Thematic Report

Regulatory Development Session May 2012

A report from the European CCS Demonstration Project Network

Website version

Proceedings from the Cottbus knowledge sharing event 24th/25th May 2012

Summary

This report presents the discussions, conclusions and actions agreed at a one-day thematic workshop on regulatory development which was held at the Schwartze Pumpe power plant (Germany) on 24 May 2012. Prior to the event, in a webinar, the network members identified a number of key issues to focus their knowledge sharing event on:

- financial issues, liability and responsibility;
- the transposition of the EU Storage Directive 2009/31/EC (CCS Directive) into national laws; and
- lessons learnt from the ROAD storage permitting process.

At the Cottbus knowledge sharing event, there was a fruitful discussion with the projects actively sharing their experiences. Most of the discussion centred on the ROAD project, as it is one the most advanced projects and other projects were keen to learn from their experiences. Below is a short summary of the key findings that came from each of the sessions.

Financial issues, liability and responsibility

- There was a high level of concern among the members that the current manner of implementation of the CCS Directive presents a significant financial hurdle for attaining a feasible project;
- Using a risk-based assessment for the Financial Security (FS) reduces the requirements to a much more feasible level;
- All of the projects gave an update of the state of transposition of the CCS Directive in their countries. All are on track for full transposition, although some are doing so in a draft form;
- ROAD emphasised that the national transposition of CCS Directive should be as general as possible and that site-specific or storage-type specific issues should not be included. The guidance documents give insufficient clarity and appear to be focused on storage in aquifers;
- Regulation concerning civil liability is not addressed in the CCS Directive and could prove problematic if it is not addressed by member governments.

Storage permit process

- A brief overview of relevant topics of concern regarding the storage permitting process was presented by ROAD. The civil act for storage liability is a separate process which is still on-going.

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Introduction

The European CCS Demonstration Project Network has continued the permitting theme of the previous year, while providing a greater focus on regulatory issues surrounding the implementation of the CCS Directive within the legal framework of the different member states. During the pre-event webinar regarding regulatory issues on the 2nd of May, the network members identified a number of key issues to be the focus of the knowledge sharing event, these include: financial issues, liability and responsibility; the transposition of the CCS Directive into national legislation; and lessons learnt from the ROAD storage permitting process.

1. Financial issues, liability and responsibility

The provision of a financial mechanism and financial security (FS) have been topics that have come under close scrutiny since the CCS Directive was enacted, and was a topic explicitly addressed within one of its subsequent guidance documents.[1] Under the Directive there is a requirement for a project to have financial security, or equivalent, which is capable of carrying the burden of liability for the period of operation of the project and for an additional period following closure of the storage site until transfer of responsibility is made to the relevant authority.

The topic of financial security is becoming more important as projects proceed further through the permitting process. The size and scope of the liabilities covered is compounded by the lack of financial mechanisms in the market place today. The challenge for suppliers of financial mechanisms is that there will be a long operation, closure and post-closure time period, an issue compounded by a lack of data and practical experience.

1.1 ROAD's experience

1.1.1 Status of the Project

The ROAD project is still on track to start injection by 2015 / 2016. A storage permit is now in place, however, the project is still waiting for the publication by the Dutch Competent Authority (the permit will be held by TAQA, the storage operator); see also section 3. The project has been working extensively on the technical specifications of the transport and storage infrastructure, supported by the national CCS research project CATO-2, and in the next few months the project will take its final investment decision.

1.1.2 Financial Security

Under the CCS Directive, Article 19(2) clarifies that a Financial Security is required to satisfy the estimated cost of meeting the obligations arising from a permit issued pursuant to the CCS Directive as well as obligations arising from the ETS Directive (2003/87/EC). Specifically, in the case of ROAD, some of the items covered in the FS are:

- Monitoring of wells;
- Contingency monitoring;
- Corrective measures;
- Abandonment well P18-4A2;
- CO_2 proof abandonment P15-9;
- EU-ETS price of any CO_2 leaked; and
- A contingency level of 20%.

The FS therefore contains known costs (such as monitoring costs) as well as unknown (but estimated) costs, such as those due to leakage (i.e., leakage of CO_2 out of the storage complex). The ROAD project used a risk-based approach to quantify the unknown costs.

[1] http://ec.europa.eu/clima/policies/lowcarbon/ccs/implementation/docs/gd4_en.pdf

This approach considers the possible scenarios for a CO_2 leak, calculates the volume of CO_2 that would be lost, and the probable CO_2 price. Based on operating experience, the worst-case estimate of stopping a 'blow out' would see a maximum of 3 months of release before it could be stopped, releasing CO_2 at more or less the same rate as it was injected. Over the project-life time this is assumed to result in a maximum loss of 3% of the stored CO_2. However, as the CO_2 price is not fixed, but based on the market, there is a cost uncertainty. While the most reasonable price is the one experienced at the time of storage, ROAD is assessing several options to cover this uncertainty. It is to be noted that the site characterization study ruled out any leakage mechanism other than a well blow out. A fault separates the storage site from another depleted gas field, which has been concluded to be sealing following work done by TAQA. This report is part of the permit application and is therefore already public.

The conclusion is that the above method could be used for other projects and sites, with the approach being tailored to the leakage mechanisms and (estimated) leakage rates that have been identified.

This approach caused considerable discussion around the table, as the risk-based approach reduces a potentially large FS to a much more feasible one. It was mentioned that DECC (UK) is currently commissioning studies that are relevant in this respect: a study of leakage scenarios and leakage rates. The study will be finished towards the end of Q4 2012 and should be made publically available.

The choice of financial instrument strongly affects the cost of the FS (for ROAD the choice of instrument is almost more important than the amount of the FS). ROAD has agreed with the authorities to use a parental account (basically stating that the mother company of TAQA Netherlands is large enough to carry any risk from the storage project). It is envisaged that an update of a parental guarantee will be given in 2014. The FS must be set six months prior to injection, and for ROAD will be updated on a yearly basis.

The storage site for the ROAD project is not large, which means that when a new compartment of the P18 field is to be developed, a storage permit for the new compartment will need to be obtained.

1.2 Jänschwalde's experience

1.2.1 Status of the Project

The development of the Jänschwalde project was stopped due to the political situation in Germany at the time, and a seeming lack of public acceptance of CO_2 storage. There appeared to be a lack of consensus on the country's future energy strategy, due to strong opposition to nuclear, coal and lignite fuelled power generation.

At the time of Jänschwalde's cancellation there had been no, or little, progress on the transposition of the CCS Directive into German regulation – making it impractical for the project to proceed.

The following critical points were presented at the knowledge sharing meeting:

- The current situation is counter-productive for the development of CCS, with federal states able to opt-out of CO_2 storage (which still appears to be the case with the draft law on the 28 June 2012, approved by the parliamentary mediatory committee).
- Discussions are ongoing, on a national (federal) level, but progress is impossible until the EU applies pressure on Germany to fully adopt the CCS Directive;
- The current law is for test projects only (a maximum storage of CO_2 of 1.5mtpa). Even if passed, there remains great uncertainty about the regulatory environment at scale and a revision of the CCS law is foreseen for 2016;
- The most suitable storage sites are in Northern Germany, while most of the CO_2 production is located in other areas;
- Land owner rights are unclear in relation to CO_2 storage;
- There is competition with other activities for the use of potential storage sites, such as geothermal; and
- The draft law specified that the transfer of liabilities would only take place after 40 years (rather than the period of 20 years specified in the CCS Directive).

While underground gas storage is currently regulated in Germany under the mining law, CO_2 storage cannot be undertaken under that law.

1.3 Compostilla's experience

1.3.1 Status of the Project

It is envisaged that the process for FID for the Compostilla project can be started in December 2012, which is a significant delay from the original planning. The main reason for the delay is due to the administration process, resulting from the new Spanish transposition of the EU CCS Directive legislation, Law 40/2010. As a result of implementing the law before the deadline the Spanish government was not able to consider the four guidance documents that were released in March 2011, and CO_2 transport is not fully covered by this law.

For the Compostilla project, exploration permits to drill wells and undertake seismic analysis have been granted under the Spanish mining law.

Currently, the political situation with regard to CCS in Spain is uncertain and has made contact with relevant authorities of the government difficult.

1.4 Belchatów's experience

1.4.1 Status of the Project

PGE GiEK SA is seeking to arrange as much non-refundable support as possible, such as financial grants, and the following sources of financing are expected to be used:

- European Energy Plan for Recovery EEPR – 180 million EUR based on Grant Agreement signed on 05/05/2010;

- Emissions Trading Scheme NER300 Programme – the application was submitted 09/02/2011, with an award decision expected at the end of 2012; and
- Norwegian Financial Mechanism– a Memorandum of Understanding was signed 10/06/2011, and the programme is being presently assessed by Financial Mechanism Office in Brussels.

There is a national financial mechanism presently under the evaluation in Poland aiming to refinance both the net operating losses and capital expenditures that are not covered by grants.

The activities concerning selection of preparatory works for the CO_2 transport contractor have been started. Now PGE GiEK S.A. has undertaken activities aiming the organization of the Phase II of the storage - Site Characterization.
In Poland, the Ministry of Environment is responsible for the transposition of the CCS Directive into Polish Law and for permitting CO_2 storage. A draft Act to transpose the CCS Directive and amend existing laws has been created and presented to the Polish Legislative Center. The legislation is likely to be transposed by way of amendment to existing legislation and most of the provisions will be included in the Geological and Mining Law. PGE GiEK S.A. has been actively participating in the transposition process by commenting on the draft Act.

1.5 Porte Tolle's experience

1.5.1 Project status

Enel announced they are awaiting a final decision of the State Council. It seems that there may soon be a further clarification regarding the ruling of the State Council (n. 3107/2011) which voided the Porto Tolle EIA in May 2011 as it did not include adequate comparison of alternative project design (gas and coal), nor adequate motivated differences among the imposed prescriptions to Enel by the Provision EIA related to the issues of carbon monoxide emissions and the reference values pointed out in the BRef.

At the 22nd May 2012 hearing of the State Council, the action brought by the Ministry of Environment on compliance to the judgment of May 2011, Section VI, asked if the EIA process should be applied to new Veneto Regional Law (which repealed the comparison between gas and coal) or the previous Law that was in force at the time of the judgment. The environmental association lawyer has again insisted on the alleged conflict between the new Regional law and the Environmental Assessment Directive 85/337, which still provides for a comparison with other design alternatives.

All parties involved have confirmed that:

1. The EIA Directive 85/337 does not require such comparison from the Administration;

2. That alternatives have been already evaluated by Enel in the EIA;

The State Council is expected to provide a final decision shortly to resolve this issue.

1.5.2 Financial topics

The project is following the procedure also used by ROAD. The following financial issues have been given: cost of monitoring; costs to ensure that CO_2 is completely and permanently contained and, in the case of environmental damage, costs to ensure environmental restoration.

1.6 Don Valley experience

1.6.1 Status of the Project

The project has been moving ahead very quickly with:

- The section 36 planning permit is in place for the 650MW power plant;
- The initial public consultations for the onshore pipeline and above ground infrastructure have been completed;
- A preferred onshore pipeline route corridor has been announced;
- Major technology providers have been selected for the capture plant;
- The capture plant FEED was completed, with a value assurance (VA) FEED expected to be completed in March 2013;
- Tax structure discussions are on-going with treasury;
- Storage license and lease terms discussions are underway with DECC and The Crown Estate respectively;
- Power plant site preparation has started with 10 Mt of mine waste being removed and a new road has been constructed; and
- Samsung has agreed to take a strategic 15% stake in 2Co Energy's Don Valley Power Project.

They expect contracting of the EPC services for the power plant will take place in next few months.

The project is considering both saline storage and EOR. Plans are in place, and discussions are in an advanced stage for both. The initial priority is to get the main framework license to store, then the storage permit will be the next step.

2CO has just joined with the Scottish Government to create a new EOR Institute at the University of Edinburgh (Stuart Hazeldine) and they are undertaking a study into the combination of CCS and EOR. This is considered a potential driver for CCS in the North Sea, although the first real project is yet to be developed.

National Grid is currently working on the pipeline routing. There are some challenges along the way as current regulations in the UK, which consist of the EU CCS Directive plus additional regulation, give rise to many issues that the proponent must work through. In particular the authorities have powers to impose variation conditions (which could amend the pipeline routine in order to support later projects) - and pipeline permits require highly detailed plans and extensive consultation.

1.6.2 Financial plan

Two separated financial models are envisaged, as the financing plan of the power station has been separated from the financials of the storage components.

CO_2 infrastructures that have multiple users sharing services would provide optimized transport cost. This is part of the optimization of the financial plan (users may be separately charged, and is currently an on-going discussion).

1.6.3 Financial Security and liability topics

The current situation in the UK has not changed substantially: the EU CCS Directive presents a significant hurdle for projects attempting to obtain their FID - mainly because of the FS requirements. Certain key issues were not resolved in the context of the first Department for Energy and Climate Change (DECC) CCS competition process, which concluded in Oct 2011. DECC is now actively engaging with Don Valley and other project proponents under the auspices of the DECC CCS Commercialisation Program (currently underway) pursuant to which confidentiality restrictions prevent their discussion.

Overall the following activities are being undertaken:

- The CCSA regulatory Working Group is preparing a Financial Securities paper listing and explaining the various options, in order to inform industry and regulators. This paper should help projects choose between different financial mechanisms.
- ClimateWise and the CCSA are working on a study of potential FS insurance instruments. These products may help projects solve some of the FS liabilities being faced by the projects.
- DECC is fully aware of industry concerns and has been undertaking its own evaluation of risks and financial consequences pertaining to North Sea CO_2 storage, and has been seeking input from specialist organisations, storage experts and academia.

2. Transposition

2.1 European Commission overview of the current status of CCS in Europe.

The European Commission kindly provided an overview of developments of CCS within Europe. Transposition of EU CCS Directive is on-going, with all EU Member States being obliged to transpose the Directive by June 25th 2011. Most countries with EEPR projects have completed the transposition.

The Permit of the ROAD project has been assessed by the European Commission. Following a number of comments and questions, the Commission gave a provisional green light. The permit is not fully complete, and in some cases contains high-level agreement of principles. Defining a detailed monitoring plan in particular cannot yet be done, because the specific details are not yet known.

The NER 300 award decision is envisaged for the end of 2012. The first tranche of EU emission Allowances (EUAs) have been sold, with a total value of 824.51 €M, and an average price 8.32 €/ton.

Reallocation of money of the EEPR and the Jänschwalde project is an ongoing discussion, but it is a political discussion. The initial budget of 1.05 b€ was not a reserved budget and the existing funds will not necessarily be recycled back into CCS projects, though Member states will be engaged on how to deal with the budget left 'unspent'. The current spending on CCS projects is 1 b€.

2.2 Project experiences with Transposition

2.2.1 ROAD

ROAD suggests that the national transposition of CCS Directive should be as general as possible and that site-specific or storage-type specific issues should not be included. They felt that the guidance documents give insufficient clarity and appear to be focused on storage in aquifers. They also pointed out that regulation of civil liability is not addressed in the Directive.

Implementation of CCS Directive in Dutch Mining Act was a literal translation and contains no further interpretation. As such the transposition has been implemented by amending existing legislation:

- The Dutch Mining Act (amended June 2011);
- The Mining decree (September 2011);
- The Mining Regulation (September 2011).

3rd party access requirements: Third parties, who connect later and use the same storage site, can use the existing storage permit. It is noted that the permit is owned by TAQA, not by ROAD. ROAD expects 3rd party access to be relatively simple, as operational costs are relatively independent of the storage rate.

2.2.2 Compostilla project

Spain was the only Member State to have transposed the CCS Directive into national law before the deadline of June 25th 2011. The EU CCS Directive was transposed in 2010 (law '40/2010'). However, at the time of implementing the new law the Spanish government was not able to consider the four guidance documents that were later produced.[2]

Although authorities have promised to speed up the storage permitting process for CCS projects, it has been difficult to work with the government and currently there are significant delays in the project due to slow government response to the project. Also the fact that a storage permit procedure in Spain requires a bank guarantee of 20 M€ to start up the permit process has proven to be a significant obstacle to progression.

In addition, the Environmental Impact statement which was produced in March 2012 states that the pipeline permit is not covered in legislation, meaning that it is currently not possible to transport CO_2 by pipeline under the current regulatory regime.

Regarding the current status of permits obtained by the project, there are 2 exclusive exploration permits, 10 permits for drilling wells and an authorization permit for 3D seismic survey. The storage permit has to be reworked to comply with the new CCS law.

3rd party access requirements: the procedure has been worked out, and will follow the EU CCS Directive. It is not expected that third party access will be an issue for the current project.

2.2.3 Belchatów

At the time of the meeting the EU CCS Directive had not been implemented. The Polish Government is working now on a draft Act to transpose CCS Directive into Geological and Mining Law. The draft law for storage is to be in place by December 2012. The draft act for transport is to be ready by June 2012.

2.2.4 Don Valley

There is a high level of concern on behalf of storage developers that the current implementation of the EU CCS Directive presents a significant hurdle to attaining project FID. The state of the transposition is as follows:

- The Energy Act 2008 (including subsequent amendments) established a regulatory framework for the offshore storage of CO_2 within the Crown's Exclusive Economic Zone (EEZ). The Act also sets out the environmental permitting regime, and the provisions for the decommissioning of structures used for storage.
- Storage of Carbon Dioxide (Licensing etc.) Regulations 2010 and 2011 implements substantive provisions of the EU CCS directive, including licensing provisions and FS.
- Energy Act 2011 addressed key infrastructure issues, including pipeline provisioning and installation licensing.
- Storage of Carbon Dioxide (Access to infrastructure) Regulations 2011 (15 September): Applies to on-shore and offshore CO_2 infrastructures and storage; requires the publication of available capacity and CO_2 specifications; the authorities reserve the right to amend the proposed CO_2

[2] http://ec.europa.eu/clima/policies/lowcarbon/ccs/implementation/index_en.htm

pipeline route, to support later projects; and in the event of a dispute third parties have a right of appeal to secretary of state.

UK authorities believe the measures taken are in full compliance with EU requirements.

3rd party access requirements: There are a number of additional third-party access requirements in UK arising from the Storage of Carbon Dioxide (Access to Infrastructure) Regulations. The regulation gives wide ranging powers to the authorities; for example to impose variation conditions, resolve disputes and determine charges. There are a number of uncertainties for developers regarding the manner of operation of the regulations and DECC is working on a further implementation guidance document to assist industry.

It was discussed that the North Sea Basin Task Force (NSBTF) is working on recommendations for the transfer from production to storage for offshore hydrocarbon fields. The recommendation is particularly relevant as both the Netherlands and UK are considering storage in depleted hydrocarbon fields (Norway is only considering deep saline formations).

2.2.5 Porto Tolle

The team gave a brief overview of the project and the groups that are working on the transposition. They found the input from other countries around the table useful, to promote the most project supportive implementation, using experience from the other projects and implementation of the Directive in other countries. An exploration permit will be issued this summer.

2.2.6 Norway

A request to develop and operate CO_2 storage in Norway was put to the market by the Norwegian government. This request is linked to Mongstad full scale project which will require a storage capacity of 1.1 Mton/annum. There are a number of companies in competition to obtain a license from the Norwegian government for the exploration of CO_2 Storage.

The Norwegian government will provide funds for the entire CCS chain. As captured CO_2 is (and will be) scarce in Norway, the new project will also consider CO_2 from other countries.

With regard to the CCS Directive Statoil advised that the Norwegian transposed regulations will be published this summer.

3. Storage permit Process – ROAD's learnings

3.1 Status of the Storage permit

While ROAD is still waiting for the publication by the Dutch Competent Authority, a storage permit is now in place. As indicated above, the permit has been reviewed by the European Commission who gave their 'provisional' opinion. As a complete storage permit application is not feasible within reasonable standards at this stage (it would require that all details are known, which is only possible once a FID is taken and additional studies have been carried out), ROAD has agreed with the Dutch authorities a 'provisional' storage permit application. This means that the monitoring plan is not yet finalized and the storage permit does not yet provide all the necessary monitoring details. Once all of the required data is available, at latest 6 months prior to the start of injection, an updated storage permit will be submitted. (This is also the reason why the opinion of the EU was provisional.)

3.2 Storage Permit: 'open standards'

The CCS Directive introduces several key elements that are left as 'open standards' and are to be addressed by operator and regulating authority. These include:

- The Monitoring plan;
- Financial security and financial mechanism;
- Third party access, open access required by the Dutch government; and
- Criteria for handover responsibility and liability.

Civil liability is not addressed in the CCS directive, meaning that it must be solved at the Member State level. Thus far, the Dutch Government is treating civil liability in line with normal underground activities. The liability period, according to EU Storage Directive, is 20 years after operations stop, however the earlier transfer of liabilities is negotiable.

The transfer of responsibility to the government must include the civil liability. An example of civil liability is damage to third parties. This is currently being discussed with the Dutch authorities and is considered one of the crucial aspects of the agreement with Government.
As mentioned above, the ROAD project is the most advanced in regard to the storage permitting process. The lessons learnt from the ROAD permit process were of high interest to other members, and ROAD presented key findings. These included:

- As a result of the new Dutch regulations regarding the permitting process the storage permit procedure had to comply with the new permit procedure (the so called "national coordination scheme");
- Separate and ongoing discussions are around the Civil act for civil liability;
- The project uses a depleted gas field for storage. Hence it was not necessary to apply for an exploration permit to perform exploration activities. (An exploration license opens the possibility of competition for the storage site.) Only a storage permit was required (and competition is not an issue).
- The ROAD permit application was the first in its kind which lead to some delays at the EC. The tendered the review work for storage permits to external consultants. The delay this caused in the EC response time should be provided for in the project timeline. An

adaptation of the permit, as required by the EC (adding a paragraph from the Directive in the storage permit), could lead to the re-working of the entire procedure for the storage permit;

- One key issue is the simultaneous transfer of responsibility and liability to the government, after injection is complete and the site is considered ready for transfer. Leakage is the main unknown in the financial security. Monitoring should prove that the CO_2 is permanently contained, and that is why a monitoring plan is important. A corrective measurement plan is a second step, reducing the impact of leakage. Storage permits for other storage locations / reservoirs will be needed in case of leakage or migration to a neighbouring reservoir. In the case of a blow-out the time needed to stop the project and close the well (which can be done within 3 months), determines the amount leaked and therefore gives the financial impact; and
- Care should be taken to define the terms migration and leakage with a view to the storage complex: 'migration' is defined as being inside the storage complex, leakage is movement outside of the defined storage complex.

ROAD has defined a monitoring programme that is fit for purpose and uses those monitoring techniques that are best suited for the selected storage site. A study of fault properties by TAQA and CATO concluded that leakage through faults is not relevant and that the only risk is leakage through the well. ROAD has benefited from studies performed by independent experts, which were used to persuade the authorities of the efficacy of the proposed monitoring programme.

Soon a final and irrevocable permit will be available; the permit will be owned by TAQA, the operator of the storage site.

An amendment of the Dutch Civil act is required in connection with the liabilities.

Other issues are:

- Burden of proof lies with the operator;
- Tax on coal fired power plants, this proposal has not been elaborated yet, but could lead to severe cost increases due to the fact that ROAD will capture CO2 of a coal fired power plant.

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The European CCS Demonstration Project Network was established in 2009 by the European Commission to accelerate the deployment of safe, large-scale and commercially viable CCS projects. The Network that has been formed is a community of leading demonstration projects which is committed to sharing knowledge and experiences, and is united towards the goal of achieving safe and commercially viable CCS. The learnings that are gained will be disseminated to other projects, stakeholders and public to help gain acceptance of the technology – and support CCS to achieve its full potential as a vital technique in our fight against climate change.

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