



## **POLICY GROUP**

### **Papers for Ministerial Conference**

Barbara N. McKee  
Tel: 1 301 903 3820  
Fax: 1 301 903 1591  
*CSLFSecretariat@hq.doe.gov*



## PAPERS FOR MINISTERIAL CONFERENCE

*Note by the Secretariat*

### Background

The Ministerial Steering Committee decided to provide substantive and current information on Carbon Capture Utilization and Storage (CCUS) and the CSLF to the Ministers as input to their deliberations. The Committee believes that five topics would be particularly important to the Ministers and commissioned a short paper on each topic.

#### Papers about CCUS

- *Status, Gaps and Measures to Close Gaps.* This paper, prepared by the Global CCS Institute, presents up-to-date information of Large Scale Integrated Projects (LISPs) currently being planned around the world to demonstrate to the public that CCUS can perform as expected. This information is based on a just-completed global survey of these projects. Some recent policy developments surrounding these projects are also discussed.
- *Financing CCS in Emerging Economies.* CCUS demonstration projects require large outlays of capital investment. Raising this capital is a challenge everywhere, but is particularly difficult in developing countries. This report, prepared by the Asian Development Bank based on work it performed over the last two years for the CSLF, explains the difficulties of financing CCUS demonstration projects in emerging economies and proposes an approach to overcome those difficulties.
- *Driving CCUS RD&D Deployment: What will it take?* This paper, prepared by the Clinton Foundation, describes the overall policy challenges facing CCUS and measures that could be taken to overcome those challenges.

#### Papers about the CSLF

- *CSLF Accomplishments since the 2009 Ministerial in London.* This report, prepared by the CSLF Secretariat, describes the work and accomplishments of the CSLF since the last Ministerial held in October 2009.
- *CSLF Capacity Building Program Progress Report.* Recognizing the critical importance of building capacity in all of its Members, especially developing country Members, the CSLF Capacity Building Program was launched at the 2009 Ministerial and funded by US\$3million in contributions. This report, prepared by the CSLF Secretariat, describes the progress of this Program.

### Action Requested

Ministers are asked to take note of these background papers.



## **Status, Gaps and Measures to Close Gaps**

*prepared by the Global CCS Institute*



## CCS STATUS, GAPS AND MEASURES TO CLOSE GAPS

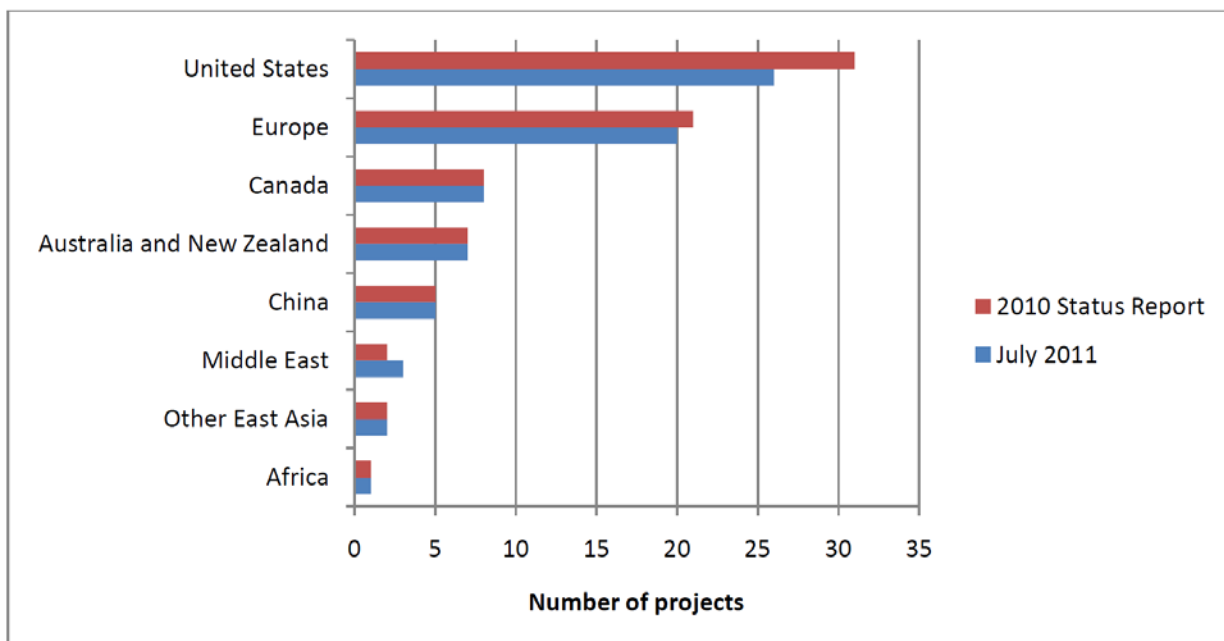
The Global CCS Institute continually tracks the worldwide status of large scale integrated CCS projects (LSIPs). These are projects which involve all stages of the CCS chain (capture, transport and storage of carbon dioxide (CO<sub>2</sub>)) and involve the capture and storage of at least 800,000 tonnes a year of CO<sub>2</sub> for coal-fired power generation facilities and at least 400,000 tonnes a year of CO<sub>2</sub> for all other industries. Projects at this scale have progressed beyond the research and development (R&D) phase and are important in demonstrating the viability of CCS as a technology which can significantly contribute to reducing emissions of CO<sub>2</sub> from large scale industrial processes.

The data set on LSIPs maintained by the Institute is updated on a regular basis to reflect changes to the status and details of projects. This data set is published on the Institute's website, so that the global CCS community has easy access to the latest information on the status of projects.

### Project status

As at 1 July 2011, the Institute's database listed 72 LSIPs across the world. This is a net reduction of five projects at this scale from those listed in the *Global Status of CCS: 2010* report, which was released by the Institute in March 2011 (figure 1). The changes in project numbers have been most evident in the United States, where a number of projects have been cancelled or put on hold. There have also been a number of projects put on hold in Europe, but this has been partly counteracted by the emergence of newly identified projects there.

**Figure 1. Number of LSIPs by region**



The most frequently cited reason for projects being cancelled or put on hold is that the project was deemed uneconomic in its current form and environment. The lack of government funding was a decisive factor for many project proponents, followed by the uncertainty regarding public carbon abatement policies in the longer term. These factors have led several project proponents to reprioritise their investments, either within their CCS portfolio or to invest in other technologies. For example, Shell cancelled its Mississippi CO<sub>2</sub> project in order to focus on developing its Quest CCS Project in Canada, and Rio Tinto decided to convert its Lynemouth power plant to biomass instead of retrofitting it with CCS at this time.



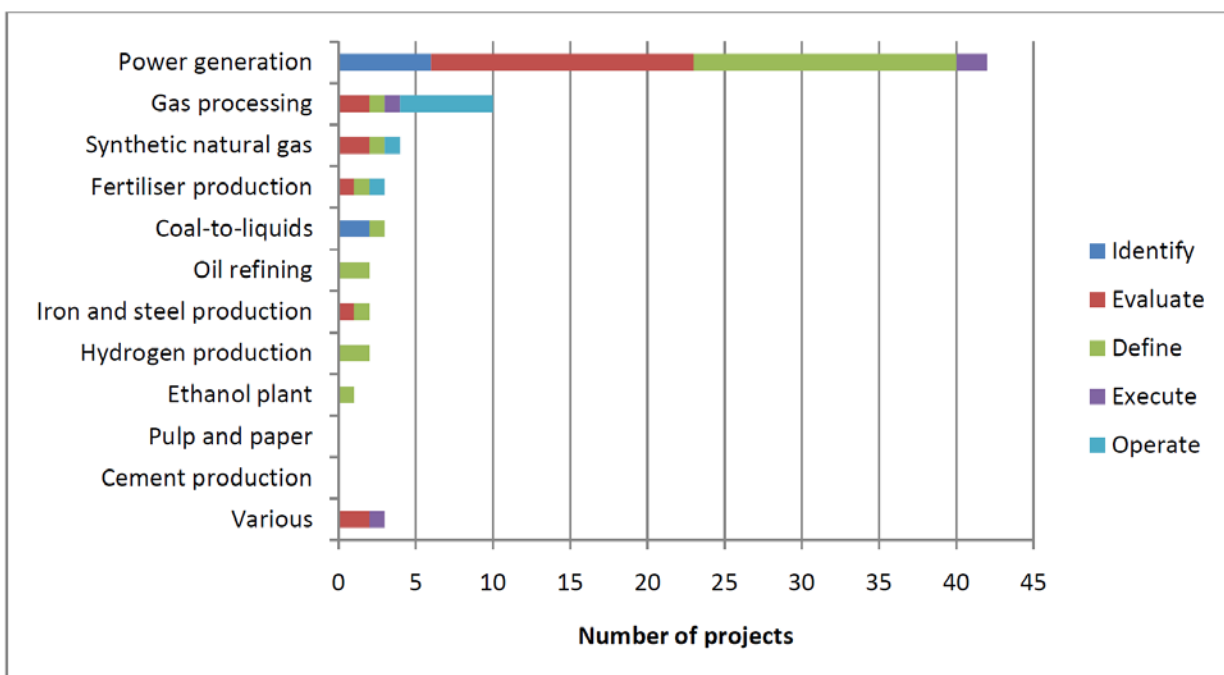
At the same time, progress in large-scale project development is occurring. For example, in Canada there have been a number of significant project-specific developments. SaskPower received approval in April 2011 from the Saskatchewan Government to proceed with the CCS component of the Boundary Dam 3 project. In May 2011, Shell filed for its Carbon Sequestration Lease for the Quest Project under the Carbon Sequestration Tenure Regulation. Also, Enhance Energy gained approval in June 2011 from the Energy Resources Conservation Board to construct the Alberta Carbon Trunkline.

It is also evident that a major challenge for many projects is identifying and fully assessing suitable storage locations. Early assessment of the opportunities and risks of a potential storage site is important in managing an integrated CCS project’s overall risks and timing. The long lead time and effort required to progress from screening to final storage site characterisation also means that realistic timeframes have to be set for demonstration projects.

A large majority of the LSIPs are in a small number of developed economies. While this is perhaps not surprising for a technology in the early demonstration phase, the potential role of CCS in large scale global emission reduction means that it is vital the technology is eventually demonstrated in many different environments and circumstances. For that reason it will be important to continue widely sharing the lessons learnt from early demonstration projects, and to continue investing in capacity development in economies where CCS may have a large role to play in future years. Some large emitting countries do not have any LSIPs at present.

All of the most advanced large scale CCS projects have links to the oil and gas sector, illustrating the importance of that sector for not only demonstrating the technology but also highlighting the possible economic drivers for early deployment of CCS. There are eight CCS LSIPs in the operational stage (figure 2), all of which have direct links to the oil and gas sector. Six of these projects capture CO<sub>2</sub> from natural gas processing plants while two capture CO<sub>2</sub> from fertiliser or synfuels production. Captured CO<sub>2</sub> from five of these projects, including the fertiliser and synfuel projects, is used in enhanced oil recovery (EOR), while that from the other three is injected into deep saline formations. There are also four LSIPs under construction (the ‘Execute’ stage of the asset lifecycle) and these also have direct links to the oil and gas sector. Very importantly, two power generation facilities including CCS are under construction – Mississippi Power’s Plant Ratcliffe in the US and SaskPower’s Boundary Dam project in Canada. In both cases, the captured CO<sub>2</sub> from these projects will be injected for EOR.

**Figure 2. LSIPs by industry and asset lifecycle stage**

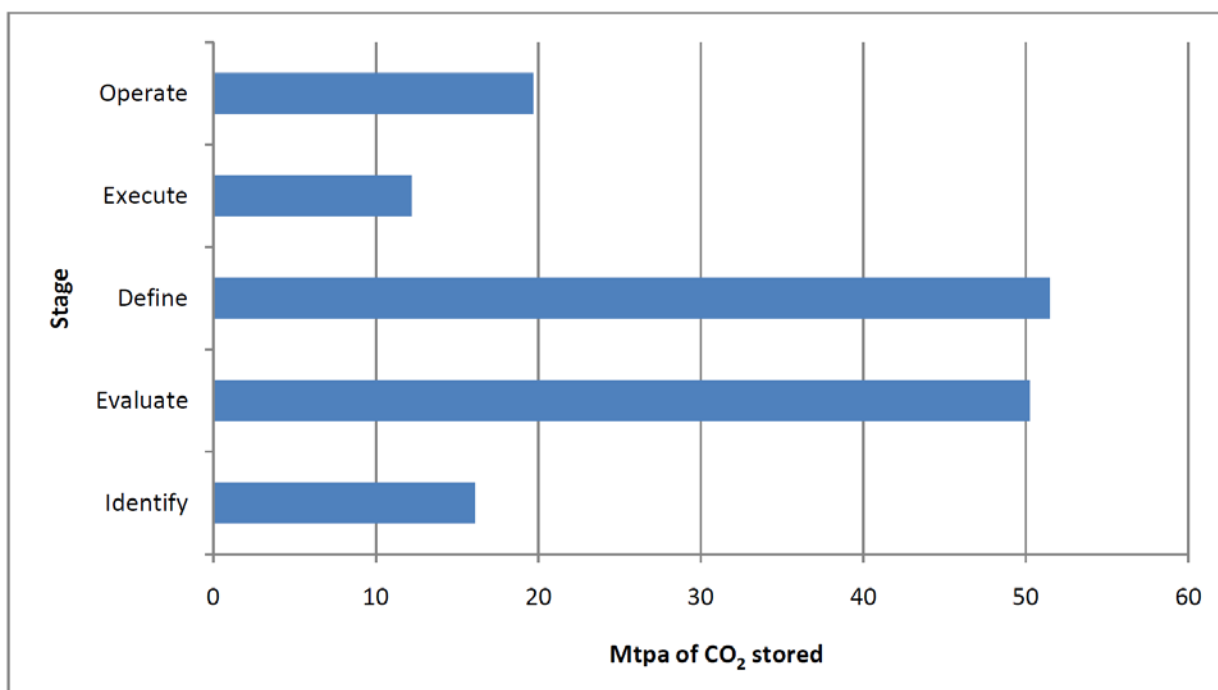


Enhanced oil recovery is one way in which captured CO<sub>2</sub> can be used for direct benefit, and also to generate revenue that can be an important driver for the capture process. Continuing to investigate and exploit uses of captured CO<sub>2</sub> is important for providing potential commercial incentives for early demonstration projects.

There are currently no LSIPs in the pulp and paper or cement production industries, following the recent failure of projects in these sectors to be selected for US Department of Energy funding. There are only two LSIPs in the iron and steel industry. All of these industries are major contributors to global CO<sub>2</sub> emissions, and in some cases there is little or no current alternative to producing CO<sub>2</sub> during the manufacturing process. For those reasons demonstrating CCS in those industries remains very important.

Collectively, the currently operational projects have a capture and storage capacity of nearly 20 million tonnes of CO<sub>2</sub> a year (figure 3). Facilities under construction will add another 12 million tonnes a year to this capacity. While still very small in the context of overall global CO<sub>2</sub> emissions, it is important to acknowledge that in some applications CO<sub>2</sub> capture, transport and storage is currently being demonstrated at a significant scale, and in some cases has been operating at that scale for decades. CCS is not an ‘unproven’ technology, as is sometimes asserted by critics. It is a technology at the early demonstration phase where its range of applications needs to be broadened, and support provided so that the benefits of continued innovation can be widely shared.

**Figure 3. Potential amount of CO<sub>2</sub> stored by LSIPs at each asset lifecycle stage**



### Policy developments

As noted above, the policy environment is critical for CCS. There have been significant recent policy developments in Europe, Australia and Canada. In addition, the progress of CCS under the UNFCCC Clean Development Mechanism (CDM) at COP17 in Durban later in 2011 will be very important for the potential deployment of the technology in developing countries.

Thirteen CCS project proposals were submitted to the European Commission in early May 2011 for assessment by the European Investment Bank under the first round of funding of the New Entrants Reserve (NER300) funding program. The EC intends to provide clarity on the outcomes of the first round of the NER300 program by early to mid 2012. Funding from NER300 could



support the demonstration of up to eight large-scale CCS projects. Seven countries made project submissions, for a mix including pre-combustion, post-combustion and oxyfuel power generation, as well as some industry applications in steel and hydrogen production.

On 10 July 2011, the Australian Government released the details of its new climate change plan, which includes establishment of a carbon price, a renewed focus on assisting renewable energy, continued energy efficiency efforts, and strong support for action in the land use sector. The proposed carbon pricing mechanism is due to commence from 1 July 2012. The new plan also lifts Australia's emission reduction aspiration from 60 per cent below year 2000 levels by 2050, to 80 per cent below 2000 levels by 2050. The Government acknowledges in its plan the current level of support for CCS through existing demonstration measures, such as its AUD\$1.6 billion CCS Flagship program. In June 2011, the Government announced that it has selected the Collie South West Hub Project for funding under this Flagship program, to support the studies required to move the project to the next phase of decision making. The Government also announced that it will continue to progress other large-scale Australian CCS projects, including the CarbonNet CCS Hub project and the Wandoan project. As with the Collie Hub project, these two projects will initially focus on the development of CO<sub>2</sub> storage reservoirs and associated community engagement. The importance placed on improved storage characterisation in Australia is also reflected in the announcement of Government funding for a National CO<sub>2</sub> Infrastructure Plan to study sites potentially suitable to store captured CO<sub>2</sub> and speed up the development of transport and storage infrastructure near major CO<sub>2</sub> emission sources.

In June 2011, the Governments of Alberta and Canada signed agreements with Shell to fund the Quest CCS project for CAD\$745m and CAD\$120m respectively. In addition, the Government of Alberta increased support for all refining or bitumen upgrading projects that capture and store CO<sub>2</sub> in geological (non-enhanced oil recovery) storage through changes to the *Specified Gas Emitters Regulation*. The change effectively doubles the level of support provided through the offset credit mechanism currently available, and also provides opportunities for further support if credit prices in Alberta increase. For Shell's Quest project, this change potentially brings in another CAD\$160m on top of previous arrangements and the CAD\$865m funding from governments.

The 17th Conference of the Parties (COP 17) to the UNFCCC will be held in Durban, South Africa, over the period from 28 November to 9 December 2011. Among other things, COP 17 will be important in advancing the legitimacy of CCS as a mitigation option, including under the CDM. While this was conditionally agreed to in Cancun, Mexico at COP16, it still needs to be fully endorsed in Durban. A large amount of work is being done by subsidiary bodies in the lead-up to Durban to address the technical issues around the role of CCS as a credible mitigation option, and to resolve the limited number of outstanding issues for CCS under CDM. It will be important for negotiators to come to agreement on these issues in Durban.

## Conclusion

CCS remains in the early demonstration phase, with a small number of large-scale operating projects, all with strong links to the oil and gas sector. These projects are successfully demonstrating that CO<sub>2</sub> can be captured from industrial processes, transported and stored at significant scale, despite claims that the technology is unproven. The challenge remains, however, to extend large-scale demonstration projects to other sectors, including power generation. Only two power generation projects have made a positive Final Investment Decision and moved into construction, and there are currently no large-scale integrated project proposals in important sectors such as pulp and paper and cement production.

Continued strong government support for CCS as a technology is important. Recent announcements have proven that in most cases projects will not proceed without government funding, and without certainty regarding public carbon abatement policies in the longer term. There have been important recent policy developments regarding CCS in developed economies, but providing the necessary policy certainty, and maintaining funding support is necessary to advance large-scale demonstration projects.

**Carbon Sequestration leadership forum**

[www.cslforum.org](http://www.cslforum.org)



**CSLF Accomplishments since the  
2009 Ministerial in London**

*An Update for the Ministers*

*prepared by the CSLF Secretariat*





## CSLF Accomplishments since the 2009 Ministerial in London *An Update for the Ministers*

Both the CSLF Policy Group and Technical Group, supported by the CSLF Secretariat, have continued their collaborative activities since the last meeting of the Ministers in London, England in October 2009. This paper provides a brief overview of accomplishments since that Ministerial. CSLF accomplishments prior to the 2009 Ministerial were documented in a report delivered at that Ministerial. See Annex 1.

### Policy Group Accomplishments

The CSLF Policy Group is responsible for the overall governance of the CSLF and for policy-related activities. Accomplishments since the last Ministerial have been in the following areas:

#### CSLF Governance

- Admission of New Member. The United Arab Emirates joined the CSLF at its meeting in Warsaw, Poland in October 2010, bringing the total number of CSLF Members to 25.
- Planning for the Long Term. Amendments to the CSLF Charter were developed for approval by the Members, most importantly, the extension of the term beyond 2013. Anticipating this extension, a new CSLF Strategic Plan for activities beyond 2013 has been developed.
- Multilateral Collaboration. Collaboration with other multilateral institutions on CCS, including the Clean Energy Ministerial Carbon Capture Use and Storage Action Group, Global CCS Institute, International Energy Agency, the World Bank, and the Asian Development Bank, were expanded in the areas of financing CCS, capacity building and technology collaboration.
- Stakeholder Involvement. While the CSLF is an organization of governments, CCS will ultimately be implemented by industry with the involvement or agreement of other stakeholders. Stakeholders continue to participate in CSLF task forces and provide valuable ongoing input to CSLF activities.

#### Capacity Building

- Capacity Building Fund. Emerging economies require the development of skills and institutions in order to implement CCS. As approved by the Ministers in 2009, the CSLF Capacity Building Fund was established to fund CCS capacity building projects for developing country CSLF Members, but with events open to all Members. The Fund has so far received US\$3.0 million in contributions. Procedures for its governance were developed by the new CSLF Capacity Building Governing Council.

- Project Implementation. Using procedures developed by the Capacity Building Governing Council to identify and select projects, a total of eight projects requested by Brazil, China, Mexico, and South Africa have now been undertaken. Further projects are being considered in Brazil, China, India and South Africa.

#### Financing CCS

- Financing Commercial Projects. CCS projects must eventually be financed commercially throughout the world, which is not currently feasible in power generation and most industrial applications. The Policy Group's Financing Task Force has conducted a series of four workshops with industry and the financial community in Europe, North America and Asia to identify potential methods of addressing this constraint.
- Financing CCS in Developing Countries. Financing CCS in developing countries poses a much greater challenge than in industrialized countries. The Policy Group commissioned a report by the Asian Development Bank on financing CCS in developing countries followed by a workshop to discuss this issue. (A separate report to the Ministers addresses the topic of financing CCS in developing countries.)

#### Information Sharing

- Project Recognition. Recognized projects agree to share information useful to the development of CCS through the CSLF. Based on Technical Group recommendations, five new projects were recognized in 2010 and it is expected that further projects are expected to be recognized at the Ministerial in 2011. Prior to the Ministerial a total of 35 projects have been recognized.
- Communications. The Policy Group's Communications and Public Outreach Task Force continues development of a series of brochures and other informational materials on CCS for public dissemination by Members and sends a daily email newsletter on CCS to Members and stakeholders. The Secretariat continues to operate the CSLF website.
- Information Supporting International Agreements. The CSLF has provided information on CCS through its Members for use in the United Nations Framework Committee on Climate Change meeting in Cancun, Mexico and for the World Trade Organization for its consideration of the tariff treatment of environmental goods and services.
- Recommendations to the G8. Working with the International Energy Agency and the Global CCS Institute, and following up on recommendations made earlier to the G8, the CSLF provided input to the G8 on CCS demonstration projects in preparation for its 2010 Summit in Muskoka, Ontario, Canada.

#### **Technical Group Accomplishments**

The CSLF Technical Group is unique in that its delegates represent 24 national governments and the European Commission and, as such, the interchange of technical information is at the highest level. The collective aim is to effect the rapid commercial deployment of carbon capture and storage (CCS) across a wide range of industries, through improving technology, development, and implementation.

Technical Group delegates also interact with other technical bodies such as the International Energy Agency (IEA), the European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP), and the Global CSS Institute. This access to a wide range of technical information enhances the role of the Technical Group.

Set out below are key achievements of the Technical Group.

### CSLF Technology Roadmap

The CSLF Technology Roadmap has been completed and is widely accepted. The 2009 version of the Roadmap was an important input to the IEA CCS Roadmap, while the 2010 and 2011 versions of the Roadmap were improved to have an increasingly strong emphasis on CCS integration and demonstration of the complete CCS value chain: CO<sub>2</sub> capture, transport, storage, and monitoring. The CSLF Technology Roadmap's importance is that it identifies key components to accelerate CCS commercialization, with particular emphasis on:

- Achieving commercial viability and deployment of CO<sub>2</sub> capture at the source, compression and transport, storage and monitoring technologies;
- Reducing the energy penalty and costs related to CO<sub>2</sub> capture;
- Developing an understanding of global storage potential, including matching CO<sub>2</sub> sources with potential storage sites and infrastructural needs;
- Addressing risk factors to increase confidence in long-term CO<sub>2</sub> storage effectiveness; and
- Building technical competence and confidence through sharing information and experience from multiple large-scale demonstrations.

The Technology Roadmap also established key milestones for CO<sub>2</sub> capture, transport, storage, monitoring, demonstration, and integration to be achieved through 2020 and beyond.

### Technical Risk Analysis

Technical risks associated with the injection and long-term storage of CO<sub>2</sub> have been identified and examined. The risk associated with CO<sub>2</sub> near-term injection processes includes predicting the stress state of the storage unit, while risks associated with long-term processes related to impacts of CO<sub>2</sub> storage include health, safety, and environmental risks, potential impact on natural resources (such as groundwater, mineral resources, etc.), and return of CO<sub>2</sub> to the atmosphere. A comprehensive report on identification and assessment of these kinds of risks has been completed and is publicly available.

### Technology Gaps Analysis

A comprehensive analysis of technology gaps has been completed in order to determine areas where further research, development, and demonstration activities are needed. Four categories of technology gaps have been identified: capture, transportation and infrastructure, storage and monitoring, and integration. Outcomes from this analysis have led to identification of a suite of future areas of activity for the Technical Group, including:

- Investigation of issues related to CO<sub>2</sub> storage in unconventional geological media such as basalt and shale;
- Identification of technological progress and any new research needs for reducing the energy penalty for CCS, both for traditional CO<sub>2</sub> capture processes and new breakthrough technologies;
- Identification of opportunities for CCS with industrial non-utility sources, and identification and attempted resolution of technology-related issues (including integration) unique to this type of application;

- Identification of optimum technical CO<sub>2</sub> transport strategies, both for pipeline and non-pipeline alternatives, including assessment of purity issues as they apply to CO<sub>2</sub> transport;
- Identification and recommendation of standards for storage and monitoring of injected CO<sub>2</sub>; and
- Identification of most economically attractive CO<sub>2</sub> utilization options.

#### Interactive Information Exchange

An interactive forum for facilitating the exchange of technical information and real-world experience directly between the sponsors of large CCS demonstration projects has been devised and successfully piloted in a technical workshop held in Saudi Arabia in early 2011. Feedback from project sponsors has been exceedingly positive, and planning for additional topic-specific forums is currently underway.

**Annex 1**  
**Report on CSLF Progress Delivered at 2009 Ministerial**

## **WHAT HAS THE CSLF ACCOMPLISHED?**

The mission of the Carbon Sequestration Leadership Forum (CSLF), as stated in its Charter, has three objectives:

- Facilitate the development of cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage;
- Make these technologies broadly available internationally; and
- Identify and address wider issues relating to carbon capture and storage, including promoting the appropriate technical, political and regulatory environments for the development of such technology.

The CSLF has made significant progress in achieving these objectives. When the CSLF was founded in 2003, Carbon Capture and Storage (CCS) was virtually unknown beyond a few technical specialists and policy analysts. Moreover, it was not clear what would be required to make CCS a commercial reality, or even if commercial deployment was feasible. Today, six years later, much technical progress has been made; CCS is widely recognized as an indispensable method for mitigating climate change; and many countries are well on the way to developing the capacity needed for deployment. Much of this progress was spearheaded by the CSLF.

### **Overarching Achievements**

Several CSLF accomplishments have had significant impact in achieving each of the three objectives of the CSLF. Of greatest importance have been:

- ✓ Creating an ongoing global forum for experts and diverse stakeholders in all fields relevant to CCS to work together to address the major challenges facing development and commercial deployment of CCS;
- ✓ Helping to raise global awareness of CCS and inform the global dialogue on the use of CCS to reduce greenhouse gas emissions;
- ✓ Facilitating international collaboration on twenty diverse CCS projects, a mechanism for the worldwide sharing of information generated from projects that will facilitate the development of cost-effective CCS technologies, and a model for further international collaboration; and
- ✓ In response to a request from the G8 and working with the International Energy Agency (IEA), convening experts from around the world to develop the recommendations<sup>1</sup> that now form the basis for global activities to make CCS commercial and broadly available internationally by 2020.

---

<sup>1</sup> [http://www.cslforum.org/meetings/workshops/iea\\_calgary2007.html](http://www.cslforum.org/meetings/workshops/iea_calgary2007.html).

The CSLF is a voluntary organization and has no budget, permanent staff or funding authority. Yet, it has had a significant impact as an international platform for governments, industry and other stakeholders to collaborate on CCS. The CSLF has also set the precedent for more recent funded international collaborative activities such as the Global Carbon Capture and Storage Institute, with which the CSLF actively collaborates.

*The two major bodies within the CSLF, the Technical Group and the Policy Group, work together to achieve the CSLF objective of making CCS broadly available internationally.* Each has each made significant progress to achieve the CSLF objective in its area of responsibility. The Secretariat, managed by the US Department of Energy, provides the administrative support to the CSLF.

CSLF activities are guided by the CSLF Strategic Plan. Members agreed on the initial CSLF Strategic Plan in 2004, which was updated in 2009.<sup>2</sup> Among other things, the CSLF Strategic Plan incorporates a comprehensive Technology Roadmap developed in 2004 and updated in 2009. The CSLF Strategic Plan represents the consensus of the Members on collaborative international activities to facilitate the development of CCS technologies, make these technologies broadly available internationally, and address wider issues relating to CCS.

### **Technical Group Accomplishments**

*The Technical Group strives to achieve the CSLF objective of facilitating “the development of cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage.”* In order to achieve that, Technical Group activities bring together experts from around the world to evaluate technology development requirements and to create useful global standards. Evaluations of technology development needs inform the research, development and demonstration activities of Members. Nonbinding international standards provide guidance for project development and regulatory requirements in Member jurisdictions.

Specific achievements of the Technical Group are listed below:

1. The Technical Group developed a CSLF Technology Roadmap to identify and evaluate requirements for Research and Development (R&D). The CSLF Technology Roadmap reflects a consensus of leading international experts on the technical developments necessary to develop and deploy all aspects of CCS. The Roadmap provides input to Member R&D activities and to international collaboration. Considerable technical progress is reflected in the updated 2009 CSLF Technology Roadmap.<sup>3</sup>
2. Experts from the Technical Group developed international standards for storage capacity estimates.<sup>4</sup> This is a critical breakthrough. Projects cannot be permitted or financed unless there is assurance that the storage capacity exists and consistent standards are needed to

---

<sup>2</sup> [http://www.cslforum.org/publications/index.html?cid=nav\\_publications](http://www.cslforum.org/publications/index.html?cid=nav_publications).

<sup>3</sup> [http://www.cslforum.org/publications/documents/CSLF\\_Tech\\_Roadmap\\_081809](http://www.cslforum.org/publications/documents/CSLF_Tech_Roadmap_081809).

<sup>4</sup> [http://www.cslforum.org/publications/index.html?cid=nav\\_publications](http://www.cslforum.org/publications/index.html?cid=nav_publications).

measure that capacity. The CSLF standards provide a consistent basis for estimating, comparing and valuing geologic storage capacity for CO<sub>2</sub>. The CSLF reports on storage capacity standards are widely cited as authoritative in measuring storage capacity.

3. An expert Task Force of the Technical Group identified and assessed gaps in Measurement Monitoring and Verification (MMV) of geologic storage. MMV is required in order to assure the security, safety and permanence of geologic storage. This assessment describes gaps in MMV technologies and practices as a guide to where further R&D is required.<sup>5</sup>
4. The Technical Group is undertaking an examination of risk assessment standards and procedures. Risk assessment is critical to design and regulatory approval of CCS projects. Activities are underway to assess prior work in this area, to determine critical issues for further development and to provide the basis for standards and procedures.
5. Technology gaps in capture and transport were identified by the Technical Group as a guide to further R&D. Considerable work is taking place throughout the world on capture and transport technologies. It is important that R&D planners and researchers understand where it all stands in order to most effectively and efficiently plan further projects and coordinate efforts. The Technical Group has prepared a report on gaps in CO<sub>2</sub> capture and transport to provide guidance in this area.<sup>6</sup>

## **Policy Group Accomplishments**

*Policy Group activities, aside from governance of the CSLF, focus on the CSLF objective of identifying and addressing the “wider issues relating to carbon capture and storage, including promoting the appropriate technical, political and regulatory environments for the development of such technology.”* Activities address legal and regulatory frameworks, financing constraints, capacity building and public outreach. Specific accomplishments of the Policy Group are listed below:

1. The Policy Group has facilitated the development of approaches to financing CCS projects. The ability to commercially finance CCS projects is a major challenge for CCS, and this challenge is especially severe in developing countries. Financing was also highlighted in the recommendations to the G8. A workshop on financing involving key stakeholders, the financial industry and governments which was held in London, England (2004) identified the key issues related to financing. The CSLF Financial Issues Task Force in meetings in Delhi, India (2007 and 2008) and in Cape Town, South Africa (2008) focused attention on solving the financing challenges in developing countries. A new CSLF Financing Task Force with a subgroup on financing in developing countries is now working to develop approaches to close the financing gap. As part of this work, a workshop on bridging the financing gap was held in New York in September, 2009. A study with the Asian Development Bank to identify methods for financing CCS in developing countries is currently underway.

---

<sup>5</sup> [http://www.cslforum.org/publications/documents/Final\\_Report\\_MMV\\_Task\\_Force.pdf](http://www.cslforum.org/publications/documents/Final_Report_MMV_Task_Force.pdf).

<sup>6</sup> [http://www.cslforum.org/publications/documents/Final\\_Report\\_Task\\_Force\\_Identifying\\_Gaps\\_CO2\\_Capture\\_Tra\\_nspo.pdf](http://www.cslforum.org/publications/documents/Final_Report_Task_Force_Identifying_Gaps_CO2_Capture_Tra_nspo.pdf).



## Annex 1: Report on CSLF Progress Delivered at 2009 Ministerial

Financial incentives for both demonstration and commercial projects, including those (such as emission allowance prices) that provide value for reducing carbon dioxide emissions, will be necessary for financing CCS. Such incentives are now starting to be put in place in various countries. The CSLF has established a registry of financial incentives that can serve as the basis for evaluation of the design and effectiveness of incentives.<sup>7</sup>

2. The Policy Group Task Force on Capacity Building in Emerging Economies conducted capacity building workshops for emerging economies and is expanding this activity. Capacity building is a critical need for all Members, and this need is particularly acute for emerging economy Members. Six workshops for emerging economies have been held so far in Brazil, Mexico, Saudi Arabia and the United States. These workshops led to the creation of academic courses and advanced CCS research projects in the host countries. Considerable expansion of this activity is planned and is the subject of another CSLF Ministerial Meeting Paper.
3. The Policy Group developed guidelines and has promoted information sharing on legal-regulatory frameworks. The legal and regulatory frameworks for CCS simply did not exist in most Member jurisdictions at the time the CSLF was formed. The Policy Group has addressed this issue since its inception. The CSLF held workshops on legal and regulatory issues in workshops in Brisbane, Australia (2003) and, with the IEA, in Paris, France (2006). The CSLF developed non-binding guidelines for legal and regulatory frameworks for CCS in 2004. Those guidelines were the first comprehensive assessment of the full range of legal and regulatory issues facing CCS. The guidelines provided input to the development of actual frameworks in Member countries. A number of CSLF Members (Australia, Canada, the European Commission, France, Germany, Japan, and Norway as well as some U.S. states) have now developed key elements of such frameworks and they are under development by other Members.
4. The Policy Group, on the recommendation of the Technical Group, has given recognition to 20 important CCS projects from around the world.<sup>8</sup> This recognition provides the basis for international information sharing on some of the most important projects throughout the world covering all aspects of CCS. The projects report progress regularly to the CSLF and results are available to Members, stakeholders and others through the CSLF website. In return, the projects receive global visibility.
5. The Policy Group supports public outreach on CCS by Members. Public understanding and informed acceptance is critical to implementation of CCS. Members exchange information on their public outreach efforts through the CSLF and the CSLF website [www.cslforum.org](http://www.cslforum.org). This website, operated by the Secretariat, also provides a mechanism for the CSLF itself to provide information. The CSLF website now includes a daily news feed of media reports on CCS from around the world. Further collaborative efforts on public outreach are part of the 2009 CSLF Strategic Plan.

---

<sup>7</sup> <http://cslforum.org/incentivesregistry/index.html>.

<sup>8</sup> [http://www.cslforum.org/projects/index.html?cid=nav\\_projects](http://www.cslforum.org/projects/index.html?cid=nav_projects).

## Annex 1: Report on CSLF Progress Delivered at 2009 Ministerial

6. The CSLF has forged strong collaborative relationships with other international organizations to foster CCS. These organizations include the International Energy Agency, the Global Carbon Capture and Storage Institute and the Asian Development Bank. Discussions are currently underway on collaboration with the World Bank.

### **Recommendation**

*Ministers are invited to note the progress that the CSLF has made in achieving its objective and endorse activities under the 2009 CSLF Strategic Plan to make further progress.*

**Carbon Sequestration leadership Forum**

[www.cslforum.org](http://www.cslforum.org)



## **Financing CCS in Emerging Economies**

*prepared by the Asian Development Bank*

## Key Points

- Multibillion dollar public funding support is being provided in developed countries to overcome the large economic gap and incentivize first-generation CCS demonstration projects. But no such mechanism exists for emerging economies.
- Use of captured CO<sub>2</sub> and potential future carbon offset revenues may mitigate some of the higher incremental costs and risks. But they alone are inadequate to fill the large economic gap for CCS demonstration in emerging economies.
- The continuing surge in demand for fossil fuels (especially carbon-intensive coal) in emerging economies, but unsatisfactory CCS progress so far, generates a compelling reason to fast-track CCS demonstration projects in emerging economies.
- A CCS-dedicated fund, large enough to offset the higher incremental capital cost and energy penalty in emerging economies, could kick-start CCS demonstration projects, fast-tracking its uptake much earlier than otherwise possible.

# Financing CCS in Emerging Economies

## Challenges in Financing Carbon Capture and Storage Demonstration Projects

Carbon Capture and Storage (CCS) technologies are crucial for cost-effective mitigation of carbon dioxide (CO<sub>2</sub>) emissions globally. Yet, very few countries have envisioned CCS in their energy portfolio and established supporting policies. The price of CO<sub>2</sub> is inadequate and the future international carbon regime is uncertain, leading to a large economic and commercial/financing gap and high risks in financing CCS. Multibillion dollar direct public funding support is being provided in some developed countries to overcome the economic gap and incentivize CCS demonstration projects.

A typical CCS demonstration project capturing and storing at least a million tons of CO<sub>2</sub> per year will face formidable financing challenges—high front-loaded costs for storage characterization, a typical transaction size of at least \$500 million, a complex multi-sectoral setup along the CCS chain, and significant regulatory risks and potential long-term liabilities. These combined challenges significantly raise the risk profile of CCS transactions. Public funding, combined with government risk sharing (or risk bearing), is needed for early-stage demonstration projects.

These challenges become even more difficult in emerging economies. They are reluctant to commit large amounts of public funding for the demonstration of CCS—an expensive, complex, and locally unproven technology. Emerging economies are also wary of the unique contradiction whereby CCS requires a large incremental capital cost to fit onto a fossil fuel-based power plant, but then reduces its electricity output and significantly affect its efficiency because it uses additional fuel and electricity to capture and store CO<sub>2</sub> (energy penalty). Emerging economies find this issue particularly difficult because they primarily rely on fossil fuel-based power but face power shortages.

Despite these challenges, many emerging economies are actively participating in CCS capacity development and knowledge building. In some cases, they are implementing pilot projects. But without a targeted funding mechanism to mitigate the higher incremental costs and risks, CCS activities in emerging economies are unlikely to move to a demonstration phase anytime soon.

## CCS Demonstration in Emerging Economies: Key Issues and Readiness Assessment

Emerging economies have different levels of initial activities. Some, like the People's Republic of China (PRC), have already implemented multiple CO<sub>2</sub> capture pilot projects and can launch large-scale integrated projects. But others, like India, are still assessing the strategic fit of CCS technologies.

The dedicated CCS Fund in multilateral development banks, such as the Asian Development Bank (ADB) and the World Bank, together with support from the Carbon Sequestration Leadership Forum (CSLF), the International Energy Agency (IEA), and the Global CCS Institute, have built momentum for CCS activities in emerging economies. Enabling work is under way in some emerging economies on key issues and barriers—e.g., capacity development, country-specific CCS road maps, legal and regulatory frameworks, pre-feasibility assessments, and the implementation of pilot projects. The following provides the readiness status on key issues:

**Legal and Regulatory Frameworks.** Recently, the IEA, CSLF, and the Global CCS Institute have developed best practice examples and guidelines across the CCS chain. They expect to develop a pilot regulatory framework based on these guidelines, but with suitable country- and project-specific CCS customization, to guide initial CCS demonstration projects in emerging economies. Lessons learned from these demonstration projects could then be incorporated into future regulatory frameworks in individual countries.

**Technical Readiness.** Consistent with the trend in developed countries, the priority for demonstration projects is expected to be on coal-fired power plants in emerging economies. Most of the new coal-fired capacity in these countries comprises high efficiency supercritical and ultra-supercritical plants, which are essential for post-combustion capture. But so far, there is no operating integrated gasification combined cycle (IGCC) power plant in emerging economies, although an ADB-financed 250-megawatt (MW) coal-based IGCC power plant is under construction in the PRC. IGCC plants, which can provide low-cost, low-energy penalty platform for pre-combustion capture, are crucial for the future uptake of CCS in emerging economies.

**Storage Issues.** Storage issues are critical and may potentially delay CCS demonstration in emerging economies. The oil and gas sector has the technical expertise to assess storage capacity and access to most data, but it operates independently of the power sector in most countries and tends to prioritize CO<sub>2</sub> capture from its own operations. Power companies, on the one hand, and oil and gas companies, on the other hand, need to collaborate from an early stage to overcome this barrier. Since current activities are at a pilot scale in emerging economies, it is unclear how this would unfold for a demonstration project. First demonstration projects are likely to involve use of captured CO<sub>2</sub> for enhanced oil recovery. Therefore, the storage characterization may be less of an issue during the demonstration phase because oil companies would have detailed information on the operating oil fields.

**Financial/Commercial Challenges.** A high level analysis of financial and commercial challenges through modeling of “with CCS” for a 600 MW coal-fired supercritical power plant and a 400 MW IGCC power plant in the PRC highlighted the challenges of CCS demonstration. The analysis suggests that a tariff increase of up to 80% (or carbon price of \$40–\$70/ton) is needed to ensure financial viability of a “with CCS” power plant. These estimates are expected to vary across emerging economies.

**CCS-Ready Power Plant Options.** “CCS-ready” power plants are projects without CCS, but that have prepared for CCS during their design and planning phases so they are ready to retrofit CCS at a later date. The “CCS ready” implementation may be a low-cost, low-risk approach in progressing with CCS in emerging economies. While the “CCS ready” concept has its merits under certain conditions, their consideration should not exclude early demonstration of CCS in emerging economies. Early CCS demonstration, in parallel with implementation of CCS-ready projects in emerging economies, can allow the accelerated uptake of CCS after the successful demonstration phase.

**Private Sector Participation.** In the absence of regulatory need and market-based incentives, it is unlikely that the private sector will be motivated enough to demonstrate CCS on its own. But a public–private partnership model could work where the private sector invests for the “without CCS” cost and the public sector invests in incremental “with CCS” cost, and absorbs the associated risk.

## Case for Early Demonstration in Emerging Economies

The rapid growth of fossil fuel, especially carbon-intensive coal, is continuing in emerging economies. Energy efficiency and renewable energy programs that are under way in these countries will moderate the growth rate only marginally. But overall, fossil fuel consumption will grow. CCS is currently the only near-commercial technology that can decouple fossil fuel consumption from rising CO<sub>2</sub> emissions. Thus, there are compelling reasons to bring CCS demonstration forward in emerging economies.

The IEA's CCS Technology Roadmap (2009) stipulates that out of 100 CCS projects that should be in operation by 2020, about 50% will need to be in emerging economies. But current progress is not promising the desired CCS growth trajectory, especially in emerging economies. The slower uptake by emerging economies has wider implication for the global efforts to mitigate climate change.

Emerging economies are unlikely to commit to a complex and potentially risky technology without testing and proving it themselves. Moreover, the need for customization is high for CCS as it is plant specific, energy feedstock specific for capture, and geology specific when it comes to storage. However, once demonstration projects are implemented and the costs start to come down, emerging economies may begin to include CCS in their long-term energy planning and set targets and complementary policies. But the demonstration phase can only be implemented with international support.

## Proposed CCS Demonstration Fund

A CCS Demonstration Fund (the CCS Fund) is essential to stimulate and incentivize CCS demonstration in emerging economies. Without such a fund, CCS would remain a low priority, with marginal activities in developing countries delaying its uptake. A CCS Fund must be set up at a scale large enough (\$5 billion) to demonstrate a commitment to support multiple projects over a period of time (at least 10 years) in fossil fuel-based emerging economies.

**Need for dedicated CCS Fund.** Due to its unique complexities and risks, CCS is unable to compete with other low-carbon technologies within a common fund. A CCS-dedicated fund that mitigates or eliminates the additional cost of CCS demonstration projects would incentivize emerging economies to test it by undertaking pilot and demonstration project(s). This would help CCS gain acceptance and accelerate its deployment. A similar dedicated funding approach has proved successful in encouraging multiple CCS projects in many developed countries in Europe, including the United Kingdom, and the United States.

The proposed CCS Fund, with contributions from developed countries (donors), is an interim measure to support an emerging but crucial climate change mitigation technology. The CCS Fund will (i) fill immediate financing gaps for CCS in emerging economies, (ii) be launched separately, from the larger Green Climate Funds being negotiated under the international climate change negotiations but could eventually merge, and (iii) have a specific sunset clause.

**CCS Activities to be Financed from the CCS Demonstration Fund.** A complete set of financing instruments, such as grants and concessional loans, and risk mitigation instruments, such as guarantees and equity, would be available to offset the additional costs of the proposed "with CCS" projects in emerging economies. The CCS Fund will provide capital cost subsidies, as well as tariff incentives, to ensure the financial viability of "with CCS" projects. It would also advance resources for upstream project development activities, such as storage characterization.

**Governance of the CCS Fund.** The detailed organization of the CCS Fund, its governance structure, and the administration of activities are being discussed under the Clean Energy Ministerial Action Group on Carbon Capture, Use and Storage (CEM CCUS Action Group). It will be determined prior to its establishment. But it is clear that multilateral development banks, such as ADB, who have long and proven history of working in emerging economies, particularly where they have shown a commitment to CCS deployment, will play a crucial role.

### Recommended Action List to Fast-Track CCS Demonstration in Emerging Economies

Action	Purpose	Responsible Stakeholders
Establish CCS Fund of \$5 billion scale by 2012	Mitigate or eliminate additional cost of CCS demonstration and CCS-ready projects	Contributions by developed countries
	Support upstream project development activities—FEED studies, storage characterization	MDBs to work with the donor governments and emerging economies in setting up the Fund
Provide policy support such as pilot regulatory frameworks, and complementary incentives—tax relief, tariff premium, and loan guarantees	Mitigate legal and regulatory risks and remove uncertainties	Governments in relevant emerging economies
Form cross-sectoral partnerships to develop integrated CCS projects	Mitigate storage-related issues and risks	Power, and oil and gas sector companies in emerging economies
Provide knowledge sharing platforms for disseminating lessons and results from demonstration phase	Overcome knowledge barriers and improve design	Knowledge institutions and CCS-specific initiatives—CSLF, IEA, Global CCS Institute
Develop relevant best practice guidelines on CCS ready; EIA, MMV, and storage characterization	Provide best practice guidelines to fast-track project development	
Intensify research and development to further reduce energy penalty	Bring down energy penalty within a tolerable range (10% or lower)	Research institutes and energy technology laboratories

CCS = carbon capture and storage; CSLF = Carbon Sequestration Leadership Forum; EIA = environmental impact assessment; FEED = front-end engineering design; IEA = International Energy Agency; MDB = multilateral development bank; MMV = measurement, monitoring, and verification.

#### Asian Development Bank

ADB, based in Manila, is dedicated to reducing poverty in the Asia and Pacific region through inclusive economic growth, environmentally sustainable growth, and regional integration. Established in 1966, it is owned by 67 members—48 from the region.

This publication is based on a report prepared under a technical assistance (TA 7278-REG: CCS Demonstration in Developing Countries—Analysis of Key Policy Issues and Barriers) by ADB staff and their resource persons.

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of ADB or its Board of Governors or the governments they represent. ADB encourages printing or copying information exclusively for personal and noncommercial use with proper acknowledgment of ADB. Users are restricted from reselling, redistributing,

or creating derivative works for commercial purposes without the express, written consent of ADB.

For further information on this report, please contact  
Ashok Bhargava  
Director, Energy Division, East Asia Department  
abhargava@adb.org

Asian Development Bank  
6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
Tel +63 2 632 4444  
Fax +63 2 636 2444

In this report, "\$" refers to US dollars.

**Carbon Sequestration leadership forum**

[www.cslforum.org](http://www.cslforum.org)



**Driving CCUS RD&D Deployment:  
What will it take?**

*prepared by The Clinton Foundation*



# Carbon Capture Utilization Storage

*prepared by The Clinton Foundation*

## **Is there a Problem?**

A critical part of the global climate change solution is not advancing fast enough and its development and deployment must be sped up. Some method of capturing and utilising or sequestering carbon emissions (CCUS) from fossil fuel fired stationary power plants is necessary to avoid catastrophic climate change. Deployment of CCUS can and must start immediately and become widespread in its use by the mid 2020s. Without CCUS, mitigating climate change will be much more difficult if not impossible.

Fossil fuel fired power plants including a preponderance of coal fired power plants will continue to exist and will continue to be built. Greenhouse gas emissions from these plants will not go away and in fact will likely increase. One can hope for a future where renewable energy replaces these plants, but this is not likely to happen to any great extent any time soon. Nuclear power deployment will be slowed by the recent Japanese catastrophe and is expensive to build in any event. Solar and wind power are growing, but are not yet suitable for base load power. Unless some means of capturing and sequestering the emissions of the fossil fuel plants is deployed, greenhouse gas emissions will continue to increase not decrease globally. This imperative applies even more so to many large industrial facilities with high carbon emissions where there is no credible alternative.

However, the reality is that the current rate of progress in deploying CCUS is far from being consistent with this imperative, and current global policies and initiatives will not close this gap. Funds being allocated in a number of countries and regions are inadequate and projects are moving very slowly where they are moving at all.

## **Why is there little progress?**

The 2010 CCS Status Report from the Global CCS Institute provides a catalogue of project initiation and termination, repeated around the world. The need and the potential for CCUS have not diminished. Rather, when projects get beyond the pilot stage, the uncertain status of climate policy becomes an insurmountable barrier.

The gap between current progress and the International Energy Agency's projection for 100 projects by 2020 and 3400 by 2050 would be laughable if it was not so serious.

The CCUS Action Group set out to identify key actions aimed at closing the gap. The recommendations of the Group were adopted at the Clean Energy Ministerial Forum in April 2011. The challenge is to ensure that implementing the recommendations does not develop into another round of meetings and working groups into the future.

CCUS is widely regarded as propping up the industries of the past when we should be looking at moving to support the technologies of the future. Anecdotally, CCUS is seen as too expensive, too far off, unproven, at least at scale, and too risky to be worth serious consideration. There are very few, if any, political leaders prepared to articulate the case for CCUS in the climate change policy mix.

Capital funding rounds tend to mask the problem by creating an illusion of activity. The 2009 Report of the US Interagency Task Force on Carbon Capture and Storage concluded: "Whilst there are no insurmountable technological, legal, institutional, regulatory or other barriers that prevent CCS from playing a role in reducing GHG emissions, early CCS

projects face economic challenges related to climate policy uncertainty, first-of-a-kind technology risks and the current high cost of CCS relative to other technologies.” Further: “CCS technologies will not be widely deployed in the next two decades absent financial incentives that supplement projected carbon prices”.

In contrast, in many parts of the world, renewable generation technologies have been driven by targeted policies such as portfolio obligations or feed-in tariffs which at least partially address the above challenge. Although such policies have many flaws, they have driven the growth of various wind and solar companies and the underlying technologies.

CCUS faces a number of major hurdles:

- The natural supporters such as the coal or gas industry are too busy fighting against climate change policies generally to argue for CCUS to be supported in climate change policy debates.
- The general climate change community finds CCUS too complicated.
- Most NGOs are either negative or at least skeptical about CCUS.
- CCUS is widely viewed as at best a transitional and partial solution that prolongs the life of fossil fuels.
- The risk allocation across the CCUS chain, let alone the storage risk, has not been fully addressed.
- CO<sub>2</sub> storage acceptability is already a problem in several countries.
- The high parasitic energy load of CO<sub>2</sub> capture is seen as a barrier, particularly in developing countries where demand for energy is growing steadily
- The absolute cost of CCUS is a major barrier to financing.

### **Does it matter?**

This state of affairs matters only if meeting accepted climate change objectives matters. Without CCUS playing its part and the likelihood that energy efficiency is unlikely to deliver in the time frame and at the level forecast by the IEA and many others, the world will not meet its climate change objectives in this half of the 21<sup>st</sup> century.

### **What has to change?**

There are three choices:

1. Give up on CCUS now and accelerate other solutions. The end results are likely to be a shift towards natural gas in the short term and renewable energy in the long term. But for this to work, a massive effort would be necessary to develop storage technologies that can make renewable power usable as base load power and the cost of renewable energy will need to decline by deploying it at large scale and lowering the financing costs associated with its deployment. Efforts at energy efficiency will also have to be accelerated. Even if all of this is done, it is questionable as to whether it can be done in time to prevent widespread climate problems.
2. Continue to muddle along as we are currently doing. We will neither really get CCUS moving at the rate that is needed, nor will we pursue non-CCUS alternatives as rapidly as we would need to do without CCUS.

3. Adopt a comprehensive approach to CCUS incorporating the minimum set of necessary and sufficient elements that would be consistent with the objective outlined above. This will require a level of political focus and commitment together with articulation of the rationale that has been absent to date. However, it is likely to be the only approach that will address the problem.

### **A necessary and sufficient solution**

Sustained, high-level political leadership and advocacy is necessary. The following seven elements would provide a basis for moving forward. Whilst the details of some elements will be jurisdictionally specific, they are all necessary for the global CCUS dilemma to be addressed:

1. Public funding to support the early stage CCUS projects at scale
2. Predictability regarding the value of GHG emissions reductions through one of a number of policy mechanisms including, but not only, cap-and-trade
3. Underwriting of carbon risk against a future carbon price or other direct, output-based support
4. A funding mechanism from developed economies to support CCUS projects in developing economies. This could be part of, or flowing from, the Green Climate Fund.
5. Comprehensive CCUS global storage characterisation studies
6. A process to disseminate best practice in regard to legal and regulatory structures across the CCUS chain, including liability issues related to storage
7. Development and dissemination of material to facilitate the global articulation of the case for CCUS by political leaders

### **Can the CSLF be part of the solution?**

The documented mission of the CSLF is “to facilitate the development and deployment of such (CCS) technologies via collaborative efforts that address key technical, economic, and environmental obstacles. The CSLF will also promote awareness and champion legal, regulatory, financial, and institutional environments conducive to such technologies.”

As indicated above, strong and sustained high-level political leadership is needed. The CSLF mission was important when it was founded, but one could argue that it is even more important today. In a world where political leaders are acting as if climate change is not a serious problem, or at least not one that is politically feasible to address, and where CCUS is viewed as too difficult, it is even more important that an organization like CSLF pursues its mission. It can continue its pioneering mission so that when political leaders do realize that they have to act and they begin to do so, there will be a foundation of work on which they can build.

**Carbon Sequestration leadership forum**

[www.cslforum.org](http://www.cslforum.org)



**A Report on CSLF Capacity Building Program  
Achievements**

*prepared by the CSLF Secretariat*



## **A Report on CSLF Capacity Building Program Achievements**

In the Communiqué of the CSLF Ministers at their October 2010 meeting in London, Ministers stated the following:

*We endorse the comprehensive capacity building plan developed by the CSLF to address the critical need for the sharing of knowledge and experience on CCS so that CSLF Members can develop capacity to effectively deploy CCS. We will seek various opportunities to support it both financially and in-kind.*

*Effective capacity building on such a scale requires the collaboration and commitment of diverse organizations. We, therefore, invite foundations, industry, multilateral institutions and other stakeholders to participate in and financially support this important capacity building initiative.*

This report describes the management of the CSLF Capacity Building Fund established for the implementation of that plan.

### **CSLF Capacity Building Program Plan**

The CSLF Capacity Building Program Plan, approved by the CSLF Policy Group and endorsed by Ministers in 2009 defines the mission of CSLF Capacity Building Program as assisting all CSLF Members to develop the information, tools, skills, expertise and institutions required to implement CCS demonstrations and then move rapidly into commercial operation.

The Program Plan further defines four program initiatives:

- Disseminate practical information;
- Build capacity in emerging economies;
- Assist government and regulatory agencies; and
- Build academic and research institutions for CCS.

Each of the capacity building projects undertaken by the CSLF, as described below, addresses one or more of these program initiatives. The Program Plan also provides a framework for the governance of the CSLF Capacity Building Program through:

- Raising of financial resources for capacity building;
- Financial governance through a Capacity Building Governing Council; and
- Assessment of capacity building needs.

## **The Capacity Building Task Force**

The Capacity Building Program Plan also spelled out the duties of the Capacity Building Task Force as follows.

“This effort will be led by the Capacity Building Task Force of the CSLF Policy Group with the Secretariat providing administrative support. Ongoing coordination will take place both within and external to the CSLF. Various task forces of both the Policy and Technical Groups will be called upon to devote effort in their areas of expertise.

The Capacity Building Task Force will develop and propose capacity building activities to the Policy Group and the Program is intended to be actively managed by the Secretariat.”

### **Activities of the Task Force**

In collaboration with the Capacity Building Task Force, the CSLF Secretariat developed evaluation criteria for requests for capacity building projects by CSLF Members. The Task Force then reviewed requests for capacity building projects solicited from developing country Members. Projects approved by the Task Force using those criteria were then reported to the Capacity Building Fund Governing Council for further consideration and funding.

Through its Chairman, the Task Force also contributed to the organization and deliberations of the Capacity Building Governing Council, including the final allocation of funds to capacity building projects.

### **CSLF Capacity Building Fund**

A CSLF Capacity Building Fund has been established and is administered by the CSLF Secretariat, which reports on financial matters to the CSLF Capacity Building Fund Governing Council. Contributions committed to the CSLF Capacity Building Fund total US\$3,010,473.75. These include the following:

Australia	US\$ 968,160.00
Canada	US\$ 233,073.75
Norway	US\$ 900,000.00 – Committed
United Kingdom	US\$ 909,240.00

As of July 31, 2011, a total of US\$1,129,500 has been committed to projects, and undisbursed funds are held on behalf of the CSLF in the United States Treasury. (Since the CSLF is not a legal entity that can enter into contracts, it cannot itself hold or disburse funds.)

### **Governance of the CSLF Capacity Building Fund**

As specified by the Program Plan, the CSLF Capacity Building Fund Governing Council composed of representatives of significant donors has been established. The Governing Council oversees financial aspects of the Capacity Building Program. The Governing Council began its operation by developing a Terms of Reference for its operation and for governance of the CSLF Capacity Building Fund. See Annex 1.

The CSLF Capacity Building Fund Governing Council also further evaluated requests for capacity building projects. This procedure was implemented in 2010 and 2011 in coordination with the Capacity Building Task Force.

## **Collaborations**

The CSLF is collaborating with the Global Carbon Capture and Storage Institute in the management of its Capacity Building Program and is coordinating its activities with CCS capacity building activities of the World Bank. Various other industrial and academic institutions in Member countries are taking part in CSLF capacity building projects.

## **Requests for Assistance**

The CSLF has received to date a total of eleven requests for projects assistance from emerging economy CSLF Members. These requests were evaluated using the criteria developed by the Secretariat and approved by the Capacity Building Task Force and the CSLF Capacity Building Fund Governing Council.

## **Capacity Building Projects**

A total of nine capacity building projects in five countries have been approved to date and will be conducted by the CSLF. While projects may be held in a specific country, workshops and other events are open to participants from all CSLF Members. In addition to these projects, the two remaining requests for capacity building activities are being considered by the CSLF Capacity Building Fund Governing Council and are under discussion with the requesting Members.

Approved projects include:

### Brazil

- Develop a training program in the process of CCS in the offshore environment. This program will be for professionals from the oil industry, research institutions, universities and stakeholders in general and is viewed as critical to the sustainable development of Brazil's petroleum industry.
- Develop a knowledge base on environmental impact assessment and CO<sub>2</sub> monitoring technologies. This data base will be used for the development of CCS projects in South America by bringing skilled personal to instruct and capacitate local human resources and advice on the appropriate technology and instrumentation necessary for a specific project.

### China

- Develop website on Carbon Capture Utilization and Storage Technologies. This project is establishing the first website focusing on CCS technologies and its development in China. The aims are to serve as a platform to share information and knowledge on technology advancements and good practices and to educate the public. The project has been initiated.

- Workshop on experience sharing among CCS demonstration and pilot projects. The workshop will be the first focusing on CCS experience sharing in China and will serve as a platform of exchange and discussion within China and internationally. Participants are representatives of government departments, academia, industrial stakeholders and NGOs.
- Workshop on legal and regulatory issues for CCS technology development. The themes of the workshop introduce the role of regulatory and enabling environment for CCS development, experiences of developed countries and how China may move forward. Participants are representatives of government departments, academia, industrial stakeholders and NGOs.

#### India

- Training engineers at CCS project sites. Engineers will be seconded to ongoing CCS projects in order bring back to India what they have learned at these projects.

#### Mexico

- Introduce CCS into academic programs. This project will educate professors and graduate students in the field. The starting date is March 2012.

#### South Africa

- Conduct workshops and conferences during South Africa's CCS week. Two workshops will be held in October 2011, to disseminate information on CCS to relevant stakeholders.
- Impacts of CCS on South African national priorities beyond climate change. The aim of this study is to improve the understanding of how CCS impacts South Africa's national priority issues beyond CO<sub>2</sub> mitigation and climate change, such as sustainable development, improved local infrastructure, job creation and protection, poverty alleviation, and social uplift.



## **Annex 1**

### **CSLF Capacity Building Programme Fund Draft Terms of Reference for the Governing Council**

#### **1. Introduction**

1.1 At the CSLF Ministerial Meeting in London in October 2009, Ministers and the CSLF Policy Group approved the CSLF Programme Plan for Capacity Building. The CSLF Capacity Building Programme (the “Programme”) is to be supported financially by the CSLF Capacity Building Programme Fund (the “Fund”). Although the Fund is open to all CSLF Members, the expectation is that the distribution of financial contributions received should focus on emerging economy CSLF Members and represent a wide geographical spread.

1.2 The purpose of the CSLF Capacity Building Fund Governing Council (the “Council”) is to assure that the Fund is spent wisely and appropriately. These Terms of Reference provide the framework for governance of the Council.

#### **2. Membership of the Governing Council**

As of December 3, 2010, CSLF Members who are members of the Council include Australia, Brazil, Canada, Mexico, Norway, Saudi Arabia, the United Kingdom, and the United States. Future membership of the Council is to consist of: (1) representatives from each CSLF Member that have made a financial contribution to the Fund of over a threshold amount of US\$ 100,000.00, (2) the Chair of the CSLF Capacity Building Task Force, and (3) representatives of the CSLF Secretariat, who are non-voting Council Members.

#### **3. Meetings**

The Council is to meet as needed, at least once a year, at such times and places as the Council members may determine. Meetings may be by teleconference or video conference. The Secretariat is to prepare minutes of all meetings.

#### **4. Leadership**

The Chair and a Vice Chair of the Council are elected from among its members.

#### **5. CSLF Fund for Capacity Building**

5.1 The Fund consists of financial contributions paid into a single account to be used for the purpose of capacity building. Following receipt of a contribution, the Council does not accept or honor conditions or restrictions a donor may seek to impose on how its contribution is to be expended.

5.2 In-kind support for capacity building activities is welcomed, but does not constitute a contribution to the Fund. Additionally, funds a CSLF Member expends on capacity building activities in its own country do not constitute a contribution to the Fund.

5.3 Expenditures from the Fund are to be used for direct expenses related to capacity building activities, as recommended by the CSLF Capacity Building Task Force with input from the Council. The CSLF Secretariat may charge up to 7% (including travel expenses) of the total Fund as a Programme management fee, as approved by the Council.

5.4 The Secretariat is responsible for providing coordination for the Programme, analyses and assessments for both the Capacity Building Task Force and the Governing Council, which are to include both the administrative and financial aspects of the Programme.

5.6 Monies in the Fund shall be held by the United States Department of Energy in an account maintained in the United States Treasury for expenditure as directed by the Council. The Council shall designate (subject to acceptance by the designee): either the Secretariat or another organisation to engage and manage contractors or service providers to implement each individual aspect of the Programme.

## **6. Decision Making and Governance Activities**

6.1 The Council is to develop and approve a budget for the Programme; determine the allocation of the Fund based on recommendations by the Capacity Building Task Force; review administration and management of the Fund; apply the CSLF capacity building strategic plan in funding decisions; review project scope and execution by reviewing CSLF capacity building criteria; provide quarterly account statements and reports to the CSLF Policy Group.

6.2 The Capacity Building Task Force is responsible for capacity building Programme strategic development; recommendation of Programme project locations, activities, and topics; and assuring comprehensiveness and complementarities of Programme activities to the CSLF's overall capacity building objectives.

6.3 All decisions of the Council are to be made on the basis of consensus.

## **7. Observers**

By invitation, observers are welcome to attend meetings of the Council.

## **8. Reporting**

The Secretariat should provide reports twice each calendar year to the Council on the status of the Fund. Each such report should provide:

- Progress reports on the capacity building activities during the preceding six-month period;
- Beginning and ending balances of any accounts within the Fund;
- Amounts of financial contributions and expenditures;
- Identity of donors and recipients;
- Quarterly account statements;
- A final expense report for each capacity building activity or event that has been completed; and
- Other information as deemed relevant by the Secretariat or requested by the Council.