The Research Council of Norway

To the SET Plan Secretariat

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Response to Issue Paper No. 9 – CCS / CCU

Dear Sir/Madam,

Many thanks for the opportunity to comment on the Draft Issue Paper for CCS and CCU. In this document we present the position of the Research Council of Norway.

We welcome the Issue Paper for CCS and CCU which clearly address the need for CCS in our common strive to achieve international climate targets. CCS is needed to avoid dramatic consequences of global warming and the importance of CCS is even strengthened after the COP21 ambition put forward in Paris last year where an ambition of limiting global warming to 1.5 ^{o}C was agreed on.

The Draft Issue Paper on CCS and CCU (hereafter for simplicity referred to as the CCS Issue Paper) presents strong ambitions and targets for deploying CCS. The document is a very good starting point for paving the way for CCS in Europe. However, improvements are possible, and our suggestions are listed below.

Ambitions

The CCS Issue Paper presents high ambitions for CCS deployment including targets for pilots and demonstrations, but in order to limit global warming to 1.5 ^{o}C even higher ambitions are needed.

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One example is the statement in the Introduction on page 1:

> *"While CCS is not currently projected to significantly contribute to helping reach the EU's 2030 climate and energy targets and objectives, a "lock-in" into an energy infrastructure, which is not in line with the EU's long term decarbonisation objectives must be avoided."*

We agree that 2030 climate targets might be reached without CCS. However, 2050 climate ambitions can not be reached without CCS and in order to reach 2050 ambitions CCS needs to be deployed as soon as possible. The paragraph referred to above could be interpreted as a possibility of delaying actions on CCS. The paragraph should be changed to emphasize on the need for actions now.

Business case for CCS

The CCS ambitions can only be reached if there is a business case for CCS. A business case will require specific financial incentives and a strong regulatory framework. The CCS Issue Paper states at page 3 that the business case for CCS will be based on a reformed ETS, complemented, if necessary, by Member State (MS) support instruments.

We believe that ETS is not sufficient to create a business case for CCS. Additional financial incentives and regulatory framework are needed. The CCS Issue Paper should elaborate on the need for subsidies, taxes, certificates, and emission performance standards (EPS) and clearly indicate which incentives that will be implemented to ensure CCS deployment.

Funding pilots and demonstration

The CCS Issue paper emphasize on the need for several pilots and demonstration projects. Substantial public funding are required to build and operate pilots and demonstration plants and possible funding mechanisms are mentioned, including the Innovation Fund, the Connecting Europe Facility (CEF), and the Modernisation Fund.

It is important that the available public funding is sufficient to build and operate all the pilots and demonstration projects that are planned in the CCS Issue paper. More details on available public funding would be useful to build confidence among key CCS stakeholders.

Masterplan for deploying CCS in Europe

Deploying infrastructure for CO_2 transport and storage is critical. This work should start now with the ambition of building a transnational infrastructure linking CO_2 sources and sinks. Projects of Common Interest (PCI) is a tool that could pave way for the required infrastructure. This is mentioned on page 3, but the importance of PCI and details on how PCI could be applicable for CCS should be more highlighted.

The European Technology Platform ZEP has published a report called *An Executable Plan for enabling CCS in Europe*[1]. The report presents a masterplan for how the CCS infrastructure could be deployed in Europe, including suggestions for needed support mechanisms. The recommendations in the ZEP report should be included in the CCS Issue Paper.

[1] An Executable Plan for enabling CCS in Europe, ZEP report 2015, http://www.zeroemissionsplatform.eu/news/news/1650-zep-executable-plan-for-ccs-in-europe.html

Energy intensive industry

CCS is applicable for both the energy sector and for energy intensive industries. Both sectors are highlighted in the CCS Issue Paper. We suggest emphasizing even more on the need for deploying CCS in the industrial sector. First of all, the KPIs listed at page 5 have to be revised, because they are now only applicable for the energy sector and not for industries.

CO_2 utilisation

Enhanced oil recovery (EOR) combined with CO_2 storage is an option that could give economic viable value chains. CO_2 EOR projects could also give the experience with CO_2 injection that is needed to accelerate the deployment of large scale CO_2 storage in aquifers without the EOR component.

There is a huge potential for CO_2 EOR in the North Sea, but several oil field that are good candidates for CO_2 EOR are in their late production phase and the time window for EOR is limited. Actions on CO_2 EOR should therefor start now.

CO_2 EOR should have a higher priority in the CCS Issue Paper. Apart from EOR the CCS Issue Paper has far too much focus on other options for utilisations. We suggest reducing this focus, because utilisation of CO_2, apart from EOR, has a limited potential for reducing European CO_2 emissions.

Collaboration with key countries outside Europe

CCS has been demonstrated large scale in North America. Europe should establish stronger collaboration with the US and Canada to ensure knowledge sharing. CCS demonstration in Europe is important, but it must be based on experiences and learnings from the North American projects.

The future European energy mix

Renewable energy will in the future have a high share of the European energy mix. Fossil fuel with CCS will play a key role as backup for the intermittent renewable power. As a consequence, KPIs related to Levelised Cost of Electricity is not the best way to measure CCS performance.

BECCS – Bio Energy with CCS

Reaching the COP21 ambition of limiting global warming to 1.5 ^{o}C will most likely require CO_2 to be removed from the atmosphere in the second half of this century. Bio energy with CCS is one of the most promising options for negative CO_2 emissions. We strongly recommend that BECCS gets a high priority in the CCS Issue Paper.

Legal barriers

Removal of legal barriers, like the challenge of cross-border CO_2 transport, should be addressed in the CCS Issue paper.

Key objectives and targets by 2020

We suggest changing the key objectives and targets by 2020 to reflect our arguments listed above. In addition we would like to add the following comments.

- *Ref: "Completed feasibility studies applying CCS to a set of clusters of major industrial CO_2 sources (at least 3 clusters in different regions of the EU)"*: This can easily be achieved, and the objective should be more ambitious.

- Ref: "*An up-to-date atlas of the geological storage capacity that has been identified by various national authorities in Europe. This will provide additional certainty that the required CO2 storage capacity will be available when needed*": An European CO_2 storage atlas can easily be established by 2020. The challenge is a suitable methodology and varying quality of available data. The wording should be changed to include an atlas based on high quality data and mutually accepted by authorities and potential storage operators.

- Ref: "*At least 3 pilots on promising new capture technologies, and at least one to test the potential of Bio-CCS*": In order to avoid confusion there should be a definition of what a pilot is. Technology Readiness Level (TRL) and the required scale in terms of annual tonnes CO_2 captured should be listed in such a definition.

- *Ref*: "*At least 3 new CO_2 storage pilots in preparation or operating in different settings":* This is an important objective, and this can be done to the point of drilling, maybe even injection – if work starts now. More details could be included: The purpose of such pilots would be to investigate CO_2 storage in different geological settings as well as a demonstration to the public, and to decision makers, that geological storage of CO_2 can be handled efficiently and safely in a fashion similar to geological storage of natural gas which is now well accepted throughout Europe. Candidate sites could be Hontomin (Spain), Sulcis (Italy), and a Czech project currently in its initial phase. Additionally, it would be attractive to look for an offshore pilot but this is expensive and would have to be in combination with other activities (e.g. oil or gas exploration well or an EOR pilot). An EOR pilot could possibly kick-start demand for CO_2.

- *Ref: "At least 4 pilots on promising new technologies for the production of value added chemicals from captured CO2":* This objective puts too much weight on a route which is not relevant for fighting global warming.

Key objectives and targets on the road to 2030

Key objectives and targets on the road to 2030 should also reflect arguments listed earlier. In addition we would like to add the following comments.

- *Ref: "MS to deliver on their 2030 nationally determined contributions to the COP21 agreement, and in particular decide on the need for CCS to achieve these targets and make them compatible with the 2050 long-term emission targets"*: This is an important objective, but 2030 seems very late.

- *Ref*: "*MS having prepared plans for retrofitting until 2040 at least 90% of their fossil fuel power plants capacity which they expect to be still operational beyond this date":* This objective should also be in place well before 2030.

- *Ref*: "*MS having prepared, if appropriate in regional cooperation with other MS, feasibility studies for applying CCS in all major clusters of energy and carbon intensive industries in the EU by 2035, cooperating across border for transport and storing CO_2"*: The objective is very important, but, again, 2030 is too late. If this is not in place well before 2030 there is a large risk of missing 2050 targets.

- *Ref*: "*Further develop the potential of the industrial use of captured CO2, in particular through a Project of Common European Interest* ": The focus on *use of CO_2* should be replaced by captured and stored CO_2.

KPIs

It has been argued above that a different set of KPIs are needed. There also seems to be a mismatch between some KPIs and the ambitious key objectives and targets by 2020. Furthermore, there are too few KPIs addressing storage. We suggest consulting EERA and ZEP to find more suitable KPIs.

Yours sincerely,

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