

Implementing CCS technologies

The **European CCS Demonstration Project Network Secretariat** discusses how stakeholder dialogue is pivotal if we are to see the rollout of commercially viable CCS technologies by 2020



JOHN SCOWCROFT COORDINATOR

To what extent does the European Carbon Capture Storage (CCS) Demonstration Project Network seek to inform and advise the public regarding developments in CCS? How are you engaging with society at large?

As a body, the Network primarily seeks to engage with society at large through the provision of fact-based information at conferences, seminars and online, illustrating the progress that the European Demonstration projects are making. It provides answers to questions and directly links the most suitable bodies that hold the relevant information. While such high-level information is important, it is on a local level that it is of the most value, and it is here that the projects themselves are best-placed to comment. To underline its importance, the provision of factual, relevant and appropriate information to the public has been continually discussed by the projects since the Network's inception.

In what ways does the Network function beyond its European focus? Are you forming cooperative partnerships with similar initiatives internationally?

The Network is actively seeking to strengthen links with projects and experts across the world. The sharing of knowledge is the most important role the Network can provide. This is a two-way process and constitutes real dialogue. The

lessons that have been learnt from the projects will be vital in driving down costs, reducing the development times and risks and addressing the problems and management issues being faced by projects across the world. Equally, European initiatives can learn much from any mistakes, achievements and steps made by others. The Network and its secretariat strive to facilitate this transfer of understanding and know-how, as it is only through global cooperation that CCS will be deployed successfully at scale.

The Network has recently undergone a change in Secretariat. Who comprises the new Secretariat, what expertise do they bring to the table, and what impact will this have?

The Global CCS Institute is a not-for-profit independent entity owned by its members, comprising 350 governments, industry, and academic and research organisations from around the world. It focuses on accelerating the deployment of CCS through knowledge sharing and assisting projects. It is joined by three leading R&D organisations in Europe: IFP Energies nouvelles (IFPEN) is a public sector research, industrial innovation and training centre active in the fields of energy, transport and the environment; TNO applies scientific knowledge with the aim of strengthening the innovative power of industry and government; and SINTEF is one of the largest independent European research institutes, focusing on power generation and energy conversion technologies, distribution and end use. This unique consortium has been created to bring together extensive technical and research expertise in CCS, facilitation, project knowledge-sharing and data analysis.

Do we remain on course to witnessing commercially viable CCS technologies by 2020?

We very much hope that commercially viable CCS in Europe will be realised by 2020; however, there are clearly many significant challenges in achieving this goal. The Network's makeup clearly demonstrates the commitment of industry to this environmental technology. While first-of-a-kind projects in the power sector will face hurdles, there are no

fundamental technical reasons preventing the development of CCS, and all elements have been individually proven.

However, the wide-scale deployment of CCS in Europe and globally will require strong, clear, consistent and immediate policy actions. While commercial-scale CCS would be cost-competitive with other low-carbon technologies, it is an innovative technology that markets cannot yet deliver alone, though in certain circumstances enhanced oil recovery (EOR) can act as a bridge to future commercialisation. Nevertheless, as has been the case with other low-carbon technologies, appropriate long-term incentive signals and first-mover support are required for this activity to be adopted and deployed at scale.

How might you challenge the preconceptions of those who argue that research and funding on CCS should instead be focused on the development of renewable energy technologies to facilitate the transition to a fossil-free economy?

We passionately believe that both research and funding should be directed to renewables, bioenergy, energy efficiency and CCS, as each will have an extremely important role to play in combating climate change. We cannot do without any of them. According to the International Energy Agency (IEA), in Europe, CCS will be responsible for achieving 24 per cent of the total effort required to meet our climate change targets. Without CCS in the power sector the overall cost to society would be substantially more. While it is the only option for many industrial plants, CCS only receives a fraction of financial incentives provided to renewables.

An important consideration here is that CCS is the only technology that can reduce emissions from the industrial sector, which includes the steel industry and the gas processing, refining, paper and pulp, and cement sectors. The combined use of biomass and CCS is the only technology that can be 'CO₂ negative' and actually extract CO₂ from the atmosphere.

Carbon solutions

As CCS looks set to become a vital part of a sustainable ecological future, the **European CCS Demonstration Project Network** is providing a support base to encourage the success of large scale projects

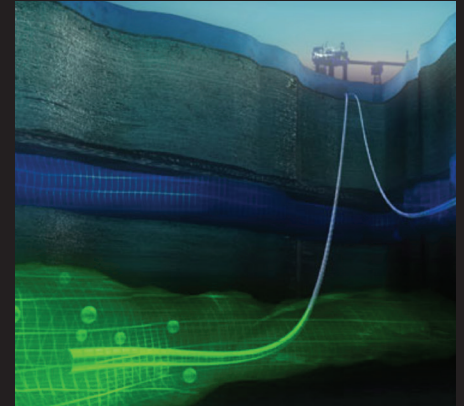
IN TODAY'S ESCALATING global warming crisis, carbon capture and storage (CCS) is a technology that aims to prevent large quantities of CO₂ from being emitted into the atmosphere, which occurs due to the use of fossil fuels in power generation and other industries. If the CO₂ generated from these industries is safely captured, it can then be transported into deep geologic formations where it is stored permanently and securely, preventing CO₂ release into the atmosphere and thus significantly slowing the current trend of rising CO₂ emissions. Slowing emissions rates and eventually decarbonising our energy and industry sectors will help limit the levels of global warming and reduce the effects of climate change on society.

In 2009 the European Carbon Capture Storage Demonstration Project Network was established in order to support and accelerate large-scale CCS projects across the continent in a safe and commercially viable way. As part of an initiative of the European Commission, the intention of the Network has been to establish a community of leading demonstration CCS projects. By uniting these projects through sharing knowledge and experience, the Network is dedicated to achieving successful, safe and economically viable CCS.

SUPPORTING THE PROJECTS

The Network aims to provide support to these key projects in a number of ways. It facilitates contact between the project advocates, drawing focus onto the key topics that can assist their development – from issues such as detailed technical issues to wider project management considerations, as project head, Daniel Rennie, explains: “Confidential knowledge-sharing takes place through workshops, topic-specific online forums, workspaces and libraries, and a detailed survey that the projects complete every six months”. This knowledge-sharing is then supported by an analysis of the project data, which leads to benchmarking, comparisons and a clear tracking of progress.

Occurring on average two or three times a year, the Network's knowledge-sharing events focus on core topics such as monitoring techniques and their development, public engagement, project and storage risk-management, and regulatory issues. Public reports are then produced to facilitate dissemination. Much of the information gathered from the projects via the Network is shared among other projects, stakeholders and the wider public in order to encourage understanding



THE SLEIPNER CCS PROJECT: IN CONTINUOUS OPERATION SINCE 1996

and acceptance of CCS technology and promote its potential as an essential technology in the fight against climate change.

OVERCOMING INDUSTRIAL CHALLENGES

The biggest challenge in the development of this technology is finding sufficient political and financial support for projects. “Funding problems are being experienced in many sectors, largely due to the global financial crisis, but the need to mitigate against climate change remains,” Rennie observes. Although there are no fundamental technical barriers to this technology, its integration into operating industries can be challenging. With this in mind the successful public demonstration of the technology in action is one of the key objectives of the Network members.

LOOKING TOWARDS THE FUTURE

CCS is expected to play an important and influential role in Europe's future energy mix. From the European Commission's Energy Roadmap 2050, in which different energy scenarios are explored, it is clear that the contribution of CCS is central to Europe's future energy security. “The Roadmap is comparable to the International Energy Agency (IEA)'s overall vision for Europe, which also indicates that the contribution of CCS in industry will be of equal if not greater importance,” Rennie notes. The implementation of CCS technologies is paramount if Europe is to achieve future environmental global goals. Yet the technology also presents economic opportunities: it is estimated that by the late 2020s UK firms alone could benefit from £3-6.5 billion of new business.

THE BRINDISI PILOT CO₂ CAPTURE FACILITY

Europe-wide Network

The initiative is currently supporting six European projects

ROAD, THE NETHERLANDS

Based at the 1,100 MWe coal-fired power plant located in the port of Rotterdam, the Rotterdam Capture and Storage Demonstration Project (ROAD) is a joint venture between E.ON Benelux and GDF SUEZ Energie Nederland. The captured CO₂ will be transported 5 km over land and 20 km across the seabed via pipeline to the P18-A platform in the North Sea and stored in expended gas reservoirs. The pipeline has a transport capacity of around 5 million tonnes per year. These gas reservoirs are located in block P18 of the Dutch continental shelf, approximately 20 km off the coast. The depleted gas reservoirs are at a depth of around 3,500 m under the seabed of the North Sea and have an estimated storage capacity of approximately 35 million tonnes.

COMPOSTILLA, SPAIN

The Compostilla power plant will be a coal-fired plant owned by Endesa and located in Ponferrada. It is expected that the capture efficiency at the plant will be 91 per cent and approximately 1.6 MtCO₂/year will be captured and then transported over a distance of 150 km via pipeline to an onshore saline aquifer storage site. The technology for this plant is first being tested on a new 30 MWth Technology Development Plant (TDP) close to Compostilla. Once testing is complete, the CCS regulations will be fully developed and an adequate financial structure will be settled; the technology will then be scaled up at Compostilla.

DON VALLEY, UK

Run by 2Co Energy, the Don Valley project will build a new coal-fired, 900 MW gross integrated gasification combined cycle (IGCC) plant in Stainforth, UK, with pre-combustion capture of at least 90 per cent of the CO₂ from the full plant. The preferred storage option is to use the CO₂ for Enhanced Oil Recovery which, through the generation of incremental oil taxation revenue, will help offset the cost to the UK of the incentive needed to support the cost of the low-carbon power. The Yorkshire and Humberside region, where Don Valley is based, has the UK's largest concentration of coal and gas-fired power generation and the CO₂ emissions from those plants will have to be reduced dramatically if they are to continue to operate. The plant at Stainforth and the infrastructure it will create have important roles to play in enabling the region to continue to generate power from fossil fuels and to allow other energy intensive industries, such as steel and cement, to also install CCS technology. It is anticipated that new projects will cluster with the Don Valley project to share infrastructure and therefore bring down the cost of CCS.

PORTO TOLLE, ITALY

The CCS demo plant will be installed on a USC 660 MWe unit of the Porto Tolle power plant, owned by Enel, which will be co-firing coal and biomass. The demonstration plant will separate about 1 Mt/y of CO₂ (capture efficiency >90 per cent) which will be transported by an offshore pipeline to a deep saline aquifer located about 100 km south-east of the power unit. In order to help develop the Porto Tolle project, Enel completed a pilot capture station at a coal-fuelled plant in Brindisi, southern Italy, where the technology can be tested on a significant scale. The pilot has now been running for over 5,000 hours with promising efficiency results.

SLEIPNER, NORWAY

Sleipner, which has captured and stored approximately 1 million tonnes of CO₂ per year since 1996, is the only project in the Network which is not a power plant; it is a light oil and gas field. The gas in the field has a very high CO₂ content (up to 9 per cent), so the field operator, Statoil, in agreement with the licence partners ExxonMobil E&P Norway and Total E&P Norge, decided to strip the CO₂ from the well stream and inject back into the Utsira (saline aquifer) Formation. CO₂ is removed from the unprocessed gas using conventional amine capture technology installed on the offshore platform and the CO₂ is injected back underground into the Utsira saline aquifer.

BEŁCHATÓW, POLAND

A 5.3 GW lignite-fired power station owned by PGE, Bełchatów is the largest thermal power plant in Europe. A post-combustion capture plant will be integrated with the newly built (2011) 858 MW power unit at the plant. This is expected to capture approximately 1.8 million tonnes of CO₂ per annum (design value), which will then be compressed and transported via onshore pipeline and stored in a saline aquifer.

INTELLIGENCE

EUROPEAN CCS DEMONSTRATION PROJECT NETWORK

OBJECTIVES

The Network is a community of leading demonstration projects committed to sharing knowledge and experiences, and is united towards the goal of achieving safe and commercially viable CCS. The outcomes will be disseminated to other projects, stakeholders and the public to help gain acceptance of the technology and enable it to achieve its full potential as a vital technique in our fight against climate change.

NETWORK MEMBERS

Bełchatów, Compostilla, Porto Tolle, ROAD, Sleipner

SECRETARIAT

Global CCS Institute, IFPEN, SINTEF, TNO

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