The voice of the energy industry

Energy UK Response to Technological Innovation and Climate Change: Negative Emissions Technologies

28th October 2021

About Energy UK

Energy UK is the trade association for the energy industry with over 100 members spanning every aspect of the energy sector – from established FTSE 100 companies, right through to new, growing suppliers and generators, which now make up over half of our membership.

We represent the diverse nature of the UK's energy industry with our members delivering over 80% of both the UK's power generation and energy supply for the 28 million UK homes as well as businesses.

The energy industry invests £13bn annually, delivers £31bn in gross value added on top of the £95bn in economic activity through its supply chain and interaction with other sectors, and supports 738,000 jobs in every corner of the country.

Should you have any questions regarding this consultation response then please do not hesitate to get in touch via the details below.

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Response to Questions

What contribution could NETs (through DACCS, BECCS, and/or other NETs) make to achieving net zero by 2050?

Energy UK recognises the vital role that negative emission technologies will play in meeting a net-zero emissions target. We support the findings – highlighted by the Climate Change Committee in their 6th Carbon Budget Advice 'Balanced Pathway' central scenario, that approximately 58MtCO2 of negative emissions per year from 'engineered' GGR technologies will be required[1]. Of this 58MtCO2, approximately 53MtCO2 will be required from BECCS.

Energy UK also endorses the National Grid ESO analysis in the 2020 Future Energy Scenarios (FES) that outlined a significant role for BECCS in meeting net zero 2050 targets.[2] Similarly, we would highlight analysis produced by the Royal Society and Royal Academy of Engineering Academy of Engineering,[3]

[1] https://www.theccc.org.uk/publication/sixth-carbon-budget/
[2] https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2020-documents
[3] https://royalsociety.org/-/media/policy/projects/greenhouse-gas-removal/royal-society-greenhouse-gas-removal-report-2018.pdf

which outlined how BECCS and DACCS could remove over half of residual emissions with contributions from 'nature-based' NET's making up the remainder.

Which 'hard to decarbonise' sectors could benefit most from NETs, and which should be prioritized?

Energy UK recognises that NET's can play an important role in 'hard to decarbonise' sectors and supports the Climate Change Committee's estimation that at least 58MtCO2 of negative emissions from 'engineered' NET's such as BECCS would be required and best suites to offset residual positive emissions from sectors such as aviation and agriculture.

Energy UK also sees carbon captured from DACCS processes in combination with hydrogen produced by electrolysis from low carbon power (nuclear or renewables) as an important potential benefit to producing net zero-compliant synthetic fuels for hard to abate sectors such as industry, aviation, and shipping.

At what technological stage are current NETs, and what is the likely timeframe that will allow NETs to be operational at scale in the UK?

Energy UK believes that BECCS should be considered a Technology Readiness Level (TRL) 8 technology as Drax has already piloted various forms of liquid solvents and has undertaken third party validation testing at the SINTEF research facility in Norway. This project is ready for a Final Investment Decision on BECCS subject to an appropriate investment framework both for the UK Government and investors.

Energy UK would highlight that there are examples of post combustion CCS that has been proven on a large-scale commercial basis at Petra Nova in the USA where 1.4mtpa CO_2 was captured from a coal fired power generation unit. Biomass flue gas is superior to coal for post combustion CCS in comparison and BECCS uses a similar but simpler process to this because there are minimal contaminants.

Energy UK also recognises that there is substantial potential synergy between nuclear power and Direct Air Capture (DAC) arising from the significant heat demand needed for operating DAC processes. Some Energy UK members would like to highlight that new nuclear power is uniquely well placed to provide large volumes of low cost, low carbon heat. While existing nuclear reactors in the UK do not exploit most of the heat from nuclear energy, there are a wide range of international examples of nuclear stations providing heat supplies for local industries or communities. EDF / Sizewell C is exploring this potential in a BEIS funded project – see here for further detail.

What are, and have been, the barriers to further development of NETs? How can such barriers be overcome?

Energy UK sees the primary barriers to the development and deployment of BECCS as being largely commercial. We believe that technologies such as Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS) are ready to begin deployment, and that further efficiency and technological advances will come through learning from early deployment, as has been seen with other emerging technologies.

We believe that the absence of a remuneration mechanism for negative emissions is another barrier to development and deployment of GGRs. It is also worth noting that some GGRs, such as BECCS power and BECCS hydrogen, produce two useful co-products that are not fully rewarded by the market (low-carbon power and hydrogen). It is key that government considers a mechanism which remunerates such technologies for all the services they provide.

What are the trade-offs between availability of land and availability of sustainable biomass to make NETs a viable option in and beyond the UK?

Energy UK believes that irrespective of where biomass is sourced from it must meet high standards and best practice so that the UK's biomass is sustainable.

In order to ensure that biomass continues to be produced sustainability in the UK, policies must ensure that land carbon stocks are not negatively impacted by biomass sourcing from unstainable importing. A robust sustainability framework will therefore be required to ensure that direct and indirect impacts of the GGR on land use emissions are protected against.

What are the options for the storage of captured carbon, whether onshore or offshore?

Energy UK sees UK offshore storage and transport and storage (T&S) infrastructure as two viable options to store captured carbon. The UK has one of the largest offshore storage capacities of any country. With the Global Carbon Capture and Storage Institute listing 87 appraised sites across 5 geological basins with a potential of up to 500 sites [4] it is evident that the UK has an abundance of offshore storage options available. We are certain that offshore storage in the UK will be one of the safest of any country with high levels of regulation. Transport and storage infrastructure is also vital for realising economies of scale and early cost reductions.

Given the proposed role of NETs in climate change modelling, is there a danger of over-reliance on these technologies in net zero strategies?

Energy UK believes that a significant contribution from negative emissions technologies will be needed to achieve net zero and in particular, to balance residual emissions from very hard to abate sectors. However, we also believe that negative emissions should not be a substitute for overall action to reduce emissions.

How should the UK Government support the further development of NETs?

Action from government is required in the near term to ensure initial deployment from the mid-2020 so that that this ambition can be delivered for the period 2040-2050.

There is currently a lack of policy and market frameworks to support the deployment of these technologies and correctly ascribe value to the negative emissions they produce. Energy UK recommends the development of a market framework which enables technologies to compete on a level playing field and designed in such a way to ensure that both climate change mitigation measures and negative emission technologies are deployed at the scale required in the near term.

Energy UK supports the development of carbon pricing to include a mechanism to remunerate negative emissions to support investment in these technologies, however it is clear that a carbon price alone will not be enough. Negative emission technologies that are shown to deliver proven, verifiable and permanent emission reduction should play an integral role in the government industrial strategy and should be deployed across the UK to help assist with post-industrial regeneration.

What principles should guide the development of policy to ensure the UK gains a competitive advantage and remains at the cutting edge of this sector?

Energy UK identifies 5 main principles that should underpin a framework for incentivisation of GGRs:

1. **Investor confidence** – it is crucial that the framework is designed in such a way that it instils confidence in investors. As much long-term clarity, stability and satisfaction of the principles below should achieve this.
2. **Value for money** – we believe that a framework for incentivisation in GGRs should promote competition wherever possible to drive value for money.
3. **Fair cost sharing** – Energy UK is keen to see that the cost of GGRs are distributed appropriately across the beneficiaries. For example, a power consumer should expect to pay

[4] https://www.globalccsinstitute.com/wp-content/uploads/2020/07/Global-Storage-Resource-Assessment_-2019-Update_-June-2020.pdf

for power from a BECCS plant, but the negative emissions from the same plant will be funded by other customers i.e. aviation.

4. **Feasibility** – it is important that any framework is tested with developers/investors to ensure that it will provides enough support to drive development and deployment of GGRs.
5. **Transition to a market based approach over time** – Energy UK believes in the power of markets to drive the most efficient outcomes and therefore highest value for money. We support the need for government intervention in the early stages of technology deployment given the associated uncertainties, but encourage government to signal that it will ultimately transition to a market based approach.

What policy changes, if any, are needed to ensure the UK gains a competitive advantage and remains at the cutting edge of this sector?

Energy UK believes innovation funding plays an important role in supporting emerging technologies. We support the use of industry/academia partnerships, such as the Industrial Decarbonisation Research and Innovation Centre, and acknowledge the importance of these in technological development.

Energy UK urges government to consider the importance that a pathway of mechanisms can have in supporting GGR technologies from a low Technology Readiness Level (TRL) through to commercial deployment. It is key that this stage is well managed, in particular to ensure that the supply chain is matured to the point of being able to support commercial deployment.

Energy UK considers that the initial deployment for BECCS and DACCS will require bespoke policy mechanisms which recognise the unique characteristics of the technologies. We note that these mechanisms may change over time as the GGR sector grows and transitions to a more market based approach over time. Some specific policy measures that could be considered include:

- Targeted support for BECCS and DACCS deployment
- GGR deployment milestones for both BECCS and DACCS
- Definition on the wider proposed market mechanisms

We consider that policy options which provide discrete stand-alone support such as grant or contract-based incentives which enable further research, demonstration and deployment of projects are most likely to be effective in stimulating innovation and learning.

The Government has indicated it will publish a Biomass Strategy in 2022, including the role of BECCS. What should be included in this strategy?

Energy UK believes the forthcoming biomass strategy should outline a commitment to deploying BECCS in the UK and supporting the agriculture sector take part through energy crops and agri-residues.

The UK government has an existing energy crop target of 1.4 Mha by 2050, which Energy UK believes is a highly ambitious target that requires several complex challenges to be addressed and resolved between sector stakeholders. However, we are confident that with the right policy and support mechanisms and the provision of a clear medium to long term line of sight, the UK bioenergy sector can contribute meaningfully to these UK targets.

Energy UK also believes the strategy should require biomass with carbon capture as far as possible to maximise emissions benefits and reduce concerns about full life cycle emissions when biomass is combusted without CO2 capture. The strategy will need to also acknowledge constrained volumes of sustainable biomass bearing in mind competing land uses and the need to use land for food production and also land for sustainable forestry.

To ensure biomass sustainability, net life-cycle emissions for biomass based GGR options should take account of all relevant factors including:

- “upstream” impacts of carbon emissions/removals arising from growing biomass, including impacts from land use change on the stocks of carbon embedded in biomass stocks and soil;
- “processing and transport” emissions associated with the processing of biomass (such as pelletising and drying) and transport, storage and stock management of biomass;
- “combustion” emissions in cases where biomass is being burned to generate electricity or gasified to make fuels, including taking account of the appropriate capture % where capture equipment is being deployed.