Monograph:
Betts-Davies, S. orcid.org/0000-0001-5682-4103, Barrett, J. orcid.org/0000-0002-4285-6849, Smith, C. orcid.org/0000-0003-0599-4633 et al. (3 more authors) (2024) Targets for effective climate mitigation governance in the UK. Report. Priestley Centre Climate Evidence Unit (CEU) , University of Leeds.

https://doi.org/10.48785/100/281

Priestley Centre
for Climate Futures

Targets for effective climate mitigation governance in the UK

July 2024

The Priestley Centre's Climate Evidence Unit provides independent insight to inform the delivery of a climate resilient, decarbonised future. It brings together world-leading experts from the University of Leeds to deliver timely and robust evidence that can inform climate action.

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Funding statement

This report was published by the Priestley Centre Climate Evidence Unit (CEU).
The CEU is supported by Research England funding.

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Summary

Targets to reduce the UK's greenhouse gas (GHG) emissions have been in place since 2008 and are underpinned by the Climate Change Act (2008). The UK is currently committed to reduce GHG emissions to 'net zero' by 2050 and has several interim targets to meet on the way. These interim targets, called 'carbon budgets', delineate permissible GHG emissions over consecutive five-year periods. The UK also has an international commitment known as a Nationally Determined Contribution (NDC), again targeting GHG reductions of 68% by 2030 compared to 1990 levels.

Beyond the setting of these interim carbon budgets and establishing a 2050 net zero date, the Climate Change Act has also established statutory reporting on progress and proposals to achieve these targets. Further, it created the independent Climate Change Committee (CCC) to provide the UK Government with crucial evidence, suggest carbon budget levels, and scrutinise progress. However, whilst these features importantly define the high-level ambition of the net zero pathway, further sub targets, or mandatory reporting on these, are not prescribed. This is by design, to ensure that the ruling government can explore how they wish to deliver the target. While this is understandable, this approach can lead to ambiguity in terms of which sectors are contributing to reductions and by when.

With a general election in July 2024, we are giving thought as to whether a new administration needs to explicitly introduce some additional targets to support the UK's high-level ambition of achieving net zero by 2050. At present, some soft targets derived from the Government's Carbon Budget Delivery Plan are tracked, monitored, and scrutinised by the CCC, such as sectoral contributions to decarbonisation. However, we present evidence suggesting that explicitly setting these additional targets could overcome some key challenges that the UK faces in delivering transformative change to achieve both interim and longer-term targets, as well as provide a framework for clear and consistent monitoring and progress evaluation on crucial indicators necessary to achieve net zero. As a result, we aim to unpick the evidence for further climate targets that could be adopted in the next parliament. These targets, still sitting at the national level, provide more focus on mitigation actions needed if the UK is to achieve its current decarbonisation aims.

The purpose of this document is to present the evidence and raise debate on how we can ensure that the UK delivers its national and international climate goals. We welcome discussion, constructive insights, and further debate to ensure this important outcome. Targets beyond those we have suggested are also important, such as one directed at our consumption emissions, methane, and other GHGs, as well as adaptation targets that are crucial to ensure the UK's resilience to climate impacts. Our proposal is that these targets would remove ambiguity from the transition by providing clarity over the direction of the transition and giving greater scope to evaluate the progress of the UK in this pivotal period for action to address climate change.

Five key targets

We consider five key targets. These include:

1. GHG emission source target by 2050 – providing an additional target on GHG emission sources. Currently, the UK's GHG emission target for 2050 is on a net basis, including removals as well as source.

2. Carbon removal target – the UK needs clear targets for carbon removal, and pathways for the development of this capacity. We currently have no target on the total tonnes of carbon dioxide to remove from the atmosphere by 2050 and beyond.

3. Smooth transition target – providing certainty by ensuring that carbon budgets are not transferable between different budgets. Currently there is the option for surplus GHG emission allocations to be passed from one budget period to the next.

4. Energy demand reduction target – while energy demand could be delivering half of the reduction in GHG emissions by 2050, the UK does not have a target to track energy demand reduction.

5. Fossil fuel reduction target – removing fossil fuels from the energy system is crucial to decarbonising our economy. Currently the UK does not have a target to map the decline of fossil fuel use in the UK.

There are several potential uses of these targets, but the starting point would be for each of these indicators to be explicitly included in both assessments by the Climate Change Committee and UK Government climate strategies. Whilst additional targets could be seen as creating further inflexibility in the transition, this does not have to be the case. If we are to achieve our international commitments on climate change mitigation, and given the scale of ambition necessary, there is already a limitation on the flexibility that can be afforded in these targets. However, if levels of ambition set for one of these targets became unrealistic or undesirable further down the line, establishing this framework of target reporting ensures complete transparency to understand which indicators' levels of ambition needs to be increased to achieve the same climate outcome. This would ensure much needed transparency on how the transition will be achieved and remove any ambiguity on who is doing what.

Beyond this, there is an opportunity for these indicators to be seen as targets that would allow the Government to be held to account. The precise level that each target should be set at would require further consideration beyond this report. This analysis would need to appreciate the interlinkages between the different targets. For example, if less energy demand reduction is achieved, more emphasis will need to be placed on carbon removal. Ultimately, it is the reduction in fossil fuel use that delivers the UK's climate ambitions.

Target 1

An absolute GHG emissions target for the UK

Currently, the UK does not have a target for the amount of GHG emissions that can be emitted in 2050. Instead, it has a ‘net zero’ target, which includes emission removals as well as sources of emissions. This was legislated for in 2019, replacing the 80% GHG emission reduction target. The net zero commitment does represent an important increase in ambition for UK climate action. Therefore, this is not a proposal to change this ambition but rather to add additional targets needed for both residual GHG emissions in 2050 and carbon removal (discussed under target 2). The ‘net’ in net zero represents the level of carbon dioxide (CO^2) emissions that are removed from the atmosphere within the UK in 2050, balancing the UK’s GHG emissions to zero. On its own, the ‘net’ part of the target adds ambiguity into the absolute level of emissions that are being targeted in 2050. Carbon removal could be achieved through an increase in natural carbon sinks such as forests or peatlands, or through prospective future technological engineered removal options such as Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Capture (DAC).

Explicitly separating targets for emissions reduction and the development of emissions removals is crucial to achieving successful climate action (McLaren, 2019). This is an important for two reasons: 1) explicitly defining a target for residual emissions establishes a necessary pace of decarbonisation in the years leading up to 2050, and 2) it would incentivise the development of the appropriate levels of removals to achieve net zero emissions. Disaggregating ‘net zero’ targets into their constituent parts would ensure that each element is evaluated on its practicality and suitability, exposing any shortfalls in achieving crucial climate goals (McLaren et al., 2019).

To address the first argument, determining an appropriate level of residual emissions by 2050 may seem like a long-term goal, but it is crucial for guiding short-term decarbonisation efforts. Some advocate for delaying immediate decarbonisation by relying on the “net” aspect of the net-zero target, claiming the ability to offset emissions in the long term through removals, an approach that is regularly discredited in the academic literature (Anderson & Peters, 2016; Fuss et al., 2014; McLaren, 2020). This problem is exacerbated by scenarios based on integrated assessment models, which heavily discount the cost of emission removal technologies that appear in the more distant future, making them seem cheaper than increasing the pace of emissions reductions in the near term (McLaren, 2019). Given the unsustainability of many of these negative emission technologies (e.g. BECCS, DACs) if rolled out at scale (Anderson & Peters, 2016; Fuss et al., 2014; D. McLaren, 2020), this mispresents these options as viable alternatives for near-term decarbonisation, leading to myopic climate action.

Addressing this, separating these out to establish a residual emissions target that considers the risks and uncertainties associated with removal methods is unlikely to allow near-term inaction. If set appropriately, it would necessitate substantial decarbonisation across most energy uses. Emissions removal methods would be reserved for sectors where complete decarbonisation is challenging due to a lack of low-carbon alternatives, and persistent demand, such as international shipping and aviation. Removing ambiguity and increasing transparency in the UK’s climate governance targets, to ensure action is pursued in the near-term, should be a significant priority.

Setting this level of residual emissions depends on an interpretation of what level of emissions removal is considered feasible or desirable given the options available. Technological options for carbon removals carry significant risks, uncertainties, and costs. For example, BECCS, used widely in IPCC climate scenarios that achieve 1.5C, as well as other UK scenarios such as those in the CCC’s 6th Carbon Budget analysis (Committee on Climate Change, 2020), requires the planting of vast areas of forests and other ‘energy crops’ to sequester carbon naturally, then burning this biomass to create energy whilst capturing the carbon and storing it underground. However, whilst lots of energy-economy models utilise large levels of engineered emissions removal, the academic literature poses significant challenges to the feasibility of large levels of technological removals in some climate scenario exercises (Anderson & Peters, 2016; Fuss et al., 2014; Grant et al., 2021). As such, setting a residual emissions target that precludes or heavily reduces the use of engineered removals this side of 2050 is more in line with the weight of academic evidence surrounding these problems with the medium-term prospects of widespread technological removal methods.

Target 1

So, what should the residual GHG emission target be for the UK? Applying a precautionary principle, we should aim for it to be as low as possible, recognising that every extra tonne requires an increased commitment to carbon removal. There is an element of uncertainty in assessments of how low emissions can get to by 2050, built on assumptions of the speed of development of key technologies, the roll out these technologies, and the extent of shifts in patterns of consumption and behaviour away from carbon and energy intensive goods and services. Figure 1 shows seven scenarios that have come up with a residual GHG emission target for 2050 include five from the CCC and two from the Centre for Research into Energy Demand Solutions (The Positive Low Energy Future Scenarios). Of course, there are more, but these scenarios give a good range of possibilities.

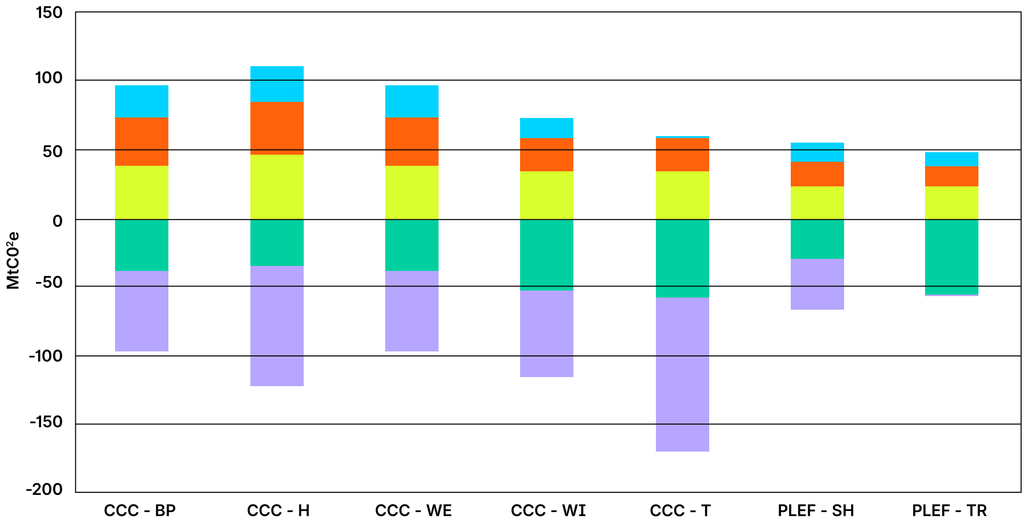

Figure 1: $MtCO^2e$ residual emissions in 2050 and $MtCO^2e$ carbon dioxide removals under a number of UK decarbonisation scenarios.

KEY

- All other sectors
- Agriculture
- Aviation
- Nature based removals
- Engineered removals

CCC-BP = Climate Change Committee's Balanced Pathway scenario
CCC-H = Climate Change Committee Headwinds scenario
CCC-WE = Climate Change Committee's Widespread Engagement scenario
CCC-WI = Climate Change Committee's Widespread Innovation scenario
CCC-T = Climate Change Committee's Tailwind scenario
PLEF-Shift = Positive Low Energy Future Shift Scenario
PLEF – Transform = Positive Low Energy Futures Transform scenario).

Source: CCC scenarios from CCC (2021 – Sixth Carbon Budget), PLEF scenario from Barrett et al (2022).

The range of residual GHG emissions in 2050 across the four scenarios is 48 to 96 $MtCO^2e$. It is therefore reasonable to assume that a target within this range is appropriate. The ability to reduce GHG emissions to a level consistent with the three more ambitious scenario does de-risk the transition by relying less on the need for unproven carbon removal technologies.

Target 2

GHG removals for post-2050 climate balancing

Global net zero CO^2 emissions are required for temperature stabilisation, but net zero greenhouse gas emissions (on a CO^2-equivalent basis) are required for a slow long-term temperature decline (Schleussner et al., 2022). This is an important distinction, since climate impacts typically follow warming levels, and long-term cooling will limit the rate and the ultimate level of sea-level rise, as well as reducing the risk of triggering irreversible processes in the Earth system. This is recognised in Article 4 of the Paris Agreement, which states the need to reach global net zero greenhouse gas emissions in the second half of the century.

There are no identified methods of achieving net negative emissions of non-CO^2 greenhouse gases. Furthermore, eliminating agricultural emissions of methane (mostly from ruminants) and nitrous oxide (from fertiliser) will likely be impossible within a century. Methane and nitrous oxide are potent greenhouse gases with global warming potentials 28 and 273 times that of CO^2 respectively on a per-kilogram basis (IPCC, 2021). Therefore, achieving net zero greenhouse gas emissions requires global net negative CO^2 emissions to balance these residual emissions.

Both the European Union and United Kingdom have net zero 2050 greenhouse gas emissions targets. To achieve and then maintain net zero greenhouse gas emissions in 2050 and beyond, ongoing greenhouse gas removals will be required, estimated to be some 50 million tons of CO^2 equivalent for the UK. Achieving this level of annual removal will be challenging and likely require a combination of solutions, both nature-based (afforestation and sustainable agriculture) and engineered (bioenergy with carbon capture and storage; direct air capture).

The UK can still play a leadership role in international climate diplomacy and negotiations, developing R&D capacity for technological carbon removal through its existing expertise and infrastructure in the offshore oil and gas sector. Co-operation with an aligned Europe could allow for burden-sharing and performing carbon removal where it is cheapest and most effective, such as direct air capture in places with abundant renewable electricity.

Of the 1,193 integrated assessment model scenarios assessed by the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) Working Group III (WG3), only 50 achieve both the Article 2 goal of limiting warming to 1.5C and the Article 4 goal of balancing emissions and removals of greenhouse gases in the second half of the century (Evans & Hausfather, 2018; IPCC, 2022). Of these 50, 24 scenarios provide emissions for the European region (no UK-specific data is available). Not a single scenario from these 24 achieves net zero greenhouse gas emissions in Europe in 2050 (Figure 2), showing the limitations in our current modelling capability to reflect policy. While the European region in the IPCC WG3 contains more countries than the EU and UK, these countries account for the majority of the population and total emissions from Europe and is a useful marker.

Clearly, the 2050 carbon removal target must align with the 2050 residual GHG emission target to ensure that net zero is achieved. However, the target would need to exceed the level of our remaining residual GHG emissions to achieve climate balancing after 2050. In addition, with small and dwindling remaining carbon budget, this would open space for developing countries to grow their economies which, at least in the short term, would lead to a per-capita emissions increases (Ganti et al., 2023). Beyond setting just a 2050 target, explicit interim targets for the development of negative emission capacity along the pathway to 2050 would help guide their development.

Target 2

European Kyoto greenhouse gas emissions, IPCC Paris Agreement compatible scenarios

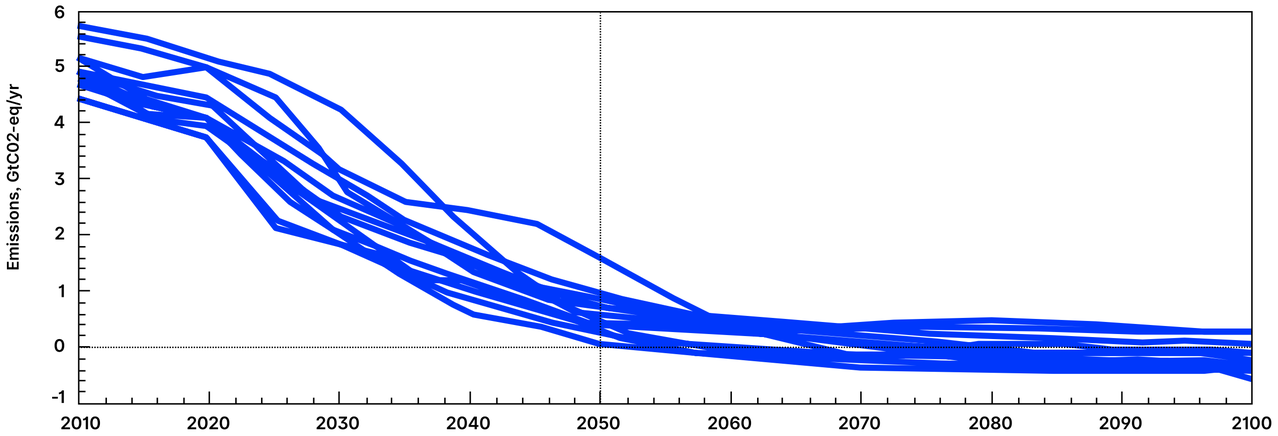

Figure 2: Greenhouse gas emissions in CO^2-eq/yr for the European region for 24 integrated assessment model scenarios that meet the Paris Agreement targets of limiting warming to 1.5^C and achieving global balance of greenhouse gas emissions and removals in the second half of the 21st century.
Data from the AR6 Scenario Explorer hosted by IIASA.

Target 3

Smooth transition target to net zero

Since the world-leading 2008 Climate Change Act, the UK has had a framework of five yearly legally binding carbon budgets for the UK's net territorial emissions, which get smaller over time to ensure that sufficient climate mitigation occurs on a pathway to net zero. This approach has cemented the UK as a significant leader in international climate debates; it is the carbon budgets that play the most important role in present UK climate policy, given their focus on near-term emissions.

With the publishing of the UK's territorial emissions for 2022, it was announced that the UK had come in 15% (391MtCO^{2}e) under the third carbon budget between 2018 and 2022 (DESNZ, 2024b), largely due to factors external to government climate policy such as the economic contractions associated with the Covid-19 response, sluggish growth in the UK economy since then, and reduced gas demand due to a greater reliance on imported electricity (Evans, 2024; Forster, 2024). The Climate Change Act allows some 'flexibility' afforded to the Government to carry over emissions surpluses to the next budget period. In this case, it would allow annual territorial emissions to increase by 15% over the next five years, and still be compliant with the fourth carbon budget (2023-2027).

Increasing the emissions budget allowance in the near term would necessitate increasing decarbonisation rates after the fourth carbon budget period, to ensure the UK met its internationally agreed obligation of reducing emissions by 68% on 1990 levels by 2030 according to the UK's NDC. If UK emissions in 2027 were 468 MtCO^{2}e – the average annual emissions of the fourth carbon budget if the surplus was to be carried over – the UK would have to reduce emissions by around 14% each year between 2027 and 2030 just to meet its NDC in 2030. Without the surplus carry-forward, the annual reduction rate is, at just over 10%, already ambitious. For recent historical context, annual emissions reductions of this magnitude have only occurred in 2020 during the Covid-19 lockdowns (13% reduction in emissions), and in this case, emissions subsequently increased upon the lifting of restrictions the following year.

As per the advice given by the CCC to Government, carrying over any surplus emissions into the fourth carbon budget period would dramatically increase the difficulty of meeting future carbon budgets, or the UK's international commitment to its NDC (Forster, 2024). This is due to the much higher rate of decarbonisation that would be necessary if emissions were to increase over the next five years.

Target 3

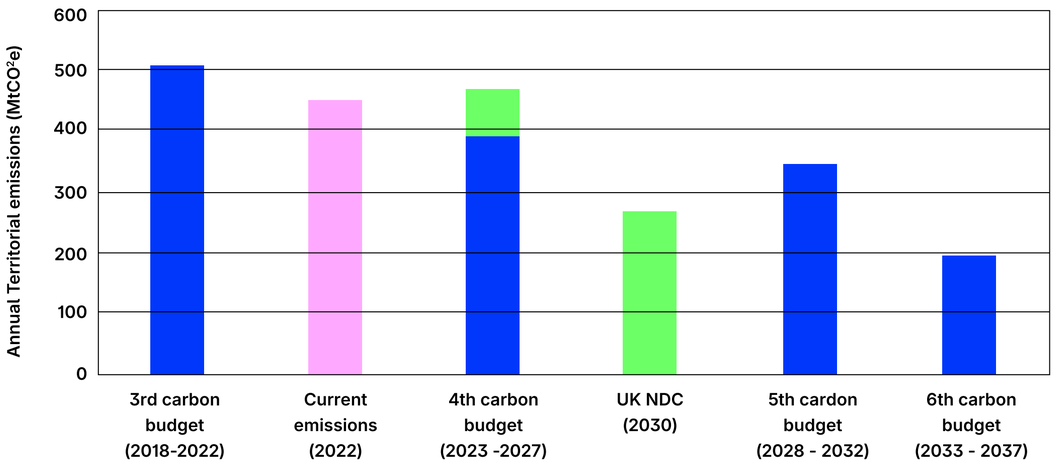

Figure 3: Bar chart showing average UK annual territorial emissions allowed under each carbon budget period, including the potential carrying over of emissions surplus from overperformance in 3rd carbon budget period, allowed by the climate change act.

KEY

- UK NDC
- 4th carbon + 3rd carbon budget surplus adjustment
- Average annual allowance under UK carbon budgets

Additionally, the average annual emissions allowed in fifth carbon budget is 22% higher than the UK's NDC 2030 commitment, which sits in the middle of this period. This discrepancy questions the usefulness of these carbon budgets in providing the UK with a smooth transition to achieving its international commitments. Thus, there is a need to consider tightening budgets to align with increased international ambitions to ensure a smooth transition.

This brings to light the need to ensure emissions reductions happen in the near term, to avoid very high levels of decarbonisation in the future that would add costs to the transition. The UK carbon budgets are already significantly front loaded, resulting in slow decarbonisation rates over the past decade, necessitating far greater decarbonisation rates later in the transition. Exacerbating this any further by delaying climate action in the present is shortsighted and will exacerbate the barriers that pose risks to the success of the transition, such as a dependence on more expensive and/or risky technological options. Any delay in decarbonisation rates going forward leaves the UK heavily reliant on the development and rollout of new technologies over a short period, during a time when dramatic reductions in emissions are required as we approach the 2050 net zero target.

One can rightly argue that there are various barriers to near-term decarbonisation options, such as lacking skilled labour for the transition, a weak infrastructure for electrified transport, or poor-quality housing. However, these barriers emanate from a lack of action and resources that are unlikely to be resolved by de-prioritising climate mitigation in the next carbon budget period. Therefore, we support the UK Government's decision that any surplus should not be permitted to be carried over to future carbon budgets, to facilitate immediate action on reducing emissions in the short term, and a smoother transition to net zero. This is a principle that should be continued for future budgets.

Target 4

Energy demand reduction targets

The development of targets for final energy demand reduction will be essential to the success of the UK's decarbonisation. However, whilst there is a proposed target related to electricity supply, there are no such proposals for energy demand. Energy demand has been given little attention in governmental net zero modelling (Barrett et al., 2023), despite energy efficiency contributing towards more than 55% of UK emissions reductions between 1990 and 2019, more than three times more than emissions savings stemming from renewable electricity production (Lees & Eyre, 2021). As found by Johnson et al. (2023), in the data accompanying the UK's Net Zero Strategy, final energy consumption was not reported, despite the impact on decarbonisation.

Recently, attention was focused on the importance of energy demand reduction at the international level, more specifically through energy efficiency measures. Alongside the rapid roll out of renewable energy, COP28 saw an agreed commitment to double the rate of global energy efficiency by 2030. The assessment by the International Renewable Energy Agency suggests that "to align with IRENA's 1.5°C Scenario, the global annual rate of energy intensity improvement should double by 2030 from the current level, which is also in line with the assessment of the International Renewable Energy Agency". This would mean a 4% improvement in energy efficiency on an annual basis, as opposed to the 2% current improvement. This would result in global energy demand staying roughly the same, meaning that new renewable energy capacity would displace fossil fuels (not just meeting demand growth). They describe several important end energy use technologies like electric vehicles and heat pumps, alongside the insulating of homes, to achieve this.

In the UK, Johnson et al. (2023) undertook an analysis of UK-based net zero modelling exercises, to understand the extent to which energy demand must be reduced to facilitate the achievement of climate targets. They find that even in cases where substantial levels of GHG removals are required, to achieve net zero emissions in 2050, energy demand is still reduced by ~30% on 2020 levels. In these scenarios, this level of energy demand reduction is often achieved through an emphasis on energy efficiency measures. However, given the reliance on establishing an extremely high capacity of carbon removals in these scenarios, it is likely that energy demand reduction will need to be more extensive to achieve net zero.

Most of the UK net zero scenarios assessed have energy use reductions of ~40%. This is a significant amount, and far more than would be achieved through technological energy efficiency measures and electrification (Barrett et al., 2022). To achieve a 40% reduction in final energy use, adapting how and when energy is consumed is necessary, including social changes such as dietary composition, switches in car transportation towards public transport and active travel, and extensive retrofitting of the housing stock to increase the efficiency of home heating (Barrett et al., 2022; Committee on Climate Change, 2020; Johnson et al., 2023). This results in additional emissions reductions, limiting the reliance on GHG removals necessary to meet net zero, and reducing the necessary size of renewable electricity rollout, moderating issues concerning supply flexibility (Johnson et al., 2023).

Target 4

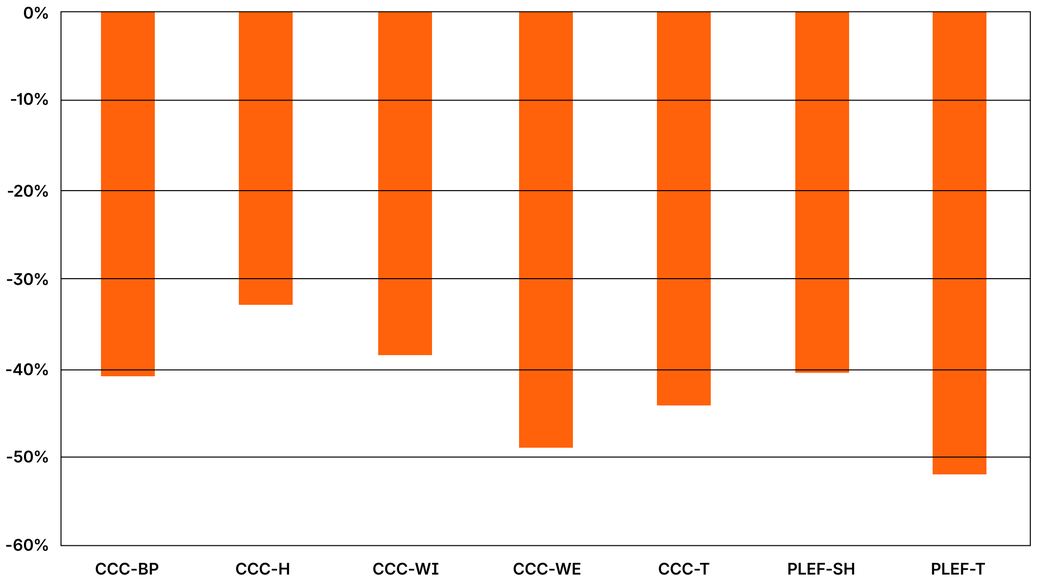

Figure 4: Percentage reduction in energy demand by 2050 (2020 baseline) in 7 UK decarbonisation scenarios.

CCC - BP = the CCC Balance Pathway.
CCC - H = Headwinds.
CCC - WE = Widespread Engagement.
CCC - WI = Widespread Innovation.
CCC - T = Tailwinds.
PLEF - SH = Positive Low Energy Futures Shift demand scenario.
PLEF – TR = Positive Low Energy Futures Transform Demand scenario.

Beyond this, there is evidence building around the potential for energy demand to be reduced by up to 52% in the UK (Barrett et al., 2022), with other studies finding comparable reductions in other western European nations (Association negaWatt, 2017; Günther et al., 2019). Johnson et al. (2023) finds scenarios achieving this depth of energy demand reductions can achieve net zero with just the use of nature-based GHG emissions removal, avoiding the reliance on engineered GHG removal technologies to meet 2050 targets. Further, they reduce the level of energy systems costs required for the transition, mitigate against challenges such as adequate energy storage, help to ensure energy security, and unlock many socio-economic co-benefits (Barrett et al., 2022). However, these scenarios have the greatest level of social change involved and would thus require significant shifts in political attitudes regarding the capacity of economies to adapt consumption patterns towards ones that incur less energy demand, as well as the willingness of society to accept such change (Johnson et al., 2023).

The precise level that an energy demand target is set at is up for debate. Whatever the level of demand reduction is chosen incurs benefits and costs. However, if the transition fails to unlock higher levels of energy demand reduction, shown to be achievable through methods of avoiding demand through social changes to consumption, this risks the achievement of net zero (Barrett et al., 2022). This is due to the exacerbation of barriers such as the increased transition infrastructure costs associated with higher levels of energy use (Johnson et al., 2023) and a greater reliance on carbon removals that evidence suggests may be difficult to achieve (Anderson & Peters, 2016; Fuss et al., 2014; D. McLaren, 2020). If a high level of demand reduction is targeted, the benefits for successful climate action are improved, but potential political and social attitude barriers may need to be considered.

What is clear is that energy demand reduction, of the extent necessary to achieve decarbonisation targets, will not just happen. It needs direct attention from government climate policy, both to support the diffusion and uptake of key technologies and guide important changes to social practices. Targets pursuing reductions in final energy use in 2050 and throughout the course of the transition is therefore a crucial yardstick to assess the effectiveness of policy, that should be implemented by the next government.

Target 5

A fossil fuel reduction target

Ultimately, the level of GHG emissions will be determined by the UK's ability to reduce the absolute levels of fossil fuel use, recognising that there are also other sources that contribute. In 2021, ahead of the UK's hosting of COP26 in Glasgow, then-Prime Minister Boris Johnson committed to achieving 100% clean power by 2035, achieving 90% by 2030, as part of their Net Zero Strategy to ensure the sixth carbon budget is achieved (DESNZ, 2021b, 2021a). The Labour Party has made the same commitment, but with a 2030 date, meaning a 100% clean power system would need to be mainly in place by the end of the next parliament. Pursuing a zero-carbon power sector is an important ambition to have, contributing to decarbonisation through end-use sector electrification, reducing energy bills for customers, and improving national energy security by reducing the reliance on imports.

However, it is also important to not conflate electricity and all energy use and assume that more renewables mean less fossil fuels. There is a need to move beyond targeting just the displacement of fossil fuels in the power sector and more directly focus on the reduction of fossil fuels across the broader energy system. In 2022, electricity only accounted for 18% of all final energy consumption in the UK, leaving the remaining 82% of energy consumption dominated by gas used for home heating and petroleum products used for transportation (DESNZ, 2024a). Therefore, to assess the extent that we can reduce energy related emissions, we must look towards the removal of fossil fuels beyond the power sector to across the wider energy system.

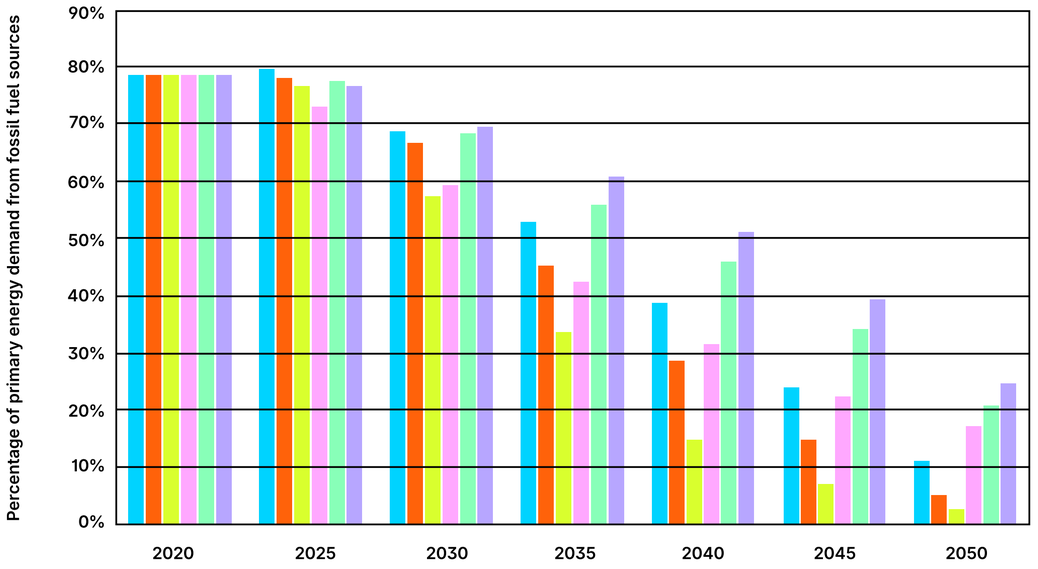

Figure 5: Percentage of primary energy demand supplied from fossil fuel energy sources. Emerging, Developing and Secure are scenarios exploring UK energy independence taken from (Price et al., 2023).

KEY

- UCL-Emerging
- UCL-Developing
- UCL-Secure
- PLEF-ST
- PLEF-SH
- PLEF-T

PLEF - ST = Positive Low Energy Futures Steer demand scenario.
PLEF - SH = Positive Low Energy Futures Shift demand scenario.
PLEF – TR = Positive Low Energy Futures Transform Demand scenario.

Target 5

Having a clear pathway of fossil fuel decline in providing the UK energy mix is essential to give clear signals to markets that future development in new fossil fuel infrastructure is unnecessary. It will signal that further development will lead to stranded assets as the UK rapidly moves to a low carbon economy. Further to this, it ensures that by foreclosing this option, we drive innovation in new low carbon technologies. To achieve this, the previous target to reduce energy demand is essential. The energy demand target ensures the substitution of fossil-fuelled energy through electrification of energy services and accelerates this effect through reductions in aggregate levels of energy demand.

Figure 5 shows the remaining percentage of fossil fuels that provide UK energy demand from several key UK scenarios. Whilst there are other UK decarbonisation scenarios available, these do show a reasonable range of possibilities. The UCL scenarios inherit the same reduction in energy service demands as the PLEF scenarios, with Emerging corresponding to PLEF-ST, Developing from PLEF-SH and Secure from PLEF-T. Whilst the greater level of energy demand reduction in the PLEF scenarios creates space in GHG emissions budgets for supply-side shifts to low carbon energy to be more gradual, the UCL scenarios explore the possibilities of these demand reductions being coupled with stronger ambition on the supply side. They indicate that energy demand reduction has the potential to further accelerate the rate at which fossil fuels can be removed from the wider energy system, boosting emissions reductions, and enhancing energy security.

The proportion of primary demand supplied by fossil fuels ranges from 57% to 69% by 2030, and 3% to 24% by 2050. Even by 2050, there is some fossil fuel use with the UCL scenario that delivers the lowest percentage of fossil-fuelled supplied energy, but this is around 3% of energy demand.

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DOI: https://doi.org/10.48785/100/281