

Greenhouse News

• the official newsletter of IEAGHG and its members •

June 2011 • Issue 102

Climate Action: Member States submit project proposals for renewable energy and clean technologies

A total of 78 proposals for large-scale demonstration projects involving innovative renewable energy and carbon capture and storage (CCS) technologies have passed the Member State stage of the NER 300 programme and have been submitted to the European Investment Bank (EIB) under the EU's "NER 300" programme, the world's largest demonstration programme for such technologies. The deadline for submissions was 9th May 2011.

According to an initial screening of the project proposals by the EIB, applications for 13 CCS projects and 65 projects involving innovative renewable energy technologies have been submitted.

A breakdown of the project proposals submitted by category is shown in the Annex.

Background:NER300 Demonstration Programme

The NER 300 programme aims to fund at least eight CCS and at least 34 innovative renewable energy demonstration projects. The programme

is so named because it will be funded from the sale of 300 million emission allowances held in the New Entrants Reserve (NER) of the EU Emissions Trading System (ETS). At the current carbon price, these allowances are worth €4-5 billion, but as project sponsors must also bring funding it is expected to leverage around the same amount in addition from private or other sources.

A first call for proposals was launched in November 2010. Project sponsors had to submit their funding applications to their respective Member State authorities by 9th February 2011. Member States then had until 9th May to check the eligibility of the projects submitted and to submit the projects they wished to support to the European Investment Bank (EIB). The EIB has started financial and technical due diligence assessments, and aims to finalise the appraisal of proposed projects by 9th February 2012.

Next steps

Based on recommendations from the EIB, the Commission will consult the EU Climate Change Committee, in which all Member States are represented, check that Member States still support the projects they recommended, and prepare and issue award decisions.

Cont.

In this issue

CIUDEN launches pilot project



P6

SaskPower's Carbon Capture Simulation



P8

6th CO₂ GeoNet Open Forum



P14

News from the IEA CCC



P16

The EIB will also sell the allowances, manage the revenues and hand them over to the Member States for disbursement to the projects. At least 1 project, and up to a maximum of 3, will be funded per Member State.

The Commission intends to issue award decisions in the second half of 2012.

Annex

Number and type of project proposals submitted to the EIB:

Type of Project Proposals	Number
Total Number of CCS Projects	13
Power Generation: Pre-Combustion	6
Power Generation: Post-Combustion	3
Power Generation: Oxyfuel	2
Industrial applications demonstrating CCS on refineries, cement kilns, in iron and steel or aluminium production	2
Total Number of Renewables Projects	65
Bioenergy	23
Concentrated Solar Power	9
Photovoltaics	4
Geothermal	3
Wind	15
Ocean	8
Distributed Renewable Management	3

Cutting-edge UK energy projects in running for EU funding (Press notice)

10th May 2011

Press Notice: 2011/039

EU funding for up to three low carbon energy projects in the UK came a step closer today.

The Government has submitted 12 applications from UK projects to the European Investment Bank (EIB) for consideration in the next round of the EU's New Entrant Reserve (NER) scheme – a fund worth around EUR4.5 billion to support carbon capture and storage (CCS)

and innovative renewable projects across the European Union. Up to three projects may be supported per Member State.

Energy Minister Charles Hendry said: "I am very encouraged by the strength and breadth of the UK applications for this round of NER funding, with all the projects received by DECC meeting the eligibility criteria.

"They demonstrate that the UK is at the cutting edge of low carbon energy development, ranging from CCS to wave, tidal and offshore wind.

"Taking forward these sorts of technologies will be crucial to our move to a low carbon economy, providing green jobs as well as helping us lower emissions and increase energy security."

Of the 12 applications submitted to the EIB ahead of the 9th May deadline, seven are for CCS projects and five for innovative renewable energy projects. Two CCS applications were withdrawn voluntarily by the Project Sponsors.

The EIB will now spend nine months performing 'due diligence' on the applications submitted to it, checking their financial and technical deliverability. After this the European Commission will verify the eligibility criteria assessment and re-confirm with Member States the public funding contribution for Recommended Projects, before making its Award Decisions.

The seven CCS applications are:

- Alstom Limited Consortium: oxyfuel new supercritical coal-fired power station on Drax site in North Yorkshire;
- C.GEN: new integrated gasification combined cycle (IGCC) power station (pre-combustion with CCS on the coal-feed) in

39th Executive Committee Meeting, by John Gale and Neil Wildgust, IEAGHG

- Killingholme, Yorkshire;
- Peel Energy CCS Ltd: post-combustion amine capture on new supercritical coal-fired power station in Ayrshire, Scotland;
- Don Valley Power Project (formerly known as the Hatfield Project): new IGCC power station in Stainforth, Yorkshire;
- A consortium led by Progressive Energy Ltd; pre-combustion coal gasification project in Teesside, North East England;
- Scottish Power Generation Limited: post-combustion amine capture retrofitted to an existing subcritical coal-fired power station at Longannet, Scotland; and
- SSE Generation Limited: post-combustion capture retrofitted to an existing CCGT power station at Peterhead, Scotland.

The Government is committed to continuing public sector investment in four CCS projects and aims to launch a selection process to identify projects for UK funding later this year.

The five innovative renewable applications are:

- POWER (Pentland Orkney Wave Energy Resource) which will deploy Aquamarine Oyster and Pelamis wave energy converters off the coast of the Orkneys;
- Kyle Rhea Tidal Turbine Array which will deploy Marine Current Turbines "SeaGen" devices in Kyle Rhea, Islay;
- MeyGen Tidal Stream Project which will deploy Atlantis Resources and Rolls Royce/Tidal Generation tidal turbines in the Pentland Firth Inner Sound;
- Scottish Power Renewables Sound of Islay Demonstration Tidal Array which will deploy Hammerfest Strom tidal turbines in the Sound of Islay; and
- Blyth Britannia which will deploy Clipper Wind Power 10 MW Offshore Wind Turbines off Blyth in Northumberland. ●

The Executive Committee (ExCo) of the IEA Greenhouse Gas R&D Programme (IEAGHG) was held in Johannesburg, South Africa, for the first time at the invitation of our South African members, the South African National Energy Research Institute (SANERI) on the 5th - 6th April 2011. Further details of SANERI's activities can be found at www.saneri.org.za.

The meeting involved 2 days of discussion on the last 6 months activity and agreed the work programme for the next 6 months. Studies discussed and approved by the members included:

- Potential impacts to potable groundwater from CO₂ storage
- Caprock systems
- The global potential for biomass CCS
- Retrofit and repowering with CCS

Members also discussed two studies that IEAGHG is undertaking for GCCSI on:

- Potential effects of CO₂ waste stream impurities on geological storage
- A global storage resource gap analysis for policy makers

These studies will be reported in the coming months and detailed will be found in Greenhouse News and on our web site: www.ieaghg.org.

Going forward the ExCo approved IEAGHG undertaking the following studies:

- Potential implications of gas production from shales and coal for geological storage
- Induced seismicity
- Subsurface resource interaction with CO₂ geological storage
- Key messages for communication needs for stakeholders

The activities of the IEAGHG Research Networks, in particular the recent

networks on Environmental Impacts and Social Research, and International Summer School were also discussed and the programme of work on the research networks for the following months agreed.

Members of the ExCo were invited to attend a one day workshop immediately following the ExCo, where initial plans for CCS research were discussed in the context of the formation of the new South African Centre for CCS. The centre will be headed by Dr Anthony Surridge who is also the South African member on the IEAGHG ExCo. Following a series presentations on the draft work programme, feedback was given from an expert panel drawn from the ExCo chaired by Professor Kelly Thambimuthu. The panel comprised and Dr Tony Booer (Schlumberger), Dr Markus Wolf (Alstom), Dr Malcolm Wilson (PTRC) and Messrs Tim Dixon and Neil Wildgust of IEAGHG. The ExCo therefore acted as informed reviewers of the South African CCS programme and made a numbers of constructive points that will be taken on board and the programme reframed.

Following this meeting the ExCo were hosted by the South African CCS group at a dinner held at the Maropeng, the visitor centre at the cradle of humankind www.maropeng.co.za/ one of 8 world heritage sites in South Africa.

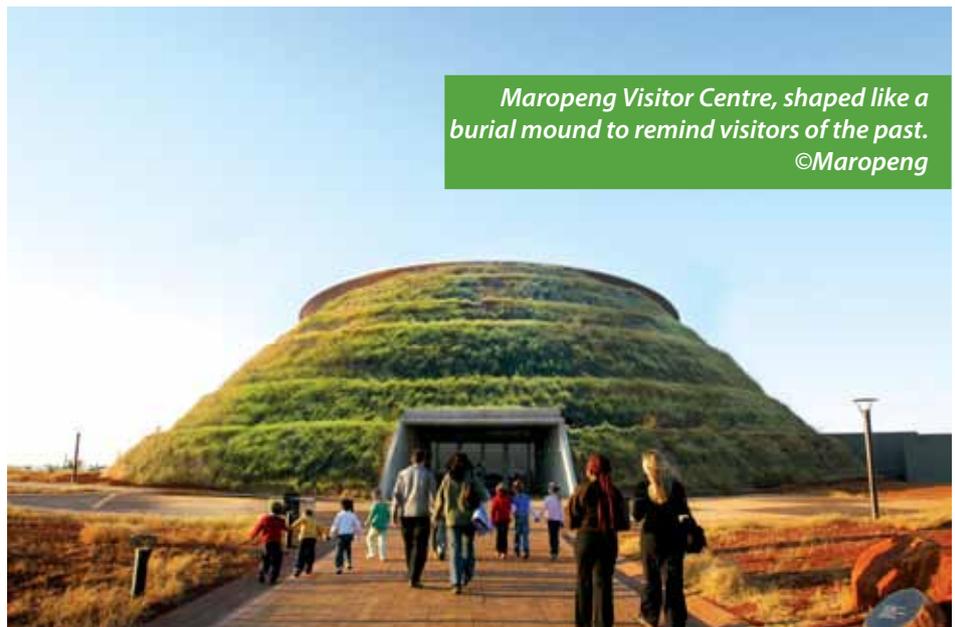
Sasol operated Secunda Synfuels Plant, emits a total of 55Mt p/a of CO₂ from gasification and related processes



Finally the ExCo members also had the opportunity to visit the Sasol operated site at Secunda, where locally mined coal and natural gas from Mozambique is converted into liquid and gas fuels, together with a wide variety other chemical products.

Full details of IEAGHG membership can be found on our website www.ieaghg.org ●

Maropeng Visitor Centre, shaped like a burial mound to remind visitors of the past.
©Maropeng

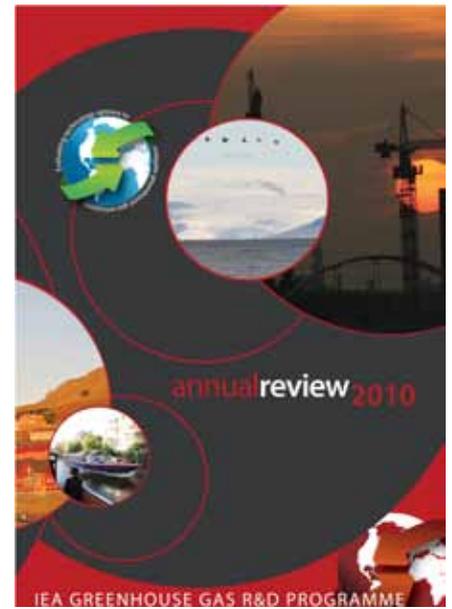


Annual Review 2010, by Toby Aiken, IEAGHG

The IEAGHG 2010 Annual Review has now been published. The Review provides an in-depth view of the work programme and activities of the IEAGHG for 2010, with specific focus on the results of the GHGT-10 Conference.

During 2010, the planning and organisation of GHGT-10 took a great deal of staff resource, and this was reflected in the great success of the event. The Annual Review also looks at the achievements of the programme in other areas, and highlights the technical reports published during the year, as well as the conclusions from the array of research networks organised and meetings attended. 2010 also saw the continuation of the IEAGHG Summer School Programme, and the introduction of IEAGHG into social media such as Facebook and Twitter.

For more information, and to view the Annual Review 2010, please visit www.ieaghg.org where the Annual Review will be available to download shortly.●



New IEAGHG Study Reports, by Toby Aiken, IEAGHG

2nd High Temperature Solid Looping Network Meeting

This report provides a summary of the presentations given at the second high temperature looping network meeting held at ECN Petten in September 2010, as reported in Greenhouse News of December 2010.

The meeting covered topics such as advances in sorbent and catalytic materials research, pilot plants and processes for CO₂ capture, sorbent enhanced reactions and Chemical looping combustion employing solids in circulating and fixed beds operating at high temperature.

Slow and steady progress has been made with the looping processes over the last year with improvements in the understanding of attrition and activity loss as well as incremental improvements in performance. All eyes are on larger scale demonstration plants under construction in Spain and Germany both slated to be started up and delivering performance information before next years network meeting.

5th Risk Assessment Research Network Meeting

The fifth meeting of the IEAGHG Risk Assessment Network was

held in Golden, Colorado in May 2010 and was hosted by the Colorado School of Mines.

The two day workshop was divided into eight sessions, opening with a welcome session and closing with the Outcomes and Recommendations discussion session. Presentations were held over six sessions, covering key topics: Regulatory Requirements, What can Risk Assessment deliver?, Risk Communication, Update from Real Projects, Induced seismicity/ Geomechanics, and Long-term Risk Management; with twenty minute presentations on average and a minimum thirty minute facilitated discussion. All the discussion sessions were met with enthusiastic input from all participants, many of which continued into the coffee and lunch breaks, expressing the great interest in the workshop topics, and the importance of such an open forum for advancing knowledge in this topical field.

Presentations and discussions showed the advancement of regulatory requirements; however some concerns from the technical

audience were raised which highlighted the need for researchers to take a proactive in informing regulators to ensure requirements are adequate for emerging needs; and to ensure they apply adaptive approaches to allow for the iterative process of risk assessment which was also highlighted in real project data.

Caprock Systems for CO₂ Geological Storage, IEAGHG Report 2011-01

In terms of geological storage of CO₂, caprocks are layers of low permeability rock that overlay the storage formation, ensuring that buoyant dense or vapour-phase CO₂ does not leak into overlying strata and towards sensitive environmental receptors. Storage security, especially in early stages after the start of injection, is largely influenced by the caprock integrity.

The study concludes that assessment of caprock systems will be highly site-specific and rely on a multi-disciplinary approach, utilising a combination of seismic surveys, exploration wells, wireline log data, stratigraphic and sedimentological analyses, well tests and laboratory scale testing of caprock samples.

The study also presents a qualitative methodology for assessment of seal potential at the basin scale. The seal potential of a caprock system may be defined as the capacity, geometry and integrity of the caprock. Seal capacity refers to the maximum CO₂ column height that can be retained in the underlying reservoir, before pressure exerted by buoyancy exceeds capillary entry pressure, thus allowing CO₂ to migrate through the caprock. Seal geometry refers to the thickness and lateral extent of the caprock. Seal integrity refers to caprock geomechanical properties, in the context of ambient stress fields that may be modified by CO₂ injection and

any associated abstraction of reservoir fluids.

Retrofitting CO₂ Capture to Existing Power Plants, IEAGHG Report 2011-2

Retrofitting CO₂ capture and storage (CCS) to existing power plants is one of the many ways of substantially reducing CO₂ emissions from power generation; others include replacing existing fossil fuel power plants by new power plants with CCS or the use of renewable or nuclear energy. Partial reductions of emissions can be achieved by efficiency improvements and switching to lower carbon fuels.

Global rollout of proven CCS technologies on power plants is not expected to commence until 2020 at the earliest but deep reductions in emissions from electricity generation are expected to be required by as early as 2030 in some developed countries and by 2050 globally, well within the lifetimes of some existing power plants and plants that will be built between now and the time when CCS becomes

widely available. It is therefore likely that some of these plants will have to either close prematurely to be replaced by new low-CO₂ sources of electricity or they will have to be retrofitted with CCS. A programme of CCS retrofits would require less construction activity than replacement by new power plants. This could allow CO₂ capture to be deployed more quickly than would be possible if new plants must be built before any CO₂ capture can be implemented.

This study assesses at a generic level the relative merits of retrofitting CCS to existing power plants and building new plants with CCS. As such it focuses mainly on the question "is CCS retrofit worth doing" rather than "can it be done". The latter would need to be addressed by detailed site specific studies for individual plants, examples of which are being undertaken by other organisations. However, the study also reports on high-level assessments of the potential for CCS retrofits in various countries: the USA, UK and China. ●

Spanish foundation CIUDEN launches PISCO₂, a unique pilot project for CO₂ biomonitoring tools via CO₂ injection in soils

The Fundación Ciudad de la Energía (CIUDEN), a Spanish state foundation created in 2006 for Research and Development in CCS, has launched a new Project to develop biomonitoring strategies of potential CO₂ leakages through testing biogeochemical effects of CO₂ injection in soils.

The test site for CO₂ injection in soils (known as PISCO₂, by its Spanish acronym) consists of 18 cells of concrete excavated in the ground; each of them, with an area of 16 square meters and a depth of 2.5 meters. These cells will be filled with soils from different areas of Spain with potential capability for CO₂ storage including Hontomín (Burgos), where CIUDEN's CO₂ Storage Technological Development Plant is under development.

Micro-perforated tubes buried at 1 and 2 meters under the surface, will allow the injection of small quantities of diffuse CO₂ at different given flow rates. The facility will serve to test how small CO₂ diffuse leakages can influence the vegetation, microorganisms, lichens and soils and aims to find useful, cheap and ecological bio-indicators of any CO₂ concentration variation in wide areas. It will also serve as a laboratory for agricultural tests of the beneficial effects of low CO₂ emissions. In addition, the installation will be a tool to test and calibrate measurement instruments such as accumulation chambers, sensors, etc.

The construction has started in April 2011 and it is planned to be fully operative in October 2011. Its configuration makes it unique and CIUDEN is open for cooperative research projects with institutions all over the World.

The research team is integrated by a multidisciplinary group of researchers such as

biologists, chemists, geologists and several collaborators. The work at the plant will consist of periodical sampling, continuous monitoring and modelling of CO₂ transport across various interfaces.

The EU has funded this project, of which costs of construction and first research phase are estimated in 1M€

The results obtained will be applied to CIUDEN's CO₂ Storage site in Hontomín, Burgos (Spain) which is planned to be completely operative in early 2013.

FURTHER INFORMATION.

www.ciuden.es CIUDEN (+34 987 456 323); Andrea Pérez; CO₂ Storage Programme: andrea.perez@ciuden.es



Construction of test site begins



US Regional Partnerships, by Neil Wildgust, IEAGHG

The United States Department of Energy (DOE) Regional Carbon Sequestration Partnerships (RCSP) Initiative in the USA has commenced Phase III of operation. This involves large scale (0.25 to 1 Mt/y) injection of CO₂ into eight geological formations across North America.

The DOE through the National Energy Technologies Laboratory (NETL), which manages the RCSP Initiative, required that a second independent technical review of the programme should be undertaken in 2011, following a previous review undertaken in 2008. IEAGHG again organised this review, held at the Hilton Hotel in Arlington, Virginia, between the 14th and 17th March, 2011.

The panel, supported from DOE/NETL by John Litynski and Traci Rodosta and from IEAGHG by Neil Wildgust and Millie Basava-Reddi, comprised:

- Dr Malcolm Wilson, PTRC, Canada (Panel Chairman)
- Dr Peter Cook, CO2CRC, Australia
- Dr Michael Kühn, GFZ, Germany
- Dr Philip Ringrose, Statoil, Norway
- Dr Iain Wright, BP, UK
- Dr Sally Benson, Stanford University, USA
- Dr Stefan Bachu, AITF, Canada
- Dr Ziqiu Xue, RITE, Japan
- Dr Steve Whittaker, PTRC, Canada
- Dr Mark de Figueiredo, EPA, USA

After giving detailed feedback on the Phase III plans of each regional partnership, the panel concluded from an international perspective that the RCSP Initiative remains a world leading programme for CO₂ geological storage research and public outreach. ●

The 5th Meeting of the North American Carbon Atlas

Partnership (NACAP) Workshop, by Ludmilla Basava-Reddi, IEAGHG

The 5th North American Carbon Storage Atlas Workshop was held in Morgantown, West Virginia, 5th – 6th April 2011. The goal of the North American Carbon Storage Atlas Project (NACSAP) is to identify the major emission sources of CO₂, map possible storage areas, and carry out resource assessments for storing CO₂ in Canada, the U.S. and Mexico. This will result in a comprehensive geological storage resource assessment across the continent, with consistency across country boundaries. This is a particularly important aspect of the project as large basins with storage potential exist across country boundaries. The project held the first workshop in December 2008 and the Atlas is expected to be released in 2012.

Much progress has been made since the last meeting in Ottawa, Canada in November 2010. Canada has selected 4 basins from an initial possible 200 to be assessed using a 2 step process. The resource assessment work for the 4 basins is complete.

Mexico selected 11 areas for resource assessment; of these 5 areas have been assessed using the DOE methodology to estimate the CO₂ storage resource. Resource assessments of the other 6 areas are currently in process.

The data for resource assessment in the U.S. comes from the U.S. Regional Carbon Sequestration Partnerships. This data was used in the most recent atlas, the third edition of the Carbon Sequestration Atlas of the U.S. and

Canada, published at the end of 2010. The plan is to have maps available online. Online there is the possibility of an interactive map, for which the U.S. will take the lead. This allows users to browse and query data, enabling them to view particular layers at any time, for example, particular emission sources.

As well as overall maps of North America, there will be separate country sections, which will contain information particularly relevant to each country, as well as the ability to view data at a state or province level. The atlas will be available both online, the online atlas allows maps to be downloaded, as well as in a printed version. Work is due to be completed and the atlas made available in 2012. ●

Carbon Capture Simulation on Initiative Aims to Bring Technologies to Market Faster

SaskPower, the government-owned electric utility in the western Canadian province of Saskatchewan, is moving forward with development of one of the first commercial-scale carbon capture and storage facilities in the world.

The \$1.24 billion (Cdn) Boundary Dam Integrated Carbon Capture and Storage Demonstration Project will see a generating unit at the Boundary Dam Power Station rebuilt and equipped with a carbon capture system that will reduce carbon dioxide (CO₂) emissions by 90 per cent, or one million tonnes per year.

"We believe this project will be the first of its kind when it begins operations in 2014," said SaskPower president Robert Watson.

"Boundary Dam will not only forge a sustainable path for coal-fired power production in Saskatchewan, it will also make SaskPower a world leader in the development of carbon capture technology."

The Government of Canada contributed \$240 million to the project, with SaskPower responsible for financing the balance.

SaskPower intends to partially offset the cost of the project by selling captured CO₂ to resource companies for use in enhanced oil recovery (EOR) operations in nearby oil fields. Sulphur dioxide (SO₂) will also be captured and sold.

With the federal contribution and EOR revenues factored in, the



"We believe this project will be the first of its kind when it begins operations in 2014"

Boundary Dam project is actually less expensive to build than a combined-cycle natural gas plant, said Watson.

"We had no intention of building this project just for the sake of building it. Before it was approved, we needed to present a strong business case to our shareholder, the Government of Saskatchewan. The federal contribution and the EOR revenues make this a viable project."

Boundary Dam, the company's largest power station with six generating units and a net generating capacity of 824 MW, is located in southeast Saskatchewan near the Bakken formation, one of the hottest oil plays in North America.

Boundary Dam is one of three coal-fired power plants operated by SaskPower, which has a total available generating capacity of 3,982 MW. In 2010, the company's coal-fired power plants generated 58 per cent of total electrical production.

Canada's Conservative government, which was re-elected May 2nd with a parliamentary majority, intends to release new emissions regulations for coal-fired power plants later this year. The regulations are expected to take effect in 2015 and would force utilities to close coal-fired power plants once they reach 45 years of age unless those plants can reduce emissions to the same level as a combined-cycle natural gas plant. Approximately 13 per cent of Canada's total greenhouse gas emissions are produced by coal-fired power plants.

Canada has committed to reducing greenhouse gas emissions to 17 per cent below 2005 levels by 2020.

Stantec, a Canadian-based engineering consulting company, is the lead engineer for the Boundary Dam project, which will involve rebuilding Unit 3 at the power station to a generating capacity of 150 MW. With the carbon capture system operating, the generating unit is expected to produce a minimum of 110 MW.

SNC Lavalin, another major Canadian firm, will oversee detailed engineering, procurement and construction activities for the carbon capture unit.

Cansolv, a wholly owned subsidiary of Shell Global Solutions, will supply the carbon capture process while Hitachi will supply a state-of-the-art steam turbine – the first in the world designed to fully integrate a coal-fired power plant with carbon capture technology. Babcock & Wilcox has been chosen to rebuild the generating unit's boiler.

Mike Monea, the SaskPower vice-president responsible for the initiative, said the Boundary Dam project will yield an unprecedented amount of information on the integration of a carbon capture system within a commercial-scale power station.

"Given the importance of coal as a fuel source in electrical production throughout the world, we expect there will be keen interest in the Boundary Dam project."

Monea said SaskPower is interested in sharing information on a commercial basis through partnerships with governments, utilities, researchers and other interested parties. For more information, contact Monea at mmonea@saskpower.com.



*Above: SaskPower Boundary Dam project
Below: Inside the Unit 4 at Boundary Dam*



Carbon Capture Simulation on Initiative Aims to Bring Technologies to Market Faster

The Office of Fossil Energy's National Energy Technology Laboratory (NETL) has begun research under the Carbon Capture Simulation Initiative (CCSI), partnering with other national laboratories, universities, and industry to develop a state-of-the-art computational modeling and simulation Toolset to accelerate commercialisation of carbon capture and storage (CCS) technologies.

There is an urgent need for accelerating the development of CCS technologies. DOE has the goal to support research and development, as well as pilot CCS projects so that barriers to the widespread, safe, and cost effective deployment of CCS be overcome within 10 years. Currently, the fastest way to deploy carbon capture technology is to scale-up existing technologies, such as amine scrubbing, to the capacity required for use in a power plant, and to deploy the technology to the hundreds of existing power plants. However, estimates show that this could increase the cost of electricity by as much as 80 percent in new pulverized coal (PC) power plants while reducing the power plant's efficiency.

Taking promising new carbon capture technologies from concept to commercial scale could take 20–30 years because of the need to manage the overall risk of the scaleup process.

Typically, several incremental steps are taken during scale-up, ensuring that the technical risk in each step is as small as possible. "The complementary CCSI approach, which is based on



CCSI is one of three areas of research under the Carbon Capture and Storage Simulation on Initiative announced late last year by Energy Secretary Steven Chu. The others involve developing validation on data and experimental work, and developing methodology and simulation on tools to assess risk. Work in all three areas will be aided by a new Simulation on-Based Engineering User Center that NETL is creating in a separate but related effort.

advanced modeling and simulation, has the potential to dramatically reduce this development time," said Dr. Madhava Syamlal, Director of CCSI and NETL Researcher. "Science-based models will be used in conjunction with pilot-scale data to enable reaching larger scales, earlier with greater confidence, thereby reducing the time and expense required for achieving commercial deployment of carbon capture technology."

The Toolset will enable the use of integrated models for identifying promising concepts, for reducing the time for design and troubleshooting, for quantifying the technical risk during scale-up, and for stabilising the cost during commercial deployment.

Meeting Industry Needs

The CCSI's industrial partners represent the power generation industry and power equipment manufacturers, and will be the initial customers of CCSI products. The initial industrial partners are ADA Environmental Solutions, Alstom Power, Ameren, Babcock Power, Babcock & Wilcox, Chevron, EPRI, Eastman, Fluor, General Electric, Ramgen Power Systems, and Southern Company.

CCSI's Industry Advisory Board will conduct semi-annual reviews to ensure that the development of tools and models within CCSI match the requirements of commercial decisionmakers for improving confidence in capture deployment decisions. Industry partners will also provide guidance, data, and development support. Early releases of the CCSI Toolset will be made available to these participants during the project.

While the ultimate goal of the CCSI is to deliver a set of tools to industry that can simulate scale-up of a broad suite of new carbon capture technologies from laboratory to commercial scale, the first five years of the project will focus on developing capabilities applicable to post-combustion capture by solid sorbents and advanced solvents and to oxycombustion. Among possible carbon capture technologies, these are expected to have the most immediate impact on U.S. pulverized coal power plants, which currently generate nearly half of the nation's electricity and are expected to emit 95 percent of U.S. coal-based CO₂ emissions between 2010 and 2030.

To learn more about the CCSI, visit its website at:

www.acceleratecarboncapture.org.

The CCSI's academic participants — Carnegie Mellon University, University of Pittsburgh, Virginia Tech, Penn State University, Princeton University, and West Virginia University — bring unparalleled expertise in multiphase flow reactors, combustion, process synthesis and optimisation, planning and scheduling, and process control techniques for energy processes. Several graduate students and postdoctoral fellows will be involved in the development of CCSI technology. Other educational activities will include an active seminar series on CCSI that is broadcast to remote sites, archived on the web and widely available to graduate students. In addition, a summer school on CCSI will be organised at Carnegie Mellon University for engineers and graduate students from around the United States. This event will include lectures from industry and academia on frontier research and the state of the art relating to the science and technology of CCSI.



The CCSI is led by the National Energy Technology Laboratory (NETL).

The project brings together the best capabilities at NETL, Los Alamos National Laboratory, Pacific Northwest National Laboratory, Lawrence Berkeley National Laboratory, and Lawrence Livermore National Laboratory. ●

Bio-Energy with Carbon Capture Offers Potential for 'Negative Emissions'

The use of bio-energy with carbon capture and storage creates the possibility of decreasing the level of carbon dioxide in the atmosphere, according to a report released by the Global CCS Institute on April 14th.

"Bio-energy with CCS (BECCS) is a very useful tool for the future as it is the only technology by which we can actually reduce the level of CO₂ in our atmosphere, rather than stabilise it," said Bob Pegler, Institute General Manager - Europe. "The application of BECCS would make it possible to reach agreed climate targets at lower costs, and involves opportunities to raise the ambitions for the level of emission reductions."

BECCS works because trees and crops, when they grow, remove CO₂ from the atmosphere. Using this biomass to produce energy or feed industrial processes, then capturing and permanently storing underground the CO₂ released during conversion, leads to a "carbon negative" technology.

"BECCS combines the natural CO₂ capture process in trees and plants, with the benefits of geological carbon storage," said Pegler. "What sets BECCS apart as a climate

mitigation measure is that it may result in permanent net negative carbon emissions."

According to the Global Status of BECCS Projects 2010, commissioned by the Global CCS Institute and carried out by Biorecro AB, a Swedish energy consultancy, the process could be applied to a range of biomass related technologies, such as power stations, combined heat and power plants, a range of flue gas streams from the pulp industry such as from recovery boilers and lime kilns, fermentation in ethanol production and biogas refining processes.

The potential climate impact of combining biomass with CCS in BECCS systems is large, with negative emissions in the order of billions of tonnes. BECCS could also be a cost-effective technology for meeting ambitious climate targets.

However, BECCS is still a new technology and the biomass it consumes must be produced in a sustainable way,

without negative impacts on food production.

The report describes the 16 first projects worldwide aiming to install a BECCS process. Most of these are in Europe and North America.

"There is an urgent need to expand the number of BECCS projects in all phases," Pegler said. "It is often overlooked, but the current insufficient efforts in research and deployment are detrimental for climate mitigation policies in general."

The full report is available here <http://www.globalccsinstitute.com/resources/publications/global-status-beccs-projects-2010> ●

New Report Finds a Role for Industrial Reuse of CO₂ in the Global Deployment of Carbon Capture Storage

Advancing the work of the Clean Energy Ministerial (CEM) Technology Action Plan, the Global CCS Institute and Parsons Brinckerhoff today released in early April a report investigating the industrial use of captured CO₂ to accelerate the uptake of carbon capture and storage (CCS).

"The findings indicate that CO₂ reuse has the potential to provide a moderate revenue stream for near-term CCS project development in favourable locations where reuse applications and markets are close to the emission source," said Peter Grubnic, Acting General Manager-Projects, Global CCS Institute.

"CO₂ reuse may provide a particular benefit in developing nations, where there is high demand for energy and construction materials," he said.

The report was commissioned through the governments of Australia and the United Kingdom under the auspices of the Carbon Capture Use and Storage (CCUS) stream of the CEM, formerly

known as the Major Economies Forum.

It forms part of the CEM's Technology Action Plan to encourage the use of captured CO₂ to generate revenue that can partially offset the cost of CO₂ capture, as a transitional measure to assist the accelerated uptake of CCS.

Client Relationship Executive in Parsons Brinckerhoff's Energy, Mining and Industry Group, Craig Chambers, said the findings of the report encourage industry to consider all available technologies that may help advance CCS and effectively tackle climate change.

"The report focuses on existing and emerging reuse technologies which have CO₂ utilisation potential commensurate with the scale of emissions from industrial processes such as power generation, steel and cement making," Chambers said.

"Some of the beneficial uses of CO₂ examined in the report may help form part of an overall carbon mitigation

strategy," he added. "CCS remains a very real solution to the significant reduction of CO₂ emissions and it is encouraging to see Australia taking a lead in support of the industry's development."

Among the existing and emerging technologies reviewed in the report are the use of CO₂ as a feedstock in urea yield boosting; mineralisation (including carbonate mineralisation, concrete curing and bauxite residue processing); liquid fuels (including renewable methanol); and CO₂ enhanced coal bed methane recovery, among others.

Findings indicate that while reuse does not have material global CO₂ abatement potential, it can help to support near-term CCS project development in some locations and applications.

The full report is available here: www.globalccsinstitute.com/resources/publications/accelerating-uptake-ccs-industrial-use-captured-carbon-dioxide

Carbon Capture Storage Projects Progressing, Report Finds

The global commitment to carbon capture and storage (CCS) technologies remains strong, according to The Global Status of CCS: 2010 report released by the Global CCS Institute in March.

The report identifies 234 active or planned CCS projects ranging across technologies, project types and sectors at the end of 2010, a net increase of 21 projects since the previous year. Seventy-seven are fully integrated, large-scale projects demonstrating the full CCS value chain.

"In addition to this project activity governments continued to pursue the development of policy, regulatory and legal frameworks to support CCS projects," said the Institute's Interim CEO, John Hartwell.

He added: "Looking ahead, the Institute anticipates that during 2011 a number of projects will have completed concept definition studies and be in a position to move to the next stage of development."

Two projects made final investment decisions recently: the Gorgon CO₂ Injection Project in Australia, which when fully operational will be the largest carbon storage project in the world and the Southern Company integrated gasification combined cycle (IGCC) project in the United States, which will be the world's first large-scale CO₂ capture project in the power sector.

Project developments are being driven by the significant support offered by governments across the

globe. As much as \$US40 billion could be available to have large-scale projects up and running this decade.

The report also highlights areas where more work needs to be done to accelerate CCS, including greater characterisation of global storage options and reducing costs.

"It is reassuring that despite the challenges, governments and industry appear committed to finding solutions for commercially deploying CCS," said Hartwell.

According to the International Energy Agency (IEA), CCS will contribute 19 per cent of all emission reductions required by 2050.

"CCS is a critically important emissions reduction tool and a key part of a comprehensive global emissions reduction portfolio that also includes other low emission technologies," said Hartwell.

To more effectively communicate the contents of the Status Report, the Global CCS Institute has run a series of two week blog campaigns on its website, each focusing on a different

part of the report. These campaigns – on storage, projects, costs, etc – have featured blogs from Institute staff and various high profile experts from the broader CCS community.

Underpinning The Global Status of CCS: 2010 report's economic analysis is data from another recently released report, the Economic Assessment of Carbon Capture and Storage Technologies.

Both of the reports and blog campaigns can be found here:

www.globalccsinstitute.com/global-status-ccs-2010?referrer=home-link

CCP 2010 Annual Report Published, by Kate Adlington, Simon Taylor and Laura Waram, Pulse Brands on behalf of The CO₂ Capture Project (CCP)

CCP 2010 ANNUAL REPORT PUBLISHED

The CO₂ Capture Project (CCP), a partnership of seven major energy companies working to advance CO₂ capture and storage (CCS), has published its 2010 Annual Report. The report provides an overview of the group's work to develop next generation technologies and improve understanding to make CCS a practical and cost-effective option for reducing CO₂ emissions from fossil fuels.

The annual report covers the first full year of activity in Phase Three (CCP3), which is scheduled to run until 2013. This phase will see at least two field demonstrations of capture technologies. A pilot test to capture CO₂ emissions from a Fluid Catalytic Cracking unit is currently underway in Brazil, and, in Canada, an oxyfuel combustion technology to reduce CO₂ emissions from once-through steam generators (OTSG) will follow. A series of monitoring field trials will also be undertaken during Phase Three to provide a clear understanding of how best to monitor CO₂ in the subsurface.

The annual report also details the CCP's work in providing technical and economic insights to inform governments and regulators developing legal and policy frameworks that are

vital for the deployment of CCS. The full annual report is available to download from: www.co2captureproject.com

2010 CCP highlights include:

Capture:

- New baselines established for a range of scenarios using post-combustion state-of-the-art technology
- Essential preparation undertaken for 2011 Fluid Catalytic Cracking (FCC) field trial, including delivery and approval of contracts, delivery, installation and integration of skids
- Groundwork laid for field demonstration of once-through steam generators (OTSG) including completion of feasibility study.

Storage:

- Well integrity field experiment started with post-survey work to investigate impacts on long-term barrier performance, carried out on a 30+year CO₂ producer well
- Studies carried out to understand physico-chemical phenomena and their impact on CO₂ injection efficiency, migration and containment
- Field trials undertaken to better understand emerging and

integrated CO₂ monitoring technology including Bore Well Gravity techniques, Through Casing Resistivity, Microseismic and InSar Satellite detection of ground movement.

P&I:

- Independent survey of regulatory issues in core markets commissioned, with the P&I Team providing a regulatory environment update at a side-event at COP16, Cancun, Mexico. The report entitled: Update on selected regulatory issues for CO₂ capture and geological storage is available to download from: www.co2captureproject.com
- Joined consortium to establish a financial value for the potential risks associated with CCS, to aid discussions with regulators and financiers. ●

Bioenergy, Land Use Change and Climate Change Mitigation

This report was prepared by Associate Professor Göran Berndes, of Chalmers University of Technology, Sweden; with input from contributing authors Dr Neil Bird, Joanneum Research, Austria and Professor Annette Cowie, The National Centre for Rural Greenhouse Gas Research, Australia.

It was co-financed by IEA Bioenergy and the Swedish Energy Agency. The report addresses a much debated issue – bioenergy and associated land use change, and how the climate change mitigation from use of bioenergy can be influenced by greenhouse gas emissions arising from land use change. The purpose of the report was to produce an unbiased, authoritative statement on this topic aimed especially at policy advisors and policy makers.

The publication can be downloaded at www.ieabioenergy.com/LibItem.aspx?id=6770 ●

The 6th CO₂ GeoNet Open Forum, by Ludmilla Basava-Reddi, IEAGHG

2011 edition focused on CO₂ storage developments Europe-wide

CO₂ GeoNet, Europe's Network of Excellence on the geological storage of CO₂ held their 6th Open Forum on San Servolo Island, Venice on 9th - 11th May 2011, with the 11th May dedicated to the 1st CGS Europe knowledge sharing workshop. The CO₂ GeoNet Association comprises 13 research institutes over 7 EU countries, while CGS Europe is a new coordination action that brings together CO₂ GeoNet and 21 other research institutes, thus covering 28 European countries, in order to develop a pan-European scientific body of expertise on CO₂ geological storage.



Ameena Camps (far right) sat on the Discussion Panel at the Open Forum

The objective of the open forum is to allow the CO₂ GeoNet members and stakeholders to interact with each other and share learnings from CO₂ storage activities. Of particular relevance to this year's open forum is the recent EU legal framework and the transposition of the CCS directive by member states into their legal framework. The deadline for completion of this is June and will be necessary if members stated wish to take part in the NER 300 funding scheme for CCS demonstration projects.

Updates from planned European large scale demonstration projects were given, including full chain CCS demonstrations in Italy, the UK, the Netherlands, Poland and Romania as well as learnings from small scale projects and field experiments. A session on scientific developments, included some results from the RISCS project, which is a 3 year project coming to the end of its first year. The aim of this project is to look at the effects of CO₂ leakage in marine and terrestrial environments by studying natural analogues and experimentation.

There was a panel discussion at the end of the second day on sharing views on CO₂ storage development in Europe; much of the discussion emphasised the importance of demos, public communication and involving stakeholders as early as possible.

The third day was a knowledge sharing workshop on legal and regulatory issues for the implementation of the EU directive on the geological storage of CO₂. Status, progress

and difficulties in the CCS directive transposition in all CGS Europe partners' countries were summarised and a few case studies were presented. The forum ended with a discussion on the most problematic scientific issues raised during the transposition process.

The forum was attended by 125 participants from 28 countries, including Japan and USA.

Programme and presentations available at: www.co2geonet.eu and www.cgseurope.net ●

San Servolo Island; Venue for the Open Forum



New IEA Study on Cost and Performance of CO₂ Capture from Power Generation, by Matthias Finkenrath, IEA, Paris

Energy scenarios developed by the International Energy Agency (IEA) suggest that CCS from power plants might contribute by 2050 to around 10% of the energy-related CO₂ emission reduction required to stabilise global warming. Since CO₂ capture from power generation is an emerging technology that has not been demonstrated on a commercial scale, related cost and performance information is based on feasibility studies and pilot projects and is still uncertain. A recent IEA paper analyses techno-economic data for CO₂ capture from power generation, including CO₂ conditioning and compression, in order to support energy scenario modelling and policy making.

The IEA study compares data for about 50 CO₂ capture installations at power plants that were published over the last five years in major engineering studies. Capital cost and levelised cost of electricity are re-evaluated and updated to 2010 cost levels to allow for a consistent comparison. Calibrated capital costs are reported as overnight costs, a common metric for comparison which assumes a power plant could be constructed in a single day. The analysis covers only costs related to the capture and compression, but not the transportation and storage of CO₂. The underlying cost data are estimates for generic, early commercial plants based on feasibility studies, which have an accuracy of on average 30 percent. The data do not reflect project-specific cost

or cost for first large-scale demonstration plants, which are likely higher.

High-level results of the IEA report are summarised in Table 1. The IEA study concludes that for coal-fired power generation, no single CO₂ capture technology outperforms available alternative capture processes in terms of cost and performance. Average net efficiency penalties for post- and oxy-combustion capture are 10 percentage points relative to a pulverised coal plant without capture, and 8 percentage points for pre-combustion capture compared to an integrated gasification combined cycle. Overnight costs of power plants with CO₂ capture in OECD regions are about USD 3 800 per kW across capture routes, which is 74% higher than costs for a pulverized coal reference power plant without capture. Cost figures vary substantially depending on the type of power plant type and fuel used, but the relative increase in overnight costs compared to the reference plant without CO₂ capture is a comparably stable metric across studies. It is thus recommended for estimating cost if limited data are available. Projected levelised cost of electricity is on average USD 105 per MWh. Average costs of CO₂ avoided are USD 55 per tonne of CO₂ if a pulverised coal power plant without CO₂ capture is used as a reference.



For natural gas-fired power generation, post-combustion CO₂ capture is most often analysed and appears the most attractive near-term option. Average cost and performance projections include net efficiency penalties of 8 percentage points for post-combustion CO₂ capture from natural gas combined cycles. Overnight costs are USD 1 700 per kW including CO₂ capture, or 82% higher than the reference plant without capture. Levelised cost of electricity is USD 102 per MWh and costs of CO₂ avoided are USD 80 per tonne of CO₂ if a natural gas combined cycle is used as a reference.

Cost estimates stated above are average figures for OECD regions. Cost data for installations in China indicate significantly

lower costs compared to the above-mentioned figures. All overnight costs include a contingency for CCS plants to account for unforeseen technical or regulatory difficulties. Cost results do not include a CO₂ emission price.

The IEA study highlights that further harmonisation of costing methodologies is needed in order to simplify technology comparisons. Though a similar approach is used for estimating cost and performance across studies, specific methodologies, terminologies and underlying assumptions are inconsistent.

In addition, broader assessments of CO₂ capture from power generation in non-OECD countries are still underrepresented, though according to global energy scenarios deployment of CCS in these regions might have to exceed expected levels in OECD countries.

The full study "Cost and Performance of Carbon Dioxide Capture from Power Generation" is available for free on the IEA homepage under: www.iea.org/papers/2011/costperf_ccs_powergen.pdf

Table 1. Cost and performance impact of adding CO₂ capture: Average figures for OECD countries

	Coal-fired power generation (similar for all capture routes)	Natural gas-fired power generation (post-combustion)
Reference plant without CO ₂ capture	Pulverized coal power plant	Natural gas combined cycle
Average efficiency penalty relative to the reference plant	10 percentage points (LHV)	8 percentage points (LHV)
Average overnight capital costs including CO ₂ capture	3 800 USD/kW	1 700 USD/kW
Average capital cost increase relative to the reference plant	74%	82%
Average cost of CO ₂ avoided relative to the reference plant	55 USD/tCO ₂	80 USD/tCO ₂

Note: CO₂ transportation and storage costs not included.

News from the IEA Clean Coal Centre, by Debo Adams, IEA Clean Coal Centre

This is an update on recent activities at the IEA Clean Coal Centre (CCC) – a sister organisation to the IEA GHG.

Clean Coal Technologies Conference (CCT2011) Zaragoza in Spain was the glorious venue for the successful CCC conference on clean coal technologies (CCT2011), the fifth in the series. Nearly 250 delegates attended the four day event, which included a trip to the Puertollano IGCC plant. There were over 100 presentations, and about 40 posters. Many of the sessions focused on aspects of carbon capture and

storage – they covered oxyfiring; IGCC and precombustion carbon capture; chemical looping combustion; carbonate cycling and solid sorbents; and international and regional perspectives. However, other aspects of clean coal were also covered. For example, there were sessions on mercury and flue gas cleaning; biomass co-firing; combustion; gasification; and ash and slag. CCT2013 will be held in Thessaloniki, Greece. Visit: www.cct2011.org

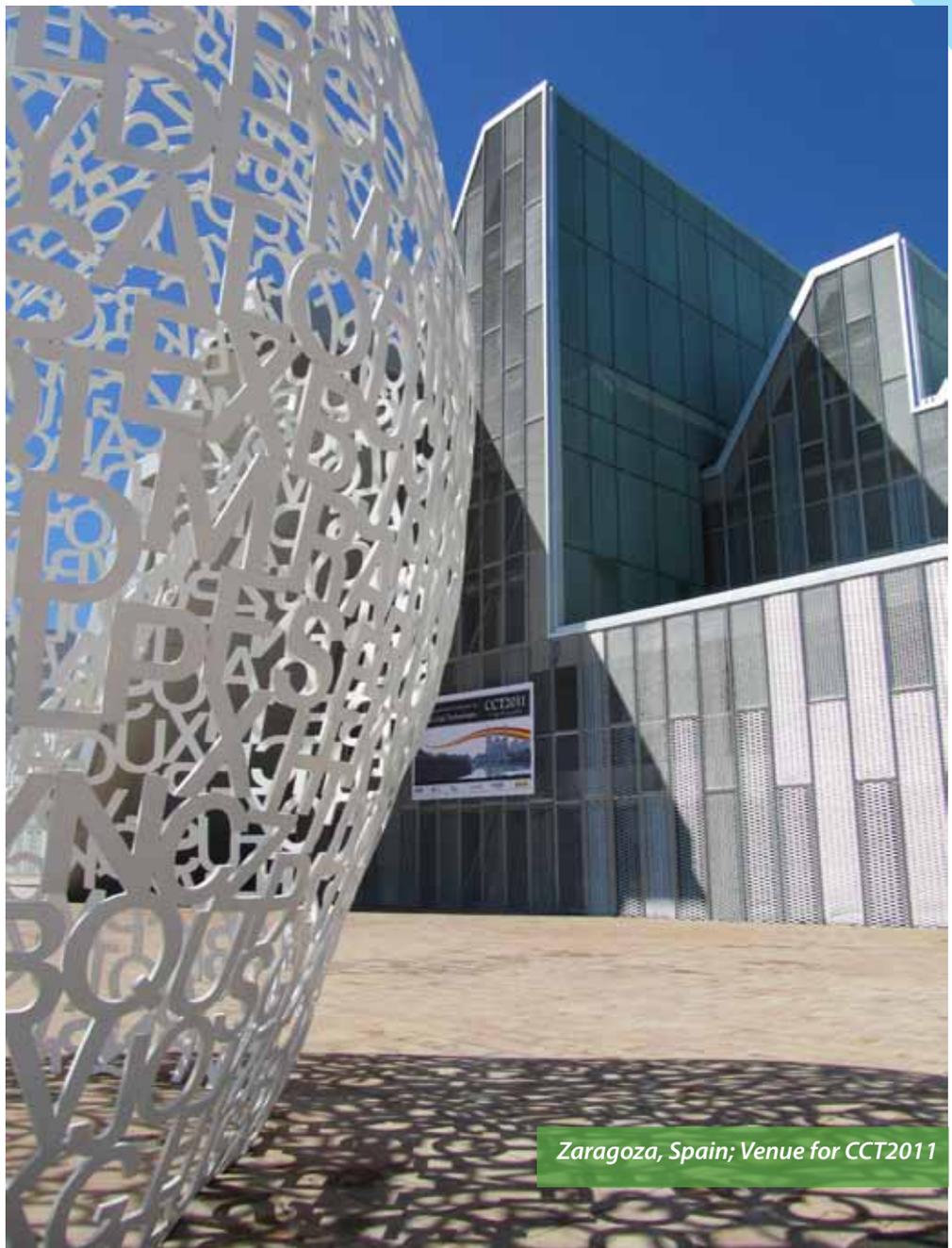
Three new reports are available from the CCC website, www.iea-coal.org.

Coal-to-oil, gas and chemicals in China, CCC/181, by Andrew Minchener provides a review of Chinese energy security concerns. Due to the relative paucity of Chinese oil and gas reserves, the government has adopted a policy of diversification by securing supplies via overland

pipelines and by tankers from various sources. At the same time, due to its abundant coal availability, China has initiated significant industrial development and demonstration programmes to establish certain coal transformation processes. These cover coal-to-oil, gas and key chemicals, namely olefins, dimethyl ether and ethylene glycol. These programmes are at the stage where some large industrial-scale projects are being constructed while for coal-to-oil, a major demonstration and three industrial pilot units are already operational. As such, over the next few years, China could establish first user advantage for many such processes. However, it is not at all certain that the originally perceived deployment of commercial-scale technologies will follow. For example, concerns have been raised regarding excessive use of coal and water to produce quantities of product that will not significantly reduce the projected import levels of oil. Consequently, the state government

has reined in both the scope and the pace of the originally expected developments. The future of all these coal transformation projects will depend on how China deals with the increasing challenges of balancing economy, energy and environment, as part of its aim to establish sustainability of its long-term development while, at the same time, addressing shorter term issues such as matching supply and demand.

In Chemical looping combustion of coal, CCC/178, Colin Henderson explains that it is an indirect form of combustion in which an oxygen-containing solid material, typically a metal oxide, supplies the oxygen to a fuel, and the spent oxygen 'carrier' is separately regenerated by high temperature reaction in an air stream. As there is no direct contact between air and fuel, CO₂ recovery up to very high levels is simplified. There is also potential for higher efficiency in delivery of energy than for conventional combustion or gasification with CO₂ capture. More elaborate chemical looping systems are also a future possibility for hydrogen production. This report describes the ongoing laboratory work to develop and test oxygen carriers and describes the continuous process development units that are being used to establish the proof-of-concept. Power cycles that could use chemical looping are also covered. The technology for coal has reached the scale of 1 MWth in the form of a continuous plant in Germany, recently commissioned.



Zaragoza, Spain; Venue for CCT2011

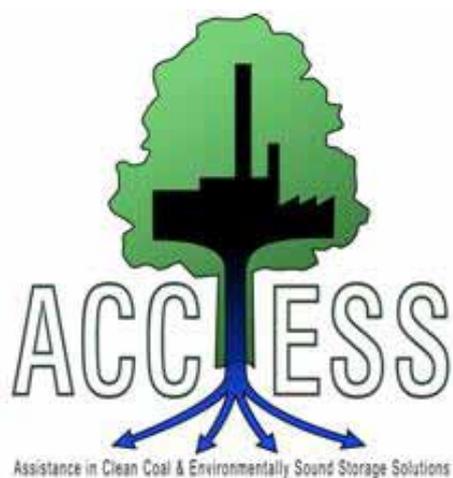
Public attitudes to coal use in the context of global warming, CCC/177 by Rohan Fernando. Although coal remains the main fuel for power generation worldwide, concerns regarding the contribution of coal-fired power generation to global warming have also increased considerably in recent years. The attitudes of the public towards power generation from a particular fuel is an important factor in shaping government policy. For example, such attitudes are crucial in determining whether new coal-fired projects can proceed.

This report describes current public attitudes towards coal-fired power plant in several countries both in the developed and developing world. It compares these attitudes with those reported in an earlier review in 2006. Events in late 2009 have increased levels of public scepticism about climate change. The report principally collates opinion poll data available on the public's attitude towards energy, environment and the use of coal for power generation. The report covers attitudes to climate change and CCS. It also reports what national and international organisations say about the use of coal. This type of information will influence public attitudes. Countries and regions chosen for particular focus are the USA, the European Union, the UK, India, Thailand and Australia.

For further information on the IEA Clean Coal Centre, visit www.iea-coal.org

ACCESS : EU funded Project in Kazakhstan on Assistance in Clean Coal and Environmentally sound Storage Solutions,

by Milos Nesladek, Ecorem



The objective of ACCESS is to build the capacity for the development of Clean Coal Technologies (CCT) and the identification of Carbon Capture and Storage (CCS) potential in Kazakhstan.

The focus lies on the transfer of knowledge and experience in the field of technology, economics, health, safety and environmental and social impacts and benefits of these new technologies. Based on the provided inventory data, the EU experts will also carry out extensive evaluation and modelling of the current situation in Kazakhstan and provide suggestions for solutions, based on the current state of the art of CCT and CCS technology in the EU. The project is realised by a Belgium team of experts in these domains (Ecorem nv, University of Hasselt, University of Liège and the Geological Survey of Belgium) together with the Kazakh Climate Change Coordination Center. Funded by the European Commission, the project runs over the years 2011 and 2012. A number of training sessions and visits covering the different topics will be given during that time, mostly in Kazakhstan and Belgium. In addition, exchange of information and the development of a network between

Belgian/EU actors and Kazakh stakeholders is another crucial element of the project mission.

For further information, please consult our website : www.access-kazakhstan.eu/ or contact milos.nesladek@uhasselt.be ●

Book Review – Climate Change in the Polar Regions, by Toby Aiken, IEAGHG

In 'Climate Change in the Polar regions,' John Turner and Gareth Marshall start from the premise that the polar regions have undergone some extensive and remarkable changes in environmental terms over the past few decades, including events such as the hole in the ozone layer above the Antarctic, loss of sea ice, and warming over the Antarctic Peninsula. The future also appears to hold more of the same events, with further warming, and continued loss of sea ice, unless greenhouse gas concentrations are held in check.

Both authors have extensive experience of the Antarctic regions from the course of their work for the British Antarctic Survey, and this experience and knowledge is clearly present in the book.

The summary messages to be taken are clear; records of the environmental changes in the polar regions coupled with climatic modelling predictions of the coming years show that unless greenhouse gas emissions and subsequent concentrations in the atmosphere are abated, mitigated or otherwise addressed, yet more harm will befall these areas. Indeed, models predict that high latitude areas will warm more than other regions on earth as a result of increased concentrations of greenhouse gases such as carbon dioxide.

In response to the counter argument that rapid climatic fluctuations are part of a cycle taking place over centuries and millennia, the book contains a reappraisal of our understanding of recent changes in the context of increased anthropogenic influences, and the comparison of recent changes with past variance. By necessity, this addresses those changes that have occurred in both the post-industrial era and those of the pre-industrial era, and these variations are analysed with the recent great advances in observations and monitoring techniques available to researchers and climatologists.

The book covers the following areas of study:

- Polar climate data and models,
- High latitude climates and mechanisms of change,
- The last million years,
- The Holocene
- The instrumental period,
- Predictions for the next 100 years,
- Summary and future research needs.

Climate Change in the Polar Regions by John Turnder and Gareth J. Marshall is available from the Cambridge University Press, priced at £70.00 (US\$115.00). ISBN 9780 5218 50100 ●

Green Investment Bank, by Nick Noakes, City and Financial

On the 24th of May, UK Deputy Minister Nick Clegg detailed the workings of the Green Investment Bank, which intends to bridge the gap between venture capital and the green economy, provide the finance for low-carbon infrastructure and lay the foundation for long-term, balanced growth.

According to the deputy minister, "the Government will bring forward legislation to ensure both the operational independence and enduring nature of the Bank. We are determined this organisation will be part of the institutional architecture of this country. Legislation will ensure a long shelf-life."

The government has guaranteed £3bn for the initial capitalisation of the bank. It expects to generate the funds through asset sales, although it is not dependent on them. The money has been underwritten by the Treasury and will be made available.

Moreover, he announced that "investments will be able to be made from April 2012, just eleven months from now. Possible early priorities for the Bank include offshore wind and waste projects. In the initial period, investment decisions will be made under interim governance arrangements, which Vince Cable will set out in more detail shortly."

As soon as state aid clearance has been approved, the bank will have full operational independence under the leadership of a new board. Activities it will be able to undertake include equity, debt and risk mitigation products. "The initial £3 billion capital by 2014/15 should enable the bank to catalyse

an additional £15 billion of investment in green infrastructure," he added. In addition, the bank will have borrowing powers from April 2015.

The practicalities of how the GIB will work is one of the central themes at City & Financial's 9th Annual UK Infrastructure Financing and Investment Summit, which is being held on Thursday 23rd June 2011 in central London. Another key theme this year will be the potential use by the Government of the Regulatory Asset Base approach for the road network, which could potentially provide very attractive investment opportunities for infrastructure investors.

Among the issues on the agenda at this timely conference are:

- Will the Green Investment Bank catalyse much needed investment in the infrastructure sector so that the investment targets in the National Infrastructure Plan can be met?
- How will the Bank work in practice?
- What is the view of institutional investors towards the Bank?
- What is the latest on the UK project pipeline?
- What are the latest policy developments at Infrastructure UK?
- How do overseas investors view the potential of UK infrastructure?
- Would the Regulatory Asset Base approach work for roads?
- What will be the impact of the EU plans for supporting private sector bonds?

- How is the European Investment Bank's infrastructure investment strategy developing?
- What impact will the launch of the Major Infrastructure Planning Unit have on the market?
- Will the proposed reform of the electricity market stimulate investment?
- What are the latest developments in debt financing and refinancing?
- Has the Hadrian Wall's model reached critical mass?

9th Annual UK Infrastructure Financing and Investment Summit, Programme, 23rd June 2011, London
www.cityandfinancial.com/pfir11 ●

Conferences & Meetings

This is a list of the key meetings IEAGHG are holding or contributing to throughout 2011. Full details will be posted on the networks and meetings pages of our website at www.ieaghg.org.

If you have an event you would like to see listed here, please email the dates, information and details to: toby.aiken@ieaghg.org.

Please note that inclusion of events in this section is at the discretion of IEAGHG.

Monitoring Network Meeting

7th - 9th June 2011; Potsdam, Germany

6th Trondheim Conference on CO₂ Capture, Transport and Storage

14th - 16th June 2011; Trondheim, Norway

Risk Assessment Network Meeting

21st - 23rd June 2011; Pau, France

9th Annual UK Infrastructure Financing and Investment Summit

23rd June 2011; London

IEAGHG International Summer School

18th - 22nd July 2011; Illinois, USA

High Temperature Solid Looping Network Meeting

31st August - 2nd September 2011; Vienna, Austria

2nd Oxyfuel Combustion Conference, OCC2

12th - 16th September 2011; Yeppoon, Queensland, Australia



Greenhouse News

ISSN 2047-220X (Print)

ISSN 2047-2218 (Online)

Greenhouse News is the newsletter of the IEA Greenhouse Gas R&D Programme (IEAGHG).

IEAGHG is funded by member contributions from IEA member countries as well as other developed and developing

countries and industrial organisations that have an interest in implementing technical options for GHG mitigation. A list of this membership

can be found on the website. Greenhouse News provides information on worldwide

developments in the field of GHG abatement and mitigation. It is published four times a year and is free of charge.

Mailing address changes and requests for copies of this newsletter should be sent to the address below. For further information about IEAGHG and suggestions for articles, please email or write to the:

IEAGHG ● Orchard Business Centre ● Stoke Orchard ● Cheltenham, Glos. GL52 7RZ ● United Kingdom.

Tel: +44 (0) 1242 680753 ● Fax: +44 (0) 1242 680758 ● mail@ieaghg.org ● www.ieaghg.org

Greenhouse News is an environmentally responsible publication. All efforts were made to consider the efficient use of resources in the production of this newsletter.

