



## YEP Forum Blog

### How can we reach net zero? The role of negative emissions.

**Richard Gow, Policy and Government Relations Manager at Drax and member of the YEP Forum Steering Committee, looks at the role of negative emissions technologies in meeting a net-zero target.**

2019 was a pretty seismic year in terms of climate and energy policy. In May the UK's Committee on Climate Change (CCC) published their much-awaited review into net-zero greenhouse gas emissions, entitled *The UK's contribution to stopping global warming*.<sup>1</sup> This landmark report showed that net zero was not only possible, but that it could be achieved within the same cost envelope previously estimated for the old 80% target for emissions reduction. A month after the publication of the report, the then Prime Minister Theresa May announced her plans to legislate for a net-zero target and, by the end of June, the UK had become the world's first major economy to set a net-zero target in law.<sup>2</sup>

So what does net-zero emissions actually mean? You might assume that net zero means simply eliminating all anthropogenic emissions so that UK's emissions reach zero. It's not quite that simple. Whilst there will need to be a significant reduction in emissions from major sectors of the economy such as power, transport, industry, and to the way we heat homes and businesses, the CCC believes it is impossible to entirely eliminate emissions from the economy. Notably, it will be extremely difficult or expensive to entirely remove emissions from aviation, agriculture, and some industrial processes.

Behavioural change, such as changes to diet and flying less, and technological changes, such as the use of carbon capture and storage and an increase in low-carbon fuels, will all help to reduce emissions in these sectors. However, unless extremely politically unpopular decisions are made such as banning eating meat or dairy, and banning flights, these emissions will need to be removed via other means. This is where the role of Negative Emissions Technologies (NETs) comes in.

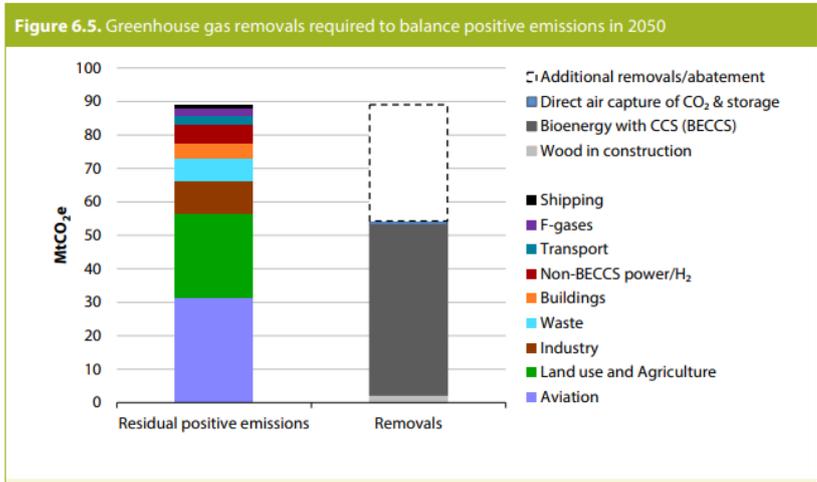
NETs are a diverse group of technologies and processes, but all have one thing in common. They remove greenhouse gasses (most commonly carbon dioxide) from the atmosphere and store this safely and securely for long periods of time. These technologies range from well understood simple processes such as afforestation, to more complicated processes such as enhanced terrestrial weathering, through to technological solutions such as Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS).

<sup>1</sup> <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

<sup>2</sup> <https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>

By removing greenhouse gases from the atmosphere, NETs are able to remove the residual emissions that are difficult or expensive to remove. By offsetting these emissions, the UK will be able to achieve a net-zero target cost-effectively, and without having to make very tough potentially unpopular political decisions.

Exactly how many negative emissions will the UK need to hit net zero? A number of prominent organisations have attempted to answer this question including the CCC, the Royal Society and Royal Academy of Engineering, National Grid Energy System Operator, and The Energy Systems Catapult. The CCC's analysis has shown approximately 89 million tonnes of CO<sub>2</sub> per year will need to be removed in order to hit net zero. This analysis places a great deal of reliance of BECCS in meeting this target.



Source: CCC

The Royal Society and Royal Academy of Engineering came to a similar conclusion in their analysis,<sup>3</sup> with 130 MtCO<sub>2</sub> of residual emissions remaining by 2050 primarily from the aviation and agriculture sectors. In their scenario, BECCS and DACCS are able to remove over half of these residual emissions with contributions from process NETs making up the remainder. Likewise, National Grid in their 2019 Future Energy Scenarios assumed 72 MtCO<sub>2</sub> of residual emissions with over half of this removed by BECCS.<sup>4</sup> This was the first time the FES had attempted to model for a net-zero scenario, and it is expected that the 2020 scenarios will attempt to refine this position.

Given that negative emissions are going to be vital for the UK to hit a net-zero target, is anyone looking at the feasibility of their deployment? The good news is that yes, a number of organisations are looking at deploying NETs at scale. DEFRA recently ran an auction under their £50 million Woodland Carbon Guarantee scheme which saw 18 contracts offered to landowners to stimulate the creation of 182 hectares of woodland under the first auction of the scheme<sup>5</sup>. Carbon Engineering are developing DACCS units capable of large-scale deployment to literally suck CO<sub>2</sub> out of the air<sup>6</sup>, and Drax are pioneering the development of BECCS at scale following the success of its world first pilot project.<sup>7</sup>

If scaled up, BECCS at Drax could remove 16MtCO<sub>2</sub> per year as the world's first "carbon negative" power station, whilst providing enough power to keep the lights on in 6 million homes. Clearly companies are interested in supporting the UK's transition to net zero but will require policy support to deploy these technologies at scale.

<sup>3</sup> <https://royalsociety.org/-/media/policy/projects/greenhouse-gas-removal/royal-society-greenhouse-gas-removal-report-2018.pdf>

<sup>4</sup> <http://fes.nationalgrid.com/media/1409/fes-2019.pdf>

<sup>5</sup> <https://deframedia.blog.gov.uk/2020/04/16/10m-available-in-second-auction-of-woodland-carbon-guarantee/>

<sup>6</sup> <https://carbonengineering.com/our-technology/>

<sup>7</sup> <https://www.drax.com/about-us/our-projects/bioenergy-carbon-capture-use-and-storage-beccs/>

A report by Vivid Economics for BEIS found that large scale investment in NETs will need to occur from 2030 onwards in order to achieve the expected level of negative emissions required by 2050.<sup>8</sup> Suitable investment and policy frameworks will need to be in place in the 2020s to enable this to occur. Similarly, the Energy Systems Catapult recommends “developing rewards for verified negative emissions” as one of their priorities for policy development in this parliament to support the rollout of NETs.<sup>9</sup>

Given a general agreement that negative emissions will be required at scale, and with several companies ready to develop technologies to meet this ambition, the only missing piece is government policy. 2019 was certainly a momentous year for climate and energy policy development, this momentum should continue into 2020 and 2021 to ensure that these policies are translated into direct action to mitigate climate change. After all, it’s only the future of our planet that’s at stake.

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<sup>9</sup> [https://es.catapult.org.uk/wp-content/uploads/2020/03/ESC\\_Innovating\\_to\\_Net\\_Zero\\_report\\_FINAL.pdf](https://es.catapult.org.uk/wp-content/uploads/2020/03/ESC_Innovating_to_Net_Zero_report_FINAL.pdf)