



Strategic Plan Implementation Report

July 2008

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Capacity Building in Emerging Economies Task Force
CSLF Task Force Strategic Implementation Report (TFIR)
June 2008

1. Task Force Members
<ul style="list-style-type: none">▪ Australia▪ Canada▪ Colombia▪ European Commission▪ France▪ India▪ Italy▪ Mexico▪ Saudi Arabia▪ South Africa▪ United Kingdom▪ United States - Chair
2. Purpose of Task Force
<p>The objectives of the Task Force (TF) are to assist emerging economy CSLF Members to develop the knowledge, skills, expertise and institutions needed to deploy carbon capture and storage (CCS) technologies, develop training and educational resources that all CSLF Members can utilize, build on lessons learned from CSLF-recognized projects, and collaborate with other international CCS initiatives.</p>
3. Milestones
<ul style="list-style-type: none">▪ The Task Force on Capacity Building for Carbon Capture & Storage (CCS) for CSLF Members in Emerging Economies held a meeting on April 13, 2008 in Cape Town, South Africa. The Task Force meeting was held prior to the joint Policy and Technical Group meetings of the CSLF.▪ CSLF Members Australia, Canada, the European Commission, France, India, Mexico, the Netherlands, Norway, Saudi Arabia, the United Kingdom, and the United States all attended the meeting. In addition, the IEA GHG had representation there.▪ The meeting reviewed the Al Khobar Capacity Building Workshop, which took place in January 2008.▪ Another key discussion of the meeting was review of a briefing paper by Stephan Bachu of Canada on the CCS training provided by non-CSLF entities. The Task Force discussed the paper and will begin developing a core training curriculum for workshops, while still allowing each workshop to be regionalized.▪ The Task Force also discussed the 2 year plan for the Capacity Building Taskforce. The 2 year plan outlines the future of the task force (after the initial wave of workshops) and during the meeting various members outlined additions for the plan.
4. Status
<ul style="list-style-type: none">▪ Mexico will be hosting the next Capacity Building Workshop in July.▪ Brazil will be hosting another Capacity Building Workshop in September.▪ The Task Force continues to explore the manner to create core training modules for capacity building based on the materials thus far gathered from the workshops held.

The materials would be standardized and aimed at decision-makers from both the public and private sectors.

- The complete list of workshops confirmed or proposed is:
 - Saudi Arabia, January 2008 - confirmed
 - Mexico, July 2008 - confirmed
 - Brazil, September 2008 - confirmed
 - U.S.A., November 2008 - confirmed
 - India, January 2009 - proposed
 - China, second quarter 2009 - proposed
 - Colombia, second half 2009 - proposed
 - South Africa, TBD
- Financing the workshops continues to be an issue of concern and the Task Force members will keep trying to determine options and available opportunities.

Project Interaction and Review Team (PIRT)
CSLF Task Force Strategic Implementation Report (TFIR)
June 2008

1. Task Force Members

The Team consists of:

- A Core Group comprising the Chair and Vice Chairs of the Technical Group, and other delegates as designated by the Technical Group. Current membership consists of representatives from:

Australia	Clinton Foster
Canada	Bill Reynen
Denmark	Flemming Ole Rasmussen
European Commission	Jeroen Schuppers
Germany	Jürgen-Friedrich Hake
India	Alok Kumar
Netherlands	Harry Scheurs
Norway	Trude Sundset
Saudi Arabia	Khalid Abuleif
UK	Nick Otter
USA	George Guthrie

The chair is performed via a 3 co-lead approach (currently with Australia, E.C., and UK) with 1 person to change on an annual basis, so ensuring continuity, sharing the work load and providing opportunity for change. During the period of this report the chair resides with the UK.

- A Floating Group comprising representatives of CSLF recognized projects with overall management responsibility in the project (e.g. project manager), as well as other subject area experts.

2. Purpose of Task Force

The PIRT has the following tasks:

- Assess projects proposed for recognition by the CSLF in accordance with the project selection criteria approved by the Policy Group. Based on this assessment, make recommendations to the Technical Group on whether a project should be accepted for recognition by the CSLF.
- Review the CSLF project portfolio and identify synergies, complementarities and gaps, providing feedback to the Technical Group and input for further revisions of the CSLF roadmap.
- Identify technology gaps where further RD&D would be required.
- Foster enhanced international collaboration for CSLF projects, both within individual projects (e.g. expanding partnership to entities from other CSLF Members) and between different projects addressing similar issues.
- Promote awareness within the CSLF of new developments in CO₂ Capture and Storage by establishing and implementing a framework for periodically reporting to the Technical Group on the progress within CSLF projects and beyond.
- Organize periodic activities to facilitate the fulfillment of the above functions and to give an opportunity to individuals involved in CSLF recognized projects and other relevant individuals invited by the CSLF, to exchange experience and views on issues of common interest and provide feedback to the CSLF.

- Perform other such tasks that may be assigned to it by the CSLF Technical Group.

3. Milestones

Near-term milestones are:

- Assessment of potential candidate CSLF Projects and make recommendations to the Technical Group as to their suitability. (April 2008)
- Identification of areas that are thought to be appropriate for new projects and to encourage the submission of projects in these areas (December 2008)
- Implement the established mechanism between the PIRT and the IEA GHG with specific `pilot` activity. (April 2008)
- Review the CSLF Technology Roadmap and modify sections that need updating. (November 2008)
- CSLF Secretariat is continuing to engage with Member countries to obtain links to current Technology Road Maps for each country, and/or strategic planning documents for CCS that they have generated. This item is in response to the PIRT Action Plan item to have a “Technical roadmap developed for each area including links with member country roadmaps”. (Ongoing)

4. Status

- The EC supported DYNAMIS project was accepted as CSLF project in Cape Town in April 2008.
- A mechanism for formalizing a relationship between the PIRT and the IEA GHG has been established and agreed formally by the IEA GHG R&D Programme at the ExCo held in Daejeon, South Korea in October 2007 and by the CSLF Technical Group in Saudi Arabia in January 2008. A `pilot` topic on CO2 storage capacity coefficients is now proceeding following its acceptance at the next IEA GHG ExCo on 21-24th April 2008 in Berlin.
- Knowledge gained from the EC Zero Emission Platform (ZEP) project is being considered for any relevant PIRT activities. Part of this is to seek to use resources from the EC FP7 R&D Programme in the future, this being open to organizations from CSLF members especially developing countries. An EC call for FP7 has been issued on 30th November 2007 and the response to this opportunity was considered in Cape Town in April 2008. The outcome of the FP7 call will be assessed by the EC during June 2008 and the relevance of appropriate projects considered in a CSLF context by the PIRT and Technical Group meetings in Washington in November 2008.
- A plan to review and potentially update the CSLF TRM has been established under the leadership of the EC. The position of this was reviewed in Cape Town in April 2008 and will be followed by a further meeting in Australia in September 2008 in order to provide a draft TRM that will be discussed at Washington in November 2008.
- The comprehensive Gap Assessment completed and presented at the CSLF Workshop in Paris in April 2007 is being used in the current process reviewing and updating the TRM. This will be used to help identify where CSLF projects to could be encouraged in relation to the CSLF Charter, a continuing topic for discussion following the Cape Town meetings in April 2008. Also to be addressed will be the benefits of being a CSLF project and how to engage better with stakeholders. To this end a short survey was conducted by the Secretariat as input Cape Town discussions. Those CSLF projects that did not respond will be followed up over the period May to August 2008.

*Task Force for Review and Identification of Standards
for CO₂ Storage Capacity Estimation
CSLF Task Force Strategic Implementation Report (TFIR)
June 2008*

1. Task Force Members

- Stefan **Bachu**, Canada, Chair
- Didier **Bonijoly**, France
- John **Bradshaw**, Australia
- Robert **Burruss**, USA
- Niels Peter **Christensen**, EC
- Sam **Holloway**, UK
- Marcelo **Ketzer**, Brazil
- Odd-Magne **Mathiassen**, Norway

2. Purpose of Task Force

- The main goal of the Task Force is to develop and disseminate a clear set of definitions and methodologies that will allow:
 - 1) Consistent assessments of CO₂ storage capacity in geological media at various levels based on jurisdiction and/or geological domains that will provide decision makers in government and industry with the information needed for making the right decisions regarding CCS implementation;
 - 2) Comparison of CO₂ storage capacity at various levels (country, basin, regional) and among sites;
 - 3) Understanding of the basis for estimation and critical review of results.
- Performance indicators are:
 - 1) Adoption of the report by the CSLF Technical Group (*realistic*) - **Achieved**
 - 2) Publication of Task Force work in technical & scientific journals to achieve wide dissemination (*realistic*) – **Achieved** (two papers have been published in the **International Journal of Greenhouse Gas Control**)
 - 3) Adoption of definitions and methodologies by CSLF member countries (*realistic*) - **Partially achieved, some member countries are using them**
 - 4) Provision on an ad-hoc basis of support to the CSLF Task Force on Capacity Building and to CSLF member countries on knowledge transfer and estimation of storage capacity (*realistic*) – **Achieved** (Task Force members have provided support to three Capacity Building workshops – in Pittsburgh, USA, May 2007; Porto Alegre, Brazil, October 2007; and Al Khobar, Saudi Arabia, January 2008; and will continue to provide to at least two more; Mexico City, Mexico, July 2008; and Salvador, Brazil, September 2008)
 - 5) Adoption of definitions and methodologies by other countries (*ambitious*) – **Achieved, methodology is being applied in and for non-CSLF member countries**
 - 6) Use of the recommended definitions and methodologies by government, research and/or industry groups in producing assessments of CO₂ storage capacity at various levels (country, basin, regional, local and site specific) - **Achieved**

Previous attempts to assess CO₂ storage capacity used a wide variety of approaches and methodologies that considered various trapping mechanisms, and data sets of variable size and quality, resulting in widely varying estimates of inconsistent quality and reliability. In September 2004 CSLF established a *Task Force for Review and Development of Standard Methodology for Storage Capacity Estimation*. In September 2005 the Task Force presented the results of Phase 1 in a Discussion Paper in which previous estimates were critically analyzed and gaps in knowledge and/or methodology were identified. In March 2007 the Task Force presented the Phase 2 Report covering definitions, concepts and methodologies to be used in estimating CO₂ storage capacity that should serve as a basis for collecting the necessary data and properly estimating the CO₂ storage capacity in geological media. In March 2007 CSLF approved three Task Force recommendations to continue work in Phase 3 on:

- Harmonization of methodologies developed by the CSLF Task Force with methodologies developed by other groups, such as the USDOE Regional Partnerships Geologic Subgroup;
- Compilation of representative case studies of CO₂ storage capacity estimation at various scales in various geological settings and different countries;
- Provision of support to the CSLF Capacity Building Task Force on knowledge transfer to CSLF-member developing countries.

3. Milestones

- Phase 2 Report to be completed and adopted at the CSLF Joint Meeting of the Policy and Technical Groups in Paris, March 25-28, 2007 - **Achieved**
- Recommendations regarding future work to be presented at the next CSLF Joint Meeting of the Policy and Technical Groups in March 2007- **Achieved**
- Possibly a paper to be submitted to and published in the International Journal of Greenhouse Gas Control, summer 2007- **Achieved, paper published in Issue 4 of Volume 1, 2007**
- Inclusion of definition and methodologies in training materials to be produced by the CSLF Capacity Building Task Force- **Achieved**
- Provision of support to the CSLF Capacity Building Workshops organized between in 2007 and 2008 –**Achieved**
- Harmonization of methodology between the CSLF Task Force on CO₂ Storage Capacity estimation and the USDOE Regional Partnerships Geologic Subgroup – **Comparison of methodologies completed**

4. Status

- The Phase 3 report on “Comparison between Methodologies Recommended for Estimation of CO₂ Storage Capacity in Geological Media by the CSLF Task Force on CO₂ Storage Capacity Estimation and the USDOE Capacity and Fairways Subgroup of the Regional Carbon Sequestration Partnerships Program” has been approved by the CSLF Technical Group at its meeting in Cape Town, April 13-17, 2008, and it is now posted on the CSLF web site.
- Following completion of all its tasks, the Task Force asked the Technical Group to approve disbanding the Task Force.

The Task Force for Review and Identification of Standards for CO₂ Storage Capacity Estimation was disbanded on April 16, 2008.

Report of CSLF Secretariat
CSLF Strategic Implementation Reporting System (SPIR)
June 2008

A. Meetings and Workshops

- Past
 - CSLF Policy and Technical Groups (13-17 April 2008, Cape Town, South Africa). The Secretariat and the host country, South Africa, worked together to plan and execute the meeting logistics. The Secretariat set the themes for the meeting, set the agendas for all sessions, arranged for and contacted all the speakers, and prepared many of the documents considered at the meeting including the concept paper for the 2009 Ministerial meeting. All presentations from the meeting have been posted to the CSLF website. The Secretariat also facilitated all task force meetings held in conjunction with the meeting, and has developing summaries for these meetings that have been posted to the CSLF website. Following the meeting, the Secretariat developed the draft minutes for the Policy Group, Technical Group, and Joint Policy and Technical Group meetings, sent them to the delegates for comments, incorporated the comments and posted the revised drafts at the CSLF website.
 - CSLF Capacity Building Workshop (9-10 July 2008, Mexico City, Mexico). The Secretariat supported the host country, Mexico, in organizing this workshop. The objective of the workshop is to create awareness among the Mexicans involved in the energy sector about the urgency of the climate change problem; to present the latest advances in carbon capture and storage (CCS) and to start an effort to develop a National Atlas identifying sites that would be adequate for CCS.
- Future
 - CSLF Technical Group (16 November 2008, Washington, D.C., United States). The Secretariat is working with the Technical Group Chair to plan the meeting. The Secretariat is developing an agenda and will set up a meeting information page on the CSLF website that includes online meeting registration. The Secretariat will facilitate all task force meetings scheduled in conjunction with the meeting. Following the meeting, the Secretariat will develop the minutes for the meeting and, once approved, post them at the CSLF website. All presentations from the meeting will also be posted to the CSLF website.
 - CSLF Financial Issues Task Force meeting (TBD September 2008, New Delhi, India). The Secretariat is working with the host country, India, to plan and develop an agenda for the meeting, which will take place in the fourth quarter of 2008.
 - CSLF Projects Interaction and Review Team meeting (23-25 September 2008, Canberra, Australia). The Secretariat is working with the Chairman of the PIRT to develop an agenda for the meeting.
 - CSLF Capacity Building Workshop (September 2008, Salvador, Brazil). The Secretariat is supporting this workshop and will give a presentation.
 - CSLF Stakeholders Meeting (29 September 2008, London, United Kingdom). The Secretariat is supporting this meeting and will give a presentation.
 - CSLF Capacity Building Workshop (17-20 November 2008, Washington, D.C., United States). The Secretariat is providing support for this workshop.

B. Updates to CSLF website (<http://www.cslforum.org>)

The following updates to the CSLF website have been accomplished following the Cape Town CSLF meeting in April:

- The following new meeting pages have been added to the “Meeting Information” section:
<http://www.cslforum.org/meetings.htm>
 - Technical Group meeting in Washington, November 2008:
<http://www.cslforum.org/nov162008.htm>
 - CSLF Ministerial Meeting in London, TBD 2009:
<http://www.cslforum.org/meeting2009.htm>
- The following documents are online in the new Washington meeting page
 - Revised draft Technical Group minutes from the Cape Town meeting
 - CSLF background documents, including Charter and Terms of Reference
- The following documents are online in the new London Ministerial meeting page
 - Revised draft Policy Group minutes from the Cape Town meeting
 - Revised draft Joint Policy and Technical Group minutes from the Cape Town meeting
 - CSLF background documents, including Charter and Terms of Reference
- Presentations from the CSLF Cape Town meeting, except for the Financial Issues Task Force, are online in the “Presentations” section:
<http://www.cslforum.org/presentations.htm>
- Finalized minutes for the following CSLF business meetings are online in the “Documents” section: <http://www.cslforum.org/documents.htm>
 - Policy Group Business Meeting (Paris 2007)
 - Joint Meeting of Policy and Technical Groups (Paris 2007)
 - Technical Group Business Meeting (Al Khobar 2008)
- The following documents are online in the “Documents” section:
<http://www.cslforum.org/documents.htm>
 - Update to the CSLF Terms of Reference and Procedures that was approved by the Policy Group at the Cape Town meeting
 - Update to the CSLF Project Submission Form that was approved by the Technical Group at the Cape Town meeting
 - Phase III Final Report from the Storage Capacity Estimation Task Force
 - March 2008 Strategic Plan Implementation Report (SPIR)
 - Updated CSLF Recognized Projects listing, which includes the newly-recognized Dynamis project
- The following documents are online in the “Task Forces” section:
<http://www.cslforum.org/taskforces.htm>
 - Finalized minutes from the Capacity Building Task Force meeting (Calgary 2007)
 - Revised draft minutes, agenda, and presentations from the Capacity Building Task Force meeting (Cape Town 2008)
 - Agenda, revised draft minutes, and background documents from Financial Issues Task Force meeting (Cape Town 2008)
 - Finalized minutes from the Financial Issues Task Force meeting (New Delhi 2007)
 - Finalized minutes from the Risk Assessment Task Force meeting (Al Khobar 2008)

- Revised draft minutes from the Risk Assessment Task Force meeting (Cape Town 2008)
- Phase III Final Report from the Storage Capacity Estimation Task Force
- Revised draft minutes, agenda, and presentations from the PIRT meeting (Cape Town 2008)
- The newly-recognized Dynamis project has been added to the “Projects” section: <http://www.cslforum.org/projects.htm>
- A video on the CO2CRC Otway Project is online in the “Video Presentations” section: <http://www.cslforum.org/video.htm>
- The next Technical Group Business meeting, 16 November in Washington, D.C., has been added to the “Events” section: <http://www.cslforum.org/events.htm>
- The “About the CSLF” section has been updated: <http://www.cslforum.org/about.htm>
- The following items are online in the “Press” section: <http://www.cslforum.org/press.htm>
 - Documents from the Press Briefing at the Cape Town meeting
 - A new “Archive of CSLF Press Releases” subsection: <http://www.cslforum.org/pressreleases.htm>
- The CSLF Public Meeting Place (PuMP) has been removed. It was discontinued by consensus of the Policy Group at the Cape Town meeting.

C. Other Activities

Over this reporting period, the Secretariat handled approximately 250 pieces of incoming e-mail correspondence.

D. Stakeholders

There are now 124 registered stakeholders, four of which have requested not to be shown in the CSLF website listing. Members are encouraged to have their stakeholders register.

Report from Stakeholders
CSLF Strategic Implementation Reporting System (SPIR)
June 2008

World Coal Institute

The World Coal Institute (WCI) has recently submitted a comprehensive report to the UNFCCC Subsidiary Body for Scientific and Technical Advice in support of the inclusion of CCS projects under the Clean Development Mechanism (CDM). Organisations have been invited to make submissions on the issue ahead of an intended final decision at the next round of UN climate change talks being held in Poznan, Poland in December 2008. WCI has engaged with other like minded organisations in order to encourage similar submissions in support of a positive decision in Poland.

WCI's submission seeks to provide answers to questions regarding a number of concerns raised by Parties at previous rounds of climate change talks. The report provides detailed information on CCS research and development being undertaken around the world in order to alleviate these concerns. Full details of the WCI submission can be accessed at <http://www.worldcoal.org/pages/content/index.asp?PageID=498>.

In May, WCI co-hosted a workshop with the IEA's Clean Coal Centre and GHG R&D Programme focusing on the financing of CCS projects. The workshop, held in New York City, brought together experts from the energy industry, finance sector and government. WCI sees the financing element of CCS as absolutely crucial as a number of projects around the world seek to get off the ground. Representatives of the finance sector in attendance noted that it was premature to speak of "financing" CCS as the technology is currently non-commercial and presented a very high investment risk. The role of governments in accelerating technology development through providing funding to support first of a kind commercial scale demonstrations was emphasised at the workshop. Further details on the workshop, including access to presentations, can be found on the WCI website.

* * * * *

Pinnacle Technologies

In Q1 2008, Pinnacle Technologies completed installation of two CCS pilot monitoring systems. The first is located in West Virginia where a 36 tool surface tiltmeter array and two differential GPS stations were installed to monitor surface deformation and calculate reservoir level CO2 plume movement, fracture development and caprock integrity. Injection is expected to occur in late July, 2008. The second project which is located in New Mexico, also included a 36 instrument tiltmeter installation, 2 DGPS stations as well as InSAR data collection over the project area and a CO2 analyzer data logging system. Injection for that project is expected to commence in late June, 2008. Pinnacle is also planning on installing downhole pressure monitoring equipment on a CCS pilot in Mississippi in June 2008.

* * * * *

United Kingdom Hydrogen Association Report

The United Kingdom Hydrogen Association (UKHA) called for better commercialisation of low carbon source hydrogen energy at an international session on hydrogen and fuel cells at the eighth All-Energy Conference held at AECC, Aberdeen, Scotland on 21 and 22 May 2008.

UKHA chairman, Alastair Rennie of AMEC, chaired the **‘The race is on - commercialisation of fuel cell technology has begun in earnest’** session, and challenged leading industrial companies and researchers to both get products to market and use their creativity to increase public awareness of hydrogen energy technologies.

Mr Rennie announced that AMEC, a leading international engineering and project management company, had made a proposal to The London Organising Committee of the Olympic Games and Paralympic Games (LOC) to have the 2012 Olympic flame powered by sustainable hydrogen energy. Because it is hydrogen it can be designed to be multi coloured, he also noted that across the UKHA’s membership we have the resources and skills to realise this concept. The LOC has yet to act on the proposal, which would provide a unique opportunity to bring together top UK companies and research organisations in an effort to increase public acceptance of clean hydrogen energy whilst adding to the magic of the Olympic Games.

The session was part of All-Energy’s ‘H208 - Hydrogen and Fuel Cells 2008’, which included a hydrogen/fuel cells pavilion and four dedicated conference sessions, co-organised by the UKHA.

The UKHA also presented a paper during the session on UK Engagement in International Standards. Andrew Winship, UKHA Safety & Standards Chair-elect (The Linde Group), said that the increased international participation in the development of standards and regulations for hydrogen energy technologies is a clear indication that commercialisation is near.

The British Standards Institute (BSI) has recently formed a new subcommittee, chaired by Karen Hall, Administrative Manager for the UKHA, to be responsible for monitoring the work of ISO/TC 197 and to discuss, agree and submit the UK position and vote regarding any associated areas of work.

The UKHA presentation introduced participants to the Programme of Work, and invited experts to participate. “Participation in the development of international standards will ensure UK technologies can be deployed worldwide, and used in a safe and consistent manner”, Mr. Winship explained.

The UKHA held its Annual General Meeting on 5 June at BSI in London.
www.ukha.org.

Alberta Enhanced Coalbed Methane Recovery Project
CSLF Project Status Report (PSR)
 June 2008

1. Project Location
Alberta, Canada
2. Project Lead
Brent Lakeman, Alberta Research Council <ul style="list-style-type: none"> ▪ Telephone: 1 780 450-5274 ▪ E-Mail: Lakeman@arc.ab.ca
3. Project Objectives
<ul style="list-style-type: none"> ▪ Reduce greenhouse gas emissions by subsurface injection of CO₂ into deep coal beds ▪ Enhance coal-bed methane recovery factors and production rates as a result of CO₂ injection
4. Recent Milestones
<ul style="list-style-type: none"> ▪ Completion of a single-well micro-pilot test at Suncor's CSEMP site ▪ Baseline seismic survey completed ▪ N₂ tracer injected with offset well monitoring completed ▪ Long term CO₂ injection initiated and suspended due to well-bore issue ▪ Alberta and China activities have led to a signing ceremony in China for another CO₂-ECBM project in the Quinshui Basin
5. Status
<ul style="list-style-type: none"> ▪ CO₂ testing completed for single well micro-pilot ▪ Engineering and Reservoir Modelling analysis being completed for micro-pilot ▪ Tiltmeter response being reviewed ▪ Analysis of injection well issue completed ▪ EUB approval obtained for remedial work on injection well ▪ No change in status from February 2008 report

*CANMET Energy Technology Centre (CETC)
R&D Oxyfuel Combustion for CO₂ Capture Project
CSLF Project Status Report (PSR)
June 2008*

1. Project Location
CANMET Energy Technology Centre, Ottawa, Canada
2. Project Lead
Dr. Kourosh Zanganeh Zero-Emission Technologies Group, Clean Electric Power Generation CANMET Energy Technology Centre, 1 Haanel Drive, Ottawa, Ontario K1A 1M1, Canada Tel: (613) 996-3916; Fax: (613) 992-9335; Email: kzangane@nrcan.gc.ca
3. Project Objectives
<ul style="list-style-type: none"> ▪ Research, development and pre-commercial demonstration of advanced near-zero emission technologies, including CO₂ capture systems, for fossil fuel plants. ▪ Development of next-generation oxy-fuel combustion and burner technologies and improving the overall performance and economics of these systems. ▪ Experimental investigation of CO₂ capture and compression processes, phase change and the impact of impurities on the performance of CO₂ capture systems. ▪ Research and development of advanced zero-emission gas turbine cycles. ▪ Development of novel integrated multi-pollutant control processes for NO_x, SO_x, Hg, and particulate with optimization, integration and low-grade heat recovery.
4. Recent Milestones
<ul style="list-style-type: none"> ▪ Developed and now testing of a new air/oxy-fuel/oxy-steam burner prototype. ▪ Developing advanced models and simulation tools for oxy-coal power plant with integrated CO₂ capture and air separation unit. ▪ Developed, constructed and will soon be testing a first-of-the-kind fully integrated CO₂ capture and compression unit pilot scale facility. ▪ Testing of oxy-steam pulverized coal combustion with zero flue gas recycle.
5. Status
<ul style="list-style-type: none"> ▪ CANMET CO₂ R&D Consortium research program started in 1994 and is currently in Phase 9. ▪ Pilot-scale experimental investigation and combustion testing at CANMET's Vertical Combustor Research Facility (VCRF) is underway. ▪ New prototypes are under construction for testing while newer, advanced prototypes are being designed. ▪ New processes for improving the efficiency and reducing the cost of CO₂ capture systems are being developed. ▪ Pilot-scale experimental investigation and combustion testing with low-value fuels, such as petcoke, is underway. ▪ Supporting the pre-commercial demonstration of near-zero emission technologies. ▪ Consortium technical reports and presentations are confidential. ▪ New members are welcome to join the program by paying a nominal membership fee and accepting the terms and conditions of the Consortium agreement. ▪ Web site (members only): http://z429e302r1c50.communityzero.com/

CO₂ Capture Project Phase 2 (CCP2)
CSLF Project Status Report (PSR)
July 2008

1. Project Location
Project Office: 150 West Warrenville Road, Naperville, IL USA 60563
2. Project Lead
<ul style="list-style-type: none">▪ CCP2 Program Manager: Linda Curran, BP▪ CCP2 Executive Board Chairman: Gardiner Hill, BP▪ Capture Team Lead: Ivano Miracca, ENI▪ Storage Team Lead: Scott Imbus, ChevronTexaco▪ Communications Team Lead: Iain Wright, BP▪ Policy Team Lead: Arthur Lee, ChevronTexaco▪ CCP2 Advisory Board Chair: Vello Kuuskraa
3. Project Objectives
<ul style="list-style-type: none">▪ Develop technology that will reduce costs and improve efficiencies of CO₂ capture through advanced technologies▪ Increase knowledge and reduce uncertainties in technology performance and deliver low-cost CO₂ capture technologies to demonstration stage by 2009▪ Demonstrate that geological storage of CO₂ is secure and can represent a viable Greenhouse Gas mitigation technique. Develop technology to address critical issues such as storage site/project certification, well integrity and monitoring▪ Increase public awareness and acceptance of CCS▪ A distinctive aspect of CCP2 is the emphasis on collaboration and partnership with governments, industry, NGO's and other stakeholders. The members of the partnership recognize the challenges associated with global climate change require solutions that are economically and socially accepted to all.
4. Recent Milestones
<ul style="list-style-type: none">▪ Capture technologies are undergoing rigorous technical and economic assessments prior to development and scaleup in Phase 3, beginning January, 2009.▪ Certification Framework: Development continues for a stream-lined, integrated, risk-based model for technical assessment of potential storage sites, including operational parameters, monitoring systems, and success criteria for demonstrating long-term containment.
5. Status
<ul style="list-style-type: none">▪ A rigorous process is underway to evaluate the most promising capture technologies for potential pilot or demonstration▪ Information from 3 well evaluations has been assessed to determine the long-term sealing capacity of wells in a CO₂-rich environment, type and levels of risk posed by failure of well components, and preventative and remediative engineering solutions.▪ Novel approaches to optimize the resolution and cost effectiveness of monitoring, leakage detection and verification are under development▪ The Phase 3 program will begin in January 2009. Parties interested in participating should contact the Program Manager for details.▪ Recent reports: can be found on the CCP2 website: http://www.co2captureproject.org/index.htm

CO₂ GeoNet
CSLF Project Status Report (PSR)
June 2008

1. Project Location
Western Europe
2. Project Lead
<ul style="list-style-type: none"> ▪ Coordinator: Dr. Nick Riley (British Geological Survey) <ul style="list-style-type: none"> - E-mail: njr@bgs.ac.uk ▪ Network Manager: Isabelle Czernichowski-Lauriol (BRGM) ▪ Secretariat: Sergio Persoglia (OGS) ▪ Contact: info@co2geonet.com
3. Project Objectives
<ul style="list-style-type: none"> ▪ Focus is R&D into geological storage of CO₂ and strengthening the European Research Area. ▪ Form a durable integration of the original 13 partners over 5 years, involve more partners. ▪ Provide the underpinning science capability and knowledge to help enable deployment of large scale CO₂ storage in Europe as quickly as possible ▪ Collaborate internationally ▪ Be a source of impartial scientific information on CO₂ geological storage for stakeholders ▪ Train existing and new researchers ▪ Develop and share research infrastructure
4. Recent Milestones
<ul style="list-style-type: none"> ▪ In April 2008 formed a legal entity, “CO₂ GeoNet Association”. This will enable new strategic partners to join and existing partners to continue working together
5. Status
<ul style="list-style-type: none"> ▪ Latest results of research presented at Annual Stakeholder workshop held April 2008. Included joint research projects on monitoring natural CO₂ sites at marine, lacustrine and terrestrial locations using remote sensing, geophysics and direct gas analysis techniques. ▪ Submitted to European Commission FP7 a proposal (Feb 2008) to support international open access and capacity building with respect to CO₂ GeoNet’s laboratory and field lab facilities. The proposal has the support of the IEAGHG and wishes to utilize the CSLF as an interface for assisting in research capacity building in the emerging economies. The proposal (if supported by the EC) will also resource transnational exchanges of personnel and equipment between established CO₂ research programmes. ▪ Network has world-class unique expertise in monitoring and understanding CO₂ migration in the shallow subsurface and ecosystem responses to CO₂ in marine, freshwater and terrestrial settings ▪ Network, training and dialogue workshop on CO₂ geological storage in Paris on October 3rd 2007 (report published in Green House Gas Issues; talks posted on CO₂GeoNet website). ▪ CO₂ GeoNet presented in 2 EU Parliament workshops regarding the draft CO₂ Capture & Storage Directive. ▪ e-mail: info@co2geonet.com or at the CO₂ GeoNet website: http://www.co2geonet.com

CO2CRC Otway Project
CSLF Project Status Report (PSR)
June 2008

1. Project Location
Southwestern Victoria, Australia
2. Project Lead
Sandeep Sharma, CO2CRC, Kensington WA 6151, Australia, <ul style="list-style-type: none">- Ph: 08 6436 8736- Mob: 0412 515 494- E-mail: ssharma@co2crc.com.au
3. Project Objectives
The Otway project has been designed to demonstrate all aspects of CCS, and will demonstrate the geological storage and monitoring of CO ₂ under Australian conditions. It will aim to provide technical information on geosequestration processes, technologies and monitoring and verification regimes that will help to inform public policy and industry decision-makers and assurance to the community. The objectives are the same as previously described.
4. Recent Milestones
<ul style="list-style-type: none">▪ Construction completed (Mar 08)▪ Project inaugurated on April 2, 2008 by Federal Minister Ferguson and State Minister Batchelor.▪ Injection commenced (April 08)▪ Commissioning completed (April 08)▪ Offset seismic acquisition with explosive source using permanently installed geophones in Naylor 1 (May 08)▪ Geochemical sampling using U-Tube set up on a monthly basis.▪ Multiple site visits by international parties from South Africa, Italy (June 08)▪ Public Meeting (April 08)▪ Licence from DOI over compulsorily acquired land by Vic Gov finalized.
5. Status
<ul style="list-style-type: none">▪ Seismic testing using permanently installed geophones to continue▪ Geochemical sampling to continue▪ Breakthrough expected in 4 to 7 months▪ Finalise working plan for the Otway Stage 2 activities (ongoing);

CO₂ Separation from Pressurized Gas Stream Project
CSLF Project Status Report (PSR)
 June 2008

1. Project Location
Japan (membrane module development) Pittsburgh, Pennsylvania, USA (testing)
2. Project Lead
Dr. Shingo Kazama, RITE (Research Institute of Innovative Technology for the Earth) <ul style="list-style-type: none"> ▪ E-mail: kazama@rite.or.jp
3. Project Objectives
<ul style="list-style-type: none"> ▪ Development of membrane material for molecular gate function and composite membrane of excellent CO₂ selectivity over H₂ ▪ Development of membrane module ▪ Testing of the module (with NETL, USA)
4. Recent Milestones
<ul style="list-style-type: none"> ▪ Improvement of membrane material for molecular gate function (2008FY) ▪ Improvement of composite membrane of an excellent CO₂ selectivity over H₂ (2008FY) ▪ Development of membrane module (2008FY) ▪ Process simulation (2008FY)
5. Status
<ul style="list-style-type: none"> ▪ 1st duration: 11/2003 – 03/2006 Completed ▪ Development of novel dendrimer materials for CO₂ separation ▪ Fabrication of dendrimer composite membrane modules and their test <p><u>References:</u> Shingo Kazama, Teruhiko Kai, Takayuki Kouketsu, Shigetoshi Matsui, Koichi Yamada, James S. Hoffman, Henry W. Pennline, Experimental Investigation of a Molecular Gate Membrane for Separation of Carbon Dioxide from Flue Gas, Session 30, Proceedings of Pittsburgh Coal Conference, Pittsburgh, USA (2006)</p> <p>Takayuki Kouketsu, Shuhong Duan, Teruhiko Kai, Shingo Kazama*, and Koichi Yamada, “PAMAM Dendrimer Composite Membrane for CO₂ Separation: Formation of a Chitosan Gutter Layer”, <i>J. Membrane Sci.</i> 287 (2007) 51-59 and so on.</p> <ul style="list-style-type: none"> ▪ 2nd duration: 04/2006 – 03/2011 ongoing ▪ Development of novel CO₂ molecular gating materials for a CO₂/H₂ mixture ▪ Test of dendrimer composite membrane under an elevated pressure (12/2007) ▪ Accomplishment of a large CO₂/H₂ selectivity at an elevated pressure (3/2008) ▪ Development of membrane modules of CO₂ molecular gate membrane (2009FY) ▪ Bench scale testing (2010FY)

CO₂SINK
CSLF Project Status Report (PSR)
June 2008

1. Project
CO₂SINK - In situ R&D Laboratory for Geological Storage of CO₂ Ketzin, State of Brandenburg, Germany http://www.co2sink.org
2. Project Lead
GeoForschungsZentrum Potsdam Telegrafenberg, D-14473 Potsdam; http://www.gfz-potsdam.de Coordinator: Prof. Dr. Frank Schilling Tel: +49.331.288-1510; Fax: +49.331.288-1502; E-mail: fsch@gfz-potsdam.de
3. Project Objectives
<ul style="list-style-type: none">▪ Developing a basis for geologic storage of CO₂ into a saline aquifer▪ Establishing the first European in-situ laboratory for onshore storage of CO₂▪ Characterization of flow and reaction processes in geologic storage, including detailed analysis of samples of rocks, fluids and microorganisms from the underground reservoir▪ Intensive monitoring of the injected CO₂ using a broad range of geophysical and geochemical techniques▪ Development and benchmarking of numerical models▪ Definition of risk-assessment strategies
4. Recent Milestones
<ul style="list-style-type: none">▪ Feb./May 2007: Spud-in of the CO₂SINK injection and observation wells▪ June 13, 2007: Opening of the Ketzin Field Lab, CO₂ Storage Site and Info Centre▪ Sept. 8, 2007: One injection and two observation wells drilled and cemented▪ Feb. 8, 2008: Injection facility installed and tested▪ Feb. 29, 2008: Hydraulic testing successful▪ June 18, 2008: Final lifting of injection and observation wells; slug injection▪ June 24, 2008: Commissioning of injection facility, start of injection test phase▪ June 30, 2008: Start of injection
5. Status
<ul style="list-style-type: none">▪ 5-years lifetime 04/2004 - 03/2009; extension of project lifetime is applied for▪ July 2008: start injection of up to 60,000 tonnes CO₂ <p>Completed subprojects:</p> <ul style="list-style-type: none">▪ Storage site development▪ Baseline Storage Site Modeling▪ GeoEngineering: drilling, coring, pre-injection logging <p>Ongoing subprojects:</p> <ul style="list-style-type: none">▪ Rock/fluid interactions laboratory experimentation▪ Economic/ecological analysis and safety concepts▪ CO₂ supply, transport, intermediate storage, conditioning and injection▪ Geophysical and geochemical monitoring and verification of CO₂ storage▪ Project coordination and public outreach

In Salah, Industrial-scale CO₂ Geological Storage
CSLF Project Status Report (PSR)
June 2008

1. Project Location
In Salah, Algeria, Africa
2. Project Lead
Iain W. Wright BP Alternative Energy, Chertsey Road, Sunbury, Middlesex TW16 7LN, United Kingdom E-mail: iain.wright@uk.bp.com
3. Project Objectives
<ul style="list-style-type: none">▪ Provide assurance that secure geological storage of CO₂ can be cost-effectively verified and that long-term assurance can be provided by short-term monitoring.▪ Demonstrate to stakeholders that industrial-scale geological storage of CO₂ is a viable GHG mitigation option.<ul style="list-style-type: none">○ Set precedents for the regulation and verification of the geological storage of CO₂, allowing eligibility for GHG credits
4. Recent Milestones
<ul style="list-style-type: none">▪ Good results from INSAR program, confirmed by monitoring well and tracer work
5. Status
<ul style="list-style-type: none">▪ Storing 1mmtpa CO₂ in a deep saline aquifer (1900 deep, 2m thick, 10mD permeability).▪ Designing seismic program for possible implementation in 2009.

International Test Centre (ITC) for CO₂ Capture with Chemical Solvents
CSLF Project Status Report (PSR)
June 2008

1. Project Location
University of Regina, Regina, Saskatchewan, Canada
2. Project Lead
Dr. Malcolm Wilson, University of Regina (malcolm.wilson@uregina.ca) Dr. Paitoon Tontiwachwuthikul, University of Regina (paitoon@uregina.ca) Dr. Raphael Idem, University of Regina (raphael.idem@uregina.ca)
3. Project Objectives
<ul style="list-style-type: none"> ▪ To reduce the cost of post combustion CO₂ capture through <ul style="list-style-type: none"> – Formulated solvent development – Process optimization & systems integration – Reduction of heat duty for solvent regeneration ▪ Perform cost study for post-combustion CO₂ capture in collaboration with an Engineering company on a site-specific case (Europe, Australia, North America, etc.)
4. Recent Milestones
<ul style="list-style-type: none"> ▪ Received prestigious NSERC Synergy award for Innovation – October 2006 ▪ Received the Innovation Award by Regina Chamber of Commerce - Paragon Awards – April 2008 ▪ Semi-annual meeting of partners was held in June and resulted in substantial interest in the gains made in overall energy efficiency as a result of: <ul style="list-style-type: none"> – Breakthroughs in solvent development (mixed and custom designed solvents) – Breakthrough in heat duty reduction – Breakthrough in process integration ▪ Patented technologies have been licensed by partners for commercial applications ▪ Site specific cost study in progress based on 800 MW coal unit (North America Gulf Coast)
5. Status
<ul style="list-style-type: none"> ▪ Phase 2 ends March 2010 with discussions on Phase 3 underway ▪ U.S. provisional patent on process integration ▪ U.S. provisional patent on solvents ▪ U.S. provisional patent on special chemical additives ▪ Cost studies in progress (North America, Gulf Coast, Lignite retrofit to be undertaken) ▪ Project website: http://www.co2-research.ca

Regional Carbon Sequestration Partnerships (RCSP) Project
CSLF Project Status Report (PSR)
 June 2008

1. Project Location
Various locations in United States and Canada
2. Project Lead
<p>National Regional Carbon Sequestration Partnership (RCSP) Initiative Managed by the U.S. Department of Energy National Energy Technology Laboratory (NETL)</p> <ul style="list-style-type: none"> ▪ Sean Plasynski, Sequestration Technology Manager, NETL (E-mail: sean.plasynski@netl.doe.gov) ▪ John Litynski, RCSP Coordinator, NETL (E-mail: john.litynski@netl.doe.gov)
3. Project Objectives
<ul style="list-style-type: none"> ▪ To coordinate this government/industry effort of seven RCSPs tasked with determining the most suitable technologies, regulations, and infrastructure needs for carbon capture, transport, and sequestration across areas of the United States and Canada. ▪ To develop the infrastructure necessary for the future deployment and commercialization of carbon capture and storage (CCS) as a critical strategy for climate change and greenhouse gas emissions mitigation. ▪ To implement the RCSP program in three phases: <ul style="list-style-type: none"> – The Characterization Phase evaluated the potential for GHG sequestration in each region. The RCSPs collected data on CO₂ sources and sinks; developed the human capital to support and enable deployment of future carbon sequestration field tests; determined which sequestration approaches were best suited for their specific regions of the country; and studied the regulations and infrastructure needed for potential wide-scale deployment of sequestration. – The Validation Phase is focused on validating the most promising regional sequestration opportunities through a series of small-scale field tests. This phase builds upon Characterization Phase accomplishments and begins field testing of geologic and terrestrial sequestration technologies to provide the technical foundation for Deployment Phase activities. – The Deployment Phase will demonstrate at large scale that CO₂ capture, transport, injection, and storage can be achieved safely, permanently, and economically. The primary goal of the Deployment Phase is the development of large-scale CCS projects across North America. The RCSPs will inject at least one million tons of CO₂ per project into geologic formations representative of potential sinks in each region. These tests will include one to three years of site characterization; two to three years of injection; and two to four years of monitoring, mitigation and verification (MMV).
4. Recent Milestones
<ul style="list-style-type: none"> ▪ Characterization Phase completed in 2005 ▪ Regional Carbon Sequestration Partnerships Phase I Accomplishments, see: http://www.netl.doe.gov/technologies/carbon_seq/partnerships/phase1/workproducts_table.html ▪ Validation Phase initiated in 2005, with small-scale field tests currently underway and scheduled for completion in 2009 <ul style="list-style-type: none"> – Development of the Carbon Sequestration Atlas, which identified over 3,600 billion tons of estimated geologic CO₂ storage capacity.

- Storage capacity estimates being modified by data obtained in the validation efforts
- Injection of CO₂ into depleted oil and gas fields has increased knowledge of CO₂ capture, transport, MMV requirements, and regulations
 - Nine ongoing saline formation field tests
 - Injection of up to 10,000 metric tons of CO₂ commenced in February 2008 at MRCSP's Michigan Basin test site.
 - Ten enhanced oil or gas recovery projects are being conducted for value-added CO₂ storage
 - Injection operations have been completed at MGSC's Huff'n Puff test site at the Loudon Oil Field in Fayette County, Illinois.
 - Injection operations are ongoing for PCOR's Validation Phase field test, which is being conducted at Apache Canada's Zama Oil Field in Alberta, Canada. This test will demonstrate the concurrent benefits of CO₂ storage, H₂S disposal, and EOR.
 - SWP commenced injection operations for an EOR test in the Aneth Oil Field near Bluff, Utah. SWP plans to inject 150,000 tons of CO₂ over a two year period to demonstrate CO₂ sequestration with EOR.
 - Five ECBM tests conducted at unmineable coal seams
 - Eleven ongoing terrestrial sequestration projects include no-till farming, conversion of marginal croplands to grasslands and forests, restoring vegetation on mined areas, wetland restoration, and reforestation
- Deployment Phase activities began in 2007 and are scheduled to run through 2017. DOE has awarded six large-scale carbon sequestration projects which are the largest single set of such projects authorized to date in the world.
 - PCOR will conduct two large-volume geologic CO₂ storage projects. The Williston Basin (North Dakota) test involves the transport of at least half a million tons of CO₂ per year from an existing coal-fired power plant in central North Dakota and injection of the CO₂ into an oil reservoir located in western North Dakota or Eastern Montana. The second demonstration, the Western Canadian Alberta Basin project, will capture over one million tons of CO₂ per year from one of the largest gas-processing plants in North America, compress it, and transport the CO₂ via pipeline to the target injection location, most likely a Devonian-age carbonate rock formation located near the gas processing plant.
 - SECARB will demonstrate large-volume CO₂ storage in the lower Tuscaloosa Formation, injecting CO₂ at two locations to assess different CO₂ streams. The first step, or Early Test, will inject one and a half million tons of CO₂ per year for 18 months. The CO₂ will come from a naturally occurring source from the Jackson Dome and will be delivered by Denbury Resources' CO₂ pipeline. The second step, or Anthropogenic Test, will inject 100,000 to 275,000 tons of CO₂ per year for three to seven years. The CO₂ will be supplied from a pilot unit capturing CO₂ from flue gas produced at a Southern Company power plant located near the injection site.
 - SWP will conduct a large-scale test into deep Jurassic-, Triassic-, and Permian-aged sandstones in the Farnham Dome of Utah. The simultaneous injection of CO₂ into two formations will occur over a four-year period, building up to one million tons of CO₂ injected per year. The CO₂ will come from both a natural CO₂ source in the Jurassic-aged Nugget Sandstone, and a second source from a coalbed methane production field northwest of Price, Utah.

- MGSC will partner with the Archer Daniels Midland Company (ADM), an agricultural products processing company, to complete a large volume saline sequestration test at ADM's ethanol by fermentation facility in Dacatur, Illinois. MGSC will inject 365,000 tons of CO₂ per year into the Mount Simon Sandstone in the Illinois Basin over a three year period, totaling up to a million tons. The CO₂ will come from ADM's ethanol production facility.
- MRCSP will demonstrate large-scale CO₂ storage in the Mount Simon Sandstone and will inject one to two million tons of CO₂ during a four-year period from an ethanol production facility. The CO₂ will be injected on the facility site, and MRCSP will be responsible for the development of the infrastructure, operations, closure, and monitoring of the injected CO₂.
- WESTCARB will inject a total of one million tons of CO₂ over four years as part of an integrated CCS test near Bakersfield, California. Clean Energy Systems, a power generation technology developer, will supply the CO₂ from a new power plant based on rocket engine technology. The site is located at the southern end of the Great Central Valley. By injecting the plant's full exhaust stream underground, the project will demonstrate that emission-free electricity from fossil fuels is viable.

5. Status

- The RCSPs span 42 states (in June 2008, Hawaii became the 42nd state to join the RCSPs, as a member of WESTCARB), 2 Indian nations, and 4 Canadian provinces and include agency participation from six member countries of the CSLF.
- 24 geologic and 11 terrestrial field tests are currently underway in the Validation Phase.
- Deployment Phase applications were submitted in June 2007, with the first four awards announced in late 2007 and two more large-scale awards announced in May 2008.
- The 2007 Regional Carbon Sequestration Partnerships Program Review Proceedings, which include more detailed descriptions of status, are at:
<http://www.netl.doe.gov/publications/proceedings/07/rcsp/index.html>

6. Links to RCSP Programmatic Information

- Carbon Sequestration webpage on the NETL website:
http://www.netl.doe.gov/technologies/carbon_seq/index.html
- Carbon Sequestration Newsletter (distributed monthly):
http://www.netl.doe.gov/technologies/carbon_seq/refshelf/subscribe.html
- Carbon Sequestration Technology Roadmap and Program Plan 2007:
http://www.netl.doe.gov/technologies/carbon_seq/refshelf/project%20portfolio/2007/2007Roadmap.pdf
- Carbon Sequestration Atlas of the United States and Canada:
http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlas/ATLAS.pdf
- An Introduction to Carbon Capture and Sequestration (video):
mms://prod-mmedia.netl.doe.gov/carbon_sequestration_sept.wmv
- Carbon Sequestration Program Environmental Reference Document:
http://www.netl.doe.gov/technologies/carbon_seq/refshelf/nepa/index.html
- Carbon Sequestration Project Portfolio:
http://www.netl.doe.gov/technologies/carbon_seq/refshelf/project%20portfolio/2007/table_contents.pdf

Regional Opportunities for Carbon Dioxide Capture and Storage in China Project
CSLF Project Status Report (PSR)
June 2008

1. Project Location
Various locations in China
2. Project Leads
<p>R Gentile, Leonardo Technologies, Inc.</p> <ul style="list-style-type: none"> • E-mail: rhgentile@lti-global.com <p>R Dahowski, Battelle – Pacific Northwest Division</p> <ul style="list-style-type: none"> • E-mail: bob.dahowski@battelle.org <p>C Davidson, Battelle – Pacific Northwest Division</p> <p>J Dooley, Battelle – Pacific Northwest Division, JGCRI</p> <p>X Li, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences</p> <p>F Teng, Tsinghua University</p>
3. Project Objectives
<ul style="list-style-type: none"> ▪ Develop the first ever bottom-up cost assessment of the potential to utilize carbon dioxide capture and storage (CCS) across the Chinese economy ▪ Assess the potential and costs for CCS technologies to deploy across regions of China ▪ Inventory large anthropogenic CO₂ point sources from power plants and other industrial sources ▪ Identify potential candidate geologic CO₂ storage reservoirs/basins which could be used for the safe, long-term storage of CO₂ ▪ Examine the economics of CCS and develop cost curves for CO₂ transport and storage via optimized source-reservoir matching
4. Recent Milestones
<ul style="list-style-type: none"> ▪ Preliminary characterization and mapping of over 1600 large, stationary CO₂ sources with combined emissions exceeding 4,000 MtCO₂ per year ▪ Storage capacity analysis and mapping for oil, gas, coal and deep saline formations with preliminary results showing as much as 3000 GtCO₂ potential storage resource in onshore and offshore basins
5. Status
<ul style="list-style-type: none"> ▪ Ongoing; expected completion: 3Q 2008 ▪ Data collection and refinement phase of project nearing completion ▪ Data integration, source-sink matching and economic analysis underway

Zama Acid Gas Enhanced Oil Recovery, CO₂ Sequestration, and Monitoring Project
Carbon Sequestration Leadership Forum Project Status Report (PSR)
March 2008

1. Project Location
Zama City, Alberta, Canada
2. Project Leads
<ul style="list-style-type: none">• Ed Steadman, Energy & Environmental Research Center, Grand Forks, ND, USA – e-mail: esteadman@undeerc.org• Steven Smith, Energy & Environmental Research Center, Grand Forks, ND, USA – e-mail: ssmith@undeerc.org• Bill Jackson, Apache Canada Ltd, Calgary, Alberta, Canada – e-mail: bill.jackson@apachecorp.com
3. Project Objectives
<ul style="list-style-type: none">• To validate the sequestration of CO₂-rich acid gas in a depleted oil reservoir.
4. Recent Milestones
<ul style="list-style-type: none">• A static gradient test was performed in the Slave Point monitoring well. Several pressure measurements along the length of the well from the surface to as close to the midpoint of the perforations as possible were taken, which gave direct measurement of the reservoir pressure at the perforations and defined the gradient (type) of the fluid contained within the well.• Following the static gradient test, the monitoring well was flared to a temporary separator and flare stack to obtain samples from the wellbore (near the perforations) to be analyzed for the presence of injected perfluorocarbon tracer.• Analytical work is in progress for the samples obtained.
5. Status
<ul style="list-style-type: none">• Injection is ongoing.• Geomechanical laboratory studies are ongoing.• Compilation of a best practices manual has been initiated.