IEA CCS Roadmap

Brazil CCS Roundtable Summary

8 July 2009

Background

On the 8th July 2009, as part of its research for the International Energy Agency's (IEA) CCS Roadmap, the IEA organized a Roundtable event on carbon capture and storage (CCS) in Brasilia, Brazil. There were 30 attendees at the event from the mining, utility, oil & gas and consultancy sectors, NGOs, and local research institutes and industry associations.

The Roundtable was the third of a series of Roundtables on CCS that the IEA will host in key emerging economies. The goal of these Roundtables is to collect detailed information about the technology, legal, financial and public awareness issues associated with CCS demonstration and commercialization in these markets. The first roundtable was hosted in China in April 2009 with the second in Poland in July 2009. A roundtable meeting is also planned South Africa in October 2009.

The roundtable meeting followed a CCS seminar ran by FBDS and Shell in which a lot of background material and status information was presented about the technology status of CCS. Accordingly, unlike at other roundtable meetings, there were no further presentations but rather the meeting went straight into a discussion.

Brazilian energy and CO_2 emissions profile

From the CCS seminar prior to the round table, Brazil was shown to have a unique electricity and emissions profile. Over 80% of Brazils electricity is produced from hydropower with the rest being made up by a combination of fossil fuels, biomass, and nuclear. This means the energy emissions in Brazil are relatively low. However when emissions from land use change are factored in, Brazil is the 4th largest CO_2 emitter in the world[1], primarily driven through the deforestation of the Amazon. Accordingly many people within Brazil see stopping the deforestation of the Amazon as the key emissions reduction mechanism for Brazil.

During discussions the representative from ERM noted that Brazils low carbon energy sector could change quicker than people think with coal now considered the marginal electricity baseline for Brazil in the clean development mechanism (CDM). The Brazilian Coal Association noted that they expected 6000MW of coal power in Brazil by 2030 but that this still only represents 2.7% of grid compared to 83% from renewables. CEPAC felt that CCS in Brazil will be more relevant to industry rather than for electricity generation.

[1] UNFCCC 2008 emissions inventories

Technology demonstration and research

Attendees were asked about the current status of CCS technology demonstration and research within Brazil. From discussions it was clear that Brazil currently has an extensive CCS research and development program that includes a number of operating and planned CCS demonstration projects in the oil sector.

Petrobras is the Brazilian National Oil and Gas Company and is very active in the field of CCS with 25 years of experience of CO_2 injection in aquifers and coal seams. In recent times, they have begun working to use this experience to actively build the capacity of CCS knowledge and experience in Brazil. They have produced three CCS roadmaps for Brazil including one focused on CCS and sustainability. Petrobras also have a number of CCS demonstration projects already operating or about to commence. Projects already operating include a pilot storage project which is injecting 400 tonnes per day into a saline aquifer and an enhanced coal bed methane (ECBM) projects that is looking at CO_2 storage in Brazilian coals. They also have an enhanced oil recovery (EOR) due to commence by the end of 2009 and are members of a CO_2 capture project looking at oxycombustion pilot project in Brazil. Petrobras' primary interest in CCS is in connection to the development of the "Pre-salt" high CO_2 gas field. In developing the field they will need to acquire an environmental license which is likely to require them to deal with the high CO_2 component of the gas and CCS is seen the best option to address these emissions.

CEPAC, the Center of Excellence in Research on Carbon Storage, was launched in 2006 and is a joint initiative between Petrobras and the Pontifical University of Rio Grande do Sul. CEPAC has a number of working partnerships with CCS organisations throughout Brazil and internationally which include the Brazilian Coal Association and a number of other Universities around Brazil, the CSLF, NETL, and the IEA. CEPAC has a wide ranging work program in the field of CCS. They have established twenty CCS research projects around the country to work on every aspect of CO_2 capture, transport and storage, and have also ran a number of international CCS conferences within Brazil with as many as 400 attendees. One of the major contributions that CEPAC has made to CCS in Brazil is a study matching sources and sinks throughout Brazil. Included in the study were an analysis and ranking of storage reservoirs and also a look at regulatory issues concerning storage. CEPAC will also release a storage atlas towards the end of 2009 which provides preliminary mapping of storage at a country scale, and at basin scale for aquifers.

The Brazilian Coal Association (BCA) is also looking at CCS within Brazil. They are currently part of a joint venture with the Ministry of Science and Technology to build a clean coal center in Brazil. They are also working with Petrobras and NETL in the US to develop a coal gasification program which includes the training of over 50 people, and with Germany to train people in conventional combustion. They see regulatory clarity as one of the key priorities for CCS in Brazil and so are looking to engage the Brazilian Ministry of Mines and Energy about CCS regulation generally and to the Ministry of Mines and Energy in respect to pore –space ownership specifically.

The oil and gas company Shell is also looking to pursue CCS in Brazil with their current focus on removing barriers and creating incentives for CCS within the Brazilian Government and through international mechanisms.

Financing

Attendees were asked about how they see CCS plant being financed in Brazil. Brazil is a non-annex 1 country so they have no emissions cap under the Kyoto protocol. As a non-annex 1 country the prime driver for CO_2 emissions reductions is the CDM however CCS is currently not an eligible technology for use under the CDM. With international funding mechanisms unavailable CCS would need to be funded domestically within Brazil or through international collaboration and support.

Petrobras said that they would be willing to fund a small CCS plant themselves but are not pursuing large plant. If a there was external funding available then Petrobras may consider building a larger plant however funding would need to cover both CAPEX and OPEX for the plant. The representative from Shell noted that there are funds becoming available for CCS in developing countries from a number of organizations, including the World Bank, which may be able to support the construction and operation of a CCS plant in Brazil.

Regulatory Issues

During the discussion regulatory certainty was identified as one of the key issues for CCS development in Brazil. In discussions, the Ministry of Mines and Energy, the Ministry of Science and Technology, the Ministry of the Environment and the National Petroleum Agency were all identified as areas of the government that may be involved in regulating CCS. It was suggested by some attendees that what is required is a public/private working group to look at what needs to be done to regulate CCS and who needs to do it, however other attendees felt that only the announcement of an actual project in Brazil will spur the government into regulatory development.

Although to date there has been no comment from the Brazilian government in regards to CCS regulation, there is evidence that the government is thinking about ways to address CO_2 emissions associated with energy production and industry. Currently there are discussion in the government that there should be some sort of compensation paid relative to the CO_2 emissions from new plant – one proposal is that all new power plants must offset 100% of CO_2 emissions. It was mentioned by the Brazilian Coal Association that at least three proposed projects are having their license application held up until discussion of compensation is concluded.

It was asked by one of the attendees if any other developing countries have a CCS regulatory framework in place. Currently no developing countries have dedicated CCS regulatory frameworks in place however there are projects in developing countries that are covered under existing or amended regulation. For projects in developed and developing countries, CCS has been included in existing or amended regulation, such as mining or oil and gas regulation, temporarily for demonstration while permanent regulations are developed.

In the discussions about CCS regulation it was also mention that the people who are responsible for compiling the Brazilian greenhouse gas (GHG) inventory should be consulted. In 2006 the IPCC released guidelines for the accounting of CCS within national GHG inventories however it was noted by ERM that non-annex 1 countries have no mandate to use IPCC inventory guidelines.

Public awareness

Public awareness of environmental issues in general and climate change issues specifically is quite good in Brazil with extensive environmental coverage in the media and on the internet. The primary focus however is on forestry and de-forestation, and on local environmental issues rather than on emissions from energy and industry. However with more coal plants planed for Brazil public awareness of these issues is growing. It was suggested however that the global financial crisis has delayed the public discussion of fossil fuel power and associated environmental impacts by around two years.

In regards to CCS specifically, Petrobras has recently conducted a questionnaire to gauge public opinion about CCS which received over 2000 responses. It was found that, unlike results from similar surveys in Europe and elsewhere, there were no inherent objections to the technology and no specific groups against CCS.

A warning was given however, that the industry can't assume that this support will continue as CCS plans develop into reality in Brazil. It was suggested that for successful public engagement and acceptance, there is a need to differentiate risk from perceived risk. The industry needs to be clear about the actual risks that CCS poses in order to gain support from the public and NGOs who may have concerns initially. It was also suggested that although this isn't a big issue in Brazil yet, with the development of the "Pre-salt" the public will become a lot more aware of CCS in the near future.

International cooperation

A number of Brazilian organizations are already active in the international CCS community. The Brazilian Coal Association suggested that the biggest need for international collaboration was in the area of capacity building. Brazil will need to ensure there are professionals (geologists, engineers, etc) with the capacity and experience in all areas of CCS to ensure Brazil can deploy CCS domestically. It was also noted that Brazil needs help developing technology that is relevant to Brazilian conditions for example, gasifiers that can work with Brazilian coals. CEPAC also saw capacity building the most important area for collaboration. It was suggested that key to this process is Brazilian participation in large scale CCS demonstration projects around the world as well as involving Brazilian institutions and government in international initiatives such as the Global CCS Institute. It was also mentioned that most Brazilian organizations will also need technology transfer to be able to implement CCS demonstrations and commercially, with the exception perhaps of Petrobras have more of a capacity to buy or develop technology themselves.

Next Steps

The IEA has incorporated these findings into the forthcoming IEA CCS Roadmap. The IEA is also exploring ways to expand its outreach and capacity building on CCS in Brazil and will be in contact as ideas arise. If the Brazilian participants have other ideas or have an interest in working with the IEA, please contact Brendan Beck at Brendan.beck@iea.org.