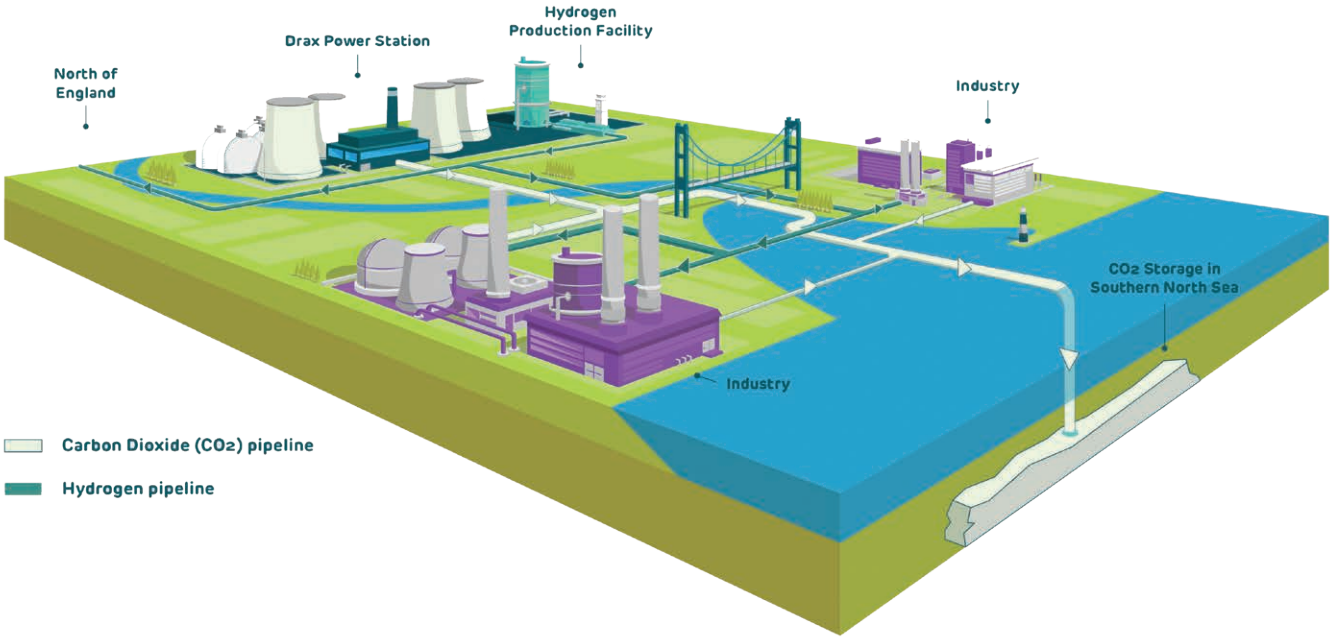
Will the UK really go 'net zero' by 2050?



Reaching net zero emissions by the middle of this century will require serious investment in both R&D and behaviour change – but getting policymakers to commit could be the biggest challenge of all. *Jennifer Johnson* reports.

In the final weeks of her premiership, Theresa May sought to establish a legacy beyond Brexit and enshrined a significant carbon reduction promise into UK law. Now, in line with the recommendations issued in May by the Committee on Climate Change (CCC), the country will pursue a target of net zero greenhouse gas (GHG) emissions by 2050. The legislation comes in the form of an amendment to the Climate Change Act of 2008 and was introduced in Parliament on 12 June.

While no other member of the G7 group of industrialised nations has set a target this ambitious, environmental groups have warned there are critical loopholes in the UK's plan for decarbonisation. Namely, the fact that it allows for the potential use of international carbon credits to get to net zero by mid-century. At an energy policy debate hosted by the EI on 22 May, Chris Stark, Chief Executive of the CCC, stated that such tactics should be used only as a last-ditch resort.

'We think it is sensible, and indeed necessary, for the UK to reach net zero through domestic effort,' he said. 'We should only use these international carbon credits as a fallback – and the main reason for this is that they're really expensive. If the world is doing what it needs to do to correct climate change, there won't be many of these credits around.'

However: 'Using international credits within an appropriate monitoring, reporting and verification framework is the right thing to do for the planet, allowing the UK to maximise the value of each pound spent on climate change mitigation,' said a statement from Downing Street.

Policy pushback

The Prime Minister's net zero announcement comes at a time of growing public awareness of the urgency of climate change. Protesters from the activist group Extinction Rebellion famously blockaded major roads across London during the Easter period – leading to thousands of arrests and widespread disruption in the city. Millions of children have also walked out of classrooms across the world as part of the school strike for climate movement, which was started in August by Swedish teenager Greta Thunberg.

What a Zero Carbon Cluster could look like in the Humber region

Photo: Drax Group

Despite this momentum, the government has recently been toying around with its longstanding climate commitments.

In fact, in early June, ministers decided to use the UK's past overperformance in emissions reductions to relax agreed emissions limits up to 2027. Over the course of the country's second carbon budget period set by the CCC – which stretched from 2013 to 2017 – the UK emitted 384mn tonnes of carbon dioxide (CO_2) less than its stated cap of 2,782mn tonnes.

The Chancellor of the Exchequer subsequently requested that 88mn tonnes of the remainder is carried forward so that the country can breach future carbon budget limits in line with projected economic growth.

Granted, the UK outperformed on its first carbon budget, which was in place between 2008 and 2012, as well as its second. At present, it's on track to roughly align with the third (2018–2022) but is likely to miss its fourth and fifth targets, according to projections from the Department for Business, Energy and Industrial

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Strategy (BEIS). This has serious implications for being able to reach net zero emissions by the middle of the century.

What will it take?

In its report, the CCC states that it will be 'technically feasible but highly challenging' to realise its zero-GHG ambitions by 2050. Reaching such a large-scale target is contingent upon the creation of a long-term policy framework that facilitates change across all sectors of the economy. It's also dependent upon the deployment of low carbon technologies, some of which are still very costly or in early-stage development.

The CCC splits decarbonisation methods into three groups: core options, further ambition options and speculative options. The first category is made up of so-called 'low cost, low regret' technologies and strategies that would most likely have been used to meet the UK's previous 80% decarbonisation-by-2050 target.

The further ambition options include carbon capture and storage (CCS) in industry, as well as an expanded use of heat pumps and hydrogen for domestic heating. This scenario will also require all cars and vans to be electric by 2050, and for the majority of heavy goods vehicles to be electric or hydrogen powered.

But these two categories are not enough, and some speculative technologies will likely be deployed to reach net zero by 2050. According to the CCC report, the combination of core and further ambition options will lead to a 96% reduction in GHG emissions – meaning that some savings will be needed from as-yet-undeveloped options.

These could include more radical shifts in land use; the extensive use of emerging technologies to remove CO2 from the air and store it underground; or the use of carbon-neutral synthetic fuels produced using algae or renewable power. However, the CCC says that the 4% gap to net zero could also be reached with the deeper rollout of further ambition options.

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Zero carbon heating

Decarbonising heat for the UK's buildings will be one of the biggest challenges in achieving net zero emissions. Currently, around 75% of the country's heating demand is met by natural gas, with 8% from oil and the rest from electricity. The deployment of the CCC's 'further ambition' options for heating would result in 4mn tonnes of CO2 emissions in 2050 – and requires the rollout of technologies including heat pumps, hybrid heat pumps and district heating in conjunction with hydrogen, as well as improved levels of energy efficiency.

While it's long been suggested that gas boilers could be replaced with hydrogen alternatives, the switchover would require an expensive and comprehensive infrastructure overhaul. Regardless, the CCC recommends that by 2035, almost all replacement heating systems for existing homes should be low carbon or hydrogen ready.

To align with zero-emission ambitions, the country's share of low carbon heating must increase from just 4.5% today to 90% in 2050. However, most hydrogen is currently produced via the process of steam-methane reforming, which creates hydrogen and, more problematically, CO2.

Capturing carbon

If hydrogen is going to be one part of the UK's route to net zero, CCS must also be used to clean up its environmental footprint. It has also been suggested that carbon capture could be deployed to clean up heavy industrial processes that will prove difficult to electrify with renewable power. In a separate report on hydrogen published late last year, the CCC recommended that significant volumes of the gas should be produced in 'clusters' by 2030 to help the sector scale up.

'We need CCS for all sorts of reasons, but basically it gives us options,' Stark told attendees at the energy policy debate. 'It opens up the option of hydrogen, for example, and it allows us to look at how we can decarbonise industry. CCS is a necessary precondition of the kind of transition that we're talking about in our net zero report.'

As of 2018, only 18 large-scale CCS facilities were in operation around the world – with an additional 25 under development. Previous efforts to build a carbon capture facility in the UK have foundered due to a lack of funding and policy support. But a newly-announced venture in the north of England could set a different precedent. In late May, Drax Group, Equinor and National Grid Ventures announced they'd agreed to work together to see how a carbon capture, usage and storage (CCUS) network, and a hydrogen production facility, could be built in the Humber in the mid-2020s.

While the companies have revealed little in the way of concrete details, they have vowed to explore the opportunity to scale up the existing bioenergy carbon capture and storage (BECCS) pilot at Drax Power Station. They've also said they will look toward the potential development of a large-scale hydrogen demonstrator within the Drax site by the mid-2020s.

According to a statement from Drax, the partnership 'could lead to the Humber becoming the world's first net zero carbon region and home to a new world leading hydrogen economy.'

Pricing it up

The CCC expects that a net-zero GHG target can be met with an annual resource cost of up to 1–2% of GDP to 2050. This is the same cost as the previous expectation for an 80% reduction from 1990. However, some officials appear to be hesitant about allocating significant sums of government money to the energy transition.

In a recent letter to Theresa May seen by the *Financial Times*, Chancellor Phillip Hammond warned that cutting emissions to net zero by 2050 will cost the UK more than £1tn.

According to Hammond, this means that less money would therefore be available for other areas of public spending, such as schools, police forces and hospitals. The CCC has estimated that reaching net zero could cost £50bn per year, while BEIS has put the figure at £70bn.

Now, the government must determine the price of global climate leadership – and whether it's willing to pay the bill in the long term. And with three decades to go, successive governments will also have to make net zero a priority. This isn't just a matter of domestic spending – it's an issue of global leadership.

'The richer, developed countries need to go further and faster and quicker,' Stark emphasised. 'And if we do that, there is at least a chance that we can meet the IPCC's temperature threshold of 1.5°C, as difficult as that may be.' ●