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Committee of Public Accounts

Carbon Capture, Usage and Storage

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Committee of Public Accounts

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Summary

The Department for Energy Security and Net Zero (the Department) considers carbon capture, usage and storage (CCUS) as essential for the UK to meet its net zero targets. In introducing its current CCUS programme, it has learnt lessons from two previous failed attempts. It has secured funding from HM Treasury of almost £22 billion over 25 years to support the first projects. A quarter of this financial support will come from the Exchequer, but three quarters will come from levies on consumers who are already facing some of the highest energy bills in the world.

The Department has, over time, reduced its ambitions for the amount of carbon that the programme will capture and store. In December 2024, it stated that its ambition to capture and store 20 to 30 million tonnes per year of CO2 by 2030 is no longer achievable. It has not yet set any revised targets.

Progress introducing the new programme has been slow. The Department has only recently signed contracts with two projects in the north east (one emitter and one transport and storage company), around two years later than it planned. The earliest these will be become operational is 2028. The Department is reliant on the technology working to contribute to achieving net zero but cannot be sure how these first-of-a-kind projects will perform. There remain questions to be answered about the level of commercial risk being undertaken by government. Ensuring better measurement and reporting of outcomes and clearer targets will be important to later and regular assessments of effectiveness and value for money.

The Department will need to find alternative ways of reducing emissions if there are further delays in agreeing support for more projects, or if the technology's performance is not as good as it expects. If the projects are successful, the Department has not considered how it could maximise the financial benefits for taxpayers and consumers. The Department will need to revisit its value-for-money case for supporting CCUS regularly, taking account of changes in the scientific understanding of carbon capture and storage and the impact this may have on the assumptions underpinning its programme. It needs to avoid over reliance on the programme at the expense of other routes to net zero, such as renewable energy. There is a high risk that CCUS will not deliver to the timescales or the level of carbon reductions needed and thus jeopardise the government's ability to meet carbon reduction targets. There is also a high degree of uncertainty as to

whether these risky investments in unproven technologies present best value for money for taxpayers and consumers, relative to other ways of decarbonising industrial sectors and energy production, other than in a minimum of cases where no alternatives available, such as cement.

The government's next Carbon Budget Delivery Plan is due in spring 2025, which will set out the overall package of policies that will secure the interim targets towards achieving net zero. This provides the Department with an opportunity to take stock of its plans for CCUS and make sure that the programme focuses on sectors where there are no viable alternatives to decarbonise, such as cement and lime production. At the same time, the Department should develop plans as to how industries located outside of geographical clusters (known dispersed sites) might make use of CCUS.

Introduction

Carbon capture, usage and storage (CCUS) technologies capture carbon before it is released into the atmosphere and store it permanently underground. They can be applied to a range of industrial applications, such as power generation and cement production. The government sees CCUS as essential to the UK achieving net zero by 2050. Previous governments have attempted to launch CCUS in the UK twice before, but these projects were cancelled in 2011 and 2016. The current approach, launched in 2018, aims to establish CCUS in geographical clusters. The government set a target of capturing and storing 20–30 million tonnes of carbon per year by 2030. In December 2024, it concluded that this target was not achievable. It has not yet set revised goals.

The Department for Energy Security and Net Zero (the Department) is responsible for the CCUS programme. In October 2021, it announced that the first two clusters to receive government support (Track 1) would be HyNet, covering Merseyside and north Wales, and East Coast, covering Teesside and Humberside. HM Treasury announced up to £20.0 billion of funding in March 2023 to support the early deployment of CCUS. In October 2024 it increased the funding to £21.7 billion over 25 years to cover the first five projects. At the same time, the Department recognised contingent liabilities with a maximum value of £34 billion to cover the risks it is underwriting for the programme.

In December 2024, the Department announced it had signed contracts with the first two projects at East Coast Cluster which it expects to begin operations in 2028.

Conclusions and recommendations

1. **The Department is taking a high-risk approach by backing first-of-a-kind, unproven technologies with large amounts of taxpayer and consumer funding.** The Department has learnt from its previous two failed attempts to support CCUS in its design and early implementation of the current programme. This includes supporting 'clusters' of projects and developing a new approach to managing risks between emitter projects and transport and storage companies. Additionally, the Department has secured significant financial support from HM Treasury – almost £22 billion over 25 years for five Track 1 projects. The government is also underwriting risks relating to the programme, creating contingent liabilities estimated to be worth up to £34 billion. But there are not any examples of CCUS technology operating at a commercial scale in the UK, meaning the performance of early projects is uncertain. The written evidence we have received raises concerns that CCUS projects may not capture as much carbon as expected and experience from Norway suggests that performance on the scale expected by the Department is far from guaranteed. The Department acknowledges the first-of-a-kind risks associated with the programme. It considers its approach for allocating costs and risks between the government and the projects reduces taxpayer and consumer risk because projects do not get paid until they deliver. But at this stage in the programme these models remain untested in practice.

   RECOMMENDATION
   The Department should, as the projects it is supporting progress, make sure it is assessing on a regular basis whether taxpayer and consumer exposure is in line with expectations. This should include an assessment of whether its approach for allocating costs and risks between government and the projects is performing as intended.

2. **While the Department is taking steps to incentivise efficient delivery of the CCUS projects, it has not established mechanisms to make sure that taxpayers and consumers will benefit financially should the programme be successful.** The Department has developed a range of business models for applying CCUS to a range of sectors. The models form the basis of negotiations between the Department and the private sector

and outline how risks will be allocated between the different parties and set the payment mechanism. While the projects will receive the bulk of taxpayer and consumer support only when they are operational, the sums involved are substantial. Should the programme be successful, projects might eventually earn significant profits that are partly a result of early public support. Neither of the two contracts that the Department has already signed include any provision for the government to share profits or take an equity stake, or for consumers to benefit from lower energy bills should things go well. Nor does the Department seem to have considered any such 'gainshare' mechanisms when negotiating with the Track 1 projects.

RECOMMENDATION
For all future CCUS projects, the Department should introduce mechanisms to make sure taxpayers and consumers benefit financially from the success of the projects they have supported financially.

3. **The Department and HM Treasury have yet to assess the full financial impact of the CCUS programme on taxpayers and consumers.** The costs of the CCUS programme are significant: in November 2024 the government announced £21.7 billion of funding over 25 years to cover only the first five CCUS projects. There are three more projects that are still under negotiation as part of Track 1, an unquantified number of additional projects that are expected to join the HyNet and East Coast clusters as part of Track 1 expansion, and all the projects that will join the Track 2 clusters at Peterhead and Humberside. The Department has not indicated the likely cost of these projects. The Department and HM Treasury expect that around 75% of the cost of supporting these early projects will be met by levies on consumers who are already facing significant financial pressures, with the remainder funded by the Exchequer. Drawing on a recent report from the National Energy System Operator (NESO), the Department has concluded that supporting the deployment of CCUS in gas–fired power stations offers lower costs compared to alternatives. But NESO also concluded that this approach would require more upfront financial support. The Department has not looked at the likely financial impact on bills of the full CCUS programme at a time when households are already facing high energy prices.

RECOMMENDATION
The Department and HM Treasury should assess whether the full CCUS programme will be affordable for taxpayers and consumers, given wider pressures on energy bills and costs of living.

4. **The Department and HM Treasury lack clarity on how they would take account of project underperformance and advances in scientific understanding as part of their ongoing assessment of the programme's future.** The Department had a clear set of five factors it considered when assessing the value for money of the first two clusters and then the individual projects it selected as part of Track 1 of the programme. The Department and HM Treasury were also clear that projects would be subject to a further value for money assessment before awarding contracts. As part of this assessment it would consider the cost effectiveness of capturing carbon and wider economic issues such as investment in particular regions. But some recent scientific evidence suggests that producing liquid natural gas (which will be used to run several CCUS projects, such as Net Zero Teesside) leaks more methane, a potent greenhouse gas, into the atmosphere than previously thought. As CCUS will not reduce these 'upstream' emissions, this could undermine the rationale for pursuing certain projects. The government also expects bioenergy with carbon capture (BECCS) to play a significant role in providing negative emissions to offset residual emissions in other sectors. However, the National Audit Office has previously concluded that the government could not demonstrate the adequacy of monitoring arrangements for its existing schemes to support bioenergy in giving it confidence industry was meeting sustainability standards. In addition, Ofgem's critical findings in its recent investigation on Drax (which has received more than £6 billion of public funding over the last two decades) over its approach to reporting against sustainability criteria, have raised concerns over whether BECCS offers a genuine path to reducing emissions. We are therefore concerned that any government support for BECCS at Drax will not necessarily support its net zero ambitions and are minded to examine further the issue soon. If not all of the materials used were meeting the government's own sustainability standards this would be completely unacceptable.

RECOMMENDATION

The Department and HM Treasury should reappraise on an annual basis its approach to assessing the value for money of CCUS projects which it intends to support. As part of this assessment they should consider the impact of up–to–date scientific understanding of CCUS. They should also make sure any future support for BECCS is accompanied by monitoring arrangements that provide real assurance that industry is meeting sustainability criteria.

5. **To date, the Department has done little to ensure that government support for CCUS is directed to the sectors or locations where it will be essential for achieving net zero.** CCUS is currently seen as the only way to decarbonise certain industries. For example, it is estimated that 60–70%

of carbon emissions from the cement industry comes from chemical reactions. The government sees CCUS at the only means to prevent these from being released into the atmosphere. Projects producing energy from waste are also reliant on CCUS due to the lack of alternate green energy sources. Other applications for CCUS capture carbon from the burning of fuels and there can be alternative methods to decarbonise these processes (for example, through electrification). However, the Department's current cluster–based approach focuses on supporting carbon capture projects that are located close to one another. While this makes sense in terms of maximising the use of infrastructure such as pipelines, it does not ensure that financial support for CCUS is directed at the sectors which will need it most. The Department has not decided how it will support the use of CCUS at sites outside of industrial clusters, known as dispersed sites.

RECOMMENDATION
The Department should set out its rationale for supporting CCUS in each sector where it could be applied, including considering whether alternative approaches could be more cost effective.

6. **The Department has downgraded its ambitions for the CCUS programme, stating that the original 2030 ambitions are no longer achievable.** The current CCUS programme is the government's third attempt to introduce the technology. Compared with previous attempts, the government is now more reliant on CCUS succeeding as it sees the technology as essential to achieving net zero by 2050. But over the course of the CCUS programme's development, the Department has reduced its expectations of the carbon that will be captured and stored by the first wave of projects, known as Track 1. Its progress has also been slower than planned: the government recently agreed financial terms with two projects in the East Coast Cluster, around two years later than scheduled. In December 2024, the Department concluded that its target to capture 20 to 30 million tonnes of CO2 annually by 2030 will not be met. It has yet to announce revised targets for the programme. The 2030 ambitions for the CCUS programme were aligned with the government's pathway for meeting the decarbonisation goals for Carbon Budget 6 (2033–2037). As these targets have now been abandoned, it is not clear by what alternative means government will meet these legally binding goals.

RECOMMENDATION

a. The Department should set out, as a matter of urgency, new targets for how much carbon it intends to capture through its CCUS programme and by when, and make clear how it will make up the shortfall created in its overall net zero pathway.

b. The Department should consider how it will monitor and report on the performance of CCUS projects in relation to the amount of net carbon captured.

1 Protecting taxpayers and consumers interests

Introduction

1. On the basis of a report by the Comptroller and Auditor General, we took evidence from the Department for Energy Security and Net Zero (the Department) on its carbon capture, usage and storage programme.[1]

2. Carbon capture, usage and storage (CCUS) technologies capture carbon before it is released into the atmosphere and store it permanently underground. They can be applied to a range of industrial applications, such as power generation and cement production. In addition to reducing emissions from industry, CCUS has the potential to achieve a net removal of carbon dioxide from the atmosphere, for example by being applied to biomass–fuelled power generation.[2] The Climate Change Committee and the government both see CCUS as essential to the UK achieving its decarbonisation goals for Carbon Budget 6 (which covers the period 2033–37) and its longer–term goal to reach net zero by 2050.[3]

3. Previous governments have attempted to launch CCUS in the UK twice before, but these projects were cancelled in 2011 and 2016.[4] The Department is responsible for the current CCUS programme. It adopted its current approach in 2018, which aimed to establish the technology in four locations, known as clusters, with a target of capturing and storing 20–30 million tonnes of carbon per year (mtpa) by 2030.[5]

4. In October 2021, the Department announced that the first two clusters to receive government support (Track 1) would be based in Merseyside and north Wales (known as HyNet) and Teesside and Humberside (known as East Coast). It subsequently announced that the second two clusters would be centred on Peterhead north of Aberdeen (Acorn) and Humberside

1 C&AG's Report, Carbon Capture, Usage and Storage programme, Session 2024–25, HC 120, 22 July 2024
2 Q 1 and C&AG's Report, para 1
3 Q 20 and C&AG's Report, para 1.4
4 Qq 12 –13 and C&AG's Report, para 2
5 C&AG's Report, para 3

(Viking).[6] In March 2023, the Department announced the eight Track 1 carbon capture projects with which it would begin negotiations. At the same time, HM Treasury announced up to £20.0 billion of funding to support the early deployment of CCUS. This funding included an unspecified mix of direct Exchequer funding and consumer levies.[7] HM Treasury made a further announcement in October 2024, increasing the funding to £21.7 billion over 25 years and specifying that this was to cover the first five projects.[8] Three–quarters of this funding will come from levies on consumers who already pay some of the highest energy bills in the world.[9] For example, data published by the Department in September 2024 shows that, for industry, the UK has the highest price (including any taxes and levies) of electricity in 2023 compared to 23 other countries considered by the International Energy Agency. Similarly, for the domestic sector, the UK had the highest domestic electricity prices of 25 IEA countries. UK domestic gas prices (also including any taxes and levies) were at the median of the 23 countries covered, and the UK was tenth lowest out of 24 for industrial gas prices.[10]

5. In December 2024, the Department announced it had signed contracts with the first two projects in the East Coast Cluster which it expects to begin operating in 2028.[11] In the same month, the Department concluded that its target to capture 20–30 mtpa by 2030 was no longer achievable.[12]

Backing first of a kind projects

6. The Department adopted a revised approach to launching CCUS in 2018, which reflected five lessons learned from previous competitions. For example, the current programme focuses on 'clusters': areas where large numbers of high–emissions industries are located. The Department hopes this will mean that transport and storage infrastructure, such as pipelines, are used more fully and generate economies of scale.[13] In addition, the Department has separated the carbon capture projects from the transport and storage projects, allowing it to allocate risks more effectively. It also

6 Q 41 and C&AG's Report, para 4
7 C&AG's Report, para 2.10
8 Government reignites industrial heartlands 10 days out from the International Investment Summit – GOV.UK
9 Q 17
10 Department for Energy Security and Net Zero, Quarterly Energy Prices, Statistical Release 26 September 2024
11 Q 1 and DESNZ press notice Contracts signed for UK's first carbon capture projects in Teesside – GOV.UK
12 Letter from Minister of State for Industry dated 11 December 2024; and Letter from DESNZ to PAC dated 21 January 2025.
13 Q 12

identified risks that the private sector cannot take on in a cost–effective manner and must therefore be assumed by government. These include the risk of undersea storage sites leaking.[14]

7. A major factor in the failure of the second CCUS competition was the lack of agreement between the Department and HM Treasury on funding limits.[15] The Department told us that this time it had agreed an affordability envelope with HM Treasury which has developed as the projects have matured.[16] HM Treasury announced up to £20.0 billion of funding in March 2023 for the early deployment of CCUS[17] and made a further announcement in October 2024, increasing the funding to £21.7 billion over 25 years and specifying that this was to cover the first five projects.[18] In November 2024, the Department recognised contingent liabilities with a maximum value of £34.4 billion and a 'reasonable worst–case' value of £14.3 billion. These potential liabilities cover the risks the Department is underwriting for the CCUS programme.[19]

8. Significant risks to the successful implementation of CCUS technology remain. There are still no CCUS plants operating at a commercial scale in the UK and the technology is unproven at the scale being planned.[20] For example, written evidence we received stated that there are currently only two power stations worldwide using post–combustion carbon capture. Neither of these plants have achieved a 90% capture rate, which is the threshold set for CCUS by the previous government's Industrial Decarbonisation Strategy.[21] We also note that, while there has been no leakage from the two undersea carbon storage sites in Norwegian waters, the stored carbon dioxide has not behaved as expected.[22] The Department told us that the Norwegian carbon stores were filled with carbon much more slowly than the Department is planning for the UK.[23]

9. Given the scale of the funding announced for the first five projects and the size of the contingent liabilities that the Department has recognised for its underwriting of the programme, the potential costs to taxpayers and consumers are huge. The Department intends to manage the risks through a series of business models that it has developed for each sector that CCUS

14 Q 12
15 C&AG's Report, para 1.5
16 Q 12
17 C&AG's Report, para 14
18 Government reignites industrial heartlands 10 days out from the International Investment Summit – GOV.UK
19 Written statements – Written questions, answers and statements – UK Parliament Statement HCWS211, 13 November 2024
20 C&AG's Report, paras 1.5 and 3.4
21 CCUS0007
22 CCUS0014
23 Qq 9–10

may be deployed in.[24] It told us that these models are structured in such a way that, apart from very small grants worth less than 2% of the overall funding envelope, the projects in the CCUS programme will only be paid once they are operating.[25] It also intends to structure the contracts in such a way that projects will receive lower payments if they are not meeting certain criteria, and could be cancelled in extreme cases of under-performance.[26] As yet, none of these business models or contracts have been tested in practice.[27]

Securing future financial returns

10. The Department established business models on which to base its support for each of the projects in the programme's Track 1.[28] These models set out how costs and risks are distributed between the government and the project.[29] The Department told us that it had separate business models for transport and storage, and then for different types of emitter, such as power.[30] It told us that its approach enabled it to bring in investors which were suitable for different parts of the programme and to allocate risks more effectively.[31] The Department also told us that the business models have been designed so a project is only paid once it is capturing carbon which is then stored. [32]

11. Looking to the future, the Department told us it wants to move the balance of risk away from the government as the market for CCUS evolves.[33] The Department's current assessment is that, because projects are first-of-a-kind, there is an inherent risk [of failure] which the market will not take on and therefore its support is appropriate.[34] The Department wants to move away from projects financially backed by the government.[35] It wants to establish what it describes as a self-sustaining "...commercial and competitive market..." for CCUS from 2035.[36]

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24 C&AG's Report, para 18
25 Qq 15–16
26 Q 27
27 Q 56
28 C&AG's Report, para 2.2 and Figure 6
29 C&AG's Report, para 2.2 and Figure 6
30 Q 12
31 Q 12
32 Q 27
33 Q 74
34 C&AG's Report, para 3.17
35 C&AG's Report, para 3.17
36 Q 74; C&AG's Report, para 3.17

12. We asked the Department whether its business models allow for the government to take a share of any profit a project makes if the programme is successful.[37] But the Department could not provide a compelling answer.[38] Now that the Department has signed its first two contracts for carbon capture and storage, this will produce an "incredibly better investment" scenario for the private sector in the second tranche, which should encourage the Department to think about, for example, profit shares and equity stakes.[39] HM Treasury hopes that the government agreeing support for projects in the programme's Track 1 will provide industry with confidence over the government's long term commitment to CCUS.[40] The Department told us that it would be "looking very carefully at the economics of the developers and the investors, including what benefit they accrue from the projects…".[41] The Department assured us "that [was] exactly the sort of thing [it] is considering in an open–minded way."[42]

Assessing the programme's affordability

13. In early October 2024, the government announced £21.7 billion of funding, over 25 years, to support the first five projects in Track 1 of its CCUS programme.[43] In early December 2024, the Department signed contracts with two projects in the East Coast Cluster – a power project (Net Zero Teesside) and a transport and storage company (Northern Endurance Partnership).[44] The Department told us the East Coast Cluster covered the largest region of emissions.[45]

14. The Department told us it expects around three quarters of the allocation of financial support of almost £22 billion will be from levies on consumers (such as those using power generated by the Net Zero Teesside project).[46] The remaining 25% will come from the Exchequer.[47] However, the Department does not yet know the precise balance of funding between the consumer and taxpayer as this will depend on the final terms of the contracts it signs with projects.[48] And uncertainty remains around the funding available

37 Q 72
38 Q 73
39 Q 74
40 C&AG's Report, para 3.16
41 Qq 73
42 Qq 73
43 Qq 1, 17
44 Q 1
45 Q 1
46 Q 17
47 Q 17
48 Q 17

for future stages of the CCUS programme.[49] Regardless of whether the programme is taxpayer or consumer funded, the cost of the programmes is "a cost to the country".[50]

15. The Department and HM Treasury have acknowledged that further funding will be required for the programme's later stages, such as Track 1 expansion and Track 2 (which includes two more clusters).[51] The Department told us that it is in "detailed discussion and dialogue with the projects involved in the core of Track 1, the Track 1 expansion, the other projects in the East Coast cluster and Track 2." [52]

16. The Department referred us to recent work from National Energy System Operator [NESO] on decarbonising the power system.[53] It told us that NESO's report, which concluded that CCUS was one of two pathways to a low-cost energy system, highlighted that the lowest cost system will include the use of dispatchable low-carbon power generation such as power CCUS.[54] CCUS did not feature in the other pathway.[55] The Department told us that NESO's analysis showed that low carbon dispatchable power, such as power CCUS, could lead to lower cost for the power sector than a system just based on renewables.[56] But NESO's report also concluded that CCUS-enabled gas would require more upfront financial support.[57]

49 C&AG's Report, para 14
50 Q 21
51 C&AG's Report, para 3.16
52 Q 58
53 Q 21
54 Q 21
55 Q 21
56 Q 43
57 National Energy System Operator, Clean Power 2030: Advice on achieving clean power for Great Britain by 2030, November 2024.

2 Adapting the programme over time

Downgrading ambitions

17. The Department began developing its current approach to CCUS in 2018, following two previous failures.[58] The Climate Change Committee, which advises government on how best to meet its decarbonisation goals, considers CCUS to be essential for the UK to meet its legally binding climate ambitions, in Carbon Budget 6 (which covers 2033–37) and to achieve net zero by 2050.[59] In October 2021, the Department set its ambitions for the CCUS programme based on its own assessment of how to meet these goals: to have two carbon capture clusters operational by the mid-2020s and four operational by 2030; for these clusters to capture 20–30 mtpa of carbon by 2030; to have at least one power station with CCUS running by 2030; and to capture at least 5 mtpa of carbon through engineered greenhouse gas removals by 2030.[60]

18. However, the Department has made slow progress in getting the first tranche of projects running. It had initially hoped to sign contracts with the first carbon capture projects in the second quarter of 2022, but this has been repeatedly pushed back.[61] It also scaled down its ambitions for the first wave of projects. In the summer of 2022, it considered the scale of storage required for HyNet and East Coast (the 'Track 1' clusters) and initially settled on the larger option of 15.5 mtpa as this was aligned with its 2030 targets. However, it subsequently reversed this decision and the eight Track 1 projects it short-listed in March 2023 would only capture a total of 4.9 mtpa.[62]

19. In the latter part of 2024, the Department successfully concluded negotiations with two of the Track 1 projects. In December 2024, the Department announced it had signed contracts with the first two projects at East Coast Cluster: Net Zero Teesside (a gas-fired power station with

58 C&AG's Report, para 1.5 and Figure 2
59 C&AG's Report, para 1.8
60 C&AG's Report, para 1.7; HM Government, Net Zero Strategy: Build Back Greener, October 2021, pages 21 and 28.
61 C&AG's Report, para 2.15
62 C&AG's Report, para 2.8 – 2.10

CCUS); and Northern Endurance Partnership (the transport and storage company for the East Coast Cluster).[63] Shortly before our evidence session, the Department stated that it no longer considered its target of capturing 20–30 mtpa of CO2 for 2030 achievable.[64] The Department told us it will set out its revised ambitions for the future of CCUS in its Carbon Budget Delivery Plan, due for publication in spring 2025.[65]

Challenging assumptions

20. When selecting which clusters to proceed with and which projects to select within each cluster, the Department assessed value for money against five criteria: deliverability; economic benefits; costs; carbon savings; and learning. Once the shortlist of Track 1 projects had been reached, the Department conducted a full value for money assessment, following Green Book guidance.[66] In terms of assessing the first-of-a-kind risks, the Department told us that it completed a technical assessment on all the projects and that these were subject to several Gateway Review stages.[67] While we understand that the Department has designed its business models with the intention that payments are only made once projects are operational and meeting certain parameters, this does not mitigate the risk that the project should not have been supported in the first place[68]

21. The Department recognised that there are some "contested views" concerning, for example, the effectiveness of CCUS in reducing emissions from gas-fired power stations.[69] We received written evidence suggesting that there are higher levels of methane (a gas with significant greenhouse effects) leakage throughout the supply chain for liquified natural gas (LNG) than previously thought. Given that the UK's LNG production is winding down, more LNG is likely to be imported from countries like the USA, lengthening the supply chain and worsening the risk of leakage. Methane leakage during production and transportation of LNG are 'upstream emissions' that will not be addressed by CCUS and might have a greater climate impact than the actual burning of the gas at a power station.[70] The Department told us that there are contested views in this space and

63 Contracts signed for UK's first carbon capture projects in Teesside – GOV.UK
64 Letter from Minister of State for Industry dated 11 December 2024; and Letter from DESNZ to PAC dated 21 January 2025.
65 Q 7
66 Q 24
67 Q 25
68 Q 27
69 Q 4
70 CCUS0018

that issues such as methane leakage will need to be looked at through the broader perspective of Carbon Budgets, rather than through the CCUS programme.[71]

22. The original 2030 targets for the CCUS programme, which the government has now told us are unachievable, included a goal for the UK to achieve 5 mtpa of engineered greenhouse gas removals. The bulk of this was expected to be achieved by applying CCUS technology to a biomass energy plant (a process known as BECCS).[72] There are no BECCS projects included in Track 1, but the Department told us that it remained under consideration for its future plans.[73] Ofgem administers the existing government support for large biomass generators, including overseeing an assurance regime intended to ensure that they only burn sustainably sourced biomass.[74] However, an Ofgem investigation into Drax, which had received £6.5 billion in public funding between 2002 and 2023 and is by far the largest biomass plant in the country, found in August 2024 that there was an absence of adequate data governance and controls in place that had contributed to, amongst other things, to Drax being unable to support the reliability of its profiling data reporting of forestry type and sawlogs for Canadian consignments.[75] Earlier in 2024, a National Audit Office report on the government's support for biomass concluded, more broadly, that the government could not demonstrate that its current arrangements were adequate to give it confidence industry was meeting sustainability requirements.[76] If not all of the materials used were meeting the government's own sustainability standards this would be unacceptable. We also received written evidence suggesting that the application of carbon capture technology to biomass power generation is effectively untested on a commercial scale, as all real–world experience to date has been on coal–fired stations, which are substantively different.[77] We also note the issues caused by international accounting principles for carbon emissions. If materials are exported from another country, it is that country that has to report the emissions. The absurdity of this is if the UK sources were being used at Drax, all of the carbon emissions would have to be reported under UK emissions. Equally if we had sufficient timber, and the UK exported the same amount of pellets to the USA/Canada and they burnt them, the UK would have to report those emissions.

71 Qq 4–5
72 C&AG's Report, para 23
73 Q 31
74 Q 34
75 C&AG's Report, The government's support for biomass, Session 2023–24, HC 358, 24 January 2024; Ofgem Decision: investigation into Drax Power Limited | Ofgem
76 C&AG's Report, The government's support for biomass, Session 2023–24, HC 358, 24 January 2024
77 CCUS0023

Targeting the right sectors

23. At present, CCUS technology is the only way to decarbonise industries that generate emissions from physical or chemical processes, rather than from the combustion of fuels. For example, 60 to 70% of emissions from the cement industry come from chemical reactions during production.[78] We received written evidence stating that while there are currently no operational cement plants using CCUS anywhere in the world, there is a commercial–scale plant currently under construction in Norway.[79]

24. In other sectors, there are viable methods to decarbonise that do not require CCUS. For example, the Department told us that CCUS could play a particularly important role in power generation.[80] However, there are other ways that the UK could decarbonise the power sector. A recent report by the National Energy System Operator (NESO) identified an alternative pathway to achieving clean power by 2030 that involved "no new dispatchable power from hydrogen or gas with CCS".[81] The Department told us that it would shortly be publishing an action plan in response to the NESO report and noted that the report identified the pathway with new dispatchable power as offering lower overall costs.[82]

25. The Department's approach to date has been focused on rolling out CCUS to geographical clusters. The Department told us that its cluster–based approach makes sense in terms of cost–efficiency as fewer and shorter pipelines need to be built and because there will be multiple emitters at each cluster that can use the same transportation and storage infrastructure.[83] To support this approach, the Department has focused on developing business models to support the deployment of CCUS in a range of sectors: heavy industry; in the production of blue hydrogen; in the waste sector (such as producing energy from waste); on power generation; for greenhouse gas removals; and BECCS.[84]

26. However, there is no guarantee that the industries most in need of CCUS will be located in a geographical cluster.[85] A cement plant was short–listed for Track 1 in March 2023, but as yet government has not agreed terms with it.[86] The Department told us that it was aware of a proposed cluster in

78 Qq 20 and 46 and C&AG's Report, para 1.4
79 CCUS0003
80 Q 46
81 National Energy System Operator, Clean Power 2030: Advice on achieving clean power for Great Britain by 2030, November 2024.
82 Qq 21–23
83 Qq 12 and 39
84 Qq 71–72 and C&AG's Report, Figure 7.
85 Q 39
86 Q 73 and Cluster sequencing Phase–2: Track–1 project negotiation list, March 2023 – GOV.UK

the Peak District that would allow CCUS to be applied to cement production, but that this was not included in Track 1 or Track 2.[87] The Department refers to emitters outside clusters as 'dispersed sites'.[88] Dispersed sites are not well–suited to using pipelines to transport captured carbon and would instead need to be transported by rail or road.[89] The Department has yet to decide how it will support the deployment of CCUS at these sites and is consulting with industry.[90]

87 Q 49
88 C&AG's Report, para 1.6
89 Qq 39 and 41
90 C&AG's Report, para 3.17

Formal minutes

Thursday 30 January 2025

Members present

Sir Geoffrey Clifton-Brown, in the Chair

Mr Clive Betts

Mr Luke Charters

Anna Dixon

Rachel Gilmour

Sarah Hall

Carbon Capture, Usage and Storage

Draft Report (*Carbon Capture, Usage and Storage*), proposed by the Chair, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 26 read and agreed to.

Summary agreed to.

Introduction agreed to.

Conclusions and recommendations agreed to.

Resolved, That the Report be the Eighth Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available (Standing Order No. 134).

Adjournment

Adjourned till Monday 3 February at 3.00 p.m.

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee's website.

Thursday 12 December 2024

Jeremy Pocklington CB, Permanent Secretary, Department for Energy Security and Net Zero; **Ashley Ibbett**, Director General, Energy Infrastructure, Department for Energy Security and Net Zero; **Paro Konar**, Director for Hydrogen and Industrial Carbon Capture, Department for Energy Security and Net Zero; **Steve Field**, Director Climate, Energy & Environment, HM Treasury	Q1–81

Published written evidence

The following written evidence was received and can be viewed on the inquiry publications page of the Committee's website.

CCUS numbers are generated by the evidence processing system and so may not be complete.

1	Armstrong, Lindsay–Marie (Professor in Decarbonised Industrial Systems within the Faculty of Engineering and Physical Sciences at the University of Southampton); Compton, Grace (Policy Officer for the Sustainability and Resilience Institute at the University of Southampton); Donnison, Caspar (Postdoctoral research – Previously worked at University of Southampton and the University of California); and Vakili, Seyedvahid (Postdoctoral research at the University of Southampton)	CCUS0032
2	Allen, Dr Myles (Head of Atmospheric, Oceanic and Planetary Physics, Department of Physics, University of Oxford); Ardiff, Rachel (Policy and Research Officer; Research Associate, Carbon Balance Initiative; Oxford Net Zero, University of Oxford); Boot, Mirte (Co-founder and Director; Research Associate, Carbon Balance Initiative; Oxford Net Zero, University of Oxford); Jenkins, Dr Stuart (Research Fellow, Net Zero for the Fossil Fuel Sector, Oxford Net Zero, University of Oxford) and Sundvor, Ingrid (Co-founder and Director; Research Associate, Carbon Balance Initiative; Oxford Net Zero, University of Oxford)	CCUS0027
3	Achillea Beauty	CCUS0002
4	Biofuelwatch	CCUS0023
5	Carbon Tracker Initiative	CCUS0003
6	Climate Emergency Planning and Policy	CCUS0018
7	Fuels Industry UK	CCUS0015
8	Green Alliance	CCUS0010
9	Hewitt, James	CCUS0007
10	Hunn, Nick (CTO, WiFore Consultancy Ltd)	CCUS0021
11	Hydrogen UK	CCUS0029

12	Just Transition Wakefield	CCUS0014
13	Lindsay, Lauren	CCUS0001
14	MP Watch	CCUS0022
15	Maitland, Professor Geoffrey (Professor of Energy Engineering, Imperial College London (Department of Chemical Engineering))	CCUS0016
16	Mineral Products Association	CCUS0004
17	NRDC; Southern Environmental Law Center; Biofuelwatch; Stand.earth; and Dogwood Alliance	CCUS0009
18	Oil Change International	CCUS0012
19	Plymouth Marine Laboratory	CCUS0006
20	RWE	CCUS0025
21	Resource Recovery UK	CCUS0019
22	Richter, Dr Katharina (Lecturer in Climate Change, Politics and Society, University of Bristol)	CCUS0031
23	Robottom, Ellen	CCUS0028
24	SCI – Society of Chemical Industry	CCUS0026
25	Spirit Energy; and Progressive Energy Ltd on behalf of Peak Cluster	CCUS0008
26	Tees Valley Industrial Netzero Leadership Group; and NEPIC – North East Process Industry Cluster	CCUS0017
27	The Carbon Capture and Storage Association (CCSA)	CCUS0030
28	The National Interdisciplinary Centre for Circular Chemical Economy	CCUS0013
29	Waller, Dr. Alexander (Visiting Professor, American University of Sovereign Nations)	CCUS0005
30	Watson, Professor Jim (Professor of Energy Policy, UCL Institute for Sustainable Resources)	CCUS0033

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the publications page of the Committee's website.

Session 2024–25

Number	Title	Reference
7th	Asylum accommodation: Home Office acquisition of former HMP Northeye	HC 361
6th	DWP Customer Service and Accounts 2023-24	HC 354
5th	NHS financial sustainability	HC 350
4th	Tackling homelessness	HC 352
3rd	HMRC Customer Service and Accounts	HC 347
2nd	Condition and maintenance of Local Roads in England	HC 349
1st	Support for children and young people with special educational needs	HC 353