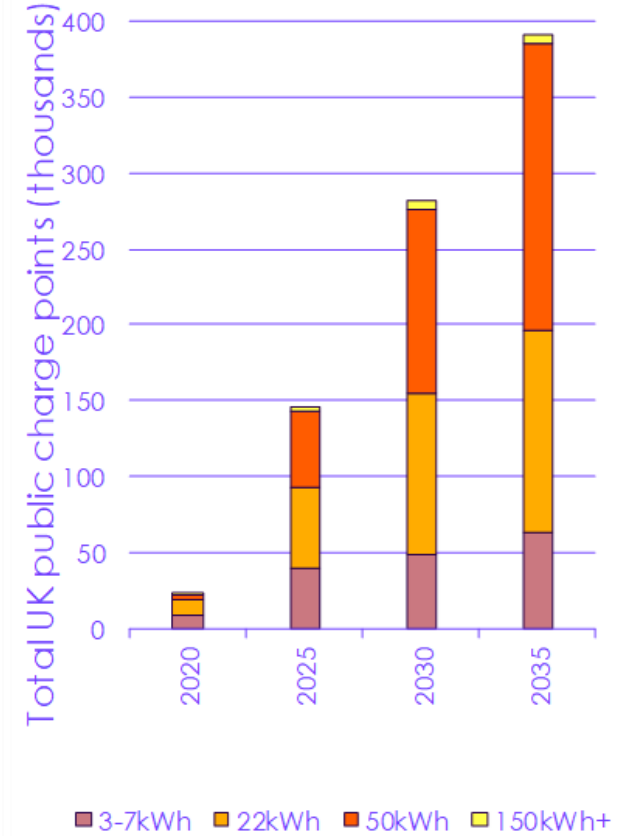
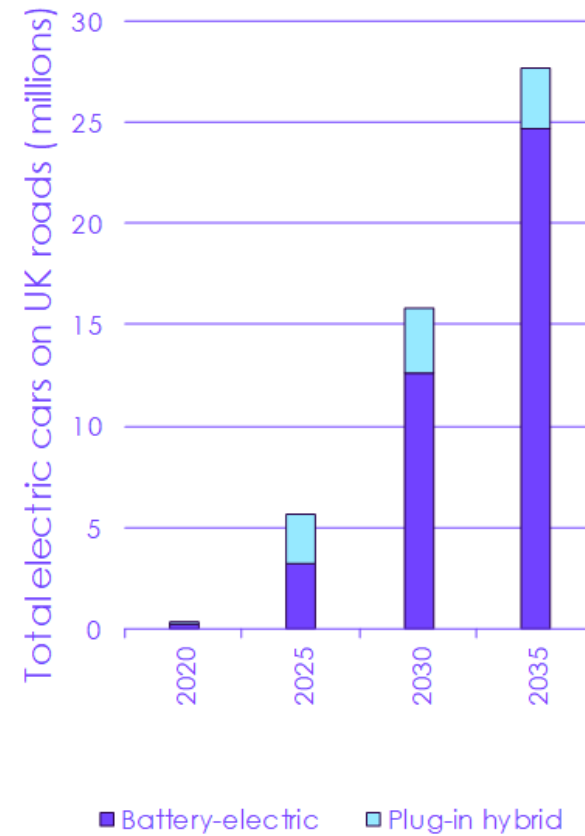


Source: BEIS (2020) Provisional UK greenhouse gas emissions national statistics 2019; CCC analysis.

Total EVs on the road and supporting charging infrastructure in balanced net-zero pathway



Figure 3.1.b Total electric cars on the road and supporting charging infrastructure in the Balanced Net Zero Pathway

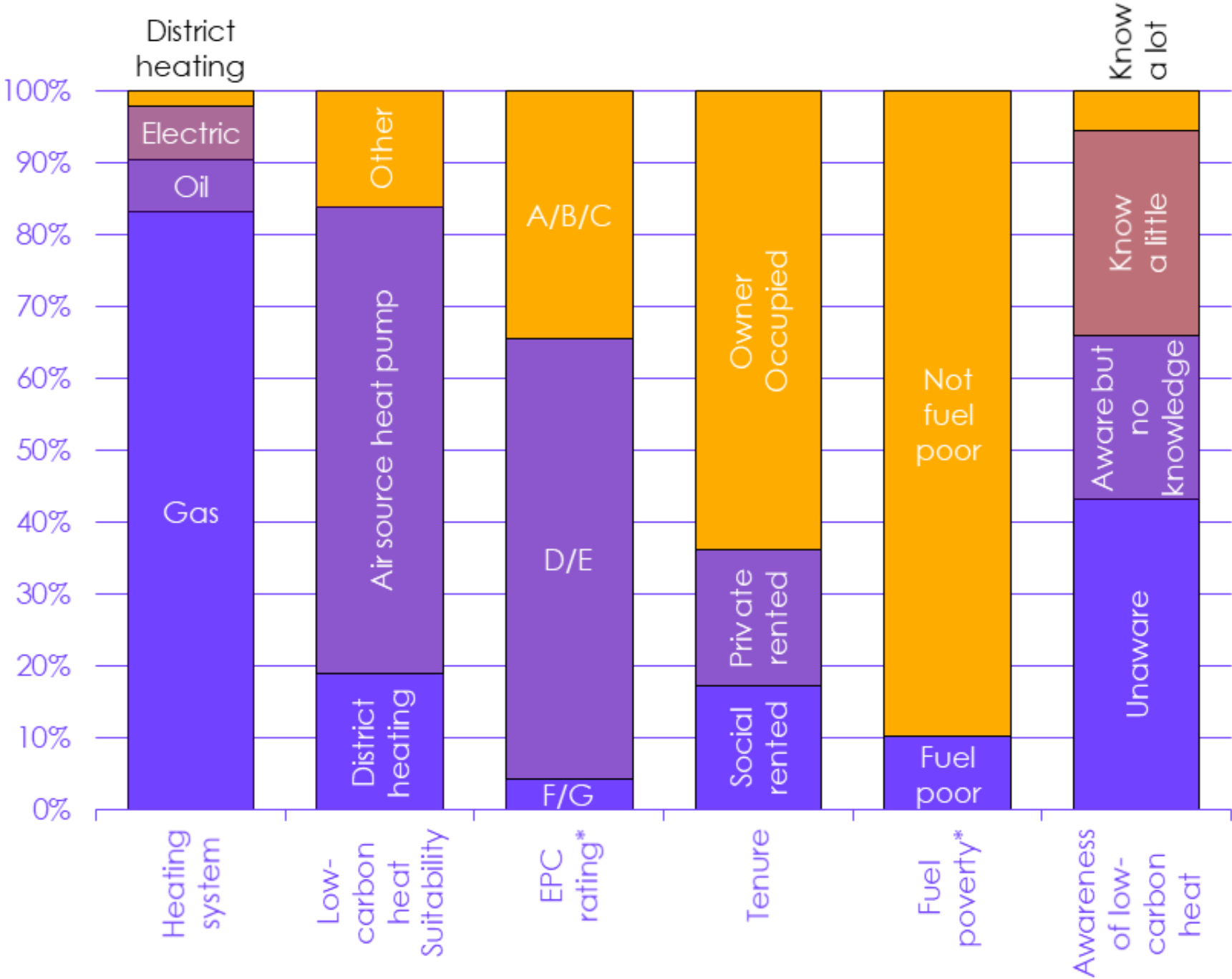


Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

Source: CCC analysis; 2020 figures based on DfT, OLEV, SMMT and Zap-Map statistics.
Includes all small, medium and large cars and all publicly accessible charge points in the Balanced Net Zero Pathway.

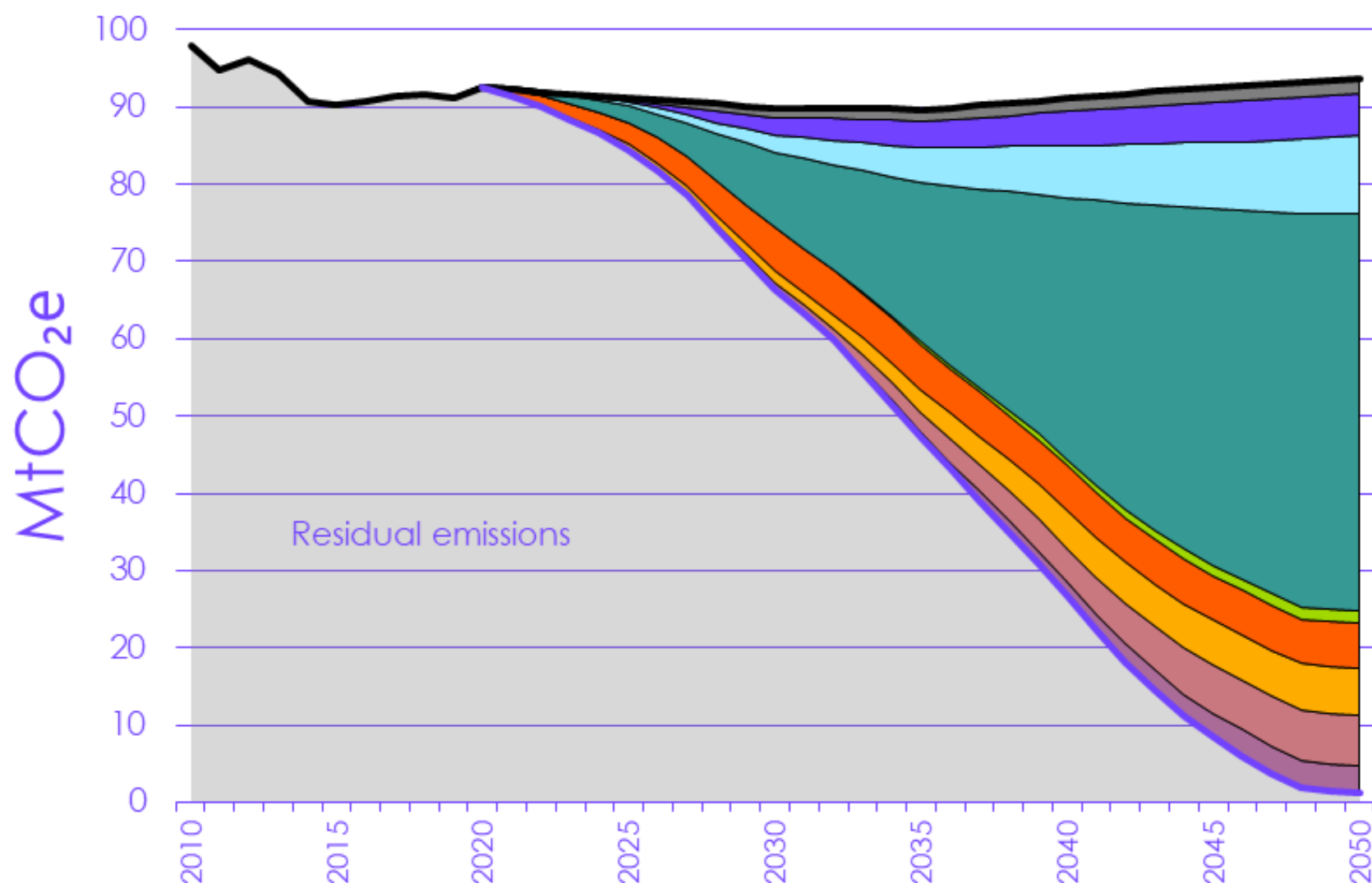
Heat

Overview of the housing stock according to key metrics



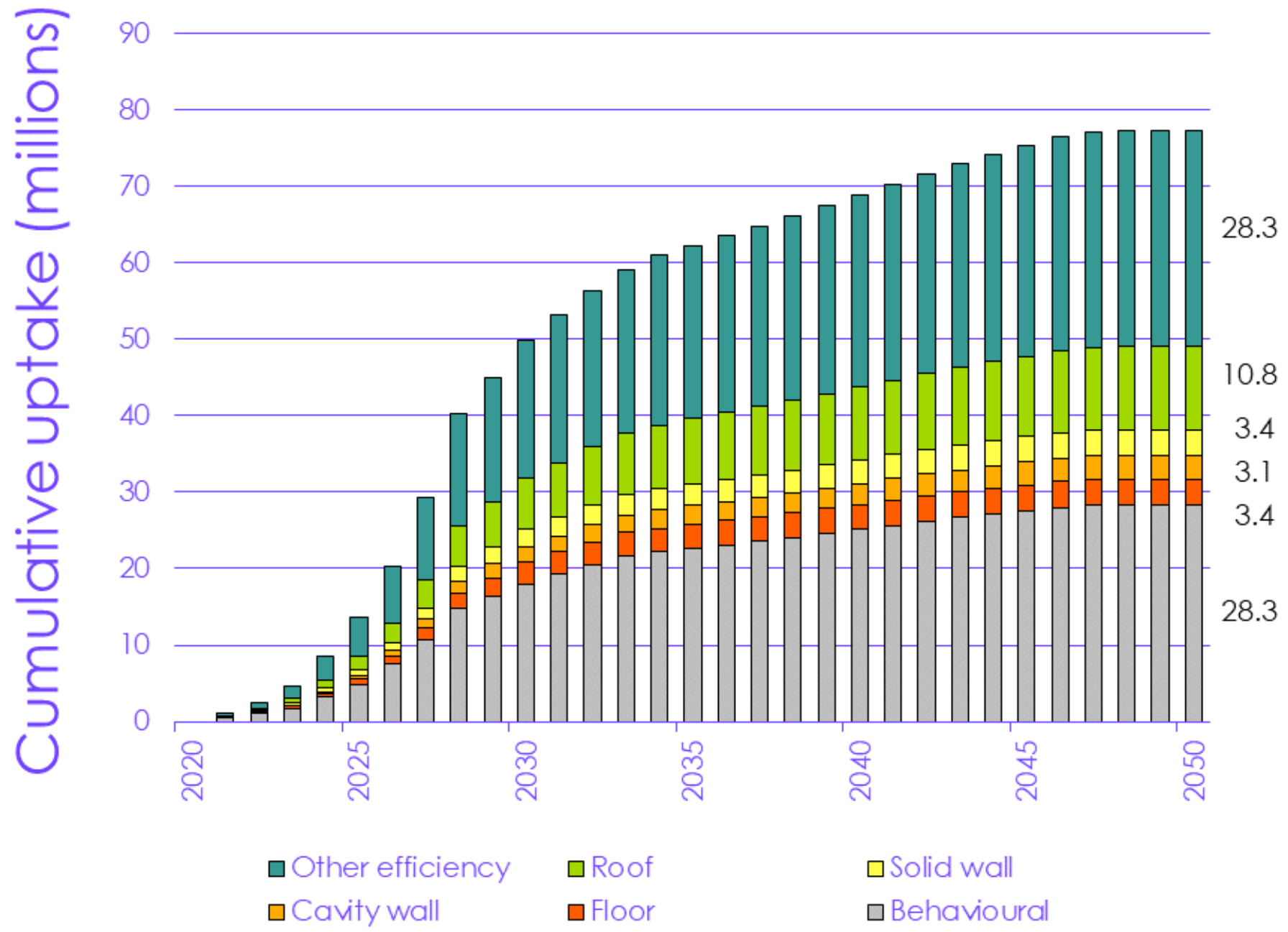
Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

Sources of abatement in the Balanced Net Zero Pathway for UK buildings



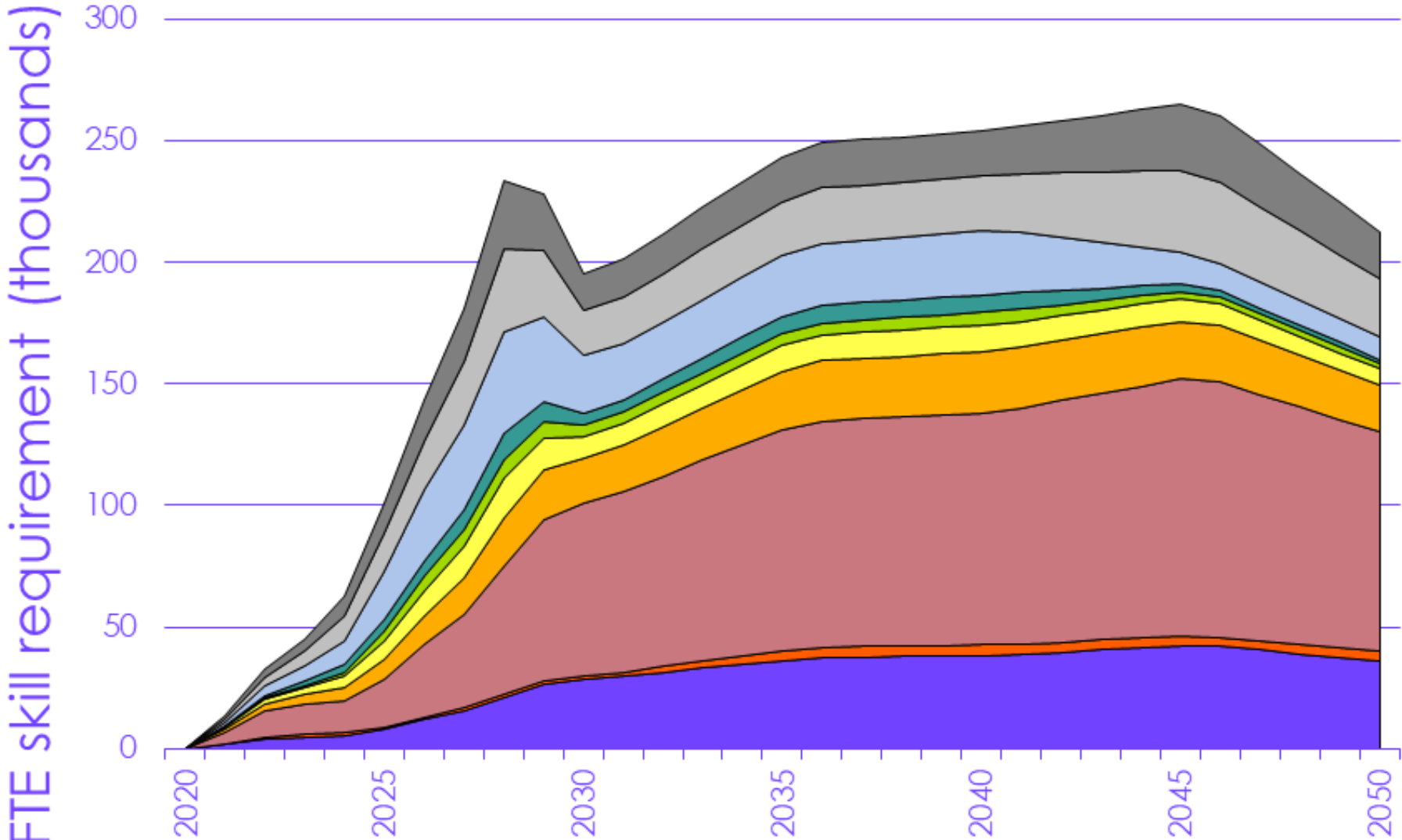
Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

Uptake of heating efficiency measures in existing homes



Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

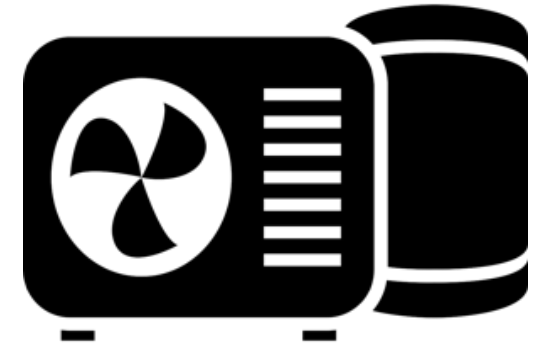
Additional
FTE
requirements
for each
qualification
level and
specialist skill



- TrustMark retrofit coordinator
- General construction training
- Renewables specialisms
- Electricals
- Hydrogen boiler conversion
- TrustMark retrofit other specialisms
- Window installation
- Smart metering
- Heat pump installation
- HVAC specialisms

Source:
<https://www.theccc.org.uk/publication/sixth-carbon-budget/>

Thirty years of action required to meet UK net zero target



~3.6 (6.1*) GW/year**
(300 x 12MW turbines/year)
(current 4GW/year)

~1.2 million BEVs/year
(136 per hour)
(current 331 vehicles/hour)

~600k installations/year
(68 per hour)
(current 182 boilers/hour)

*including CCS and electricity storage

** or 1.2 million PV system like mine
(136/hour)

Massive opportunity for future UK utilities



Plant efficiency
£75 – 1809 m



Service provision
£5 – 9 bn



Local LC generation
£42 – 4600 m



Large LC generation
£0.61 – 8 bn



Flexibility optimisation
£400 – 2000 m



CCS
£-0.14 – 1669 m

Up to £21bn
of new value
is available to
electricity
utilities per
year by 2050