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CCSA response to the CCS Consultative Communication
on the Future of Carbon Capture and Storage in Europe

The CCSA welcomes the release of the European Commission consultative communication on the future of CCS in Europe. This is a critically important piece of work that will help determine the future direction of CCS in Europe.

The CCSA brings together a wide range of specialist companies across the spectrum of CCS technology, as well as a variety of support services to the energy sector. The CCSA exists to represent the interests of its members in promoting the business of Carbon Capture and Storage (CCS) and to assist policy developments in the UK, EU and internationally towards a long-term regulatory framework for CCS as a means of abating carbon dioxide (CO₂) emissions.

1. *Should Member States that currently have a high share of coal and gas in their energy mix as well as in industrial processes, and that have not yet done so, be required to:*
 - a. *develop a clear roadmap on how to restructure their electricity generation sector towards non-carbon emitting fuels (nuclear or renewables) by 2050*
 - b. *develop a national strategy to prepare for the deployment of CCS technology.*
- Member States (MSs) should be required to undertake analysis. Showing how they will decarbonise their electricity generation sector by 2050 would help them to understand the relevance of CCS to their national circumstances (accepting that not all MSs will need or have the capacity to deploy CCS). Longer-term roadmaps also provide greater certainty to industry thereby helping them to plan their investments against a long-term trajectory more effectively. This is a similar outcome to the long-term carbon budgets that have been adopted in the UK. It appears that relatively few MSs have undertaken such detailed analysis to date and this is significantly hindering the debate and actual progress on the role that CCS will play in decarbonising both the electricity and industrial sectors.
- However, there are a number of improvements that could be made to the terms of any analysis;
 - It is a false dichotomy to suggest that MSs can choose a decarbonisation pathway using either renewables and nuclear or CCS. In practice all MSs will have to use a wide range of complementary low-carbon technologies in order to deliver low-carbon goals, e.g. flexible fossil fuels fitted with CCS complementing intermittent renewable technologies.

- All Member States should be required to develop ambitious roadmaps that are consistent with EU carbon reduction targets. The development of roadmaps should not just be restricted to those MSs with an arbitrarily defined 'high share of coal and gas' as suggested in question one.
 - The roadmaps must include analysis on decarbonisation of both electricity generating and industrial sources given the strong interlinkages between the two sectors.
 - The roadmaps should include an analysis and quantification of the total costs of the selected approach contained in the roadmap, i.e. the total energy system costs including infrastructure developments such as transmission lines and interconnection, balancing services, total lifecycle costs, etc.
 - There is inevitable uncertainty over the mix of technologies that will most efficiently meet carbon-reduction goals whilst retaining security of supply and cost-competitiveness out to 2050. The roadmaps will need to balance this uncertainty against the need for robust and supportive strategies to support investment. To allow the identification of possible misaligned strategies and deliverables and to aid the development of policy decisions the 2050 targets need to be accompanied by nearer term milestones and dates, e.g. 2030.
 - Given the cross-border impacts of national energy policy the roadmaps should also consider the impact and potential impacts of the national approaches beyond the MS, e.g. at the regional and European level whether a high degree of reliance on particular generation technologies is causing reliance on the excessive export (or import) of electricity during high (or low) production periods.
- Successful delivery of European carbon reduction goals requires national policies to be implemented by MSs in order to drive investment in the appropriate technology mix. Therefore the MS must also outline the national strategy, policies and incentive structures that will deliver against the roadmaps.
 - MSs should be required to forward to the Commission periodic reports containing analysis on the progress made on delivering against their roadmap as well as any changes they face. These reports should be made public and will help present a view of Europe's decarbonising journey as a whole. Going further the pooling of individual MS roadmaps can help to properly understand the aggregate impacts including the opportunities for cost efficient cross-European CCS infrastructure development.

2. *How should the ETS be re-structured, so that it could also provide meaningful incentives for CCS deployment? Should this be complemented by using instruments based on auctioning revenues, similar to NER300?*
- It should not be underestimated how important the early development of operating CCS projects will be in demonstrating the effective contribution that CCS can make to climate change mitigation and the opportunities for the technology to be utilised by policy makers as one element of an overall low carbon strategy. The Commission should, as a matter of urgency, come forward with additional proposals for supporting existing CCS projects in order to enable the first projects to be operating by the end of this decade.
 - The CCSA believes that the EU ETS should remain the long-term driver of electricity and industrial sector decarbonisation in the EU. However, the EU ETS is clearly not driving the necessary investment in low-carbon technology due to the low price of EUAs and urgently needs to be restructured if it is to provide longer-term support for low-carbon technologies. Whilst the CCSA supports structural reform of the EU ETS to drive effective carbon prices, and believes these should be undertaken as a matter of urgency, it is recognised that this will not raise prices sufficiently to make CCS investment economic in the short to medium term. In addition to EU ETS structural reforms, robust transitional complementary policies will also be required to deliver CCS in Europe. Such complementary policies should have the least possible impact on the ETS and the electricity market and should be phased-out as the ETS strengthens and the CCS costs are reduced.
 - In theory transitional complementary instruments based on auctioning revenues could help to support CCS alongside a restructured ETS over the near to medium term. A mechanism that provided ongoing demonstration and early deployment support, in a manner that was compatible with the ETS, could be a welcome means to support CCS technology in the early stages. However, if any auctioning based instrument is to be successful then the implementing arrangements would need to be fundamentally restructured and not merely copies of those of the NER300 programme. In addition the NER 300 programme was a 'one-off' support mechanism and was not an enduring policy instrument that could be seen by developers to give long-term confidence in the CCS market.
 - Any new CCS policy mechanism will have to deliver a number of outcomes if it is to successfully promote CCS deployment in Europe. These outcomes are considered in detail in the response to question 3 below. However in addition to these general points there are a number of specific issues that pertain to auctioning that should be considered in the design of any new auctioning-based mechanism, including;
 - It is necessary to move away from a rigid EU-level prescribed CCS deployment programme – essentially the NER300 approach – as designing criteria that enables the EU to select projects that adequately meet the needs of MSs is challenging. However, MS-led programmes based on auctioning carbon market revenues create challenges as MSs

have traditionally proved resistant to measures that require the hypothecation of auction revenues.

- An inherent and fundamental challenge to the use of auction revenues to support the development of CCS is the lack of predictability of the carbon price. This creates significant uncertainties on the future auctioning derived revenues that will be available to support a CCS deployment mechanism and therefore the outcome that the mechanism will deliver, e.g. total installed capacity of CCS in Europe. This creates particular challenges for the CCS supply chain which requires a high degree of predictability on policy outcomes if it is to begin to make the significant investment required in delivering this technology. Stimulating a European CCS supply chain must be an important deliverable of a European CCS policy in order to maximise the contribution that CCS can make to the green growth agenda, reducing the cost of CCS technology through the stimulation of supply chain competition and securing a European stake in the international CCS industry. Technology suppliers have already had their confidence dented and it will take a definitive and enduring policy shift to reawaken interest and ensure a competitive market.
- The NER300 programme ranked the projects on the basis of €/tonne of CO₂ avoided. Within the power sector such ranking may be misleading and CCSA suggests projects to be compared on its ability to deliver low-carbon power (€/MWh) and ranking and incentives should be re-designed accordingly.

3. *Should the Commission propose other means of support or consider other policy measures to pave the road towards early deployment, by:*

- a. support through auctioning recycling or other funding approaches*
 - b. an Emission Performance Standard*
 - c. a CCS certificate system*
 - d. another type of policy measure*
- As well as supporting the development of new policy measures to drive CCS post-2020 it is important that the Commission and MSs also continue to identify funding mechanisms that support the development of existing CCS projects so that they can begin operating this decade. These projects will play an invaluable role in helping to inform and refine potential support mechanisms that can decarbonise CO₂ emitting power plants and industries into the future.
 - The CCSA would strongly welcome the Commission coming forward with a proposed new policy instrument to support the development of CCS projects and begin the deployment of this strategically important technology in Europe. It is clear that without a bold move from the Commission many MSs will continue with the current approach and the necessary investments in CCS will not occur. The consultative communication is correct to note that a business-as-usual approach

to CCS is inconsistent with the requirement to materially reduce the carbon intensity of both the electricity and industrial sectors over the coming decades.

- A key overarching principle is that CCS must be fully integrated into the 2030 climate and energy package on an equivalent basis to other low-carbon technologies. The Communication outlines a number of potential approaches to support CCS in Europe and encourages stakeholders to present alternative measures in order to secure a deployment of CCS as one of the low carbon technologies to meet EU's carbon reduction ambitions. At present it is hard to be precise on the merits of individual instruments given the uncertainty over Europe's 2030 climate and energy policy.
- A CCS-specific support mechanism similar to those used for renewables or biofuels would be most likely to meet the tests outlined above. For example, given the principle of equivalent treatment for CCS and renewable post-2020 then the CCSA believes that if a 2030 renewable target is established then there should be an equivalent 2030 CCS target. Failure to implement an equivalent policy will significantly disadvantage CCS. However there are strong arguments against the adoption of 2030 technology specific targets and the CCSA urges the Commission to consider alternative technology neutral policies to drive investment in all new low-carbon technologies post-2020. The idea of using CCS certificates, to bring forward a defined volume of CCS as a transitional support mechanism, could be one option and CCSA would like to see the Commission to engage in a more detailed discussion on how this scheme would be designed and operated in practice.
- The CCSA notes that one option which is not considered in the Communication is the establishment of a technology neutral sustainable-energy target for 2030 in place of technology specific targets. Under this approach MS would have the flexibility to choose to develop CCS projects in order to comply with such targets or invest in alternative low-carbon technologies.
- Given the lack of investment in CCS in Europe to date the Commission should consider adopting a minimum capacity threshold for CCS (and other early stage low carbon technologies) which would ensure investment in the minimum volume in order to secure demonstration and early deployment of the technology.
- To deliver on the goals set out in the CCS consultative communication any new CCS policy must deliver the following;
 - Create a CCS support mechanism that is investable for the private sector. A CCS support mechanism must provide a predictable and robust revenue stream that allows the developer to recover both capital and operating costs and earn an appropriate level of return to investors. The support needs to be structured in a manner that recognises the commercial and technical risks associated with the integration of the CCS chain and scaling of existing technologies. The Feed in Tariff with Contract for Differences (FiT CfD) under development in the UK is an example of such an instrument. While more detail is still needed on the development of FiT CfDs before they can be considered as a fully

investable instrument the early reaction from the CCS industry is positive that they can deliver investment in the technology.

- Generate an incentive effect at the MS level to drive investment in CCS projects. In common with the other main low-carbon generating technologies it is necessary for MSs to perceive a clear domestic rationale for CCS which can be translated into a supportive regulatory and incentive environment which enables international companies to invest in CCS projects that best meet the national circumstances.
 - Support for CCS must move away from a funding model based on a centrally managed series of sequential competitions to a more market based approach. Competitions are resource intensive for companies to participate in, risk stifling innovation through the establishment of rigid criteria and often lead to outcomes that can appear subjective, discrete and unpredictable for the private sector. Competitions may also inadequately account for some of the other factors that can enable MS investment, e.g. efforts to maintain jobs and skills in strategic national industries and regions.
 - Policy should recognise and appropriately reward the early investors on CCS to reflect the larger commercial risks with their projects. The private sector will not invest in vital early demonstration projects unless rewards are commensurate with the risks. A number of MSs are developing early projects which will be important enablers for follow-on projects and any new policy should take care to not disincentivise investment in these projects.
 - Provide confidence that the policy will create a viable and vibrant CCS market. Unless the private sector has a credible expectation that there will be a future CCS market then companies will see little rationale to invest finite capital resources into First-Of-a-Kind CCS projects. Similarly without the expectation of a CCS market the supply chain will see little justification for investment. The stimulation of a competitive supply chain is key to delivering cost reductions in the technology and ensuring the maximum contribution of CCS to the green growth agenda.
 - CCS support should be designed, as far as is practicable, to limit any adverse impacts on the ETS. In addition the support that drives investment in all low-carbon technologies should be designed so that over time the principal incentive for investment transitions from the interim supporting measures and back to the ETS. However, it should be recognised that the ETS shortfalls may not be reconciled in the timeframe that is required and therefore the policy instrument must be capable of being free-standing as well as complementary.
- An important issue that also needs to be considered is whether the European political process can successfully deliver a positive and ambitious outcome for a CCS specific mechanism that delivers a high degree of confidence that there is a future market for CCS in Europe. This point must be adequately considered as a

deeply unambitious outcome which acted to significantly 'cap' a European CCS market such that companies do not see a viable future CCS market would be deeply damaging to confidence in the sector and hinder potential investment.

- Projects combining CCS with EOR could help kick-start wider deployment of CCS in Europe. Combined CCS and EOR projects where economically and technically achievable present a number of advantages; EOR may improve the business case for CCS since the increased oil production may present an additional economic incentive compared to pure CCS projects. EOR's potential as a driver or enabler for early CCS projects is underlined by the number of early full chain CCS projects developed outside of Europe that include EOR in the business case. However, the value from EOR alone is insufficient to drive projects in the absence of wider regulatory support and EOR should be seen as an added incentive not a replacement for policies that directly support CCS investment.
- New CCS policies must also incentivise the application of CCS on biomass combustion. The combination of CCS and renewable biomass is the only currently available technology which can remove CO₂ from the atmosphere creating so called 'negative emissions' and is a critical technology to address climate change. To date the EU policy framework has discriminated against CCS and biomass as the emission reductions are not recognised under the CCS Directive.

4. *Should energy utilities henceforth be required to install CCS-ready equipment for all new investments (coal and potentially also gas) in order to facilitate the necessary CCS retrofit?*

- There is an argument for revisiting the requirements for CCS readiness in the EU CCS Directive to see if they are still fit for purpose. However it should be noted that companies will ensure that new power plants will be developed capture-ready if there is a strong signal that decarbonisation will occur. If long-term and predictable regulatory incentives are in place, then the commercial players will invest in power plant which can be retrofitted with CCS to reduce the risk that new fossil-fuel assets are stranded in the future. It should also be noted that some conventional power plants will not require capture readiness if they are planned to be operating as peak-shavers, with associated very low load factors.
- In addition the development of early CCS projects which act as 'anchor projects' and support the development of CCS networks enable future CCS plants to connect to shared transport and storage infrastructure at a lower cost are also important facilitators for future CCS deployment. The roadmaps discussed in the answer to question one above would also help the industry to plan effectively on the future demand for CCS enabling capture plant developers and CCS infrastructure providers to plan and invest accordingly.

5. *Should fossil fuel providers contribute to CCS demonstration and deployment through specific measures that ensure additional financing?*

- In practice it would be possible to implement levy measures at a number of stages within the fossil fuel supply chain, e.g. fossil fuel providers or at the point of use in the power and industrial sectors. Any decision should be subject to an appropriate impact assessment to understand better the merits of such a scheme. There is a risk that simply putting additional financial burdens on fossil fuel providers might just drive fossil fuel reliant generation and industrial sectors away from Europe because they will become uncompetitive. The benefit of retaining fossil fuel in the mix from the point of view of preserving energy security through diversity of fuel and/or use of indigenous fuel would be lost, resulting in negative impacts to Europe.
- However it should be noted that the development of CCS has wide reaching and profound societal benefits which means that support should come from a broader base instead of just fossil fuel suppliers. For example, fossil fuels provide a reliable and flexible energy source which complements and enables the substantial deployment of other low-carbon technologies that have inflexible or intermittent generation characteristics. In addition all low-carbon technologies require substantial inputs of energy intensive products such as steel, cement and chemicals. These sectors will also require CCS if they are to be substantially decarbonised. Finally a broad support base is consistent with the funding of mechanisms that are currently used to deploy renewable technologies.

6. *What are the main obstacles to ensuring sufficient demonstration of CCS in the EU?*

- The CCSA refers to the response to question 3 above which highlights what a CCS policy must deliver in order to overcome barriers to CCS. In summary these barriers can be categorised as the following;
 - No clear confidence that energy and climate policy will deliver a viable and vibrant CCS market which hinders investment in early projects and the supply chain, e.g. the lack of a long-term investment signal from the EU ETS.
 - Lack of a viable and demonstrated business model to enable the private sector to invest. This is primarily the result of very limited, and sometimes unpredictable incentives for MS to implement CCS support policies. CCS support measures require some form of capital support, particularly to stimulate CCS projects during the early phase but investors also require ongoing operating support to ensure that CCS facilities, once built, are economically viable to operate.
 - Lack of policies that can drive investment in CO₂ transport and storage infrastructure. In particular measures that can stimulate the development of large-scale transport and storage options which can deliver significant cost reductions to CCS projects.

- The CCS Directive poses a number of material hurdles to the development of CCS projects. The Commission should undertake a review of the CCS regulatory framework to identify these barriers and propose approaches to address these.
- The current prohibition under the London Protocol of the transboundary transfer of CO₂ is a significant outstanding barrier to transboundary European CCS projects using certain project configurations. This barrier limits the number of MSs that will be able to deploy CCS and should be addressed as a matter of urgency.

7. How can public acceptance for CCS be increased?

- Develop multiple operating early CCS plants to unequivocally prove the viability of the technology. The development journey will allow public scrutiny via the planning process and help increase public awareness of this crucial technology. Communicating the volumes of CO₂ emissions which are avoided by operating CCS plants can help communicate the climate benefits in terms of national and EU objectives.
- Highlight CCS as a technology with a clear national advantage that generates significant new jobs, skills and investment as well as maintaining existing jobs in CO₂ emitting sectors.
- Ensure that the public are aware that CCS is complementary to other low-carbon technologies like wind and solar and can enable climate and energy objectives to be delivered at least cost to the consumer.
- As CO₂ storage, particularly for sites located onshore, presents the largest public perception challenge, avoid the circumstances where communities are presented with local storage alone without the associated industrial benefits. Alternatively there could be financial incentives for communities hosting CO₂ stores similar to the business rates retention for communities hosting renewable projects in the UK. It is important to engage openly on CCS with stakeholders to understand and overcome any concerns they may have about the technology – e.g. CO₂ permanence.

The view expressed in this paper cannot be taken to represent the views of all members of the CCSA. However, they do reflect a general consensus within the Association.