Department for Energy Security & Net Zero

Department for Business & Trade

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Our ref: MCB2024/14457

10 February 2025

Dear Claire and co-signatories,

Thank you for your letter of 11 September to the Secretary of State, regarding Carbon Capture, Usage and Storage (CCUS), Track 1 investment decisions, CCUS-based blue hydrogen and the importance of decarbonising the UK's power supply and industrial processes. I am responding as this matter falls under my Ministerial portfolio. I apologise for the significant delay in response.

Owing to ongoing legal proceedings related to the award of a Development Consent Order to Northern Endurance Partnership and Net Zero Teesside, I will not comment on issues related to that litigation at this time.

Analysis by my Department and the independent Climate Change Committee (CCC) confirms that CCUS-enabled hydrogen will provide a reliable pathway for large-scale hydrogen generation as we work to achieve our Carbon Budgets and our legally binding net zero commitment. CCUS-enabled hydrogen production plants currently offer the largest individual hydrogen production capacities of any projects in the UK pipeline, with the ability to produce large volumes at consistent baseload from the mid-2020s onwards. The hydrogen produced can decarbonise important industrial sectors and ensure the UK's hydrogen transport and storage infrastructure develops at pace. While electrolytic 'green' hydrogen from renewable sources can provide near-zero emission hydrogen production, it is not yet available at scale. The Government is focused on deploying CCUS technologies to ensure that CCUS-enabled 'blue' hydrogen can serve as a critical enabler in the transition to a net zero energy system.

Analysis by both my Department and the CCC supports the significant role that gas-fired power stations equipped with CCUS ("power CCUS") will likely play in our future energy system with the CCC in their sixth carbon budget report estimating that 30 TWh of generation could come from power CCUS by 2035. Power CCUS can provide non-weather dependent, dispatchable low carbon generation. We consider this to be vital alongside system flexibility and energy storage to support the rapid deployment of renewables to 2030 and beyond. The Dispatchable Power Agreement, the business model that will support the deployment of Power CCUS, has been developed to enable power CCUS plants to play a valuable mid-merit role in our generation mix, dispatching behind intermittent renewables but ahead of unabated gas generation. This ensures that power CCUS will not displace lower

carbon alternatives and only operates when necessary to meet demand and provide system stability in order to ensure security of supply.
I have set out below responses to the particular concerns raised in your letter.

Upstream and Methane Emissions

The Low Carbon Hydrogen Standard (LCHS) was developed to ensure hydrogen production contributes to our Greenhouse Gas (GHG) emission reduction targets under the Climate Change Act. Projects seeking support through the Net Zero Hydrogen Fund (NZHF) and the Hydrogen Production Business Model (HPBM) are assessed in respect of LCHS compliance and the HPBM revenue support contracts include LCHS compliance requirements.

The Global Warming Potential (GWP) 100 methodology used in the LCHS is in line with the methodological approach taken in the United Nations Framework Convention on Climate Change (UNFCCC). As new versions of the standard are published, we will consider best practice and common methodologies at the time.

In terms of international action, the UK is a member of the Global Methane Pledge, to collectively reduce global methane emissions by at least 30% by 2030 compared to 2020 levels. This was launched at COP26, and the UK was one of the first countries to sign up. We have a strong track record on methane emissions in our domestic energy sector - the methane intensity of our upstream production is estimated at 0.15%, one of the lowest globally. We therefore share technical expertise and best practice internationally on reducing methane emissions from oil and gas operations and have provided funding for the International Energy Agency to support developing countries with this work.

Hydrogen Leakage

The UK has been at the forefront of research into the GWP of hydrogen, publishing early-stage research on the atmospheric implications of increased hydrogen use in April 2022, alongside publication of the first LCHS.

My Department continues to work closely with the Natural Environment Research Council, Department for Environment, Food & Rural Affairs and the Environment Agency to understand environmental and climate concerns associated with hydrogen and we are also assessing the suitability of existing regulation to protect the environment. This includes commissioning research into the indirect GWP of hydrogen and assessing the subsequent need to mitigate fugitive emissions and leakage of hydrogen. Work is also underway with UK specialists and the National Physical Laboratory (NPL) to develop methods of estimating fugitive emissions, identify their impacts and increase our capability to find, measure and quantify hydrogen emissions.

As a condition of LCHS compliance, projects are required to produce a fugitive hydrogen emission risk reduction plan which must be reported on an annual basis. The plan should capture the sources of hydrogen leakages, estimated volumes and mitigating actions which will be enacted to minimise the leakages. As the evidence around the GWP of hydrogen is developed and best practice for minimising leakages including detection technologies advances, the position on fugitive emissions in the LCHS will evolve. Our current and ongoing efforts aim to ensure the sustainability of hydrogen production and continued alignment with the UK's wider decarbonisation goals.

We are currently developing assessment processes for the Hydrogen Transport and Storage Business Models and are considering including an assessment of projects' plans to avoid, mitigate and monitor hydrogen leakage.

CCUS Track Record

Carbon capture is a safe technology and geological CO_2 storage is a proven technology that has been in operation globally for decades. For example, Norway has been geologically storing CO_2 since 1996, with over 20 million tonnes of CO_2 stored so far. As of November 2023, 41 CCS facilities are in operation globally, capturing 49 Mtpa of CO_2. A further 26 CCS enabled facilities are currently under construction, with another 325 in development. The global development of CCUS is an accelerating industry, and 198 new CCS facilities have been added to the project pipeline since November 2022.

The Environment Agency has published guidance for operators of natural gas fueled power generation plants with post combustion CO_2 capture for use when preparing their applications for an environmental permit. More information is available at: Post-combustion carbon dioxide capture: emerging techniques Environment Agency (2024). This recognises that capturing at least 95% of CO2 in flue gas during normal operation is considered Best Available Techniques. This document is underpinned by an evidence review prepared by the UKCCSRC. More information is available at: ukccsrc.ac.uk/best-available-technology-bat-information-for-ccs/ Gibbins, J., Lucquiaud, M. and Samson, A. (2024). Citing examples of high capture rates from a range of pilot plants operating internationally.

Storage and Transport Leakage

Carbon capture is underpinned by a strong regulatory framework to mitigate any potential risks associated with transporting and storing CO_2. There have been no recorded leaks to the seabed from either the Snøhvit or Sleipner projects. At Sleipner, CO_2 migration was entirely contained within the storage complex. More information is available at: Sleipner 26 years: how well-established subsurface monitoring work processes have contributed to successful offshore CO2 injection. Furre et al. (2024) Geoenergy v.2.

At Snøhvit capacities are less than originally planned for, but the operator has subsequently undertaken measures to increase capacity. Both projects have been in operation for decades and were first of a kind geological CO_2 storage projects, which have provided invaluable insight into the behaviour of CO_2 in the subsurface.

In 2023, the former Department for Business, Energy and Industrial Strategy commissioned a group of independent experts to provide a synthesis and estimation of the containment certainty of CO_2 in deep geological storage sites, including leak rates, probabilities and durations. This identifies that over the whole life of a store, including post closure, the overall worst-case leakage would be <0.1% of the overall injected CO_2; which in most cases could be remediated due to the requirement for robust monitoring and mitigation plans. While the risks will vary on a site-specific basis, the report indicates a very high level of confidence in the long-term security of CO_2. More information is available at: Deep geological storage of carbon dioxide (CO2), offshore UK: containment certainty'[1] Department for Business, Energy & Industrial Strategy (2023).

Health and Safety and Environment

The Government is working with a range of Departments, regulators, and other public bodies to ensure the UK's regulatory environment is well placed to support the deployment of CCUS. Health and Safety Executive is responsible for regulating the health and safety of CCUS operations, both on and offshore.

The UK has an established regulatory regime in place to protect human health and the environment, with the Environment Agency (EA), Natural Resources Wales (NRW), Scottish Environment Protection Agency (SEPA), Northern Ireland Environment Agency (NIEA), Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) and the Marine Management Organisation exercising functions relevant to the environmental impacts of CCUS projects. Statutory Nature Conservations Bodies are also consulted as part of the environmental assessment process in consenting to a project. UK Regulators have been working with the UK Carbon Capture and Storage Research Centre (UKCCSRC), Carbon

Capture and Storage Association (CCSA), and other stakeholders to develop Guidance for Emerging Techniques.

CCUS projects are aware of their obligation to comply with the UK regulatory framework, including health and safety, environment, and planning. Existing Health and Safety legislation regulates the safety of the CCUS process chain. All CCUS operators have duties under The Health and Safety at Work etc. Act 1974 (HSWA) to manage safety risks to both employees and the public, and HSE is engaging with potential operators of CCUS operations to ensure that risks will be appropriately managed. In addition, the department is working with the EA on understanding the regional cluster impact of new CCUS infrastructure. This work is ongoing and an intermediate report is published with focus on the Humber region: www.gov.uk/government/publications/environmental-capacity-for-industrial-clusters.

The Government also recognises the need to develop current policy to include new green technologies. Regulators are continuing to assess potential safety risks associated with CCUS operations and will consider any regulatory amendments that may be appropriate. HSE is also involved in a joint industry project looking at the challenges of safe operation of CO_2 pipelines that will help inform future regulatory decisions. This project focuses on understanding and mitigating potential risks around the transport of CO2 in pipelines including emergency response and the importance of weather and geographical conditions.

Monitoring and Enforcement

A CO_2 storage site licensed by the North Sea Transition Authority (NSTA) will only be granted a storage permit if the NSTA is satisfied that, under the proposed conditions of use of the storage site, there is no significant risk of leakage or harm to the environment or human health. As part of the CO_2 store permitting NSTA will require store operators to have Monitoring and Corrective Measures Plans in place. More information is available at: Guidance on Applications for a Carbon Storage Permit North Sea Transition Authority (2023). This consideration will include the suitability of the proposed monitoring plan which will include monitoring during the operational lifetime of the project (during injection period). There must also be a post closure plan, including monitoring, for the post-closure period (expected to be 20 years) once operations have ceased. The post-closure period can be extended depending on circumstances.

Better Alternatives for Investment

As you know, making Britain a clean energy superpower is one of the five missions of this Government — delivering clean power by 2030 and accelerating to net zero across the economy. To support this mission, the Government has already taken immediate steps to secure more home-grown renewable energy – overturning the de facto onshore wind ban and kickstarting the solar rooftop revolution. However, it is essential that we maintain a diverse mix of technologies, including low carbon flexible power, to support renewables and maintain a secure supply when the wind does not blow, and the sun does not shine.

Thank you again for your letter and your engagement on these points. The CCC is clear on the importance of these technologies and the role they play in achieving net zero and we do not intend to delay our investment decision on Track 1 CCUS projects.

Our mission to make Britain a clean energy superpower with zero carbon electricity by 2030 and accelerating our journey to net zero will bring much needed focus to the delivery of the infrastructure needed to enable it, from grid infrastructure to warmer homes and lifting people out of fuel poverty.

Very best wishes,

SARAH JONES MP
Minister of State for Industry
Department for Energy Security & Net Zero and
the Department for Business and Trade