Draft Report of the meeting of the ECCP working group on carbon dioxide capture and geological storage (CCS)

on

The Impact Assessment of the enabling legal framework for CCS

8 March 2007
Charlemagne building, room DURI, Rue de la loi 170, 1040 Brussels

Agenda Item 1: Welcome and Introduction

The Chair, Mr. Piotr Tulej, welcomed participants and stressed that the meeting represented a valuable input to the Commission's preparation of a legislative proposal for carbon dioxide (CO_2) capture and geological storage. He emphasized the EU's commitment to limit average global temperature increases to 2^{o}C above pre-industrial levels and stressed the role and importance of CCS in this context. He drew attention to the fact that the European Council urged the development of the necessary framework to bring safe carbon capture and storage (CCS) to deployment with new fossil-fuel power plants, if possible by 2020, and he explained that the Commission Legislative Work Programme for 2007 includes the development of an enabling legal framework for CCS.

Purpose of the meeting

As the Chair explained, the Commission would like to outline its plans with regard to CCS and to consult on (i) the scope of the impact assessment, (ii) the identified options for managing risks, removing barriers and promoting development, and (iii) the possible outline of a regulatory framework. The Commission had sent two reports to participants for their comments.

Agenda Item 2: Why CCS? Role as part of a suite of measures to meet 2°C commitment

Presentations

In his presentation Mr. Scott Brockett (European Commission) gave a brief introduction to CCS and then he explained why safe and widespread deployment of CCS by 2020 is needed for meeting the EU climate change objective. He referred to the importance of CCS to achieve significant CO_2 emission reductions globally and presented the work of the International

Panel on Climate Change's Special Report on CCS showing significant storage capacity both worldwide and in Europe. Mr. Brockett presented also the IPCC assessments on the risks of CCS: the risks of adverse impacts from transport of CO_2 are similar to or lower than those of current hydrocarbon pipelines; and with appropriate site selection, monitoring and remediation the risks of CO_2 storage would be comparable to those of natural gas storage or Enhanced Oil Recovery. Finally, Mr. Brockett emphasized the necessity to establish a comprehensive regulatory framework for CCS to enable adequate risk management, and stressed the importance of the Communication on Sustainable Power Generation from Fossil Fuel's objective of setting up 10-12 demonstration plants to facilitate development and widespread deployment of CCS by 2020.

Mr. Hans Spiegeler (MINVROM, NL) outlined the views of the Netherlands. He emphasized that CCS is a necessary, yet intermediate solution in the process of establishing sustainable energy systems. The ambitious Dutch energy and climate targets will make CCS indispensable in his country. Mr. Spiegeler summarized the need to build new coal-fired power plants in the Netherlands and informed about the costs to deploy CCS with new/existing power plants, as well as about the storage capacities for CO_2 in the Netherlands. Finally, Mr. Spiegeler enumerated the most important preconditions for widespread deployment of CCS by 2020, such as setting clear CO_2 targets at EU level, safeguarding the credibility of CCS in the ETS and addressing issues related to long-term liability and post-closure regimes.

In his intervention, Mr. Stefan Singer (WWF) expressed the view of WWF. Mr. Singer stressed that CCS is an uncomfortable but necessary solution to stay below 2^oC. By 2025 about 70% of all coal-fired power plants in the EU will be replaced; if CCS is to play a role, this should happen before 2020. Mr. Singer underlined that the legitimacy of CCS depends on the Commission's commitment to provide strong support to energy efficiency and renewables both short- and long-term, to support decentralized energy systems, to strengthen the caps in the EU ETS and to reduce nuclear energy. Regarding governmental support, focus should be placed on geological storage to safeguard that this can be accomplished in a safe, environmentally friendly way. Finally, Mr. Singer expressed the wish of WWF, to have a carbon-free power sector by 2035 in the EU and to adopt a EU-wide moratorium on all conventional new built power stations that emit more than CHP CCGT technologies.

The presentation by Mr. Arve Thorvik (Statoil) informed about the work undertaken by the EU technology platform on Zero Emission Fossil-Fuel Power Plants (ZEP). The platform focuses on CCS and aims to enable EU fossil-fuel power plants to have zero emissions by 2020. It focuses on the development of policies to enable CCS, development of risk management systems to achieve political support and public acceptance at large in the EU, and development of market mechanisms to facilitate CCS deployment. Mr. Thorvik stressed that international cooperation plays an important role and that cooperation with China should be intensified in future. He pointed out that new EU legislation is needed for the regulation of geological storage sites and that for CO_2 capture and transport ZEP favours the amendment of existing legislation rather than the development of a new regulatory framework for CCS. The platform also works on flagshipping the 10-12 CCS demonstration plats which will be built by 2015.

Discussion

Asked about funding, Mr. Spiegeler informed that the Netherlands will only provide governmental support for CCS until 2020, during the learning curve of CCS. However, a decision regarding funding mechanisms has not been adopted.

Regarding the Commission's view on coal Mr. Brockett clarified that as long as CCS will be applied there is a future for coal, both in the EU and internationally. The Commission has two objectives for its energy policy: to increase energy security and to meet the 2°C climate objective. The Impact Assessment of the Communication on Sustainable Power Generation from Fossil Fuels concluded that there is no way to meet both constraints simultaneously without CCS; energy efficiency improvements on their own would not be sufficient. For that reason the Communication had stated the Commission's belief that all new coal-fired power stations should apply CCS from 2020 onwards.

Finland pointed out that plant size matters when defining the "capture-readiness" obligation for fossil-fuel power plants after 2015, and that CCS cannot be applied to small distributed power plants on gas and/or using combined heat and power (CHP), which are mostly used as backup plants or in the case of peak-loads. The discussion confirmed that for CCS the focus will be on big CO_2 emission sources.

EURACOAL welcomed the Commission's efforts to draft an enabling legal framework for CCS and to promote demonstration. It commented that energy efficiency of coal-fired power generation has substantially improved and that further improvements are projected.

WWF stressed that in the European fossil-fuel power sector there is a trend to switch from gas to coal due to the gas-coal price ratio and driven by concerns over energy security. Coal is likely to become the fuel of choice over the next 10-15 years in particular if the phase-out of old nuclear power stations will continue. To simply replace all these energy options with new coal-fired power plants is not an option if the Commission wishes to meet its 2°C climate change objective.

After acknowledging the importance of CCS Austria reminded participants about the energy penalty related to CCS and about the increase of emissions given a higher consumption of coal. It expressed the wish that CCS should not be treated on a similarly favourable basis to other conventional energy options to reduce greenhouse gas (GHG) emissions.

The Commission pointed out that energy efficiency and renewables must be the front line of the efforts to achieve a sustainable and secure energy system, but that they alone are insufficient to meet the 2°C climate change objective and therefore CCS will be needed in the near future. CCS does indeed have an energy penalty, which is the energy used to capture and store a large percentage of the emissions that would otherwise be emitted to atmosphere. The key issue is to ensure that this storage is safe and this is the Commission's primary objective. Once a framework is in place ensuring that CCS is safe, widespread deployment of CCS can follow.

Agenda Item 3: Main issues to be addressed in impact assessment

Presentations

Mr. Mihai Tomescu (DG ENV) presented the preliminary findings of the on-line public consultation on CCS that was carried out by the Commission. The consultation was translated in 19 member states languages and has received some 800 responses. Respondents moderately supported the view that CCS is as good as other conventional energy options to reduce greenhouse gasses (GHGs) and showed a moderate to strong preference for CCS when this was compared to nuclear energy generation. According to respondents, the key issue lies in assuring that the geologically stored CO_2 stays underground in the long-term. Among participants who consider CCS less good than conventional options to reduce GHGs the main concern is that CCS will drive resources and attention away from renewables and energy efficiency. However, participants consider that CCS can provide emission reductions in addition to RES and EE and therefore CCS is seen as a bridging technology, until long-term alternatives are developed. The consultation indicates a moderate to strong support for the CCS measures stated by the Commission in its Communication on Sustainable Energy Generation from Fossil Fuels.

Mr. David Reiner (University of Cambridge) presented the key findings of an EU-funded survey of about 500 stakeholders in Europe, which focused on the acceptance of and perception on CCS. The survey indicates that about three quarters of the respondents think that CCS is definitely or probably necessary to achieve deep reductions in CO_2. Among the key issues for widespread CCS deployment participants indicated the availability of geological storage sites and the price for carbon under the EU ETS. Half of the respondents indicated that CCS should receive incentives similar to those for renewables; the majority of respondents believe that CCS-related risks are "moderate" or "minimal.

Mr. Ger Klaassen (DG ENV) outlined and explained the four options that will be considered in the frame of the impact assessment (IA). In the baseline, the next 20 years will represent a coal revival given the coal-gas price ratio, but the European Council's decision to reduce greenhouse gas emissions in 2020 by 20% and to reach 20% renewables in the total energy supply by 2020 would create incentives to deploy CCS. The impacts will depend on whether CCS is enabled or made mandatory With regard to future CCS policies, Mr. Klaassen emphasised the possible positive impacts of CCS employment on air quality.

Discussions

The Commission explained the procedure of carrying out public internet consultations. It highlighted that such consultations are open to stakeholders and to the general public and that there is a certain limitation posed by the self-selection process within the respondents' group (individuals with strong opinions, substantial knowledge and/or a high stake in the topic may be more willing to spend time responding to the consultation than the others).

Responding to the point raised by the coal industry – that current technical knowledge on CCS is insufficient and a decision on making CCS mandatory should therefore be delayed until more information will become available – the Commission explained that up until now no serious technological barrier has been reported by technology providers. The ZEP platform confirmed the view of the Commission and stated that the technology is functional, but would need to be adjusted to suit CCS operations.

The Commission underlined that it is totally engaged in developing renewables and energy efficiency in future, and stressed that the Action Plan for Energy Efficiency, the Renewable Energy Road Map and the targets for renewables and energy efficiency adopted by the European Council based on these clearly reflect this engagement. On subsidies for coal production, it explained that issues are currently being discussed in the Commission and they will be detailed in a forthcoming Commission report.

The discussion made clear that a coherent European policy is necessary in order to meet the climate and health objectives. Emergent CCS technologies can significantly reduce SOx and NOx emissions and therefore CCS can help meet the objectives under the Thematic Strategy for Air Pollution. Specification of mandatory emission limit values for fossil-fuel power plants is most likely to have the same effect as making CCS mandatory through regulation.

Agenda Item 4: Options for managing risks and removing barriers

Presentation

Mr. Paul Zakkour (ERM) informed about the nature of the risks posed by CO_2 capture, transport and storage and described the needs of a regulatory framework to manage these risks. The legislative options for regulating risks under existing EU law could include the Environmental Impact Directive (EIA), the Integrated Pollution Prevention and Control Directive (IPPC), the Seveso Directive, the Environment Liability Directive (ELD) and the EU Emission Trading Scheme (ETS). The application of waste management legislation is probably no real advantage to regulate CCS. Mr. Zakkour listed a series of outstanding issues, such as harmonizing consenting procedures for storage sites at member state/EU level, choosing the right regulatory instrument to set technical standards for CO_2 storage sites, and whether the Seveso Directive should apply to CCS operations.

Discussions

The discussion about monitoring revealed that to date there are no specific recommendations regarding the monitoring requirements for storage sites in the injection and post-closer phases (frequency, type of monitoring, duration in time). Nevertheless, the requirements will be designed so as to fit the purpose while also being cost-effective. Most likely, they will include simulation of CO_2 behaviour in the storage site, actual monitoring of CO_2 behaviour after injection, simulation of long-term behaviour and anticipation of long-term behaviour of CO_2 in the geological sink.

Mr. Zakkour pointed out that if the EU waste legislation were to apply to CCS activities, than this legislation would need to be substantially adjusted so as to accommodate for CCS. It might be therefore better to draft a specific enabling legal framework for CCS.

The representative of the ZEP platform, Mr. Thorvik, expressed his wish to devise a single set of regulations for CCS at EU-level, rather than different regulations at member state level. Mr. Thorvik further suggested that the Commission should look closer at the existing mining laws, which cover also the issue of mine-closure, and which could provide a good basis for treatment of liability in the context of CCS.

Regarding the definition of CO_2 as waste, Mr. Zakkour explained that the CO_2 stream contains other impurities and therefore, in theory, the waste legislation applies. He indicated that in theory the waste legislation could be disapplied from CO_2 storage by amending the latter.

Asked about how the EU ETS will apply to CCS, Mr. Zakkour indicated that during phase II of the ETS, CCS will have to be opted in as a single installation (including capture, transport and storage), whereas phase III could be amended to include CO_2 transport and storage sites separately. This would accommodate for the scenario with multiple pipeline operators and separate ownership and operation.

Agenda Item 5: Options for stimulating deployment of CCS

Presentations

Mr. Tim Dixon (UK Department of Trade and Industry) gave an overview on the work on CCS in the UK, with a view on opting-in CCS in the EU ETS. He stressed the CO_2 mitigation potential of CCS and highlighted the efforts currently underway to give confidence for an environmentally sound CCS. He informed that the UK has notified the Commission about the intention to opt-in a CCS project under the EU ETS, and pointed out that the UK is in the process of drafting interim monitoring and reporting guidelines to assist the work of the Commission and to give confidence that CCS can be implemented in a safe way.

In her presentation, Ms. Heleen de Coninck (ECN) described the various options to incentivise CCS at member state and EU-level and explained the likely effects CCS will have on the EU carbon market, which will call for a tightening of the caps. She presented the various incentivisation policies and their ideal timing so as to provide the most adequate support to CCS during R&D, demonstration, upscaling and commercialisation phases. The policy analysis indicates that, although the EU ETS provides cost-effective incentives for CO_2 reduction, market failure and low carbon prices may hinder CCS deployment and therefore additional incentives are necessary if widespread deployment of CCS is to be achieved.

Discussions

CCS stakeholders (Alstom) expressed their wish for higher CO_2 prices and tighter caps that would constitute the best incentive to apply CCS in future, and explained that one measure to support various CCS technologies without disadvantaging other renewables is to provide feed-in tariffs for electricity sourced from CCS plants during an initial phase. WWF stressed that the EU ETS will probably fail to provide sufficient incentives for fast and widespread CCS deployment, and that a mandatory requirement to apply CCS in all fossil-fuel or coal-based power plants may act not only to ensure CCS deployment, but also as an incentive for renewables, because of the increase in the electricity price that it would stimulate. That effect would apply also to other non-carbon technologies such as nuclear power, but for nuclear, constraints of political and public acceptance would be the determining factor.

Responding to a question about handling seepage, Mr. Dixon described a three-phased approach based on general monitoring of the CO_2 plume behaviour, specific monitoring if seepage has been identified and finally purchase of an amount of carbon credits that is equal to the CO_2 seepage and their surrender to the competent authority.

With regard to the cooperation with China to facilitate CCS deployment, WWF underlined China's fast growing energy demand that cannot be met only with internal coal supplies. Given the specific energy penalty associated with CCS use, which would pose even more constraints to China to meet its growing energy demand, WWF argued that the cooperation should be extended to include other non-coal energy options. Mr. Dixon explained that the UK government is looking also to other, non-coal solutions to address China's growing energy need.

Asked about the treatment of CCS in the revised Environmental Guidelines for State Aid, the Commission explained that discussions are taking place within the Commission and that a proposal will be sent to Member States and stakeholders soon.

Mr. Dixon specified that at the time being the UK has not decided about a particular set of policies to support CCS during the demonstration phase, but the considered options include investment support, operation support or a potential combination of these.

Agenda Item 5: Outline of legal framework and further planning of impact assessment

Presentation

The final presentation, by Mr. Scott Brockett (European Commission), outlined the Commission's initial thoughts on the enabling legal framework for CCS. The Commission inclines to regulate CO_2 capture under IPPC, to leave the transport of CO_2 under the jurisdiction of Member States and to adopt a comprehensive regulatory framework similar to the IPCC guidelines for CO_2 storage sites. Mr. Brockett explained why during an initial phase centralised verification of the draft permitting procedures for storage sites would be useful. For the purity of the CO_2 stream he outlined a proposal requiring application of, Best Available Techniques, the emission limits defined for air quality under the Large Combustion Plants (LCP) Directive, as well as constraints relating to potential risk to the security of transport and storage. To enable CCS deployment, the Water Framework Directive and the waste legislation need to be amended and suggestions were proposed. The Commission presented the rationale of having a free-standing legal framework for CCS. Mr. Brockett outlined an initial liability scheme for CCS and focused on the inclusion and future treatment of CCS under the EU ETS. He explained the Commission's impact assessment work on making CCS mandatory after 2020 and concluded by indicating the timing of the CCS Impact Assessment and the foreseen adoption of the legal framework by the Commission, in November 2007. He encouraged participants to submit their comment and suggestions on the Commission's drafting of a legislative proposal for CCS before 31 May.

Discussions

Regarding the purity of the CO_2 stream the Commission acknowledged that from a risk-based perspective there is no scientific basis to adopt air quality limits for geological CO_2 injection. However, its view was that meeting the LCP requirements would not pose any significant burden on CCS technologies and that the requirement would defuse a potentially controversial issue and thus promote a broader base of support for CCS.

Some energy stakeholders voiced concern over a centralised approach to verifying security of the storage site. The Commission emphasised that the rationale for this is limited to the transitional period in which is not possible to establish implementation guidelines and best-practices for site selection, characterisation, monitoring and so on. In the absence of such guidelines, a centralised approach during this limited phase is justified in order ensure that the framework methodology is properly implemented across Europe and so ensure public confidence in the early development of storage. The experience gained on permitting of storage sites would then allow the development of guidelines, at which point the centralised approach would no longer be necessary.

Regarding the amendment of the Water Framework Directive to allow CCS it was clarified that injection of CO_2 streams for storage purposes into geological formations will be permitted on the basis that these geological formations have been found to be permanently unsuitable for other purposes. 'Permanently unsuitable' is used in the context of natural gas storage in the Water Framework Directive, and is understood to mean unsuitable for the provision of drinking water, irrigation water etc., and not connected to and sustaining dependent ecosystems.

Two approaches to defining financial provisions for future liability under the EU ETS were discussed. Under the precautionary approach installations would provisionally surrender a certain amount of their emission allowances, which would be reverted to the operator if no leakage occurs. The Commission will try to reformulate the definition of this precautionary approach in order to avoid giving the false impression that a certain level of leakage is expected to occur. Provisions for the case of insolvency of the operator prior to safe closure and decommissioning of the storage site will be defined by following the principles outlined in the Landfill Directive.

Two alternatives are being addressed in the impact assessment on making CCS mandatory. These alternatives are (1) by specifying the application of the technology and (2) by setting specific emission limit values. Concerning the retrofitting obligation for new power plants and the request that new plants should be *capture-ready*, the Commission is awaiting more guidance from the impact assessment (IA). The IA will also assess the risk that a retrofitting obligation would provide a perverse incentive to existing operators to request a prolongation of the lifetime of their installations. The Commission commented that a retrofit obligation would obviate the need to define capture-ready, as it would then be for the operator to determine how much investment it was worth making at the point of building in order to make later retrofit cheaper.

In response to questions about why an opt-in approach might continue for the EU ETS for Phase III (2013 onwards) the Commission first of all explained that the proposed opt-in would allow classes of CCS installations to be opted-in for all Member States: the opt-in would not be site by site. The rationale for such an approach would be to enable the Commission to scrutinize any new class of installations to ensure that adequate monitoring and reporting requirements were in place, in order to safeguard the integrity of CO_2 storage.

The Impact Assessment will consider both the alternative of applying CCS to coal, but also gas and other fossil fuel. In the first instance the impact assessment will focus on the impacts of mandatory application to the power sector, on the grounds that it is the major emitter, and that for certain other categories of installation for which CCS is suitable, it can be done more cheaply than for the power sector and so is more likely to be stimulated by the ETS in any

case. According to industry stakeholders significant capture capacities exist in the steel industry, where some 80-90% of the CO_2 emissions from the blast furnace can be retained.

Conclusions

The Chair concluded the meeting by thanking the presenters for their interventions and by emphasising that the Commission has adopted an ambitious schedule for the finalisation of the enabling legal framework for CCS. He stressed that immediate action is needed if the European energy and climate targets are to be met. He concluded the meeting by pointing out that:

- the deadline for submitting comments and suggestions is the end of May and it should be respected.
- a report of the meeting as well as the presentations will be circulated to participants and will be published on the web.
- http://ec.europa.eu/environment/climat/ccs/consultation_en.htm.
- if necessary, a follow-up meeting will take place around September 2007.