Consultative Communication on "The future of Carbon Capture and Storage (CCS) in Europe"

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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 should develop a clear roadmap on how to get on a credible trajectory for very low CO2 emissions by 2050 if they have not already done so. Research suggests that if CCS is not available in the mix of options then costs for decarbonisation will be significantly higher in many cases, even assuming that decarbonisation takes place under these circumstances. Recent studies have also been indicating that decarbonising many industrial processes to levels that are consistent with decarbonising the energy sector by 2050 will not be possible unless CCS is available. Such roadmaps should, therefore, be free to use all options available, including CCS.

Member States cannot all develop a reasonable strategy for CCS deployment in isolation, however, since the most viable storage locations for many of them would be in other Member States' jurisdictions. For example, substantial geological storage is expected in saline formations in the North Sea. Pipeline transport in large volumes to the North Sea is not expected to present an insuperable bar to access to this storage (by analogy with natural gas transport). But such a pipeline and storage system cannot be implemented without clear coordination between Member States and support from clear and long-term EU policies and regulations on CCS.

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?

Carbon emission pricing is inherently unsuitable to drive a transition since:

a) Carbon price starts low and rises, the cost of new technology starts high and falls (due to learning and economies of scale)

b) Carbon pricing is economy-wide and is likely to lead to first no projects and then a rush of projects at a higher-than-optimal rate.

Support mechanisms used for renewables have demonstrably worked to bring projects forward in different Member States. And a large wind farm, for example, is not so different from a CCS project in financing requirements once first-of-a-kind projects have been built. Investors will also have to evaluate CCS projects in comparison with alternative investment

opportunities in renewable energy. So instruments that are similar to those for renewables are likely to be most appropriate to provide meaningful incentives for CCS deployment.

Costs for instruments to support low-carbon electricity from CCS (as for low carbon electricity from renewables) ultimately come from some combination of electricity consumers and taxpayers. Auctioning revenues fall into this category, but not uniquely so. To the extent that such revenues are demonstrably uncertain, because the ETS cap and trade mechanism gives emission certainty but not price certainty, auctioning revenues may not inspire industry confidence or be able to deliver CCS in the planned quantity or at planned timings. Despite this uncertainty, allocating auction revenues to CCS projects could provide a useful opportunity to accelerate CCS deployment if no other, more certain, sources for funding capital expenditure can be identified and amounts are commensurate with actual project costs.

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

In general, it is expected that the Commission will be aiming to identify the most cost-effective way to incentivise early deployment of CCS, while paying minimum risk premiums for early projects. As noted above, support mechanisms used for low carbon electricity from renewables have demonstrably worked to bring projects forward in many Member States, although this has sometimes been at relatively high cost. CCS currently has somewhat similar requirements to emerging renewables technologies so renewable-like support mechanisms would be very likely to work for CCS. Other mechanisms run a more substantial risk of failing to function in the real world and, even if viable, will be unfamiliar to investors.

A very important characteristic of renewable support mechanisms in the EU is that they are operated by individual Member States. An EU-wide tradable CCS certificate has some desirable characteristics, in that it would accommodate very different CCS potential and hence rates of progress across the EU. Experience with analogous Renewable Obligation Certificates in the UK market suggests, however, that inherent certificate value uncertainty increases project financing costs. This uncertainty could only be compounded when multiple Member States are involved.

Emission Performance Standards introduce a number of complex considerations, as discussed briefly in Box 1. Particular care needs to be given to the design of the EPS if it is to incentivise action on CCS, rather than only disincentivising unabated fossil fuel use. The likely limits in long term viability and scope for perverse consequences for an EPS are also important factors in considering whether it is an appropriate support measure for CCS.

Box - Emission Performance Standard Considerations

1. Emissions per what output measure?

1.1	Per unit energy	Emissions per MWh supplied
1.2	Per unit CO_2 produced	Fraction of fossil fuel CO_2 captured and stored
1.3	Per unit of generating capacity	Tonnes of CO_2 emitted per MW of capacity installed per year

2. Size of the entity which has to meet the standard

2.1 Generating unit

2.2 Stack (by analogy with LCPD opt-out regulations) – could include multiple plants and of different types (latter not common now but could be done if an advantage)

2.3 Site - could include multiple plants, even of different types

2.4 Company

2.5 Industry sector - nature of sector determines plant types

2.6 Country – will almost always include a range of different plant types

3. Can compliance be traded?

4. Time period over which emissions are averaged when calculating compliance with the EPS?

5. How are the costs of compliance met?

6. Action required for compliance?

6.1 Don't do something - i.e. don't build or don't run a certain type of plant

6.2 Have to do something - i.e. capture a certain fraction of CO_2 from any fossil plant; it could be argued that the need to capture CO_2 could be entirely avoided if no fossil fuel plants were used at all, but this is currently not feasible in practice

7. Is the EPS based on capability or actual performance?

8. How is the emission performance standard made more stringent over time?

8.1 There is a general expectation that the stringency of the EPS will increase over time

8.2 The long term end point for all EPS if cumulative CO_2 emissions to the atmosphere are to be limited to minimise the risk of dangerous climate change is that any fossil fuel can only be used if a corresponding amount of CO2 is captured and stored (note this does not imply CCS if no fossil fuels are used).

8.3 Increased stringency could be that the EPS applies to more power plants, e.g. plants with different fuel types, existing plants as well as new plants.

8.4 It is difficult to see how the capture level at an individual plant could be increased progressively over time in a cost-effective manner, except in the case where certain novel components need first to be tried out and refined (e.g. one 400MW post-combustion capture unit on a 2 x 800MW power plant site). It might be technically feasible, but the capture plant would probably not be integrated efficiently as a result and for some of the time the capital investment for the CCS chain (pipelines and injection facilities) would not be used at its full potential capacity.

8.5 At an individual plant level retrofitting full capture to a carbon capture ready (CCR) site would not involve any artificial cost increases. But having all CCR plants retrofitted within a narrow time window would add unnecessary cost increases since the equipment supply industry, pipeline construction, drilling industry etc. would be facing a boom and bust market situation rather than a period of sustained demand with gradual up and down changes.

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?

In principle making all fossil fuel plants CCS ready (CCSR) will increase future optionality at minimal cost. A particularly important factor is the location of the plant, to give reasonable prospects for access to transport and storage, as well as equipment configuration. A plant site is likely to remain in use beyond a single generation of power plants in many cases.

It is generally important to emphasise that CCSR plant designs should seek to increase optionality rather than make expenditure on a particular CCS technology design. In most cases more advanced technology, unknown in detail at the time of plant construction, is likely to be retrofitted.

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

Recent IEA reports have stated that fossil fuel reserves are approximately three times in excess of amounts that that can be emitted to atmosphere safely. Thus, if a global process to limit atmospheric CO2 emissions is implemented then large amounts of global fossil fuel reserves can only be used with CCS. CCS project developers and operators will then have to say, in effect 'It is only possible to purchase fossil fuel if the price is low enough to allow CCS to be undertaken at a cost which is competitive with non-fossil energy alternatives that give the same controllability and other benefits as fossil fuel'. Under these circumstances it is likely that some of the costs for CCS will be taken from the theoretical profit margins that the fossil fuel suppliers could have obtained otherwise.

But in the absence of global agreement and with many fossil fuels freely traded it is likely that fossil fuel providers would seek to avoid any levy to support CCS, or would be able to pass it on to consumers, because alternative markets would be available.

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

Due to public concerns related to onshore storage, it is likely to be essential for initial commercial-scale demonstration projects in Europe to use offshore storage. It might also be beneficial to use sites that have existing facilities that can be adapted for CCS use to avoid the need to permit and construct new facilities. Only a few countries have accessible offshore storage, especially using existing facilities.

The learning value from CCS demonstration is expected to be most substantial for the earliest projects and many of the insights from these projects are likely to benefit a broader range of stakeholders than the ‘first movers’ that implemented these projects. Particularly in the current economic climate, it has proved difficult to finance CCS demonstration and it is now likely that a relatively small number of demonstration plants will be built in Europe. This implies that an excessive burden is being placed on a few countries. It would, therefore, be appropriate to identify appropriate burden-sharing arrangements, perhaps drawing on

experiencing gained in developing and implementing renewable burden-sharing arrangements.

7) How can public acceptance for CCS be increased?

The surest way to increase public acceptance for CCS is to have successful demonstration projects in the EU. Early CCS projects should have characteristics that minimise the risk of raising public concerns, for example due to concerns over unfamiliar use of technology. This includes that initial CCS projects should be sited in low-impact locations and use offshore storage. Additionally, pipelines should run offshore where possible or re-use existing pipelines as much as possible.