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Response to: BEIS Business Models for Carbon Capture, Usage and Storage consultation

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Uniper

Uniper is an international energy company with around 12,000 employees and operations in 40 countries. In the UK, Uniper operates a flexible and diverse generation portfolio, sufficient to power around six million homes. With our seven-strong fleet of power stations and our flexible, fast-cycle gas storage facility, we support the energy transition and make a tangible contribution to Britain's energy supply security.

Uniper also offers a broad range of commercial activities through its Engineering Services division, while the well-established Uniper Engineering Academy delivers high-quality technical training and government-accredited apprenticeship programmes for the utility, manufacturing and heavy industry sectors, at its purpose-built facilities near Nottingham.

We have addressed each of the questions in turn below. Our views in summary:

- The dispatchable CfD business model is better suited to the flexible operation expected from power stations in the future low carbon, high renewable, generation mix.

- A dispatchable CfD business model for the power sector should be technology neutral and competitively tendered, enabling pre and post combustion capture and hydrogen turbines to compete, so that the lowest cost solutions are successful.

- Power-to-gas technology has positive effects for the whole system integration of renewable power, it is proven and ready to deploy now. Electrolysis hydrogen production business models should be developed in conjunction with CCUS dependent hydrogen production methods to allow the technologies to compete.

- Business models for CCUS and hydrogen are dependent on scalable demand in the industry, heat and transport sectors. Growing these markets is an essential component of the CCUS and hydrogen business models. To achieve this a market framework for hydrogen needs to be developed.

Overarching questions

1. Have we identified the right parameters to guide the development of CCUS business models?

We agree with the parameters set out in the consultation.

2. Bearing in mind our emerging findings on CCUS business models, do you have any views at this stage on how the business models might be integrated?

Separating out the transport and storage activity seems sensible in order to better manage full chain risks and enable the activity to access lower cost finance through a RAB model. The RAB model for network activities has a proven track record in the electricity and gas networks. A network RAB model could also have similar characteristics to comparable networks by allowing multiple users to utilise the network and enabling appropriate investment in capacity to support anticipated future use.

From the analysis accompanying the consultation, a dispatchable CfD for power seems to be the most suitable model, although further work is required on the detail of how this business model will be integrated alongside the capacity market, energy wholesale, flexibility and balancing markets. For example, whether investment in a power station life extension project is delivered through the dispatchable CfD or the Capacity Market. How the dispatchable CfD sits alongside these other markets as conventional generation transitions to lower carbon alternatives needs to be assessed.

A dispatchable CfD business model for the power sector should be technology neutral, enabling pre and post combustion capture and hydrogen turbines to compete for a contract. Competition for a CfD should also support cost reduction. As the dispatchable CfD allows for recovery of the transport and storage fee this also creates a direct link between the power sector and enables the separate regulated transport and storage activity.

Business models for CCUS and hydrogen are dependent on scalable demand in the industry heat and transport sectors. Growing these markets is an essential component of the CCUS and hydrogen business models. To achieve this a market framework for hydrogen needs to be developed. For some sectors, an initial obligation approach with tradeable certificates with differential pricing that rewards low carbon gas could support investment in production facilities. Increasing the ambition in the Renewable Transport Fuel Obligation (RTFO) may support deployment for low carbon hydrogen production in refineries.

An advantage of electrolysis-based hydrogen production is related to its positive effects on the whole system integration of renewable power. With the need to grow renewable power identified in the Committee on Climate Change's Net Zero report, the use of electrolysis production could offset the potential need to constrain wind generation, as well as allow for the seasonal storage of hydrogen for use in the power, heat, transport and industrial sectors. A way needs to be found to bring power-to-gas technology to market alongside gas reformation technologies for hydrogen production if the 2050 target is to be met. Power-to-gas technology is proven and ready to deploy now. Electrolysis hydrogen production business models should be developed in conjunction with CCUS dependent hydrogen production methods to allow the technologies to compete.

CCUS-specific risks

3. Do you have proposals to mitigate CCUS-specific risks?

We agree with the assessment of the long-term storage liability and leakage risk. There is a role for Government on this aspect until such time as cost effective insurance products are available. Nonetheless, the risk of leakage could significantly be reduced if carbon would be stored in solid form (i.e. carbon black).

4. Are there any other CCUS-specific risks that need to be considered? If so, what are your proposals for mitigating them?

We have not identified any other CCUS-specific risks.

Carbon dioxide transport and storage

5. Have we identified the most important challenges in considering the development of CO_2 networks?

Based on the analysis and research informing the consultation, yes.

6. Do you agree that a T&S fee is an important consideration for any CO_2 T&S network? In your view, what is the optimal approach to setting the T&S fee?

How an entity recovers its costs and makes a sufficient return for its investors is clearly an important consideration for the T&S activity. An optimal T&S fee will be one that enables the first investment in infrastructure that can be borne by the user of that infrastructure. Enabling subsequent cost sharing as new users of the network connect will spread the cost burden across multiple users. Depending on the form of the regulated asset base model it could be possible to consider alternative charging structures after an initial period, as the assets mature and the number of users of the network increase.

7. Of the models we have considered for CO_2 T&S, do you have a preference, and why?

Separating out the transport and storage activity seems sensible in order to remove full chain risks and enable the activity to access lower cost finance through a RAB model. The RAB model for what is essentially a network activity has a proven track record in the electricity and gas networks. A network RAB model could also have similar characteristics to comparable networks by allowing multiple users to utilise the network and enabling appropriate investment in capacity to support anticipated future use.

8. Are there any models that we have not considered in this consultation which you think should be taken forward for CO_2 T&S, and why?

We have not identified any additional models for the transport and storage activity.

Power CCUS

9. Have we identified the most important challenges in considering the development of CCUS power projects?

We agree with the challenges outlined in the consultation. Providing for a single mechanism that allows all low carbon power station technologies to compete against each other should enable the most cost effective solutions to emerge. Whilst government should set the outcomes it wants to achieve and the most cost effective route to achieving this, it should then let the market come forward with the best solutions.

How any future CCUS power business model is integrated alongside the existing market framework is key. Avoiding the introduction of any new, along with minimising, market distortions is important to investor confidence in the power sector. We agree with the objective of ensuring that as much revenue as possible should come from the wholesale market alongside any new funding model.

10. Of the models we have considered for power CCUS, do you have a preference, and why?

The dispatchable CfD business model is better suited to the flexible operation expected from power stations over the life time of the assets in the future low carbon, high renewable, generation mix. A dispatchable CfD business model for the power sector should be technology neutral and competitively tendered, enabling pre and post combustion capture and hydrogen turbines to compete so that the lowest cost solutions are successful.

Further work is required on the detail of how this business model will be integrated alongside the capacity, energy wholesale, flexibility and balancing markets. For example, whether investment in a power station life extension project is delivered through the dispatchable CfD or the capacity market. How the dispatchable CfD sits alongside these other markets as conventional generation remains on the system whilst the power system transitions to lower carbon alternatives needs to be assessed, to ensure a managed transition.

A key component of the dispatchable CfD is the reference plant and its associated parameters. How these parameters are determined and set is an important consideration as each project is likely to have its own individual characteristics. It may be necessary to create a reference plant that reflects the full duration of the contract and performance characteristics of the reference plant over that time as the plant performance and market changes, rather than just a single snapshot at the time contracts are tendered.

We do not support the standard ‘baseload’ CfD as this does not reflect the anticipated future full life time flexible operation expected of back up power stations. The Cornwall Insight report accompanying the consultation suggests that in order to bring forward first investment in technology it may be necessary to award bilaterally negotiated contracts. We do not think that offering a single bilaterally negotiated arrangement would be the best way to build up investment in either CCUS enabled or hydrogen turbines as this closes the market and investment opportunity to specific providers. The absence of competition in this scenario could also lead to a higher cost solution being selected and paid for by the consumer. For example, the initial offshore wind CfD that were bilaterally negotiated were in the region of £30/MWh more expensive than the first

contracts awarded by competitive tender, that took place less than twelve months after the initial contracts were awarded.

The RAB model under consideration for new nuclear build is likely to introduce market distortions, as the guaranteed funding associated with a RAB model closes off any capacity and energy funded under this model from directly competing in the existing markets. If a RAB model is taken forward for new build nuclear then it should also be considered for funding new low carbon power stations to ensure that all technologies are competing on the same basis.

11. In your view, should any potential funding model(s) be applicable across all power CCUS technologies (including but not necessarily limited to CCGT with post-combustion capture, BECCS, and pre-combustion capture or hydrogen turbines)?

There should be a single competitive market based mechanism for funding power CCUS technologies. This enables technologies to compete on an equivalent basis for contracts, which minimises market distortions and the risk of less efficient outcomes. Of the options considered in the consultation the dispatchable CfD seems to be the most appropriate for power.

12. Are there any models that we have not considered in this consultation which you think should be taken forward for power CCUS, and why?

We have not identified any alternative models for the power sector.

Industrial CCUS

13. Have we considered the most important challenges in considering the development of CCUS for industry?

As outlined in the consultation, yes.

14. Of the models we have considered for industry CCUS, do you have a preference, and why?

We do not have a preference, but we think it is important that government looks at creating a market framework to create the need for low carbon input fuels in to industry, in particular low carbon hydrogen production.

As the business models for CCUS and hydrogen are dependent on scalable demand in the industry, heat and transport sectors. Growing these markets is an essential component of the CCUS and hydrogen business models. For some sectors, an initial obligation approach with tradeable certificates with differential pricing that rewards low carbon gas could support investment in production facilities. Increasing the ambition in the RTFO may support deployment for low carbon hydrogen production in refineries.

15. Are there any other models that we have not considered in this consultation which you think should be taken forward for industry CCUS, and why?

We have not identified any additional business models for industrial CCUS.

16. In your view, are there any models which best work across all industrial sectors where CCUS could have a role to play?

We do not have a view on which model may work best, however we would note that in the case of the CfD model explored, it would be a perverse incentive if the CfD was remunerated purely on the basis of the amount of CO2 offset. A better measure would be the amount of CO2 offset in the output from the industrial process, so that it is production output measure based.

17. What actions should Government and industry take to establish demand for low-carbon industrial products?

We do not have a particular view in answer to this question, however we think there is a need to establish markets that require low carbon input fuels, such as hydrogen, in the heat and transport sectors.

CCUS for hydrogen production

18. Do you agree that a future business model should focus on hydrogen production costs? If not, what are the benefits of considering other parts of the hydrogen value chain in the next phase of our work?

Reducing hydrogen production costs is a key aspect. Seeking to reduce capital costs is one element, however looking at ways that operating costs can be reduced is also an important consideration to enabling a hydrogen production business model.

Hydrogen needs a market framework that provides a premium for low carbon hydrogen production and incentivises demand in the industry, heat and transport sectors, once proven as an acceptable fuel. One possibility could be an obligation based approach with tradeable certificates with differential pricing for lower carbon forms of production to enable initial investment, as the Renewables Obligation did for the wind sector. The idea being that initial subsidy is required to build a production industry that can then morph toward a subsidy free market. Increasing the ambition in the RTFO may support deployment for low carbon hydrogen production in refineries.

As part of this we want to see the business model for power-to-gas being developed alongside the one for gas reformation and/or gas splitting with CCUS (CO2 or carbon black). An obligation based market could be technology neutral and allow different technologies to compete on their merits.

19. Do you have views on whether the model should seek to support both CCUS-enabled hydrogen production and renewable production methods? If so, how might this work?

Power-to-gas technology is proven and ready to deploy now. Electrolysis-based hydrogen production business models should be developed in parallel with business models deploying technologies to decarbonise natural gas (e.g. gas reformation or gas splitting) for hydrogen production. Technology neutrality is in our view one crucial building block for the development of a competitive and cost effective hydrogen business.

In the timescales being considered for wider role out of hydrogen use from 2030, it is not fully clear now which technology might be the most cost effective way for hydrogen production in the long run. Even though we see a wider range of technological options

evolving within the next years we belief that power-to-gas technologies could be competitive to gas reformation and/or gas splitting technologies with CCS in the long-run. However, one precondition for a wider deployment of electrolysis-based hydrogen production is a significant increase in renewables-based power generation. With various sectors (e-mobility in transport, renewable power for heating, renewable power for industry, etc.) competing for renewables-based power generation, competitiveness of electrolysis-based hydrogen production depends on low-cost renewable power availability. This is why technology neutrality is crucial for the future development of a hydrogen business especially in the mid-term.

One additional advantage of electrolysis-based hydrogen production is related to its positive effects on the whole system integration of renewable power. With the need to grow renewable power identified in the Committee on Climate Change's Net Zero report, the use of electrolysis production could offset the potential need to constrain wind generation, as well as allow for the seasonal storage of hydrogen for use in the power, heat, transport and industrial sectors.

20. Have we identified the most important challenges in considering the development of a business model for hydrogen production?

We agree with the considerations set out in the consultation.

21. What reflections do you have on the approaches we have identified to address the main challenges in designing the model?

The role of carbon pricing in incentivising behaviour and potentially growing markets for hydrogen use is an important consideration in its own right.

The volume of hydrogen required will depend to what extent it is used for peak heating requirements. In assessing where hydrogen may make the greatest contribution to decarbonisation goals, this should be considered alongside the expected heat road map in terms of deliverable heat decarbonisation.

22. Do you have views on which business models we should evaluate in the next phase of our work?

We do not have a view on a particular model at this stage, but would encourage government to consider both power-to-gas as well as natural gas-based technologies as part of its development of business models for hydrogen production. Considering the input costs to the operation of electrolysers as well as gas reforming and/or splitting, in particular electricity and natural gas costs, a review of the network charges and the levies and taxes when transferring energy from one sector to another may improve the commercial business case for hydrogen production.

Delivery capability

23. What capabilities are needed for the delivery of CCUS in the UK?

In our previous experience with CCUS developments, the UK has access to the capabilities needed to deliver CCUS infrastructure, particularly with its expertise in the oil and gas sector. The barrier to deployment has been an investable business model.