



House of Commons

Business, Energy and Industrial  
Strategy Committee

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# Carbon capture usage and storage: third time lucky?: Government Response to the Committee's Twentieth Report

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Twenty-first Special Report of  
Session 2017–19

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## Business, Energy and Industrial Strategy Committee

The Business, Energy and Industrial Strategy Committee is appointed by the House of Commons to examine the expenditure, administration, and policy of the Department for Business, Energy and Industrial Strategy.

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### Committee staff

The current staff of the Committee are Chris Shaw (Clerk), Alison Groves (Second Clerk), Ian Cruse, Becky Mawhood and Ashleigh Morris (Committee Specialists), James McQuade (Senior Committee Assistant), Matthew Eaton (Committee Assistant) and Gary Calder (Media Officer).

### Contacts

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# Twenty-first Special Report

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On 25 April 2019, the Business, Energy and Industrial Strategy Committee published its twentieth Report of Session 2017–19, on [Carbon Capture Usage and Storage: third time lucky?](#) (HC 1094). The response from the Government was received on 21 August 2019. The response is appended below.

## Appendix: Government Response

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### Ambitions and least cost decarbonisation

#### *Recommendation one*

*We encourage the Government to view CCUS as a tool for decarbonisation, rather than as an extra cost on power generation. Deployment should be prioritised because CCUS presents an opportunity to reduce the overall cost of meeting the UK's emissions reduction targets.*

#### *Government Response*

The Government agrees with the Committee that CCUS can support decarbonisation across the economy, including industry and power. This is why our CCUS Action Plan published in November 2018 confirms that we will shift our focus to domestic deployment, enabling the development of the first CCUS facility in the UK, commissioning from the mid-2020s.

To realise this, we need to address the commercial barriers to deployment. We are engaging industry on this. For example, we worked with industry to establish a CCUS advisory group, which brought together industry, finance and government to provide advice on possible CCUS business models. The group published their report on potential investment frameworks to develop CCUS in the UK,<sup>1</sup> forming an important input into the Government's consultation document on CCUS business models<sup>2</sup> that was published in July 2019. We will publish the Government's response to the consultation by the end of the year.

We have also established an ambitious Mission to decarbonise industry. We announced at COP24 in December 2018 our Industrial Clusters Mission<sup>3</sup> to create the world's first net zero carbon industrial cluster by 2040 and at least one low carbon cluster by 2030. To support this Mission we have also announced up to £170 million funding from the Industrial Strategy Challenge Fund. We expect CCUS could play a key role in supporting the delivery of this Mission.

In addition, we are investing in CCUS innovation to support the development of the technology and a shift to deployment. In June 2019, we also announced that nine companies have secured £26 million of government funding to advance the rollout of

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1 <http://www.ccsassociation.org/ccus-advisory-group>

2 <https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-business-models>

3 <https://www.gov.uk/government/news/world-first-carbon-net-zero-hub-of-heavy-industry-to-help-uk-seize-global-economic-opportunities-of-clean-growth>

CCUS in the UK.<sup>4</sup> One company, Tata Chemicals, is being awarded £4.2 million toward the construction of a facility to capture and utilise 40,000 tonnes of carbon dioxide a year. When fully operational in 2021 it will be the largest carbon capture plant in the UK, avoiding 100 times more carbon dioxide from entering the atmosphere than the country's current largest facility.

### **Recommendation two**

*We recommend that Government revise its formal aims in light of the Minister's more nuanced position and prioritise the development of clear ambitions that will bolster its renewed efforts to kick-start CCUS. We further recommend that the Government commits to supporting CCUS where and whilst it remains the cheapest route to decarbonisation, notably in industrial applications. Rather than seeking unspecified cost reductions, the Government should set out plans to ensure that projects are brought forwards at least cost.*

### **Government Response**

Our ambitious CCUS Action Plan sets out how the UK is committed to playing a leading role in supporting the development of CCUS. A crucial part of our approach is establishing the right business environment which can unlock investment, encourage innovation and secure cost reductions in CCUS in the UK to ensure value for money for taxpayers.

That is why we committed in the CCUS Action Plan to work with industry to address the critical challenges to delivering CCUS in the UK, in particular the cost structures, risk sharing arrangements and the necessary market-based frameworks to support cost effective deployment of CCUS in the UK. We have done this through a CCUS advisory group and engagement with prospective CCUS projects and will continue to work closely with industry as we progress our work on new CCUS business models.

Alongside this, we are continuing to support industrial regions and specific CCUS projects. For example, in June 2019 we announced:

- £4.8 million funding for Project Acorn—a proposed low-cost CCUS project designed to be built quickly, taking advantage of existing oil and gas infrastructure and a well understood offshore CO<sub>2</sub> storage site.
- £4.2 million to Tata Chemicals to construct a carbon capture and utilisation (CCU) demonstration plant which will capture approximately 40,000 tonnes of CO<sub>2</sub> each year.
- £4.9 million funding for C-capture—a spinout company from Leeds University who are working alongside the Drax Group to progress their bioenergy and carbon capture and storage (BECCS) project at Drax Power Station in North Yorkshire. If the project is successful, it would become the world's first negative emissions power station in the 2020s.

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4 <https://www.gov.uk/government/news/uks-largest-carbon-capture-project-to-prevent-equivalent-of-22000-cars-emissions-from-polluting-the-atmosphere-from-2021>

- £3.8 million funding for the Clean Gas Project—the UK's first commercial full-chain CCUS project in Teesside, led by six major energy companies including Shell, Total and BP.
- £0.5 million for HyNet—an integrated hydrogen and CCUS project, being developed by Progressive Energy in partnership with Cadent Gas (formerly National Grid Gas Distribution).

As well as the ambition to establish a 'net-zero carbon' cluster by 2040—the first of its kind in the world—backed by up to £170 million funding we have also provided £315 million for the Industrial Energy Transformation Fund. This will support businesses with high energy use to transition to a low carbon future, potentially including through carbon capture.

To facilitate CCUS deployment in industrial applications, we are reviewing the barriers to the deployment of industrial carbon capture, including options for establishing a cost-effective market-based industrial carbon capture framework. Industrial carbon capture forms an important part of our consultation on potential business models for CCUS.<sup>5</sup>

### **Recommendation three**

*We recommend the timetable for policy delivery is accelerated to enable CCUS commissioning from 2023, to avoid the additional cost of recommissioning disused oil and gas pipelines after they have been decommissioned.*

### **Government Response**

We recognise the potential opportunities re-using existing infrastructure might present to progressing CCUS in the UK at lower cost. That is why we committed in our CCUS Action Plan to work with industry and regulatory stakeholders to: (i) identify existing infrastructure that could be re-used to support CCUS projects; and (ii) to develop a policy on re-use of infrastructure for the purpose of CCUS.

As part of this, on 22 July 2019, we launched a consultation on the potential re-use of oil and gas assets for CCUS,<sup>6</sup> which seeks views on whether government should introduce a discretionary power for the Secretary of State to remove the decommissioning liability from previous oil and gas asset owners if assets are transferred to CCUS projects; and on changing guidance from the Oil and Gas Authority (OGA) and government to encourage owners and operators of oil and gas assets to propose a period of suspension prior to decommissioning in circumstances in which there is a reasonable prospect of the asset being acquired by a CCUS project.

We are also working closely with the OGA, the licensing authority for offshore carbon dioxide storage in the UK, responsible for approving and issuing storage permits, and maintaining the carbon storage public register. The OGA is currently leading a project to understand what practical steps they can take to support North Sea energy integration, including considering the role of CCUS.

5 <https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-business-models>

6 <https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-projects-re-use-of-oil-and-gas-assets>

### **Recommendation four**

***We recommend the Government sets a specific target to store 10 million tonnes of carbon by 2030 and 20 million by 2035, to keep the UK on track to meet its 2050 climate change targets, as recommended by the CCC.***

#### **Government Response**

Under the Climate Change Act 2008, the Government legislated for carbon budgets which are amongst the most stringent targets in the world. We have already outperformed the first carbon budget; the final greenhouse gas emissions statistics for 2017<sup>7</sup> confirmed we have outperformed the second; and we are on track to meet the third.

Projections show that we are on track to deliver over 90% of our required performance against 1990 levels for the fourth and fifth carbon budgets, even before many of the policies and proposals in the Clean Growth Strategy are taken into account.

CCUS will likely have an essential role in helping the UK meet its 2050 net zero commitment, supporting emission reductions across the economy. As outlined in our Action Plan, CCUS can reduce the carbon impact of gas, decarbonise industry and potentially transport and heat through enabling low carbon hydrogen production. It could also be crucial in deploying negative emissions in the UK.

Our ambition for CCUS remains that the UK should have the option to deploy CCUS at scale during the 2030s and the first critical step to achieving this is through our commitment to deploy the UK's first CCUS facility from the mid-2020s.

### **Recommendation five**

***We recommend the Government expedites safety demonstrations and—assuming these are satisfied—brings forward amendments to the Gas (Safety Management) Regulations and the Gas (Control of Thermal Energy) Regulations as a matter of urgency to enable large-scale demonstrations of hydrogen injection into the gas grid.***

#### **Government Response**

We recognise the value of hydrogen injection demonstrations in the gas grid. We are working closely with Health and Safety Executive (HSE) and Ofgem to ensure that assurances around gas safety and quality are in place to support such trials (through exemptions) and provide the evidence necessary to make any amendments to relevant Regulations.

The HSE is currently reviewing the Gas Safety (Management) Regulations 1996 (GSMR), this includes reviewing the permitted hydrogen content of network gas. In support of this, the Institute of Gas Engineers and Managers (IGEM) is coordinating work which, if shown to be safe, will allow for a small increase in the amount of hydrogen permitted in the network. HSE will continue to work with industry and Government to ensure that any proposed revisions to GSMR are fit for purpose and allow for safe innovation and decarbonisation.

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7 <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

HSE has the power to grant exemptions to GSMR where the duty holder is able to demonstrate that this would not lead to a reduction in health and safety standards. HSE will consider granting limited exemptions in bespoke circumstances, such as demonstration projects, and also where sufficient evidence exists to justify the granting of a 'class exemption', which applies to the gas network in general. HSE has granted an exemption to the Ofgem-funded HyDeploy project at Keele University (led by Cadent) so that evidence for the safety of blends of up to 20% hydrogen (by volume) in the existing gas network can be obtained. Ofgem have recently announced funding for HyDeploy2, which will build on the first project and involve two larger trials. The project is expected to conclude in March 2023.

The responsibility of implementing the Gas (Calculation of Thermal Energy) Regulations 1996 (GCOTER) broadly lies with Ofgem. As with the GSMR, any proposed changes to GCOTER to accommodate unconventional gases (e.g. hydrogen) will need to ensure that consumers are not disadvantaged. The supply of unconventional gas blends presents billing challenges, due to the variability of calorific value (CV). Cadent's 'Future Billing Methodology' project, which is funded by Ofgem, is exploring a range of different options for billing such blends, and aims to provide a "proof-of-concept" framework for attributing zone-specific CV. It seeks to support the decarbonisation of heat by enabling unconventional gas blends. The project is expected to conclude in March 2021.

## Industrial opportunities

### *Recommendation six*

*We recommend that the Government prioritise the development of CCUS to benefit from growing international demand for low carbon products and service—building on the UK's existing successes with offshore wind.*

### *Government Response*

The Government agrees with the Committee's recommendation. The development of CCUS provides an opportunity for the UK to develop a domestic supply chain, utilising the expertise of our existing oil and gas industry and new UK-based innovative carbon capture technologies. We are in a strong position to grasp the opportunities from becoming a global technology leader on CCUS, and why, as outlined in our CCUS Action Plan, we see an opportunity for the UK to be a global leader on CCUS.

Deployment of CCUS could create new markets for UK businesses both domestically and internationally. For example:

- CCUS exports could potentially be worth multiple billions of pounds per year in the UK in 2050, particularly in engineering, procurement and construction services, helping to support tens of thousands of jobs;
- With the potential to store more than 78 billion tonnes of CO<sub>2</sub>, the UK can be a world leader in CO<sub>2</sub> storage services;

- Innovative companies across the UK are developing cutting edge CCUS technologies including Econic Technologies, C-Capture, Origen Power, Carbon 8, Carbon Capture Machine and Carbon Clean Solutions; and
- The UK has world leading academic institutions, including universities such as Sheffield, Edinburgh, Imperial and Cambridge as well as academic networks led by the UK CCS Research Centre and Scottish CCS, in the UK focused on driving cost reductions and advancing the technology.

This is why we are continuing to invest in CCUS innovation to help ensure the UK is at the forefront of developing CCUS technologies. For example, we announced, on 27 June 2019, financial support to innovative UK technologies including C-Capture and Origen Power while also investing in enhancing the UK's national carbon capture test facility near Rotherham.

To support our companies in taking advantage of this growing global market, the Department for International Trade (DIT) has recently added CCUS technology to its power and renewables portfolio. Work has started to map UK capabilities, identify international opportunities and determine where UK expertise might apply. Once completed, DIT will look at how it can support UK-based companies with CCUS expertise, services and products.

### **Recommendation seven**

*The UK's storage and supply chain resource strengths mean that we have a unique opportunity to lead the world in the development of a new CCUS industry. The Government should not allow the UK to pass this opportunity up. We recommend that the Government prioritise the development of CCUS to benefit from growing international demand for low carbon products and services-building on the UK's existing successes with offshore wind. We believe that support for CCUS—an innovative technology expected to be critical on tackling climate change—is also justified on these grounds.*

### **Government Response**

The Government agrees with the Committee and we see an opportunity for the UK to be a global technology leader in CCUS and recognise the significant opportunities a growing global CCUS market presents, building on the UK's storage and supply chain resource strengths. For example, the Oil and Gas Authority has recently undertaken a programme of work to understand what practical steps they can take to support the energy transition in the Oil & Gas industry going forward, including considering the role of CCUS.

We agree with the Committee that innovation support remains important and we are, through our CCUS and Industrial Energy Innovation Programme,<sup>8</sup> investing over £50 million in innovation to support the technology to March 2021. As part of this, on 27 June 2019, we announced £26 million of innovation funding to CCUS and will be announcing the successful projects under the second call of the Accelerating Carbon Technologies R&D programme in September 2019.

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8 <https://www.gov.uk/guidance/funding-for-low-carbon-industry>

We are also taking broader action in this area. For example, we have also established a £315 million Industrial Energy Transformation Fund to support heavy energy users become more energy efficient and cut their carbon emissions potentially including through CCUS. Our £170 million Industrial Strategy Challenge Fund will kick start the Industrial Clusters Mission to establish the first 'net-zero carbon' industrial cluster by 2040.

Recognising the global importance of CCUS, we are co-leading the Mission Innovation Carbon Capture Challenge, the CCUS initiative under Clean Energy Ministerial and last November hosted the Global CCUS Summit, with the International Energy Agency, bringing together fifty world energy leaders to accelerate global progress of CCUS.

### **Recommendation eight**

***We recommend that the forthcoming Comprehensive Spending Review take account not only of CCUS' costs but also its wider benefits—notably to extend the lifetime of heavy industries which will otherwise need to close under the requirements of the Climate Change Act.***

#### **Government Response**

CCUS could support critical sectors of the economy in key industrial regions. For example, CCUS is fundamental to the decarbonisation of certain Energy Intensive Industries (EIIs), such as steel, cement, oil, refining and chemicals, some of which lack alternative options for achieving deep decarbonisation. EIIs are crucial to the UK economy, contributing around £30bn in GVA (around 2% of the UK economy); employ around 310,000 workers with exports totalling £90bn.<sup>9</sup>

Under a Comprehensive Spending Review, all potential programmes and projects are assessed in accordance with government [Green Book Guidance](#) which takes into account the costs and benefits of a programme/project. The guidance highlights that costs and benefits should also be identified and appraised for non-market or-monetisable values, specifically including greenhouse gas emissions, land value and land use.

### **Recommendation nine**

***We recommend that the Government tasks the National Infrastructure Commission—or a third party—to conduct a cost benefit analysis of the potential role of CCUS to decarbonise industrial emissions, taking account of how development of industrial CCUS would affect—and be affected by—the potential development of CCUS for other applications, notably hydrogen and power. The results of this assessment should be taken into account during decision-making on spending for national infrastructure.***

#### **Government Response**

The Government is committed to building and maintaining a robust evidence base concerning the costs and benefits of CCUS across a number of applications, including industry but also power and production of low carbon hydrogen at scale for use across the energy system. The Government welcomes the views and evidence submitted by third

parties such as the National Infrastructure Commission as we continue to strengthen our analysis, particularly in light of the Government's commitment to achieving net zero by 2050.

Within our consultation looking into potential business models for CCUS,<sup>10</sup> there is a specific chapter on industrial CCUS. We will review responses submitted to build the evidence base to examine the potential role of CCUS to decarbonise industrial emissions.

## Business models and funding

### *Recommendation ten*

***We recommend that the funding models for carbon capture are separated from those for carbon transport and storage. We welcome BEIS' work to consider RAB's appropriateness for nuclear power, and recommend that this is expanded to consider CCUS, including transport and storage infrastructure to link with industrial carbon emitters.***

### *Government Response*

In our CCUS Action Plan, we underline our view that the greatest barriers to the development of CCUS in the UK are commercial, rather than technical.

We have reviewed analysis conducted by a number of bodies including the National Audit Office,<sup>11</sup> Parliamentary Advisory Group on CCS,<sup>12</sup> and CCUS Cost Challenge Taskforce,<sup>13</sup> who broadly concluded that the full chain, fixed price model under the CCS Competition may not be capable of absorbing the different risk appetites of different organisations involved in the full chain. This work identified that this approach had an impact on the cost of the CCUS project. As such, each of these bodies concluded that a separate CO<sub>2</sub> T&S business model should be established.

We therefore committed to undertake a review of delivery and investment frameworks for CCUS that would look into more commercially sustainable models. This includes reviewing the business models for:

- CCUS in power—to create a market-based framework which provides the greatest value to the electricity system and supports wider decarbonisation;
- CCUS in industry—to consider the barriers to deployment of industrial carbon capture and the best market-based framework for its deployment; and
- Carbon dioxide transport and storage infrastructure—to consider the potential models and market-based frameworks that could best support investment such infrastructure.

10 <https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-business-models>

11 National Audit Office, Carbon Capture and Storage: the Second Competition for Government Support, 20 January 2017, <https://www.nao.org.uk/report/carbon-capture-and-storage-the-second-competition-for-government-support/>

12 Parliamentary Advisory Group on Carbon Capture and Storage, Lowest Cost Decarbonisation for the UK: The Critical Role of CCS, September 2016, <http://www.ccsassociation.org/news-and-events/reports-and-publications/parliamentary-advisory-group-on-ccs-report/>

13 CCUS Cost Challenge Taskforce, Delivering Clean Growth: CCUS Cost Challenge Taskforce Report, 19 July 2018, <https://www.gov.uk/government/publications/delivering-clean-growth-ccus-cost-challenge-taskforce-report>

The review has also begun to explore business models for CCUS enabled low carbon hydrogen production, recognising hydrogen's potential as a flexible and strategic decarbonised energy carrier for the UK, alongside electricity and other decarbonised gases.

In line with the recommendation from the Committee, the review considers the appropriateness of separating funding models for carbon capture from those for transport and storage, include consideration of a regulated asset base (RAB) model and its applicability for transport and storage infrastructure, drawing on the Department's experience of considering a RAB for new nuclear development.

We are seeking views on the applicability of a RAB for new nuclear development in a separate consultation.<sup>14</sup> We will review evidence submitted to this consultation, as well as responses to the consultation on potential business models for CCUS<sup>15</sup> to examine its potential suitability for carbon dioxide transport and infrastructure.

## Clusters and competition

### **Recommendation eleven**

*We recommend the development and commissioning of first CCUS projects in at least three clusters by 2025 to minimise the risk of a third major delay to the technology's development and to ensure that its benefits for productivity accrue to industries across the UK.*

### **Government Response**

Our CCUS Action Plan sets out our intention to enable the development of the first CCUS facility in the UK, commissioning from the mid-2020s. We believe that this is the right first step to meet our 2030s ambition to deploy CCUS at scale, subject to the costs coming down sufficiently.

Critical to achieving this will be getting the right business models for CCUS in place, which is why we are reviewing the CCUS Delivery and Investment Frameworks and have published a consultation on CCUS business models in July. We will respond to the consultation by the end of the year.

### **Recommendation twelve**

*We recommend the Government consults on approaches to allocate funding for CCUS industry clusters, to ensure that the approach selected promotes collaboration and benefits CCUS development across the UK, including those clusters that take longer to get going. It should also seek to ensure that the scope of funding is sufficiently broad to allow consideration of all viable CCUS schemes and avoid excluding particular applications or technology-types. This consultation should be conducted as a matter of urgency and completed by the end of 2019, so that there is no delay to the development of projects.*

14 <https://www.gov.uk/government/consultations/regulated-asset-base-rab-model-for-nuclear>

15 <https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-business-models>

### *Government Response*

Our CCUS Action Plan highlights the opportunities of developing CCUS in the UK to support the delivery of our modern Industrial Strategy and the competitiveness of our industrial regions across the UK. This approach is underpinned by our Industrial Clusters Mission announced at COP24 in December 2018 with an ambition to establish the first 'net-zero carbon' cluster by 2040 to cut emissions, and at least one low-carbon industrial cluster by 2030.

This Mission is backed by up to £170 million funding from the Industrial Strategy Challenge Fund. We are working closely with United Kingdom Research and Innovation (UKRI) on the development of this Challenge, which UKRI aim to open before the end of the year.

As we develop the focus and plans for the Industrial Clusters Mission, we will consider the role that CCUS could play in delivery of the Mission, and any links to the commitments in the CCUS Action Plan.