**REA Response: Non-pipeline transport and Cross-border CO2 networks – Call for Evidence.**

### **Who are you responding on behalf of, and what is your interest in this call for evidence?**

The Association for Renewable Energy & Clean Technology (REA) is pleased to submit this response to the above consultation. The REA represents a wide variety of organisations, including generators, project developers, fuel and power suppliers, investors, equipment producers and service providers. Members range in size from major multinationals to sole traders. There are over 500 corporate members of the REA, making it the largest renewable energy trade association in the UK.

### Of further relevance to this consultation, the REA has the largest number of bioenergy industry stakeholders with direct interest in delivering carbon capture and storage. This includes member forums directly involved in biomass power, energy from waste, anaerobic digestion, advanced conversion technologies, hydrogen and renewable transport fuels.

### **If you consent to members of the team reaching out for clarifications on responses provided, please provide contact details.**

### Mark Sommerfeld, Deputy Director of Policy, [msommerfeld@r-e-a.net](mailto:msommerfeld@r-e-a.net)

### **Do you give permission for your anonymised evidence to be shared with external advisors for the purpose of technical analysis?**

Yes.

### **View on the potential vision for the NPT sector**

**4. Please provide views on the potential long-term vision for the NPT sector.**

The REA fully support the need to ensure there is a feasible market for CO2 capture and storage with NPT. There are a number of differing sectors that will be required to capture CO2 and access long term geological storage. This is especially the case for industries including biomass power, biomass heat, anaerobic digestion, energy from wase and advanced conversion technologies (ACT), all of which the REA has dedicated member forums focused on.

There was a large focus on BECCS within the Governments Biomass Strategy 2023 and a requirement for industry to capture, utilise and store CO2. This will be the case for not only new projects where it is expected to be stipulated as part of future applications, but also retrofitted to existing projects. Such assets vary greatly in size and are located across the country, with many applications located well outside proposed CCS hubs. Their size also means that it is unlikely that their capture rates would be economical for pipeline connection. As such, facilitating the vision for non-pipeline transport as part of establishing the CCS market is expected to be essential if the UK is to meet its carbon capture targets, decarbonise key industries and realise the growth of this sector.

The consultation set out 3 phases as follows

1. Market creation phase until 2030
2. Market transition phase: 2030-2035
3. Self-sustaining market phase: 2035 onwards

We are supportive of this phased vision, although highlight that greater detail on delivery dates will be required and that realisation of this transition will be dependent on the speed at which government are able to make decisions on supportive policy. Government has already acknowledged that there is a need to support the nascent sector of CCUS and particularly issues in the supply chain that could impact on deployment and hence the inclusion and consultation under the GIGA fund ( <https://www.gov.uk/government/calls-for-evidence/green-industries-growth-accelerator-hydrogen-and-ccus-supply-chains>). Therefore, considerations on timescales needs to be coordinated with the speedy development of related policy (CBAM, CCUS business models, future biomethane Framework etc). The need will also increase as policies such as the UK ETS include more industries and as carbon accounting increases in scope.

The REA are also supportive of the vision’s recognition for the need for operational flexibility. The NPT capture market will need to be open to a wide range of capture opportunities, utilising different technologies at differing scales. Ensuring that the NPT market is designed to operate in a technology neutral fashion, without limiting the market or closing potential capture routes is essential. REA members highlight the range of capture technologies that could use NPT and stress that this is not only related to capture, but also the facilitation of carbon utilisation markets which may also see the permanent locking away of carbon. Unlike with pipelines that, by their nature will see carbon sent straight to storage facilities, NPT flexibility will allow assets to explore different end markets for their carbon.

Flexibility in NPT operation is also essential given the wide range of technologies that see potential for carbon capture. The anaerobic digestion and biogas market, given the purity of the CO2 stream, is already identified as a key growth market for carbon capture, with early adopters already leading the way. There can also be expected to be future innovation in a variety of industries where capture technologies with NPT may be used. For example, the integration of direct air capture with high carbon environments, such as organic composting sites, could be a further industry not yet fully explored or identified by government.

It is for this reason that we are also supportive of a vision that is proportional, and principles based. We agree with the focus in the vision to keep regulation of the sector to where it is needed (i.e. avoiding economic licensing) and ensuring that it keeps wider economic opportunities open, including cross boarder carbon trade and operational flexibility.

**5. Which regions and sectors of the economy will benefit most from NPT solutions unlocking CCUS? Which regions and sectors of the economy will continue to struggle to deploy CCUS? Should the government look to prioritise any particular regions or sectors of the economy for NPT?**

There are several differing sectors that will be required to capture CO2 and a large proportion of those sit outside of the existing planned clusters. Amongst the REA membership this includes a range of bioenergy members involved in developing carbon capture on existing assets that will rely on NPT. This includes:

* Small and medium scale biomass power, biomass heat or CHP sites, using a range of feedstocks including waste wood, wood pellets and energy crops.
* Anaerobic Digestion sites producing biogas and biomethane.
* Energy from waste, including advanced conversion technology sites.
* Nature based solutions, including organic recycling and composting
* Renewable Transport Fuel production.

Although the clusters will eventually expand, the rate of capture on distributed assets means it will likely never be economic to build dedicated pipelines to all assets. There is, therefore, a clear role for NPT. Given the distributed nature of these assets, Government should not focus on specific regional areas, as opposed to ensuring that NPT solutions work across the country from the start, with the market determining where it is most commercially viable.

Government should ensure that it has good understanding of the range of industries that have the potential to be able to capture CO2 and use NPT. This should also include possible storage facilities not currently utilised/earmarked under the industrial clusters and could be connected via NPT access to take the pressure off cluster storage facilities. This could include repurposed sites used for gas storage or formation of new strategic sites.

Once the strategic/technically assessment has been completed, an understanding of the types of transport routes (pipeline, vehicle, vessel) can be better understood. This could focus on those that may be most geographically disadvantaged, but also those that initially make the most significant impact to the evolution of the negative emission market.

Development of the NPT market should also have in mind the potential for carbon utilisation, where his takes place. NPT will likely also be used to take captured carbon to usage facilities, some of which will also include carbon being locked away for significant amounts of time or see carbon used in the production of fuels for hard-to-treat sectors (for example SAF and e-fuels). Given the inflexibility of pipelines, it is likely that a significant proportion of the carbon utilisation market will rely on NPT. Where appropriate, and aligned with broader storage principles, this should be encouraged and enabled.

Finally, focus should also be given to the infrastructure required to inject carbon into pipeline transport from sites that are not in the clusters. This will require stations that can received compressed liquified carbon into the pipeline network. Captured carbon will be transported, via NPT systems, to the nearest injection points, ability to do this will be dependent on the availability of relevant infrastructure in the pipeline system.

**NPT value chain data**

**Project Data**

**6. Please provide details of your potential NPT or cross-border solution. Please provide any information on the timing of the project through the initial phase and into the future, and the minimum viable project.**

As a trade association, and due to commercial sensitives, we are unable to provide specific details of projects but have encouraged members to engage with the consultation individually.

We, however, highlight that one of our biogas members, Future Biogas, as an early adopter of NPT, having committed to BECCS through the northern Light scheme as detailed here: <https://www.futurebiogas.com/beccs/>. Having been unable to join the UK based clusters they have had to go further afield to secure the ability to sequester their captured CO2 into geological storage. As detailed on their website, this would involve capturing CO2 at a number of their sites and transporting to a port via road vehicles. This is then transported via marine vessel to the Northern Lights sites where the Norwegian gas field provide access to long term storage.

The above situation is currently a viable route available to those outside of clusters. NPT is also expected to help in carbon utilisation sectors such as food or industrial uses or captured for use through Biochar or Carbon Black, such as in the case of REA Members [HiiROC](https://hiiroc.com/) (https://hiiroc.com) .

We also stress the need for government to keep demand for NPT under review, identifying how the market can be expected to evolve and develop. We note that those currently considering carbon capture are also having to understand how wider market development will impact their sector, including the evolution of the UK ETS, CBAM proposals, the biomethane framework and development of the green gas support scheme. With a wide range of consultation underway to consider, it is important that overall policy development remains aligned, and that government remains on top of how he sector is expected to evolve.

**7. Please provide the technical and operational considerations for the major pieces of infrastructure, equipment, and transportation. Considerations may include information on the sizes and numbers of the above, CO2 temperature and pressure conditions, loading/un-loading times and NPT journey lengths and duration. Please also provide the rationale for the technical and operational decisions.**

As above, we are not able to provide information on specific projects.

However, on operational considerations, we reiterate the need to consider the interaction between NPT systems and pipelines, especially the need to ensure development infrastructure able to accept compressed liquified carbon into the pipeline system, allowing for NPT systems to integrate into pipeline systems.

**8. For the above NPT chain, please provide information on the expected ownership/operatorship (e.g. leasing, owned, shared ownership, etc) and expected commercial/contractual arrangements. Please include when equipment is to be shared between multiple entities or for sole use.**

Proposals need to be suitably flexible to allow a range of ownership options recognising existing commercial structures, including situations where public bodies like local authorities are also likely to be involved e.g. energy from waste facilities with carbon capture installed. NPT systems should be able to be utilised within a range of commercial structures.

**9. Please provide information on the elements in the NPT chain with the longest lead times which could be rate determining in the deployment of the NPT chain. Please provide any information that you have on timelines for delivery of your NPT chain (e.g. project delivery Gantt charts).**

Different assets will have different projected lead times for CCS delivery, with the first NPT related sites already getting underway, while others are not expecting to be able to capture and transport carbon until the early 2030s. Consideration will need to be given to how the NPT sector will grow and how demand for such services will change over the next decade.

We, however, emphasis that many lead times will not be clear until government provides clarity on post Renewable Obligation support, which starts to come to an end from 2027 onwards. Commercial decisions to commit to CCS will depend on their being a clear route to market for repowering and reinvesting in existing bioenergy assets. Failure to provide this clarity will see assets choose to decommission rather than invest in delivery of critical negative emissions in the form of BECCS.

**10. What are the expected transport emissions and fugitive emissions expected within the NPT value chain? Please provide any information on how these emissions can be minimised.**

Givern the range of NPT solutions and potential sources for captured carbon, we suggest a fuller technical study should be commissioned by government to understand potential emissions from different pathways. This should also include consideration of how NPT solutions could themselves be decarbonised in the future through both electrification and use of renewable transport fuels.

**Costs**

**11. Could the costs associated with the full NPT value chain prevent investment and deployment of NPT solutions? If so, why?**

No. However, it should be recognised that NPT will likely have a very different associated cost base then pipeline connected projects. This is both in terms of capture and transportation. This does not mean that NPT, overall, will be more expensive than clustered pipeline projects, or less financeable, but that the volumes, revenues and cost base need to be considered individually.

The capture process itself can, in some cases, be cheaper than other engineered solutions. For example, carbon capture following fermentation, as takes place in anaerobic digestion, already takes place commercially, including the compressed liquification of the carbon, without government support given its low price compared to post-combustion solutions. Transportation of carbon is also already taking place, although prices will vary by transport mode and distance, and will likely be more expensive then pipeline projects.

It should also be expected that such costs are also likely to be typically borne by smaller more dispersed assets, then those located in large industrial clusters creating different economies of scale.

Given this, we support the NPT value chain being recognised as different from pipeline projects in the ICC/GGR and Power BECCS business models. A more bespoke approach that recognises the realities of different projects costs will attract and reassure investment in both the NPT and pipeline sectors of the market. This will also need to be kept under review given expectations that costs will decrease as sector becomes more established.

**12. If available, please provide any assessments that have been carried out to show an NPT solution is more economically viable than a piped solution for your NPT value chain, or that a piped solution is not technically viable.**

Individual projects will need to provide evidence on this. However, we note there will be a clear commercial case where existing assets are outside of clusters and where capture volumes are such that pipeline transport would never be economically viable. However, with current and expected revenue streams available to NPT projects, it is still expected that NPT based projects will be both economically viable and investable, if policy and regulation is suitable and proportional to the sector.

**13. Please provide evidence on the costs associated with NPT. Where possible disaggregated to the nodes delivered by NPT service providers (e.g. after capture plant and before delivery to the T&S network). Where possible, please provide information in relation to the devex, capex and opex of the operation. Please include the stage and Association for the Advancement of Cost Engineering (AACE) Cost Class at which this cost data has been generated, and please share the methodologies and assumptions that have been utilised to generate this data.**

Individual members will be, where possible, able to provide these costs. However, it will need to be recognised that such costs remain uncertain as the sector develops. Rather than piecemeal numbers being provided through a consultation, we would encourage Government to consider commissioning dedicated research to build a strong evidence base for NPT costs. The REA would be happy to coordinate industry involvement in such an exercise.

**Financing**

**14. What are the main financing risks with a disaggregated chain, and how do these differ to the full chain piped approach?**

It is recognised that the disaggregated chain could have higher risks if they have only one off-taker or are dependent on one transportation solution. This is in comparison to the economies of scale provided by pipeline solutions, especially where there are multiple carbon sources, will have a different risk profile than NPT. However, as long as operational flexibility is allowed, then such risks are expected to be manageable, as NPT based projects can be expected to be more agile with the ability to switch to alternative offtakes and transport methods.

It should be noted that for the most part, such risk is not new, and carbon transport operators are already managing such risk. Companies are already transporting significant volumes of compressed liquified gases, including carbon, as part of normal commercial activities. We therefore do not expect these risks to be a limiting factor to financing projects.

**15. What are the main financing risks associated with operational flexibility, and how do these differ to the full chain piped approach?**

It is recognised that operational flexibility is likely to be more common in NPT sites and that this will be an important aspect of business models, providing NPT sites the ability to sell captured carbon into different markets, including carbon utilisation, and respond to different price signals. As such, this is likely to be seen as a benefit rather than a financing risk. However, it is noted that with several different potential markets, all with nascent pricing structures, modelling returns with any level of certainty is a currently difficult. Inclusion of NPT based capture projects within the capture business models will therefore be essential to be able to provide confidence to early projects.

We also note that there remains a lot of price uncertainty within different markets until government finalises policy workstreams associated with GGR business models, carbon boarder adjustment mechanisms and GGR inclusion in the UK ETS. Risks associated with operational flexibility will be reduced with greater clarity on final market arrangements.

**16. Which archetype do you think would be most attractive to investors? Why?**

Flexibility in arrangements is likely to be required with differing structural arrangements depending on the sector and capture technology being deployed. However, given the current growth of the market, we currently see a ‘capture led’ model being the most appropriate and attractive to investors. This is where there is the focus on achieving captured carbon and where the demand for both stores and intermediary services is originating from. Ensuring the product is created and available, will drive the market signals required for the establishment of the rest of the sector.

**17. What types of financing are best placed to deliver NPT value chains?**

Further member input welcome

**CCUS policy landscape**

**TRI Model**

**18. Do you agree the rationale for economically licensing NPT service providers does not exist? Or do you believe that some elements in the NPT value chain may still require some kind of economic licencing?**

Yes. We agree that economic licencing is not required in the NPT market given that the risk of monopolisation is far lower than is the case for pipeline projects. We also note that 100’s of thousand of tonnes of carbon are already transported in the UK, primarily for utilisation. The introduction of licencing now would be significant market disruption with little benefit.

**19. Considering the expected deployment timelines for potential NPT projects within the CCUS programme, can the risks associated with the deployment of an NPT value chain be effectively managed commercially between the different actors within the NPT value chain? If not, please provide evidence and rationale why these risks cannot be managed commercially.**

Transportation risks can be commercially managed if NPT capture projects are appropriately supported through capture business models. This includes ensuring that the different cost base of NPT projects is considered, including likely NPT costs. Within a capture led model, revenues will be passed through the chain if intial capture is considered commercially viable and appropraitly supported.

**CCS Network Code**

**20. Please provide details on how you believe that the CCS Network Code would need to be updated to facilitate NPT.**

This is difficult to answer while industry is still awaiting the outcomes of the Government consultation on the CCS network code, given outstanding proposals. However, we note that all regulation around CCS and NPT, needs to be cognitive of the fact that NPT may transport carbon to utilisation as well as to storage, and needs to be reflective if this market dynamic. This includes utilisation where carbon see permanent storage (such as in use in building materials) or used in the development of renewable transport fuels (e-fuels) required for the decarbonisation of hard-to-treat sectors.

**Capture Business Models**

**21. What changes to the Track-1 capture BMs do you envisage being required to make the capture BMs work for NPT solutions? What considerations would be required for power-BECCS and GGR BMs when developing for NPT? Please flag in your response which of the capture BMs you are answering in reference to.**

We note that both the Power BECCS and GGR business models are both still in development, it is therefore difficult to comment on specific design changes before the final models are presented. However, in both cases the calculated level of the relevant strike prices for the CfD based support will need to take into consideration the differing cost bases of NPT, which will be different to that of piped solutions. Strike prices will need to be bi-laterally agreed with this in mind and be suitably responsive. This will equally need to apply to the Industrial Carbon Contract for Energy from Waste sites who will also use a NPT solution in some cases.

With NPT in mind, it is also appropriate that the business models should also consider capture projects that may see carbon sent to utilisation, where carbon can also be shown to be permanently locked away. The current focus just on storage is likely to limit the flexibility which NPT capture sites offer to the market.

**22. How important should consistency in approach between capture BMs be? How important is consistency between NPT users and piped users within a specific BM (e.g. ICC via pipeline and ICC via NPT)?**

The contracts need to be reflective of the cost base of the individual project being supported. While the mechanism of support should be consistent to allow for appropriate comparison between projects, the calculations for the strike prices need to be suitably flexible to accurately recognise differing cost basses. Ensuring delivery of a range of capture and transport solution should be a key part of the principle behind the design of the business models.

**Future Allocation Processes**

**23. If NPT solutions are assessed against pipeline solutions, would this raise any concerns?**

While it is expected that their will be some level of assessment between pipeline and NPT solutions, two aspects need to inform the principles against how they are compared to ensure fair allocation.

Firstly, it must be recognised that in many situations NPT will be the only viable solution, where it will not be economically viable to deliver a pipeline. As such, NPT will need to be considered a strong solution if levels of carbon capture are to be optimised and a fair market is developed.

Secondly, consideration of NPT projects needs to be reviewed on the costs and merits of their own supply chain, not compared to those of pipeline projects. As previously expressed, NPT will have a different cost base to pipeline projects where it will not be possible to compare like and like projects. This could include cheaper capture costs, but higher transport costs or vice a versa. As such projects need to be considered on their own merits and the benefits they provide to the wider carbon capture market.

**24. If government is to allow all archetypes of NPT, how should an assessment of an NPT value chain be considered to allow comparisons?**

The REA support a principled based approach to considering comparisons. Where key different commercial structures are being used, aligned with different archetypes, then it will be the overall outcomes that need to be considered when comparing projects.

This will, naturally, include relevant principles considering the levels of emissions captured, value for money, associated emissions with transport and issues like permanence. However, such principles should also be aware of available options to individual sites, and where NPT is the only viable option.

**Cross-Border CO2**.

**25. Please provide views on the potential vision for cross-border CO2 T&S networks in the UK.**

The REA have limited members involved in the cross-boarder trade of captured carbon at this point. As such we offer some high-level points in relation to this section of the consultation. We however are overall supportive of the proposed vision for cross-border CO2 T&S networks.

Firstly, development of cross border trade needs to recognise potential for carbon trade in both directions. While the UK rightly has significant potential to see European carbon imported into the UK for storage, delays to the establishment of this market means that initial volumes will be exported from the UK to projects like that of the Northern Lights storage facility. New policy and regulatory process around carbon trade will need to work in both directions.

Intial regulatory and policy requirements around cross- boarder carbon trade will need to be kept under review. Both the UK and EU markets are still developing and are likely to be subject to significant change as the market evolves and as policies on both sides are put in place. Government will need to be responsive to these changes and ensure that regulatory positions remain fit for purpose.

Finally, far greater transparency in relation to the time scales for delivery of the North Sea storage assets is needed. It is currently difficult for capture project developers, in either the UK or Europe, to be sure when the North Sea market will be functional. They are unlikely to make significant carbon trade plans until there is greater transparency around the availability of the storage assets themselves.

**26. With regard to Questions 18 and 19 and in the context of establishing cross-border CO2 T&S networks, do you have a view on:**

i) whether an economic licensing framework for CO2 T&S might need to evolve to accommodate cross-border T&S networks?

ii) how cross-border CO2 volumes should be viewed within a commercial landscape currently designed for domestically captured CO2 volumes?

iii) how service providers could manage the risks on a commercial basis that would allow for a merchant delivery model?

iv) whether there are any specific changes needed to the current suite of capture business models if CO2 cross-border T&S networks are established?

For each answer please provide further explanation.

Member feedback welcome.

**27. With regard to Question 20 do you think any changes will be required to the CCS Network Code to ensure cross-border CO2 T&S networks can be established?**

Member feedback welcome.

**Storage**

**28. To what extent would enabling NPT users and cross-border users incentivise storage exploration and appraisal activity? If not, why doesn’t it?**

Given the lead time required for he build out of pipeline infrastructure, we are confident that enabling both NPT and cross-border users will both help drive storage exploration and help to de-risk current storage projects that are intended to be primarily fed by pipeline. The development of the NPT market will provide options and flexibility to the market that is to be welcomed.

With both the dispersed and comparatively smaller nature of capture sites likely to use NPT, this also provides the opportunity for exploration of more localised and, likely, smaller storage facilities. This should be encouraged, enabling more localised solutions and growth of the storage industry.

**29. Could a store which is solely reliant on NPT users be viable? What are the technical challenges to operating a store solely reliant on NPT users? How would this operating model impact the risk profile of the project?**

Yes. Assuming the successful development of a negative emissions and storage market, NPT only storage sites should be economically viable. It is likely that such storage facilities will be smaller then pipeline connected ones, but also have more bespoke contract arrangements that reflect the cost base of NPT solutions. This could well develop as a particular section of the market.

**30. Please provide evidence for the potential viability of shipping CO2 straight to the wellhead for CO2 injection. Please expand on the risks/barriers and benefits of straight to wellhead shipping.**

Member input welcome

### **Wider deployment considerations**

**Other Regulatory Controls**

**31. What regulations need to be considered or amended for NPT value chains to deploy (excluding those regulations which are covered in the CCUS policy landscape section)?**

Clarity is still required from relevant environmental regulatory authorities as to the end of waste criteria when it comes to captured carbon. For example, the current Regulatory Position statement provided by the Environment Agency relation to carbon captured from anaerobic digestion (RPS 255) requires further clarity and guidance on what can and can’t be done. Evolution of this guidance also needs to take into consideration revisions to the Quality Protocol (now “Resource Framework”). NPT will not be able to take place unless regulatory rules around the storage and use of captured carbon from capture assets is clear.

Separately, we also stress that here must be consistency in MRV approaches around carbon capture and transporting across differing government schemes. Currently MRV processes are being considered for the capture business models, the UK ETS, CBAM and NPT. In particular there must be consistency in how biogenic carbon is treated in relation to all of these areas to avoid conflicting requirements or contradictory standards being applied.

**32. Do the current processes to comply with existing health and safety or environmental regulations or controls create barriers to NPT deployment when transporting CO2 via road, rail, barge, ship, or processing CO2 at intermodal facilities? If so, what are those barriers, and what would you suggest as an alternative?**

CO2 Transport is already common and done commercially, primarily to utilisation in the food or industrial sectors. Such activities are already able to operate in line with existing H&S requirements. Any new regulatory requirements on this issue should consider closely what is already in place and avoid disruption to the existing sector, while maintaining high H&S standards.

**33. Are there any specific changes to UK legislation, existing regulations or permitting processes which are necessary to support the development of cross-border CO2 T&S networks?**

As mentioned in question 31, clarity is needed in relation to the waste status of captured carbon, especially when considering the original feedstock and conversion process. This will have a bearing on the required regulatory rules around waste export and import, in terms of how such material is treated and the potential tariffs that maybe applied.

**34. What do you see as the biggest regulatory barriers to the growth of cross-border CO2 T&S networks?**

It is important that there is consistency in how various aspects of cross board carbon trade policy developmnet. There are currently outstanding consultation looking at CBAM, UK ETS and NPT. The outcomes of these consultations must be aligned to avoid unintended barriers to such trade.

**Delivery**

**35. What are your views on the best approach to creating interoperable CCUS networks?**

There needs to be some consistency in network standards and processes for NPT injection into carbon pipelines. We are already seeing diversion in approaches between the current storage networks, with differences in approach to pressures within the pipeline, which will determine where compressed liquified carbon can be injected and accepted. Setting early standards and consistent approaches, will enable NPT solutions to have easier access to different pipelines and help evolve the market quickly. These standards should be developed in conjunction with both pipeline operators and NPT developers as soon as possible.

**36. How should the UK design the standards and specifications for CO2 T&S which offers network users sufficient flexibility in store choice but also provide sufficient protection to core T&S infrastructure? How can the UK ensure that its T&S network design does not impede access to an interconnected and interoperable European system?**

The UK and EU will need to keep abreast of developments in both markets with a principle of cooperation to avoid market barriers key to both market developments. It is best these agreements are established early on to avoid unintended barriers to captured carbon trade.

Government should establish an advisory board of relevant industry experts to inform the development of such standards, directing both industry and government on process and developmnet of what is needed to get the industry operating.

**37. Are there any technical or operational limitations that may exist that could be a barrier to domestic NPT or cross-border T&S network deployment? Please explain.**

Government should ensure consistency in policy areas affecting the market, to avoid any unintended barriers to wider domestic NPT or cross-border T&S network developments. This includes developmnet of capture business models, CBAM and UKETS work streams.

**38. Is there any specific foundational infrastructure that must be operational in the UK before UK stores can offer storage to domestic NPT or international customers? If so, what should the UK prioritise?**

It is essential that pipeline developments include reception sites for compress liquified carbon from NPT sites. These reception sites need to be well located and ensure that they are taking advantage of the fact that the carbon will already be compressed for storage, avoiding the need to gassify it for further pipeline transport only to be compressed again before entering the store. Such infrastructure should be a requirement of pipeline development.

**39. Do you foresee any infrastructure innovations which could speed up the deployment of NPT and cross-border T&S networks and/or reduce associated costs? Please provide any supporting evidence.**

Member feedback welcome.

**40. What are your views on other flexible users of CCUS networks, e.g. flexible use of technologies such as DACCS? Do you foresee that NPT and buffer storage could be complimentary to operate alongside a flexible piped user (e.g. projects that could ramp up or ramp down CO2 output, potentially including technologies such as DACCS).**

Yes. Operational flexibility is likely to be an important aspect of different NPT capture sites and the commercial structure, especially as the utilisation market develops. Ensuring a level of flexibility will be welcome as long as non-flex demand is also serviced to ensure validity of long-term offtake contracts.

**41. Does the UK have the relevant skills and capability to deliver NPT? Does the UK have a competitive advantage to deliver certain elements of the NPT value chain?**

The UK is comparatively well placed to deliver the skills needed for NPT, given both the fact that capture sites in some places are already operational, such as on AD facilities, and that) carbon is already being transported for utilisation purposes. However, as with the wider energy sector, there is a significant skills gap that will need to be addressed as the sector becomes established and grows. Government should look to work with existing academic institutions and industry, to work out how best o develop relevant training courses in order to meet this skills gap. For example we highlight the work being done by Aston University and the Supergen Bioenergy Hub as it comes to training the next generation of decarbonisation experts (<https://www.aston.ac.uk/latest-news/aston-university-train-uks-next-generation-decarbonisation-experts>.)

**Further Comments**

**42. What other areas should government be considering for successful deployment of NPT?**

Government should work with the finance community to understand the attractiveness of NPT dependent projects, ensuring that the policy decisions made now create a suitable risk profile that enables investment.

**43. Please respond with any other comments that are not contained in the above questions.**

***July 2024***