



# Strategic Plan Implementation Report

October 2008

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**Strategic Plan Committee**  
*CSLF Task Force Strategic Implementation Report (TFIR)*  
*September 2008*

|  |
|--|
| <b>1. Committee Members</b>  |
| <ul style="list-style-type: none"><li>▪ Canada – Ian Hayhow (Chair)</li><li>▪ Australia – John Hartwell; Bill Koppe</li><li>▪ European Commission – Wiktor Raldow</li><li>▪ France – Bernard Frois</li><li>▪ India – Anil Razdan</li><li>▪ Mexico – José Miguel González Santaló</li><li>▪ Netherlands – Hans Bolscher</li><li>▪ Norway – Tone Skogen</li><li>▪ South Africa – Elizabeth Marabwa</li><li>▪ United Kingdom – Rachel Crisp; Milton Catelin; Jeff Chapman</li><li>▪ United States – Justin Swift</li><li>▪ CSLF Secretariat – Barbara McKee</li></ul> |
| <b>2. Purpose of Committee</b>   |
| <p>Develop a revised and updated CSLF Strategic Plan that will contain:</p> <ul style="list-style-type: none"><li>▪ Significant achievements as strategic destinations,</li><li>▪ Strategies to reach those destinations,</li><li>▪ Activities to execute the strategies,</li><li>▪ Priorities for each of the activities, and</li><li>▪ Milestones to measure progress.</li></ul> <p>As part of the process, the Committee will consider the role and engagement of the CSLF and how it would achieve its long term goal over the next five years.</p>            |
| <b>3. Milestones</b>   |
| <ul style="list-style-type: none"><li>▪ Strategic Plan Committee created at CSLF Cape Town meeting, April 2008</li><li>▪ Finalized CSLF Strategic Plan will be a deliverable at CSLF Ministerial Meeting in November 2009</li></ul>  |
| <b>4. Status</b>   |
| <ul style="list-style-type: none"><li>▪ The Committee is finalizing its approach for performing the Strategic Plan update. Areas of significant effort will include incorporation of the recommendations to the G8 on near-term opportunities for CCS and updating the previous Strategic Plan taking into account CCS developments outside the CSLF.</li></ul>  |

***Task Force on Communications***  
*CSLF Task Force Strategic Implementation Report (TFIR)*  
*September 2008*

|  |
|--|
| <b>1. Task Force Members</b>   |
| <ul style="list-style-type: none"><li>▪ United Kingdom – Rachel Crisp (Chair)</li><li>▪ Australia – John Hartwell</li><li>▪ Mexico – José Miguel González Santaló</li><li>▪ Norway – Tone Skogen</li><li>▪ United States – John Grasser</li></ul>                  |
| <b>2. Purpose of Task Force</b>  |
| Implement a communications strategy to raise the profile of the CSLF so that it can be more effective in carrying out its work.  |
| <b>3. Milestones</b>   |
| <ul style="list-style-type: none"><li>▪ Aim of launching new website by November 2008 (GHGT-9)</li><li>▪ Final communications strategy with plan of action to be sent to all CSLF Members – December 2008</li></ul>  |
| <b>4. Status</b>   |
| <ul style="list-style-type: none"><li>▪ Task Force created at CSLF Cape Town meeting, April 2008</li><li>▪ Initial communications strategy produced and circulated to Task Force Members for comment</li><li>▪ Initial design of new website carried out</li></ul> |

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

|   |
|---|
| <b>1. Task Force Members</b>  |
| <ul style="list-style-type: none"> <li>▪ Australia – John Hartwell; Martin Squire; Clinton Foster</li> <li>▪ Canada – Ian Hayhow; Bill Reynen; Stefan Bachu</li> <li>▪ Colombia – TBD</li> <li>▪ European Commission – Jeroen Schuppers</li> <li>▪ France – Christian Fouillac; Pierre Le Thiez; Claudia Vivalda</li> <li>▪ India – Ishraq Ahmad; Laxman Prasad</li> <li>▪ Italy – Pierpaolo Garibaldi</li> <li>▪ Mexico – José Miguel González Santaló</li> <li>▪ Saudi Arabia – Khalid Abuleif; Abdulmuhsen Al-Sunaid</li> <li>▪ South Africa – Elizabeth Marabwa</li> <li>▪ United Kingdom – Rachel Crisp; Nick Otter</li> <li>▪ United States – Justin Swift (Chair); George Guthrie</li> </ul>   |
| <b>2. Purpose of Task Force</b>   |
| <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>   |
| <b>3. Milestones</b>  |
| <ul style="list-style-type: none"> <li>▪ The Task Force for Capacity Building in Emerging Economies held its 4<sup>th</sup> Workshop on July 9-10, 2008 in Mexico City, Mexico.</li> <li>▪ At the workshop, CSLF experts from around the globe shared information with 140 attendees from Mexico’s energy industries on topics including enhanced oil recovery (EOR) using carbon dioxide (CO<sub>2</sub>), identifying and quantifying the quality of CO<sub>2</sub> storage sites, and measurement, monitoring, and validation (MMV).</li> <li>▪ Scenarios for electrical power generation and CO<sub>2</sub> emissions in Mexico and experiences with EOR using CO<sub>2</sub> injection in Mexico were presented by experts from IIE (Instituto de Investigaciones Eléctricas), PEMEX (Petróleos Mexicanos), and CFE (Comisión Federal de Electricidad). Perspectives from South America and the International Energy Agency’s Greenhouse Gas R&amp;D Programme were also presented.</li> <li>▪ The workshop featured extensive audience interaction with several panel sessions and in-depth intellectual exchanges among the experts that were initiated by questions from the audience.</li> <li>▪ The next step forward will be the development of a framework to be applied toward a proposed action road map for CCS implementation in Mexico.</li> </ul> |
| <b>4. Status</b>  |
| <ul style="list-style-type: none"> <li>▪ The Task Force conducted a workshop in Brazil at the end of September 2008 and will hold another in Washington, DC, in November 2008, which will take place alongside the 9th International Conference on Greenhouse Gas Control Technologies (GHGT9).</li> <li>▪ The Task Force continues to explore creation of core training modules for capacity building based on materials from the initial workshops. These materials would be standardized and</li> </ul>  |

aimed at decision-makers from both the public and private sectors.

- The following workshops have been confirmed or proposed:
  - USA, November 2008 - confirmed
  - India, January 2009 - proposed
  - China, second quarter 2009 - proposed
  - Colombia, second half 2009 - proposed
  - South Africa, TBD
- Financial support for these 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)***  
***September 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               | Ishraq Ahmad           |
| Netherlands         | Harry Scheurs          |
| Norway              | Trygve Riis            |
| Saudi Arabia        | Khalid Abuleif         |
| UK                  | Nick Otter (Chair)     |
| 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 CO<sub>2</sub> 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 2009)
- Identification of areas that are thought to be appropriate for new projects and to encourage the submission of projects in these areas (December 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

- 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 Daejon, 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 proceeding following its acceptance and progress will be reviewed at the IEA GHG R&D ExCo in Washington on 13-14<sup>th</sup> November 2008.
- 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 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 a further meeting held in Canberra, Australia on 23-24<sup>th</sup> September 2008. A draft TRM that will be discussed at Washington on 16<sup>th</sup> 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. Also being addressed is the benefits of being a CSLF project and how to engage better with stakeholders. To this end a continuation of the survey conducted by the Secretariat has been initiated for those CSLF projects that did not respond to the initial request. This will be reviewed at the meetings in Washington in November 2008.

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

**A. Meetings and Workshops**

- Past
  - CSLF Capacity Building Workshop (9-10 July 2008, Mexico City, Mexico). The Secretariat and the host country, Mexico, planned and organized this workshop. The objective of the workshop was 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. All presentations from the Workshop are now online at the CSLF website.
  - CSLF Capacity Building Workshop (8-9 September 2008, Salvador, Brazil). The Secretariat planned this workshop and gave a presentation. Presentations from the Workshop are being made available at the CSLF website.
  - Meeting of CSLF Stakeholders (17 September 2008, London, United Kingdom). The Secretariat participated in this meeting.
  - CSLF Projects Interaction and Review Team (PIRT) meeting (23-25 September 2008, Canberra, Australia). This was a special meeting of the PIRT to develop a working draft update of the CSLF Technology Roadmap. The Secretariat, the Chair of the PIRT, and the host country, Australia, worked together to plan the meeting. The Secretariat prepared the agenda for the meeting, developed a briefing book for meeting participants, and was an active participant in the meeting and Roadmap editing process. The result of the meeting was an intermediate working draft of the Roadmap that the Secretariat will prepare for posting at the CSLF website in time for the November 2008 meeting of the CSLF Technical Group in Washington.
- Future
  - CSLF Technical Group (16 November 2008, Washington, D.C., United States). The Secretariat is planning and coordinating the meeting with the Technical Group Chair, including development of the agenda. A meeting information page, now online at the CSLF website, includes documents relevant to the meeting and an online meeting registration form. 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 PIRT meeting (16 November 2008, Washington, D.C., United States). The next meeting of the PIRT will be held in conjunction with and just prior to the Technical Group meeting. The Secretariat is working with the PIRT Chair to develop an agenda for the meeting. All presentations from the meeting will also be posted to the CSLF website.
  - CSLF Capacity Building Workshop (17-20 November 2008, Washington, D.C., United States). The Secretariat is providing support for this workshop.
  - CSLF Financial Issues Task Force meeting (2-3 December 2008, New Delhi, India). The Secretariat is working with the host country, India, to plan and develop an agenda for the meeting.

- Ministerial Meeting of the CSLF (16-18 November 2009, London, United Kingdom).  
The Secretariat has initiated planning for the meeting.

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

A redesign of the CSLF website is in progress. The purpose of the redesign is to improve the “look and feel” of the website as well as its user-friendliness. The redesign is expected to be complete during 2009.

The following updates to the CSLF website have been accomplished since the last reporting period:

- Presentations from the 4<sup>th</sup> CSLF Capacity Building in Emerging Economies Workshop, held in Mexico City on 8-9 July, are online in the “Workshops” section: <http://www.cslforum.org/workshops.htm>
- The July 2008 Plan Implementation Report (SPIR) is online in the “Documents” section: <http://www.cslforum.org/documents.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>
- Listings of Policy and Technical Group delegates have been updated. These are viewable at the

## **C. Other Activities**

Over this reporting period, the Secretariat handled approximately 260 pieces of incoming e-mail correspondence.

## **D. Stakeholders**

There are now 140 registered stakeholders, six of whom 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)*  
*September 2008*

**Rio Tinto**

Rio Tinto made a written submission to, and appeared before the Australian House of Representatives Standing Committee on Primary Industries and Resources to give evidence to its inquiry into the draft geological GHG storage legislation. The draft legislation regulates the geological storage of GHGs in the seabed in offshore Commonwealth waters.

The primary message delivered by RTE was that the legislation must not only effectively regulate geological storage of GHGs; it must also support the broader objective of facilitating the development, commercialisation and deployment of CCS in order to reduce emissions consistent with government objectives. The Standing Committee delivered its report in August making 19 recommendations that broadly address the concerns raised by Rio Tinto and other CCS proponents.

\* \* \* \* \*

**Pinnacle Technologies**

- In Q2 2008, Pinnacle Technologies installed downhole pressure monitoring equipment at the Gulf Coast Stacked Storage Project at the Cranfield Oilfield near Natchez Mississippi CCS project managed by the SEACARB Partnership.
- Pre-injection baseline tiltmeter, differential GPS and InSAR monitoring began at the Southwest Regional Partnership's Pump Canyon CO2 ECBM Sequestration demonstration project. Injection at this project began in July and surface deformation results have been observed already.
- Pre-injection baseline tiltmeter monitoring also began on the West Virginia University ECBM CO2 Sequestration project. Injection is expected to begin in November 2008.
- Pinnacle Technologies exhibited in May at the 7<sup>th</sup> Annual Conference on Carbon Capture & Sequestration and presented a paper titled "Surface Deformation as a Cost Effective, Long Term MMV Method".
- Numerous pre-injection MMV technology feasibility studies were performed for various projects around the world focusing on micro seismic and surface deformation monitoring.
- Pinnacle Technologies released its new Denali tiltmeter for use on CO2 sequestration projects. The Denali was designed from the start with seabed deployment in mind. It features ultra low power consumption, acoustic modem compatibility and the ability to mesh network with other instruments.
- Pinnacle Technologies also released its first commercial fiber optic downhole pressure gauge in Q2. The gauge contains no downhole electronics and can be run in conjunction with Distributed Temperature Sensing (DTS) systems with a single downhole control line.
- Pinnacle Technologies built its first geothermally cooled fiber optic interrogator system. The system is designed for ultra low power consumption and uses the constant temperature of the earth at 5-10m for cooling rather than have to deploy large solar arrays and climate controlled enclosures at remote sites.

\* \* \* \* \*

**APPEA:**

***Fairview Power Project***

Fairview Power and the Australian Government have been unable to reach a commercial close on the Low Emissions Technology Demonstration Fund grant funding allocation previously offered to this Project. As a result, the shareholders have elected not to proceed further with this project. Both Santos and GE remain committed to commercialising low emission and carbon capture technologies that mitigate carbon dioxide emissions including carbon geosequestration.

***Gorgon Project***

During the second half of 2007 the Gorgon Project in Western Australia received State and Australian Government environmental approvals. We understand that this is the first time a commercial scale geosequestration project has been subject to a formal environmental impact assessment process incorporating a public review and comment period. The Gorgon Joint Venturers still require a number of State Government approvals prior to making a final investment decision.

The Gorgon Joint Venturers are continuing to work with the Federal Government to finalise funding arrangements around the AUD 60 million grant offered as part of the Low Emissions Technology Demonstration Fund. This funding offer is contingent on the Project receiving its final approvals. Further details are available at

[www.ausindustry.gov.au/library/LETDF\\_grantoffers\\_march0720070327095527.pdf](http://www.ausindustry.gov.au/library/LETDF_grantoffers_march0720070327095527.pdf).

**Report from Stakeholders**  
*Summary of Meetings held in London on 17 and 29 September 2008*

**Participants for 17 September 2008 meeting**

| <b>NAME</b>              | <b>AFFILIATION</b>             | <b>COUNTRY</b> |
|--------------------------|--------------------------------|----------------|
| Alex Zapantis            | Rio Tinto                      | Australia      |
| Bill Koppe               | Anglo Coal                     | Australia      |
| Ian Hayhow               | Natural Resources              | Canada         |
| Lars Hende               | Danish Coal and Gas            | Denmark        |
| Hardiv H. Situmeang      | PT PLN (PERSERO)               | Indonesia      |
| Hisham Khatib            | WEC                            | Jordan         |
| Karlis Mikelsons         | Latvenergo                     | Latvia         |
| Børge Rygh Sivertsen     | StatoilHydro ASA               | Norway         |
| Latsoucabé Fall          | WEC                            | Senegal        |
| Zara Khatib              | Shell EP Int. Ltd.             | UAE            |
| Jeff Chapman             | CCSA                           | UK             |
| Judith Shapiro           | CCSA                           | UK             |
| Milton Catelin           | World Coal Institute           | UK             |
| Luke Warren              | World Coal Institute           | UK             |
| Mark Purcell             | DNV                            | UK             |
| Norio Suzuki             | Mitsubishi Corporation<br>(UK) | UK             |
| Kathleen Abdalla         | UNIES                          | USA            |
| John Hammond             | USEA                           | USA            |
|                          |                                |                |
| <i>CSLF Secretariat:</i> |                                |                |
| Barbara McKee            | US Department of Energy        | USA            |
|                          |                                |                |
| <i>WEC Secretariat:</i>  |                                |                |
| Elena Nekhaev            | WEC                            | UK             |
| Catriona Nurse           | WEC                            | UK             |

**Participants for 29 September 2008 meeting**

| <b>NAME</b>             | <b>AFFILIATION</b>     | <b>COUNTRY</b> |
|-------------------------|------------------------|----------------|
| Arthur Lee              | Chevron Corporation    | USA            |
| Gabriel Marquette       | Schlumberger           | France         |
| Declan Murphy           | The Ecology Foundation | Ireland        |
| Steven Broome           | CPI                    | UK             |
| Philip Sharman          | Alstom Power Ltd.      | UK             |
|                         |                        |                |
| <i>WEC Secretariat:</i> |                        |                |
| Elena Nekhaev           | WEC                    | UK             |

Both Stakeholders meetings followed the same agenda and the main points arising from the discussions are summarised below.

### **1. Stakeholders views on their participation in the CSLF process**

Transparency of the CSLF process has improved significantly and there has been noticeable progress in closer integration of Stakeholders in the CSLF activities. Stakeholders have been included in nearly all activities of the Technical Group and most task forces.

However, Stakeholders role and participation in work of the Policy Group remains unclear. Stakeholders believe that having seats at the table was important as this would allow their participation in the real time discussion. Perhaps a kind of public hearing arrangement as in the UK Parliament could be considered.

This issue could possibly be addressed by developing a CSLF Stakeholder Charter to be adopted at the next CSLF Ministerial meeting at the end of 2009.

Stakeholders believe that CSLF should assume a renewed global leadership role and develop a closer cooperation with industries, NGOs, financial and research institutions, i.e. Stakeholders. Otherwise it would remain an intergovernmental framework for international cooperation in research and development.

It was agreed to improve CSLF “internal communications”, as Stakeholders requested the Secretariat to notify them directly by e-mail about forthcoming meetings of various CSLF working groups. Although all this information was available and regularly updated on the CSLF website, where all agendas, minutes and other documents were also posted, the meeting in Canberra scheduled for a week later went largely unnoticed by Stakeholders.

Stakeholders noticed that there has been little feedback from IEA in respect of the G8 proposals formulated by CSLF. The IEA’s role in the CCS dialogue in general was also unclear.

Stakeholders are keen to raise the profile of CSLF and believe that CSLF should establish closer collaboration with the leading organisations involved in the activities which can shape the future for CCS. It would be helpful to develop a focused communications strategy, as some Stakeholders felt it was “criminal not to do anything”. Declan Murphy from the Ecology Foundation in Ireland has volunteered to prepare a first draft.

### **2. Stakeholders Charter: Process and Schedule**

The proposal for a Stakeholders Charter was discussed, and although certain concerns were raised, it was agreed to develop a draft. The objective is not to establish yet another semi-formal body within CSLF, but rather define clearly the role and responsibilities of Stakeholders. Alex Zapantis and Bill Koppe agreed to prepare a first draft of the Charter (attached as Annex 1).

### **3. Stakeholders meetings and activities and the next CSLF Ministerial**

Stakeholders felt it would be important for CSLF to be more actively and formally represented at key international events which can significantly affect the future of CCS.

It was proposed that CSLF should register with UNFCCC to acquire a formal IGO status in the UNFCCC meetings and other activities. The CSLF Secretariat agreed to handle the registration.

It was agreed to request the CSLF Chair to write to the G8 governments to question what they are doing in terms of delivery on the Hokkaido agreements.

Stakeholders believe that it would also be useful for the CSLF Chair to visit Europe and meet with UNFCCC to discuss the inclusion of CCS projects in the scope of activities under the Clean Development Mechanism (CDM). A resolution to this effect was adopted and a letter will be sent from Stakeholders to James Slutz.

It was also agreed that while in Europe, the CSLF Chair could meet with IEA to clarify both the follow-up to G8 and the issue of the “capture ready” technology. IEA would be requested to provide a clear definition which could be used as a standard in the future.

It was discussed whether a side event should be organised in Poznan and the CSLF presence at the COP meeting next year.

In terms of the preparation for the 2009 CSLF Ministerial, it was proposed to organise a CEO Roundtable during the Stakeholders day. Milton Caitlin, Bill Koppe and Jeff Chapman would lead the Stakeholders Planning Group for the 2009 Ministerial.

It was noted that there was little participation of environmental NGOs in the CSLF process. To ensure some dialogue between CSLF annual meetings, it was proposed to hold more regular Stakeholder meetings and examine whether Stakeholders would be willing to get involved in more activities together.

## ANNEX 1

# Carbon Sequestration Leadership Forum Stakeholders Charter **First Draft**

## Framework for Government, Industry and NGO Collaboration

### **Background:**

The Charter of the Carbon Sequestration Leadership Forum (CSLF), adopted by the founding Member national governments in 2003, describes the CSLF as “a framework for international cooperation in research and development for the separation of carbon capture and storage of carbon dioxide” that will “seek to realise the promise of carbon capture and storage over the coming decades”.

Recognition of the potential and critical importance of carbon capture and storage (CCS) has subsequently made great progress and in 2008, at Cape Town, the CSLF joined with the international Energy Agency (IEA) in presenting a series of urgent CCS development recommendations to G8 Leaders, including calling on them to:

*“act now to commit by 2010, to a diverse portfolio of at least 20 fully integrated industrial-scale demonstration projects (larger than 1 Mt per year), with the expectation of supporting technology learning and cost reduction, for the broad deployment of CCS by 2020”*

In accepting and committing to the CSLF/IEA recommendations, the G8 Leaders effectively provided a platform and encouragement for organisations with an interest in CCS to come forward with proposals and initiatives for the implementation of the CSLF/IEA recommendations for industrial-scale CCS development and deployment.

For CSLF to establish a renewed leadership role in this next industrial-scale phase of CCS project development, it will need to strengthen its engagement with industry, the companies that will build, operate and partly fund the projects, and with the environmental NGOs whose role will influence community acceptance of the planned developments.

### **Purpose:**

The purpose of this “Stakeholders Charter” is to provide a framework, within the organisational structure of CSLF, for strengthened international engagement between governments, industries and environmental NGOs committed to the development and deployment of CCS.

The objective of this engagement is to strengthen CSLF’s capacity to contribute effectively to the implementation of the G8 Leaders commitment to industrial-scale CCS demonstration and deployment, by adopting policies and programs that incorporate the perspectives of the companies that will develop CCS projects and the NGOs that will address related community acceptance issues.

## **Structure and Operation:**

Rather than defining a distinct and separate role for Stakeholders, this “Charter” seeks to encourage and facilitate industry and NGO participation in the CSLF task groups and committees, with a view to integrating Stakeholder participation in CSLF with that of Member government representatives.

It does not seek to change the existing CSLF organisation, nor does it seek to perpetuate a separate Stakeholders organisation beyond whatever transitional period is required for integration of Stakeholders into the CSLF structure.

Stakeholder participation in CSLF will be open only to Registered Stakeholders who commit to supporting the development and deployment of CCS, and to abide by an agreed code of conduct governing CSLF activities.

Participation in CSLF task-groups will be open to any Registered Stakeholder who has relevant expertise or capabilities, and who is prepared to contribute their time to the task-group work-programs and to meet their own participation expenses (perhaps subject to the initial limitation that government appointees must constitute at least 50% of the task-group membership).

Where ever practicable all CSLF task-groups should be co-chaired by a Registered Stakeholder who is not also a government appointee.

Implementation of this structural proposal will require re-registration of Stakeholders to obtain their commitment to CSLF objectives and to an agreed code of conduct. That done however the only material additional operational requirement is that Registered Stakeholders are kept directly informed by the Secretariat of all of the CSLF activities so that they are given every opportunity and encouragement to participate.

Given that these proposals essentially operate within the structure and policies laid down in the original CSLF Charter, they should be capable of immediate implementation by the Secretariat.

## **Policy and Technical Groups:**

The operation of the Policy and Technical Groups is defined in the original CSLF Charter, Terms of Reference and Procedures. No amendment to the Policy Group structure and representation is proposed at this time, but it is proposed that, subject to the satisfactory operation of the initial task-group integration, Stakeholder task-group co-chairs should be given a voting seat at the Technical Group table.

Bill Koppe

19<sup>th</sup> September 2008

**First Draft**

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

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| <b>1. Project Location</b>   |
| Alberta, Canada  |
| <b>2. Project Lead</b>   |
| Brent Lakeman, Alberta Research Council <ul style="list-style-type: none"> <li>▪ Telephone: 1 780 450-5274</li> <li>▪ E-Mail: <a href="mailto:Lakeman@arc.ab.ca">Lakeman@arc.ab.ca</a></li> </ul>  |
| <b>3. Project Objectives</b>   |
| <ul style="list-style-type: none"> <li>▪ Reduce greenhouse gas emissions by subsurface injection of CO<sub>2</sub> into deep coal beds</li> <li>▪ Enhance coal-bed methane recovery factors and production rates as a result of CO<sub>2</sub> injection</li> </ul>  |
| <b>4. Recent Milestones</b>  |
| <ul style="list-style-type: none"> <li>▪ Completion of a single-well micro-pilot test at Suncor's CSEMP site</li> <li>▪ Baseline seismic survey completed</li> <li>▪ N<sub>2</sub> tracer injected with offset well monitoring completed</li> <li>▪ Long term CO<sub>2</sub> injection initiated and suspended due to well-bore issue</li> <li>▪ Alberta and China activities have led to a signing ceremony in China for another CO<sub>2</sub>-ECBM project in the Quinshui Basin</li> </ul> |
| <b>5. Status</b>   |
| <ul style="list-style-type: none"> <li>▪ CO<sub>2</sub> testing completed for single well micro-pilot</li> <li>▪ Engineering and Reservoir Modeling analysis being completed for micro-pilot</li> <li>▪ Tilt-meter response being reviewed</li> <li>▪ Analysis of injection well issue completed</li> <li>▪ Regulatory approval obtained for remedial work on injection well</li> <li>▪ Suncor lead consortium discussing termination of CSEMP project</li> </ul>                              |

*CO<sub>2</sub> Capture Project Phase 2 (CCP2)  
CSLF Project Status Report (PSR)  
September 2008*

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| <b>1. Project Location</b>   |
| Project Office: 150 West Warrenville Road, Naperville, IL USA 60563  |
| <b>2. Project Lead</b>   |
| <ul style="list-style-type: none"><li>▪ CCP2 Program Manager: Linda Curran, BP</li><li>▪ CCP2 Executive Board Chairman: Gardiner Hill, BP</li><li>▪ Capture Team Lead: Ivano Miracca, ENI</li><li>▪ Storage Team Lead: Scott Imbus, ChevronTexaco</li><li>▪ Communications Team Lead: Iain Wright, BP</li><li>▪ Policy Team Lead: Arthur Lee, ChevronTexaco</li><li>▪ CCP2 Advisory Board Chair: Vello Kuuskraa</li></ul>  |
| <b>3. Project Objectives</b>   |
| <ul style="list-style-type: none"><li>▪ Develop technology that will reduce costs and improve efficiencies of CO<sub>2</sub> Capture through advanced technologies</li><li>▪ Increase knowledge and reduce uncertainties in technology performance and deliver low-cost CO<sub>2</sub> capture technologies to demonstration stage by 2009</li><li>▪ Demonstrate that geological storage of CO<sub>2</sub> 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</li><li>▪ Increase public awareness and acceptance of CCS</li><li>▪ 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.</li></ul> |
| <b>4. Recent Milestones</b>  |
| <ul style="list-style-type: none"><li>▪ Capture technologies are undergoing rigorous technical and economic assessments prior to development and scaleup in Phase 3 -beginning January, 2009.</li><li>▪ 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.</li></ul>   |
| <b>5. Status</b>   |
| <ul style="list-style-type: none"><li>▪ A rigorous process is underway to evaluate the most promising capture technologies for potential pilot or demonstration</li><li>▪ Information from 3 well evaluations has been assessed to determine the long-term sealing capacity of wells in a CO<sub>2</sub>-rich environment, type and levels of risk posed by failure of well components, and preventative and remediative engineering solutions.</li><li>▪ Novel approaches to optimize the resolution and cost effectiveness of monitoring, leakage detection and verification are under development</li><li>▪ The Phase 3 program will begin in January 2009. Parties interested in participating should contact the Program Manager for details.</li><li>▪ Recent reports: can be found on the CCP2 website:<br/><a href="http://www.co2captureproject.org/index.htm">http://www.co2captureproject.org/index.htm</a></li></ul>   |

**CO<sub>2</sub> GeoNet**  
*CSLF Project Status Report (PSR)*  
 September 2008

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| <b>1. Project Location</b>  |
| Western Europe  |
| <b>2. Project Lead</b>  |
| <ul style="list-style-type: none"> <li>▪ Coordinator: Dr. Nick Riley (British Geological Survey)           <ul style="list-style-type: none"> <li>- E-mail: <a href="mailto:njr@bgs.ac.uk">njr@bgs.ac.uk</a></li> </ul> </li> <li>▪ Network Manager: Isabelle Czernichowski-Lauriol (BRGM)</li> <li>▪ Secretariat: Sergio Persoglia (OGS)</li> <li>▪ Contact: <a href="mailto:info@co2geonet.com">info@co2geonet.com</a></li> </ul>   |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"> <li>▪ Focus is R&amp;D into geological storage of CO<sub>2</sub> and strengthening the European Research Area.</li> <li>▪ Form a durable integration of the original 13 partners over 5 years, involve more partners.</li> <li>▪ Provide the underpinning science capability and knowledge to help enable deployment of large scale CO<sub>2</sub> storage in Europe as quickly as possible</li> <li>▪ Collaborate internationally</li> <li>▪ Be a source of impartial scientific information on CO<sub>2</sub> geological storage for stakeholders</li> <li>▪ Train existing and new researchers</li> <li>▪ Develop and share research infrastructure</li> </ul>  |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"> <li>▪ In April 2008 formed a legal entity, “CO<sub>2</sub> GeoNet Association” – this will enable new strategic partners to join and existing partners to continue working together</li> </ul>   |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"> <li>▪ CO<sub>2</sub> GeoNet’s new brochure available at <a href="http://www.co2geonet.eu">http://www.co2geonet.eu</a>. The CO<sub>2</sub> GeoNet researchers have prepared basic answers to several frequently asked questions, as to how CO<sub>2</sub> geological storage can be carried out, under what circumstances it is possible, and what the criteria are for its safe and efficient implementation.</li> <li>▪ Latest results of research presented at Annual Stakeholder workshop held April 2008. Included joint research projects on monitoring natural CO<sub>2</sub> sites at marine, lacustrine and terrestrial locations using remote sensing, geophysics and direct gas analysis techniques.</li> <li>▪ Submitted to European Commission FP7 a proposal (Feb. 2008) to support international open access and capacity building with respect to CO<sub>2</sub> 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 CO<sub>2</sub> research programmes.</li> <li>▪ Network has world-class unique expertise in monitoring and understanding CO<sub>2</sub> migration in the shallow subsurface and ecosystem responses to CO<sub>2</sub> in marine, freshwater and terrestrial settings</li> <li>▪ Network , training and dialogue workshop on CO<sub>2</sub> geological storage in Paris on October 3<sup>rd</sup> 2007 (report published in Green House Gas Issues- talks posted on the CO<sub>2</sub> GeoNet website).</li> <li>▪ CO<sub>2</sub> GeoNet presented in two EU Parliament workshops regarding the draft CO<sub>2</sub> Capture &amp; Storage Directive.</li> <li>▪ e-mail: <a href="mailto:info@co2geonet.com">info@co2geonet.com</a> or at the CO<sub>2</sub> GeoNet website: <a href="http://www.co2geonet.com">http://www.co2geonet.com</a></li> </ul> |

**CO2CRC Otway Project**  
*CSLF Project Status Report (PSR)*  
September 2008

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| <b>1. Project Location</b>   |
| Southwestern Victoria, Australia   |
| <b>2. Project Lead</b>   |
| Sandeep Sharma, CO2CRC, Kensington WA 6151, Australia, <ul style="list-style-type: none"><li>- Ph: 08 6436 8736</li><li>- Mob: 0412 515 494</li><li>- E-mail: <a href="mailto:ssharma@co2crc.com.au">ssharma@co2crc.com.au</a></li></ul>   |
| <b>3. Project Objectives</b>   |
| The Otway project has been designed to demonstrate all aspects of CCS, and will demonstrate the geological storage and monitoring of CO <sub>2</sub> 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.  |
| <b>4. Recent Milestones</b>  |
| <ul style="list-style-type: none"><li>▪ Construction completed (Mar 08)</li><li>▪ Project inaugurated on April 2, 2008 by Federal Minister Ferguson and State Minister Batchelor.</li><li>▪ Offset seismic acquisition with explosive source using permanently installed geophones in Naylor 1 (May-June 08)</li><li>▪ Geochemical sampling using U-Tube set up on a monthly basis.</li><li>▪ Multiple site visits by NSW Parliamentarians and Shadow Federal Minister for Energy</li><li>▪ Site Emergency Response Plan Tested with over 30 people from State and Local Government bodies involved</li><li>▪ Over 20,000 tonnes of CO<sub>2</sub> have been injected to date and monitoring is ongoing.</li></ul> |
| <b>5. Status</b>   |
| <ul style="list-style-type: none"><li>▪ Seismic testing using permanently installed geophones to continue</li><li>▪ Geochemical sampling to continue</li><li>▪ Breakthrough expected before November</li><li>▪ Otway Stage 2 concepts discussed with regulators.</li></ul>   |

**CO<sub>2</sub> Separation from Pressurized Gas Stream Project**  
 CSLF Project Status Report (PSR)  
 September 2008

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| <b>1. Project Location</b>   |
| Kyoto, Japan (membrane module development)<br>Pittsburgh, Pennsylvania, USA (testing)  |
| <b>2. Project Lead</b>   |
| Dr. Shingo Kazama, RITE (Research Institute of Innovative Technology for the Earth)<br><ul style="list-style-type: none"> <li>▪ E-mail: <a href="mailto:kazama@rite.or.jp">kazama@rite.or.jp</a></li> </ul>  |
| <b>3. Project Objectives</b>   |
| <ul style="list-style-type: none"> <li>▪ Development of membrane material for molecular gate function and composite membrane of excellent CO<sub>2</sub> selectivity over H<sub>2</sub></li> <li>▪ Development of membrane module</li> <li>▪ Testing of the module (with NETL, USA)</li> </ul>   |
| <b>4. Recent Milestones</b>  |
| <ul style="list-style-type: none"> <li>▪ Improvement of membrane material for molecular gate function (2008FY)</li> <li>▪ Improvement of composite membrane of an excellent CO<sub>2</sub> selectivity over H<sub>2</sub> (2008FY)</li> <li>▪ Pencil membrane module production (2009FY)</li> <li>▪ Real gas pre-testing of pencil membrane module (2009FY)</li> <li>▪ Preproduction sample of commercial size membrane module (2010FY)</li> <li>▪ Real gas pre-testing of commercial size membrane module (2010FY)</li> <li>▪ Process simulation (2008FY-)</li> </ul>   |
| <b>5. Status</b>   |
| <ul style="list-style-type: none"> <li>▪ 1<sup>st</sup> duration: 11/2003 – 03/2006 Completed</li> <li>▪ Development of novel dendrimer materials for CO<sub>2</sub> separation</li> <li>▪ Fabrication of dendrimer composite membrane modules and their test</li> </ul> <p><u>References:</u><br/>           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 CO<sub>2</sub> 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"> <li>▪ 2<sup>nd</sup> duration: 04/2006 – 03/2011 ongoing</li> <li>▪ Development of novel CO<sub>2</sub> molecular gating materials for a CO<sub>2</sub>/H<sub>2</sub> mixture</li> <li>▪ Test of dendrimer composite membrane under an elevated pressure (12/2007)</li> <li>▪ Accomplishment of a good CO<sub>2</sub>/H<sub>2</sub> selectivity at an elevated pressure (3/2008)</li> </ul> |

***Dynamis Project***  
*CSLF Project Status Report (PSR)*  
*September 2008*

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| <b>1. Project Location</b>  |
| <ol style="list-style-type: none"><li>1. East-Midlands (UK) – coal-based IGCC with an integrated hydrogen bleed, providing 2.2 Mtpa CO<sub>2</sub> for southern North Sea-based off-shore aquifer storage (sponsor: E.ON UK),</li><li>2. North-East UK – coal-based IGCC with integrated hydrogen bleed, providing 2.2 Mtpa CO<sub>2</sub> intended for EOR in North Sea-based off-shore operations (sponsor: Progressive Energy Ltd.),</li><li>3. Mongstad (Norway) – natural gas CHP, post combustion with separate hydrogen production, providing 1.3 Mtpa CO<sub>2</sub> for North Sea-based off-shore aquifer storage in the Johansen formation (Sponsor: StatoilHydro), and</li><li>4. Hamburg (Germany) – coal-based IGCC with an integrated hydrogen bleed and district heating off-take, providing 2.2 Mtpa CO<sub>2</sub> for aquifer storage (Sponsor: Vattenfall)</li></ol> |
| <b>2. Project Leads</b>   |
| In the DYNAMIS project Charles Eickhoff is leading the case studies:<br>- E-mail: <a href="mailto:charles@progressive-energy.com">charles@progressive-energy.com</a>  |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"><li>• See item 1 above. Cases 1,2 and 4 are pre-combustion plants, whereas case 3 is post-combustion. All includes CCS with geological storage. Some includes hydrogen production.</li><li>• Overall objective; To pave the ground for co-production of electric power and hydrogen with CCS.</li></ul>   |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"><li>• The case studies have now passed the technical and environmental assessments, and are being further detailed.</li></ul>   |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"><li>• See item 4. The progress is according to plan. A comprehensive multi-criteria assessment approach has been used for the screening and pre-selection of the recommended sites for plant and storage in Europe.</li></ul>   |

**ENCAP “Enhanced capture of CO<sub>2</sub>”**  
*CSLF Project Status Report (PSR)*  
 September 2008

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| <b>1. Project Location</b>   |
| Companies and research providers in a number of places in Europe   |
| <b>2. Project Lead</b>   |
| <ul style="list-style-type: none"> <li>▪ Leif Brandels, Vattenfall AB, Sweden           <ul style="list-style-type: none"> <li>- Tel: +46 8 739 60 40</li> <li>- E-mail: <a href="mailto:leif.brandels@vattenfall.com">leif.brandels@vattenfall.com</a></li> </ul> </li> </ul>   |
| <b>3. Project Objectives</b>   |
| <ul style="list-style-type: none"> <li>▪ Develop and verify IGCC/IRCC, Oxy-Fuel and Chemical Looping Combustion technologies with CO<sub>2</sub> capture for large scale power plants</li> <li>▪ By early 2009 Recommend one of the technology for a demonstration in 350 MW scale</li> <li>▪ Develop and test high temperature oxygen production technologies</li> <li>▪ Investigate an number of novel CO<sub>2</sub> technologies</li> </ul>  |
| <b>4. Recent Milestones</b>  |
| <ul style="list-style-type: none"> <li>▪ Reference cases and guidelines for evaluation for a number of large power plants developed. A final version is delivered. The guidelines are used also by other EC sponsored project in Europe and are regarded as an “almost standard” for comparison of Carbon Capture Technologies.</li> <li>▪ IGCC/IRCC concepts developed. Technology and costs reported to the ENCAP internal benchmarking group.</li> <li>▪ Tests of ALSOM and Siemens developed gas turbines fuelled by H<sub>2</sub> rich gas executed.</li> <li>▪ Concept developed for large Oxyfuel PF, CFB power plants.</li> <li>▪ Successful test of oxyfuel combustion in 20kW and 100kW scale completed. Initial test in a 500kW test facility completed and is under final reporting.</li> <li>▪ Chemical looping combustion based on CFB technology developed.</li> <li>▪ Three high temperature oxygen production technologies further developed and investigated for integration in power plants with CO<sub>2</sub> capture.</li> <li>▪ A number of new technologies possible for CO<sub>2</sub> capture investigated.</li> <li>▪ The project has entered into phase II and the large scale testing in phase II is under further preparation in the 30MW Oxyfuel Pilot in Germany (Vattenfall power plant site Schwartze Pumpe).</li> </ul> |
| <b>5. Status</b>   |
| <ul style="list-style-type: none"> <li>▪ The active development and research work has been completed for most of the technologies in ENCAP. However the project is now planning validation tests in the 30 MW OxyFuel Pilot Plant in Germany and further work with a selected number of novel technologies.</li> <li>▪ The tests with Alstom and Siemens gas turbines with lean-premixed H<sub>2</sub>-rich combustors have been successfully completed at DLR. Some more evaluations of the results of high-pressure test of the Siemens concept is ongoing. Comparison with test results and development of CFD combustion model including H<sub>2</sub> reaction mechanisms has been done with very good results. It means that verified CFD models now exist.</li> <li>▪ Test programmes in the 500kW oxyfuel test rig at Stuttgart has been executed and are under final reporting.</li> <li>▪ Preparation of the test programme for verification large scale testing in the 30MW oxyfuel</li> </ul>  |

Pilot plant has continued The test period is planned to autumn 2008 and evaluation of the test results will following in early 2009. The project has proposed a six month extension to the European Commission in order to also include the evaluation and reporting of the tests.

- The final benchmarking of the pre-combustion technologies in ENCAP and the recommendation for a demonstrator has been done during 2008. A report is available on the ENCAP website.
- Website address: <http://www.encapco2.org/>

***Frio Brine Pilot Project***  
***CSLF Project Status Report (PSR)***  
***September 2008***

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| <b>1. Project Location</b>  |
| South Liberty oilfield, east of Houston, Texas, USA   |
| <b>2. Project Lead</b>  |
| <ul style="list-style-type: none"><li>▪ Susan Hovorka, Gulf Coast Carbon Center, The Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin, USA<ul style="list-style-type: none"><li>- E-mail: <a href="mailto:susan.hovorka@beg.utexas.edu">susan.hovorka@beg.utexas.edu</a></li></ul></li><li>▪ Tom Daley, Lawrence Berkley National Lab, Berkeley, California, USA</li><li>▪ Yousif Kharaka, U.S. Geological Survey, Menlo Park, California, USA</li></ul>  |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"><li>▪ Project Goal: Early success in a high-permeability, high-volume sandstone representative of a broad area that is an ultimate target for large-volume sequestration.</li><li>▪ Demonstrate that CO<sub>2</sub> can be injected into a brine formation without adverse health, safety, or environmental effects</li><li>▪ Determine the subsurface distribution of injected CO<sub>2</sub> using diverse monitoring technologies</li><li>▪ Demonstrate validity of conceptual and numerical models</li><li>▪ Develop experience necessary for success of large-scale CO<sub>2</sub> injection experiments</li></ul> |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"><li>▪ Second injection completed October 1, 2006</li><li>▪ Confirm no-detect at surface of perfluorocarbon tracers</li><li>▪ Post injection monitoring of second injection completed September 2007</li><li>▪ Permission to plug and abandon both wells has been received</li></ul>   |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"><li>▪ Project is approaching completion</li><li>▪ Post- injection stable conditions attained – monitoring program nearing completion</li><li>▪ Final repeat VSP prior to plug and abandon scheduled for winter 2008</li><li>▪ Two short duration injection tests completed: Frio 1, Oct 2004; Frio 2 September 2006</li><li>▪ Assessment of storage permanence – quantifying residual saturation and dissolution of year long period following injection</li><li>▪ Reports can be found at <a href="http://www.gulfcoastcarbon.org">http://www.gulfcoastcarbon.org</a></li></ul>  |

***In Salah Industrial-Scale CO<sub>2</sub> Geological Storage Project***  
*CSLF Project Status Report (PSR)*  
*September 2008*

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| <b>1. Project Location</b>  |
| In Salah, Algeria, Africa   |
| <b>2. Project Lead</b>  |
| Iain W. Wright,<br>BP Alternative Energy, Chertsey Road, Sunbury, Middlesex TW16 7LN, UK  |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"><li>▪ Provide assurance that secure geological storage of CO<sub>2</sub> can be cost-effectively verified and that long-term assurance can be provided by short-term monitoring.</li><li>▪ Demonstrate to stakeholders that industrial-scale geological storage of CO<sub>2</sub> is a viable GHG mitigation option.</li><li>▪ Set precedents for the regulation and verification of the geological storage of CO<sub>2</sub>, allowing eligibility for GHG credits</li></ul> |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"><li>▪ Good results from INSAR program, confirmed by monitoring well and tracer work</li><li>▪ Quantified Risk Assessment updated</li></ul>  |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"><li>▪ Storing 1mmtpa CO<sub>2</sub> in a deep saline aquifer (1900 deep, 2m thick, 10mD permeability).</li><li>▪ Expect to repeat seismic data acquisition in Q2 2009.</li></ul>  |

*International Test Centre (ITC) CO<sub>2</sub> Capture with Chemical Solvents Project*  
*CSLF Project Status Report (PSR)*  
*September 2008*

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| <b>1. Project Location</b>  |
| University of Regina, Regina, Saskatchewan, Canada  |
| <b>2. Project Lead</b>  |
| Dr. Malcolm Wilson, University of Regina ( <a href="mailto:malcolm.wilson@uregina.ca">malcolm.wilson@uregina.ca</a> )<br>Dr. Paitoon Tontiwachwuthikul, University of Regina ( <a href="mailto:paitoon@uregina.ca">paitoon@uregina.ca</a> )<br>Dr. Raphael Idem, University of Regina ( <a href="mailto:raphael.idem@uregina.ca">raphael.idem@uregina.ca</a> )  |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"> <li>▪ To reduce the cost of post combustion CO<sub>2</sub> capture through             <ul style="list-style-type: none"> <li>– Formulated solvent development</li> <li>– Process optimization &amp; systems integration</li> <li>– Reduction of heat duty for solvent regeneration</li> </ul> </li> <li>▪ Perform cost study for post-combustion CO<sub>2</sub> capture in collaboration with an Engineering company on a site-specific case (Europe, Australia, North America, etc.)</li> </ul>  |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"> <li>▪ 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"> <li>– Breakthroughs in solvent development (mixed and custom designed solvents)</li> <li>– Breakthrough in heat duty reduction</li> <li>– Breakthrough in process integration</li> </ul> </li> <li>▪ Commercial partner HTC Pureenergy concluded technology licensing agreement with Doosan Heavy Industries, Korea, and Doosan Babcock Energy, UK. in September 2008 and Doosan is now represented on the ITC Board of Governors.</li> <li>▪ Site specific cost study in progress based on 800 MW coal unit (North America Gulf Coast)</li> </ul> |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"> <li>▪ Phase 2 ends March 2010 with discussions on Phase 3 underway</li> <li>▪ U.S. provisional patent on process integration</li> <li>▪ U.S. provisional patent on solvents</li> <li>▪ U.S. provisional patent on special chemical additives</li> <li>▪ Cost studies in progress (North America, Gulf Coast, Lignite retrofit to be undertaken)</li> <li>▪ Project website: <a href="http://www.co2-research.ca">http://www.co2-research.ca</a></li> </ul>   |

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

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| <b>1. Project Location</b>   |
| Various locations in United States and Canada  |
| <b>2. Project Lead</b>   |
| National Regional Carbon Sequestration Partnership (RCSP) Initiative Managed by the U.S. Department of Energy National Energy Technology Laboratory (NETL) <ul style="list-style-type: none"> <li>▪ Sean Plasynski, Sequestration Technology Manager, NETL (<a href="mailto:sean.plasynski@netl.doe.gov">sean.plasynski@netl.doe.gov</a>)</li> <li>▪ John Litynski, RCSP Coordinator, NETL (<a href="mailto:john.litynski@netl.doe.gov">john.litynski@netl.doe.gov</a>)</li> </ul>   |
| <b>3. Project Objectives</b>   |
| <ul style="list-style-type: none"> <li>▪ 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 storage across areas of the United States and Canada.</li> <li>▪ 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.</li> <li>▪ To implement the RCSP program in three phases:           <ul style="list-style-type: none"> <li>– Characterization Phase: Each of the partnerships characterized their regions’ potential to store CO<sub>2</sub> in different geologic formations.</li> <li>– Validation Phase: The partnerships are 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.</li> <li>– Deployment Phase: The partnerships will implement large-scale field testing involving at least one million tons of CO<sub>2</sub> per project to confirm that CO<sub>2</sub> injection and storage can be achieved safely, permanently, and economically. These tests will include one to three years of site characterization; two to three years of injection; and two to four years of monitoring, verification, and accounting (MVA).</li> </ul> </li> </ul> |
| <b>4. Recent Milestones</b>  |
| <ul style="list-style-type: none"> <li>▪ Characterization Phase completed in 2005</li> <li>▪ Validation Phase initiated in 2005, with small-scale field tests currently underway and scheduled for completion in 2009           <ul style="list-style-type: none"> <li>– Nine ongoing saline formation field tests               <ul style="list-style-type: none"> <li>– Injection of up to 10,000 metric tons of CO<sub>2</sub> commenced at MRCSP’s Michigan Basin test site (February 2008).</li> <li>– Injection of up to 3,000 tons commenced at the MRCSP’s Appalachian Saline Injection Project (September 2008)</li> <li>– Injection of 10,000 tons of CO<sub>2</sub> commenced at the SECARB Plant Daniel Massive Tuscaloosa Saline Project (October 2008)</li> </ul> </li> <li>– Ten enhanced oil or gas recovery projects are being conducted for value-added CO<sub>2</sub> storage               <ul style="list-style-type: none"> <li>– Injection operations completed at MGSC’s Huff’n Puff test site at the Loudon Oil Field in Fayette County, Illinois (March 2007).</li> </ul> </li> </ul> </li> </ul>  |

- Injection operations are ongoing for PCOR's Validation Phase test, which is being conducted at Apache Canada's Zama Oil Field in Alberta, Canada. This test is demonstrating the concurrent benefits of CO<sub>2</sub> storage, H<sub>2</sub>S disposal, and EOR (December 2006).
- SWP commenced injection operations for an EOR test in the Aneth Oil Field near Bluff, Utah. SWP plans to inject 150,000 tons of CO<sub>2</sub> over a two year period to demonstrate CO<sub>2</sub> sequestration with EOR (August 2007).
- SECARB began a CO<sub>2</sub> injection project for EOR at the Cranfield oilfield in Mississippi (July 2008).
- Five Enhanced Coalbed Methane (ECBM) tests conducted at unmineable coal seams
  - MGSC began injecting CO<sub>2</sub> into a coal seam in Illinois to demonstrate ECBM extraction with CO<sub>2</sub> sequestration (July 2008).
  - SWP began injection CO<sub>2</sub> in the San Juan Basin, New Mexico for ECBM, CO<sub>2</sub> sequestration, and beneficial use of produced water (August 2008).
- 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 CO<sub>2</sub> storage projects. The Williston Basin project in North Dakota will couple EOR and CO<sub>2</sub> storage of over one million tons into a deep carbonate formation that is also a major saline formation. The second demonstration, the Fort Nelson project, will capture over one million tons of CO<sub>2</sub> per year from one of the largest gas-processing plants in North America, compress it, and transport the CO<sub>2</sub> via pipeline to the injection site, most likely a Devonian-age carbonate rock formation located near the gas processing plant.
  - SECARB will demonstrate large-volume CO<sub>2</sub> storage in the lower Tuscaloosa Formation, injecting CO<sub>2</sub> at two locations to assess different CO<sub>2</sub> streams. The first step, or Early Test, will inject one and a half million tons of CO<sub>2</sub> over 18 months. The CO<sub>2</sub> will come from a naturally occurring source from the Jackson Dome and will be delivered by Denbury Resources' CO<sub>2</sub> pipeline. The second step, or Anthropogenic Test, will inject 100,000 to 250,000 tons of CO<sub>2</sub> per year for four years. The CO<sub>2</sub> will be supplied from a pilot unit capturing CO<sub>2</sub> 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 sandstone in the Farnham Dome of Utah. The simultaneous injection of CO<sub>2</sub> into two formations will total 3 million tons of CO<sub>2</sub> over a four-year period. The CO<sub>2</sub> will come from both a natural CO<sub>2</sub> 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 Decatur, Illinois. MGSC will inject 365,000 tons of CO<sub>2</sub> per year into the Mount Simon Sandstone in the Illinois Basin over a three year period, totaling up to a million tons. The CO<sub>2</sub> will come from ADM's ethanol production facility.
  - MRCSP will demonstrate large-scale CO<sub>2</sub> storage in the Mount Simon Sandstone and will inject one of CO<sub>2</sub> during a four-year period from an ethanol production facility. The

CO<sub>2</sub> 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 CO<sub>2</sub>.

- WESTCARB will conduct a large-scale geologic storage project in the San Joaquin Basin in Central California. The project will inject a total of one million tons of CO<sub>2</sub> over four years as part of an integrated CCS test near Bakersfield, California. Clean Energy Systems, a power generation technology developer, will supply the CO<sub>2</sub> from a new power plant based on rocket engine technology. 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 42<sup>nd</sup> 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](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](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](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](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](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](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](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/project%20portfolio/2007/table_contents.pdf)
- Regional Carbon Sequestration Partnerships Phase I Accomplishments, see:  
[http://www.netl.doe.gov/technologies/carbon\\_seq/partnerships/phase1/workproducts\\_table.html](http://www.netl.doe.gov/technologies/carbon_seq/partnerships/phase1/workproducts_table.html)

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

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| <b>1. Project Location</b>  |
| Various locations in China  |
| <b>2. Project Leads</b>   |
| R Gentile, Leonardo Technologies, Inc. <ul style="list-style-type: none"> <li>• E-mail: <a href="mailto:rhgentile@lti-global.com">rhgentile@lti-global.com</a></li> </ul> R Dahowski, Battelle – Pacific Northwest Division <ul style="list-style-type: none"> <li>• E-mail: <a href="mailto:bob.dahowski@battelle.org">bob.dahowski@battelle.org</a></li> </ul>  |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"> <li>▪ Develop the first ever bottom-up cost assessment of the potential to utilize carbon dioxide capture and storage (CCS) across the Chinese economy</li> <li>▪ Assess the potential and costs for CCS technologies to deploy across regions of China</li> <li>▪ Inventory large anthropogenic CO<sub>2</sub> point sources from power plants and other industrial sources</li> <li>▪ Identify potential candidate geologic CO<sub>2</sub> storage reservoirs/basins which could be used for the safe, long-term storage of CO<sub>2</sub></li> <li>▪ Examine the economics of CCS and develop cost curves for CO<sub>2</sub> transport and storage via optimized source-reservoir matching</li> </ul> |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"> <li>▪ Characterization and mapping of over 1600 large, stationary CO<sub>2</sub> sources with combined estimated emissions of 3,890 MtCO<sub>2</sub> per year</li> <li>▪ Storage capacity analysis and mapping for oil, gas, coal and deep saline formations with preliminary results showing as much as 2,300 GtCO<sub>2</sub> potential storage resource in onshore basins, plus additional storage potential in near offshore basins</li> <li>▪ Computation of cost curves for CO<sub>2</sub> transport and storage for the six major regions of China</li> </ul>   |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"> <li>▪ Ongoing; expected completion: 4Q 2008</li> <li>▪ Initial data collection, and economic modeling phases of project complete</li> <li>▪ Ongoing review of preliminary results; examining potential for key follow-on research</li> </ul>   |

**Zama Acid Gas Enhanced Oil Recovery, CO<sub>2</sub> Sequestration, and Monitoring Project**  
*Carbon Sequestration Leadership Forum Project Status Report (PSR)*  
 September 2008

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| <b>1. Project Location</b>  |
| Zama City, Alberta, Canada  |
| <b>2. Project Leads</b>   |
| <ul style="list-style-type: none"> <li>• Ed Steadman, Energy &amp; Environmental Research Center, Grand Forks, ND, USA<br/>         – e-mail: <a href="mailto:esteadman@undeerc.org">esteadman@undeerc.org</a></li> <li>• Steven Smith, Energy &amp; Environmental Research Center, Grand Forks, ND, USA<br/>         – e-mail: <a href="mailto:ssmith@undeerc.org">ssmith@undeerc.org</a></li> <li>• Bill Jackson, Apache Canada Ltd, Calgary, Alberta, Canada<br/>         – e-mail: <a href="mailto:bill.jackson@apachecorp.com">bill.jackson@apachecorp.com</a></li> </ul>  |
| <b>3. Project Objectives</b>  |
| <ul style="list-style-type: none"> <li>• To validate the sequestration of CO<sub>2</sub>-rich acid gas in a depleted oil reservoir.</li> </ul>  |
| <b>4. Recent Milestones</b>   |
| <ul style="list-style-type: none"> <li>• A new well was drilled into the producing formation of the target pinnacle. This is to aid in the production of oil utilizing acid gas in the Zama field.</li> <li>• Schlumberger's Modular Formation Dynamics Tester was used to perform a minifrac on the formation caprock to determine the minimum horizontal stress. This information is useful for predicting the likelihood of failure because of overpressurization in the reservoir.</li> <li>• Coring of the acid gas disposal zone commenced on September 30. Samples from this core will be analyzed both geochemically and geomechanically to determine the magnitude of change that may occur in a reservoir that has been used for disposal for as many as 15 years.</li> </ul> |
| <b>5. Status</b>  |
| <ul style="list-style-type: none"> <li>• Injection is ongoing. Over 20,000 tons of acid gas has been injected to date.</li> <li>• Geomechanical laboratory studies are ongoing.</li> <li>• Compilation of a best practices manual has been initiated.</li> </ul>  |