Asia-Pacific
Economic Cooperation

Carbon Dioxide Capture and Geological Sequestration Potential of the APEC Region (PHASE III)

Final Report

APEC Energy Working Group Project EWG 07/2005

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1.0 PROJECT BACKGROUND

With the global emphasis on climate change, many nations have realized that in planning the pathway to sustainable development, efficiency measures and fuel switching to less carbon intensive fuels, while important, cannot alone achieve the necessary reductions in greenhouse gas (GHG) emissions. For many economies, access to energy and energy-related goods and services continues to be of critical importance, for economic development and international trade.

It is therefore important for APEC economies to understand there is a third non-energy-restricting option available to them in this emerging GHG-constrained world – this being carbon management activities where CO_2 is sequestered in the biosphere, in oceans and in deep geological formations. CO_2 capture and storage (CCS) involves the injection and containment of CO_2 in geological structures such as depleted oil and gas reservoirs, onshore and offshore saline aquifers located deep in the earth's crust, salt caverns or unminable coalbeds. It can also be, via Enhanced Oil recovery, both an approach to improve energy production from existing fossil fuel operations as well as a means of reducing greenhouse gas emissions.

CO_2 capture and geological storage (CCS) is an emerging technology that now, and more so in the future, will be proven affordable, effective and environmentally safe. A number of issues remain to be addressed, mostly related to the acceptance of the technology. This option, if accepted by the international community, will mean that nations, both developed and developing, have increased alternatives in the utilization of fossil-fuel based energy, while gaining a transition time to move to carbon-reduced or zero carbon fuels, such as renewables.

Responding to Asia-Pacific Economic Cooperation (APEC) priorities regarding sustainable development, clean and more efficient energy technologies and the transfer of technologies, the APEC Energy Working Group (EWG) have established a multi-phased project to explore the potential for geological CO_2 capture and storage technologies in APEC regions. The first two phases of this work have been completed by the Project Team and have involved:

- **(Phase I)** An assessment of the geological storage potential of carbon dioxide in the APEC region which resulted in an inventory and assessment of potential geological sites for storing CO_2 in the APEC economies (*EWG 06/2003)*. This included:
    - An overview of CO2 emissions; and,
    - Type of geosequestration options available (i.e. deep saline formation, depleted hydrocarbon field, deep coal seams, etc).
- **(Phase II)** Enhanced capacity of APEC economies (through the use of training materials and workshops) to built awareness and capacity around the potential for the capture and geo-storage of CO_2 and the ability to contribute to sustainable development objectives (*EWG 03/2004)*. Phase II produced the following results:
    - A set of 13 training modules and 2 case studies aimed to build capacity around climate change and carbon capture and storage (CCS);
    - A strategy for community outreach;
    - A guidance document to trainers using the modular training package; and,
    - A 2-day pilot workshop held in Korea (2005) to test the materials.

The Delphi Group, Alberta Research Council, Innovative Carbon Technologies Pty Ltd. - ICTPL have formed a partnership (The Project Team) to respond to the request for proposals (EWG 07/2005) as requested by the Asia Pacific Economic Cooperation and undertake the third phase of work. This project has built on and enhanced the work completed in the first two phases by effectively promoting carbon capture and geological storage (CCS) technology transfer into developing APEC economies.

1.1 Objectives

The purpose of this project (phase III) was to increase the capacity, expand the knowledge and awareness of APEC economies (China and Mexico) to assess the potential of CCS technologies within their own economies, evaluate the options and implement successful CCS initiatives. The objectives of this project were to:

- Design and deliver two workshops – one in China and the other in Mexico;
- Update and modify the training manuals for the target audience;
- Disseminate training materials to participating economies;
- Identify opportunities that CO_2 capture and geological storage represent for their economies;
- Increase the ability to evaluate options and implement successful CO2 capture and storage initiatives; and,
- Maintain the momentum of the previous two projects, and make full use of materials developed for Phase 1 & 2 when they are most relevant.

1.2 Main Deliverables

This report outlines the results of Phase III of this APEC initiative, specifically an assessment of the workshop held in Beijing, China and in Mexico City, Mexico.

The full Phase III project deliverables include:

- Updating the training materials from Phase II to match economy specific interests and characteristics;
- Preparing, facilitating & delivering a workshop in China;
- Preparing, facilitating & delivering a workshop in Mexico; and,
- Preparing a final workshop report.

2.0 ASSESSMENT OF THE TRAINING WORKSHOPS

2.1 Overview

Under Phase III of the project, The Project Team conducted two technical, hands-on training workshops in developing a CO2 capture and storage project. These workshops provided a unique opportunity for the host economies to gain practical insight into developing successful CO2 storage projects and learn from internationally recognized experts.

- The first workshop took place in Beijing, China – October 24 & 25, 2006.
- The second workshop took place in Mexico City, Mexico – May 23 & 25, 2007.

Although very different, both workshops were considered to be very successful. Senior level support and the coordination of the logistics proved to be more difficult in Mexico, and while the attendance level could have been higher, there was a good representation from the various organizations that have a potential interest in CCS. In addition, the participants in Mexico were at the appropriate level and caliber to engage with the experts as was evidenced throughout the two days and the end-of-day discussions.

This project achieved the overall goals initially identified to:

- Build relationships between technology developers, industry, governments and utility companies in developing economies and aid in technology transfer;
- Enhance the host economies' technical understanding of CO2 capture and geological storage technologies and project types;
- Present options for advancing CCS projects and technologies;
- Disseminate training and materials to participating organizations;
- Facilitate capacity building through targeted training sessions by raising the level of awareness and knowledge of participating stakeholders around specific CCS project issues;
- Stimulate open discussions to share knowledge and information; and,
- Gain input from participating stakeholders to identify and discuss options as to how to progress the development of CCS as a viable technology.

A number of key activities and deliverables were undertaken to prepare for the workshops. These included:

- Creating a website to disseminate project results to participants: **http://www.delphi.ca/apec/.** The full package of training modules, updated workshop presentations (including the 2-day pilot workshop held in Korea) and workshop agenda's were posted for downloading.
- Distributing questionnaires to workshop participants with the purpose to gain frank and open feedback on the usefulness of the session as well as to provide input on various facets including, format, quality of speakers and workshop materials. Results from the questionnaire have been incorporated into this report. In addition, project team members provided valuable comments from the workshop which have also been incorporated.
- Providing workshop materials in an organized booklet containing the agenda and translated speaker presentations. The books were distributed to the participants at both workshops and were well received.

- Translating relevant workshop materials, such as agenda's, questionnaires, etc. Specifically for China all of the presentation materials were translated by our partner organization and had a positive impact on the audience.
- Following-up and proving thank you letters to participants, key partners and senior level officials which were distributed following the completion of each workshop.

2.2 Partners

In order to gain additional buy-in and interest from the host economies, partnership opportunities were identified with local partners to play a key role in the development of the workshop and to assist with:

- Enhancing the profile of carbon capture and storage technologies;
- Supporting the planned workshops;
- Increasing participation for both workshops;
- Tailoring the workshop materials to meet the needs of the two targeted economies; and,
- Increase the replicability and sustainability of the project moving forward.

The success of both workshops can be partially attributed to having a person situated in the economy working on our behalf. In both cases, it was an Alberta Government representative who lived in the economy to promote Alberta's business presence in these two economies; Angelo Zia in the case of China and David Nygaard in the case of Mexico.

Partners who assisted in the preparation of the workshops included:

- IEA Greenhouse Gas R&D Programme (IEA GHG)
- The China National Petroleum Corporation-Alberta Petroleum Center - Alberta Petroleum Center (CAPC)
- The Research Institute of Petroleum Exploration and Development (RIPED) (China)
- SENER (Mexico)
- PEMEX (Mexico)
- Alberta Mexico Office (Mexico)

2.3 The Project Team

The Project Team consists of international experts in carbon capture and sequestration. On-going communication and consultations with the Project Team members occurred throughout the project in order to provide advice and support to the project activities. Key team members include:

The Alberta Research Council (Canada)
- Dr. William Gunter
- Mr. Sam Wong

The Delphi Group (Canada)
- Mr. Michael Gerbis
- Ms. Lael Morgan
- Helena Olivas

Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) (Australia)
- Mr. Andy Rigg

Alberta Energy and Utilities Board (Canada)
- Dr. Stefan Bachu

NRCan (Canada)
- Dr. Frank Mourits

IEA Greenhouse Gas R&D Programme (UK)
- Mr. John Gale
- Mr. Stanley Santos

Team members and participants at the workshop reception in Mexico

3.0 WORKSHOP TRAINING MATERIALS AND AGENDA

3.1 Workshop Content

The training materials from Phase III formed the flow and content of the workshops. While the format and structure of the agenda for both workshops were slightly different, the key subject areas included:

- CO_2 Capture, Separation and Compression Technologies
- Types of CO_2 Storage Projects
- How to Screen Reservoirs for Suitability for CO_2 Storage
- The Potential for CO_2 Storage in the APEC Region
- Performance and Management Issues
- Carbon Storage and the Clean Development Mechanism (Kyoto Protocol)
- Economic Considerations of CO_2 Capture and Storage
- Public Education and Outreach Considerations
- Case Studies of International Experience

3.2 Enhancements to the Workshop Content

Building on the recommendations for future training workshops in Phase II, a number of enhancements and improvements were made to both the logistics and training materials. This included:

1. Updating the training materials (presentations). Major modifications were done for the following decks:

    - Types of CO2 Storage Projects and How to Screen Reservoirs for Suitability for CO2 Storage
    - CO2 Capture, Separation and Compression Technologies (General outlook for this new technology)
    - Economic Considerations of CO2 Capture and Storage
    - Carbon Storage and the Clean Development Mechanism (Kyoto Protocol)

2. Preparing new presentations in order to customize the training materials for the target economy. Three presentations were developed:

    a) *Overview of the APEC Project and Workshop Objectives.*
    - Overview of APEC
    - Overview of Phase I and II
    - Summary of phase III and objectives
    - Discussion of the Project team
    - Useful website links

    b) The Potential for CO2 Storage in the APEC Region (focus on China)
    - Discussion on coal storage sites
    - Stationary CO2 emissions and basins
    - Detailed discussion of the basins and comparison
    - Storage prospectively
    - CO2 storage pilot sites

    c) Mexico's Potential for CO2 Geological Storage
    - Approach to Assessing Mexico's Potential for CO2 Geological Storage
    - Energy production
    - Distribution of Mexico's Centres of CO2 Emissions from Large Stationary Sources
    - Location of Mexico's Large Sources of High Purity CO2
    - Mexico's Tectonic Setting and Sedimentary Basins
    - Effect of Tectonism on Mexico's Potential for CO2 Storage
    - Comparison between Canada's and Mexico's Potential for CO2 Storage

3. Customizing existing training materials and the agenda to the target economy. This included:
    - Demonstrating how the topic applies to their economy
    - Using case study examples
    - Incorporating relevant market information, etc.
    - Increased the use of diagrams in the presentation materials

4. Consideration was given to the sequencing of the presentations. For example in Mexico, partners identified the preference to breakout capture and storage into 2 separate days.

5. Presentation materials were formatted to follow a consistent template. This included:
    - Formatting slides with the same background, style and font to assist in uniformity and flow.
    - Modifying background templates so that the materials translate well to print.
    - Ensuring that standardized terms (technical) and units were consistent in all presentations

6. Translation services were provided at both workshops.
    - Subsequent translation services were provided in China.
    - A professional simultaneous translation company was used in Mexico as well as incorporating a bilingual facilitator.

3.3 Recommendations Related to the Training Materials

The training materials were designed to work for a variety of participants despite levels of knowledge, be comprehensive in scope and act as stand alone training material package if face-to-face training is not available. Feedback from participants and project team members identified that broadly the training materials accomplished these objectives.

It is recommended, however that if future workshops are held that additional improvements should be made to the training materials. These recommendations include:

Participants at the Workshop in China

- Updating the training materials so that they are more relevant based on recent developments on CCS;
- Streamline the more lengthy presentations (such as the performance assessment presentation);
- Increase the technical details on the Weyburn case study to satisfy those working in the oil & gas sector;
- Expand on the capture side and provide additional concrete examples;
- Expand on the economics of both storage and capture;
- Add a new presentation (or a more detailed coverage) on EOR if the participants continue to be oil field oriented; and,
- Add a new presentation on regulatory, legal and public acceptance.

Agenda:

- Continue to have longer break times to allow for participants to interact with the experts;

- Inviting participants to lunch provided a positive opportunity to develop relationships with key people in the sector in a less formal setting. It is recommended that more time be allocated for lunches; and,
- Continue to invite experts in the host economy to make presentations.

4.0 OUTCOMES AND RECOMMENDATIONS

A number of positive points came out of the workshop in China, including:

1. There were two very high ranking Chinese who helped organize and pay for the workshop venue; the former head of RIPED (the national research organization for CNPC); Shen Pingpimg and the Chief Engineer of the Jinlin Oil Field for PetroChina. They were both present for the first day of the workshop, ARC engaged in discussions around CO2-EOR in China and a future engagement session in Canada.

2. The follow-up was a visit to Canada and the US where they had technical meetings and toured EOR projects. Since then, ARC has been invited by them back to China to discuss their EOR projects (all expenses paid by the Chinese).

3. In addition, at the Chinese workshop, Matt Webb was present form the UK is who helping lead a combined UK-Europe Union project in China over a multiyear period whose final aim is to invest 300 million pounds in the capture and storage part of a greenfield project in China. He indicated that he viewed the APEC project as complimentary to theirs and was interested in cooperation in the future.

4. Furthermore, Jaco Libenberg of Sasol was also present at the workshop who plans to build two coal to liquid plants with CCS in China straddling the Ordos Basin. Since then, ARC has done a top down assessment of the CO2 geological storage capacity of the Ordos Basin for them. This work and future work on the Ordos Basin could also fit in nicely with the UK-Europe Union initiative.

A number of interesting points came out of the workshop in Mexico, including:

1. Participants seemed to be interested and engaged. There was also the enthusiasm to have follow-up, but was made very clear that no follow-up would move things forward unless high level decision makers made a commitment to have concrete actions defined.

2. There were high ranking officials present for the opening of the workshop. Jordy Herrera Flores, Undersecretary for Energy Planning and Technology Development SENER stressed the importance of the training workshop, collaboration between Mexico and Canada and their commitment to mitigating climate change through carbon capture and sequestration.

3. The superintendent of refinery at PEMEX indicated that the next possible step is to organise a workshop that will strongly involve the operations people to discuss in detail the more relevant application of CCS to their operation.

4. Discussions with the academic sector participants revealed they are interested in Biomass Gasification applications which indicate that their current research interest would be to look at alternatives to natural gas.

5. Discussions with the Institute of Electricity Research revealed they are looking at presenting various proposals for CCS activities for the Power Generation Industry. There are also plans of putting in a proposal for CO2 EOR.

6. There is the potential to leverage the Mexico-Alberta Energy MOU in this context.

7. There was a suggestion by Dr. Stefan Bachu that SENER and PEMEX participate in the CSLF technical and policy group given its relevance to Mexico. This would provide opportunity to transfer knowledge in Mexico and to help Mexico with decision making.

8. Canadian experts suggested that an ad hock bilateral committee be formed to start a community of dialogue around CCS to increase the lines of communication. The next steps are to go through SENER to see about establishing a formal committee.

4.1 Gaining Support for CCS in Mexico

After the completion of the workshop in Mexico and having spoken to different participants on the issue, it became very evident that there is a tiered approach that should be followed in order to gain buy-in at higher levels (i.e., Director General level). Three key players must be at the table when planning for decision making processes regarding carbon storage and capture (be it to develop further studies or actual investments), they are:

1. SENER (the Secretariat of Energy)
2. PEMEX (the oil industry)
3. Instituto Mexicano de Electricidad (Electricity Institute)

1. Within SENER the key players (in order of importance):
    - Undersecretary Jordy Herrera Flores
    - Ian Miller his coordinator
    - Leonardo Beltran
    - Dr. Diego Arjona
    - Ramon Torres and Alma Concepcion Santa Rita Feregrino

    The key decision makers are at the Undersecretary level, but by contacting both Ian and Leonardo (copying the rest of the team) it is safe to undergo initial engagement.

2. PEMEX should be contacted first through SENER. However, to know who to contact and at what level, it was advised not to rely on SENER but to try and determine this through other contacts. It is advisable to contact the two participants who were at the workshop who are not only well connected but are eager and willing to assist in the process. They are:
    - Jose Antonio Machado Soberanes with the Environmental Department of PEMEX.
    - Jose Carlos Pacheco to get more information and insight into who are the key decision makers at PEMEX.

3. Finally, at the decision table should have people from Instituto Mexicano de Electricidad (did not get specific names), but could contact Jose Miguel Gonzalez Santalo, Director of Instituto de Investigaciones Electricas, who is knowledgeable about the process.

Once the three key groups are engaged, SENER would then be required to make an official request for actions to take place, as well as then deciding who stays engaged in the process. From the welcoming words provided by the Undersecretary of Energy at SENER, there is commitment from Mexico to seriously

consider carbon capture and storage as part of the solution. It was stressed that the current government is very committed to attaining sustainable development and are looking at the different options for this to occur.

5.0 Workshop Report: China

5.1 Workshop Overview

Moderating the workshop was Mike Gerbis from The Delphi Group (President and CEO). Welcoming remarks were made by Mr. Han Hua the Managing Director of CAPC and Mr. Qin from the Research Institute of Petroleum Exploration and Development.

The workshop was hosted by CAPC and held at the Mangxi Hotel.

The workshop agenda, participant list and questionnaire are found in Appendices A – C.

5.2 The Project Team and Partners

Presenters at the workshop in China included:

- Dr. William Gunter, The Alberta Research Council (Canada)
- Mr. Sam Wong, The Alberta Research Council (Canada)
- Mr. Andy Rigg, Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) (Australia)
- Mr. John Gale, IEA Greenhouse Gas R&D Programme (UK)
- Mr. Michael Gerbis, The Delphi Group (Canada)

Other key team members and experts include:

- Dr. Frank Mourits, NRCan (Canada)
- Stefan Bachu, Alberta Energy and Utilities Board (Canada)
- Ms. Lael Morgan, The Delphi Group (Canada)
- Stanley Santos, IEA Greenhouse Gas R&D Programme (UK)
- Harry Ardus, IEA Greenhouse Gas R&D Programme (UK)

Partners who assisted in the preparation of the workshop (organizing logistics) in China included:

- The China National Petroleum Corporation-Alberta Petroleum Center - Alberta Petroleum Center (CAPC)
- The Research Institute of Petroleum Exploration and Development (RIPED)

5.3 Participant Information

Over 75 participants attended the workshop from key federal government departments and agencies, industry, institutes, universities and private citizens. Participants were from the oil & gas, power generation

and coal mining sectors. Individuals ranged from managers to project engineers, professors and students from the local universities involved in carbon capture and storage.

Workshop Attendees by Organization Type

Total Number of Participants who Attended: 75+

Total Participants on the Registration List: 52. ***The breakdown of participants from this list:***

- **Universities: 14**
- **Research Institutions (focus on coal): 4**
- **Industry: 34**

5.4 Workshop Organization: Venue, Timing and Length of Workshop

The workshop went very well, particularly from an organizational point of view.

- The venue was very appropriate for the workshop. The room layout worked and was organized in a U shape conference seating arrangement.

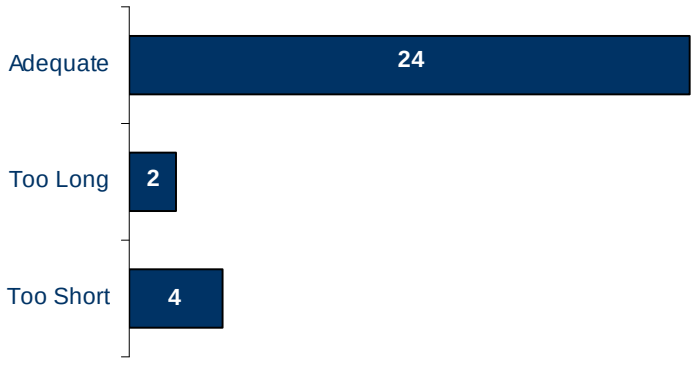
- Translation services (subsequent) were provided by CAPC. Two interpreters were on site and did an excellent job interpreting the presentations, especially given the detailed and technical content. The downfall to not having simultaneous translation was the length of time taken to translate each presentation (doubled). Also for those who understand both languages they heard the same information twice.

- Participants were asked to rate whether the workshop length (by number of days) was 'adequate', 'too long' or 'too short'. The majority of participants (24) noted the length of the workshop was adequate, two (2) felt it was too long, and four (4) felt it was too short. The chart below illustrates the breakdown of responses.

  - Participants felt the workshop was too long because of the extra time spent on translation.

  - Participants that felt the workshop was too short would have liked additional discussion time worked into the day while others would have liked to see more detailed information presented.

Q3. Was the Length of the Workshop...



- The number of participants attending the workshop at any one time varied throughout both days. Participants attending from the industry sector and universities remained at the workshop longer than other participants and attended both days. The box below provides an estimate of the number of participants in the workshop room at various times over the course of both days.

Participant Attendance throughout Both Days

Day 1	Day 2
Start - 56 participants	Start – 80 participants
Morning break – 47 participants	Morning break – 74 participants
After lunch – 36 participants	After lunch – 48 participants
Afternoon break – 34 participants	Afternoon break – 46 participants
Day's end – 32 participants	Day's end – 40 participants

**Number of participants are estimates based on head count at workshop*

5.5 Training Materials: Information, Presentations and Panel Discussions

- The workshop format consisted of presentations, case studies and panel discussions - of all which were well received. Participants were particularly engaged in the panel discussions and had good dialogue with the experts during the breaks and lunch. A panel discussion was planned for Day 2, however the closing remarks came early thus the discussion did not happen.

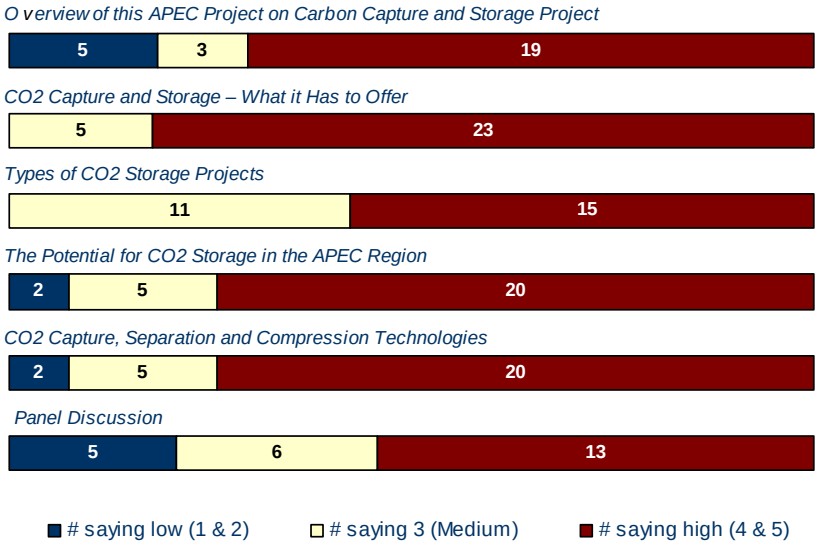
- The agenda flowed well and the time allocated for each presentation gave speakers sufficient time to make their presentations without being rushed and to answer questions at the end.

- Workshop materials were provided in a booklet containing the agenda and translated speaker presentations. The books were distributed to the participants and were well received.

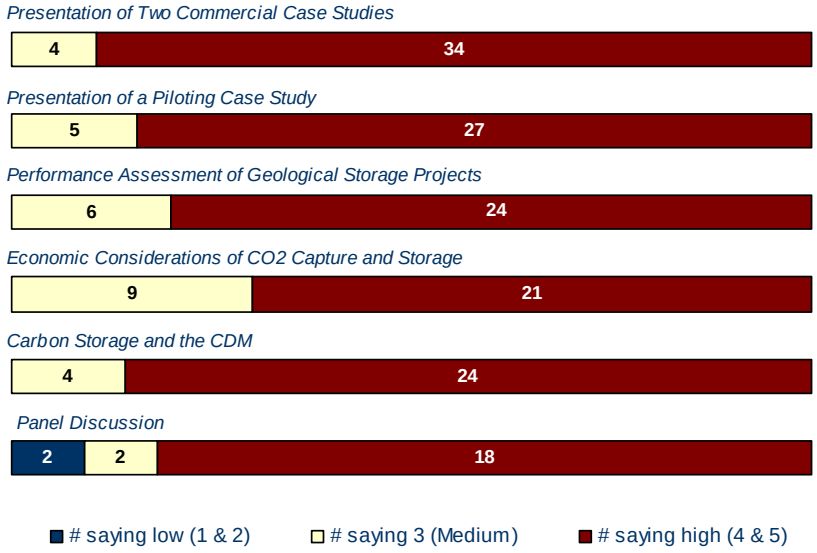
5.6 Training Materials: Information, Presentations and Panel Discussions

- Overall, the level of detail and information given during the workshop was well received by participants. Illustrated in the two graphs below, participants were asked to rate the level of detail and information given in each of the workshop sessions on a scale from 1 to 5 ('five' being the highest rating and 'one' being the lowest rating). The charts below are presented individually by workshop day.

Q1a. Please rate the level of detail and information given in each of the following workshop sessions (DAY ONE)



Q1b. Please rate the level of detail and information given in each of the following workshop sessions (DAY TWO)



- The results demonstrate that the majority of participants felt the sessions provided a high level of information. While the results were close, the sessions on Day 2 received a more favorable rating, specifically the '*presentation of two commercial case studies'* and the *'presentation of a piloting case study'*.

- When asked how these sessions could be improved the most common responses were:

Format

- Would like to have longer break times to provide a chance to communicate with experts and other participants.
- Participants who came late did not receive workshop booklets (ran out).
- Translation should be more clear and rapid.

Topic

- Would like to see more detailed technical information in the presentations (Injection technologies).
- Present more details about the process of the reservoir where the CO_2 project has been successfully conducted and analyzed.
- Would like to know more about heavy oil recovery using the CO_2 injection method.
- More detail technical information about CO2 capture or separation, especially capture from flue gas.
- Present case studies in more detail.

5.7 Speakers

- When asked if other speakers should have been included in the agenda, most participants felt that the Project Team had assembled a knowledgeable group of qualified experts.
- A few participants indicated they would like to see the addition of:
  - Speakers from the host economy and that can present in Chinese.
  - Mr. Li Kewen from Stanford University.
  - Local presenters of research institutes and project mangers who have studied CO_2 capture and storage.

5.8 Questions that were not answered for participants during the workshop

- Most CO_2 comes from flue gas burned by fossil fuel in China. In the three capture technologies (post-combustion, pre-combustion and oxy-fuel combustion) which is the best technology that could be applied in China in the future? What is the biggest barrier to obstruct those three biotechnologies from commercialization to implementation?
- What kind and type of equipment can capture storage and inject CO_2?
- I want to learn more about the CO_2 injection monitoring technology including, 4D seismic methods and other non-seismic techniques. As we know 4D seismic methods are very expensive. If we use other techniques (electric or electromagnetic methods) are they viable?
- How do you formulate the numerical model of a CO2 flood? What's the most important issue?
- In more detail, what is the prediction of performance for CO2 miscible floods?

- What is the screening criterion in combining CO2 storage and EOR?

5.9 Options for Moving Forward on CO2 Capture and Storage in China

- When asked what needs to be addressed (technical or policy issues) in order to implement CO2 capture and storage in their economy, participants responded with the following:
  - Preferential policy: encourage investment in this area and provide subsidies.
  - We currently use CO2 to drive oil and gas for EOR but we are in need of better technologies and equipment to do this type of work.
  - The government's policy must be published, technical research must be strengthened and industries / corporations must support these types of projects.
  - How to apply a CO2 capture and storage plan with minimal cost.
  - The potential places to store CO2 need to be tested more carefully.
  - Government should encourage the industrial community, including power plants and oil fields, to consider the problem and take action as soon as possible.
  - The location, reservoir parameters, and flexibility of CO2 capture and storage and the most important issue is the support of the government.
  - Our economy doesn't have a discharge standard, regulation or law for CO2. The government should realize this issue and implement to speed up the steps of the technology development for CO2 capture and storage.

6.0 Workshop Report: Mexico

6.1 Workshop Overview

Moderating the workshop was Helena Olivas from The Delphi Group (Manager, Climate Change). Welcoming remarks were made by Jordy Herrera Flores the undersecretary for Energy Planning and Technology Development with SENER.

The workshop was hosted by SENER and held at their office.

The workshop agenda (English and Spanish), participant list and questionnaire are found in Appendices D – F.

6.2 The Project Team and Partners

Presenters at the workshop in Mexico included:

- Dr. William Gunter, The Alberta Research Council (Canada)
- Dr. Stefan Bachu, Alberta Energy and Utilities Board (Canada)
- Mr. Stanley Santos, IEA Greenhouse Gas R&D Programme (UK)
- Helena Olivas, The Delphi Group (Canada)

- Martin Velarquez, PEMEX (Mexico)

Other key team members and experts include:

- Dr. Frank Mourits, NRCan (Canada)
- Ms. Lael Morgan, The Delphi Group (Canada)

Partners who assisted in the preparation of the workshop (organizing logistics) in China included:

- SENER (Mexico)
- PEMEX (Mexico)
- Alberta Mexico Office (Mexico)

6.3 Participant Information

Although there were over 75 participants on the attendee list, approximately, 35 participants attended the workshop from key government departments and agencies, industry, financial institutions and NGO's. The majority of the participants were from the oil & gas and power generation sectors. There was a high technical and middle management participation. The majority of participants had at least a basic knowledge of carbon capture and sequestration and/or understanding of climate change and the clean development mechanism.

Workshop Attendees by Organization Type

The breakdown of participants who attended the workshop includes:

- **Government: 14**
- **Industry (oil & gas): 15**
- **Universities: 4**
- **NGO: 2**

6.4 Workshop Organization: Venue, Timing and Length of Workshop

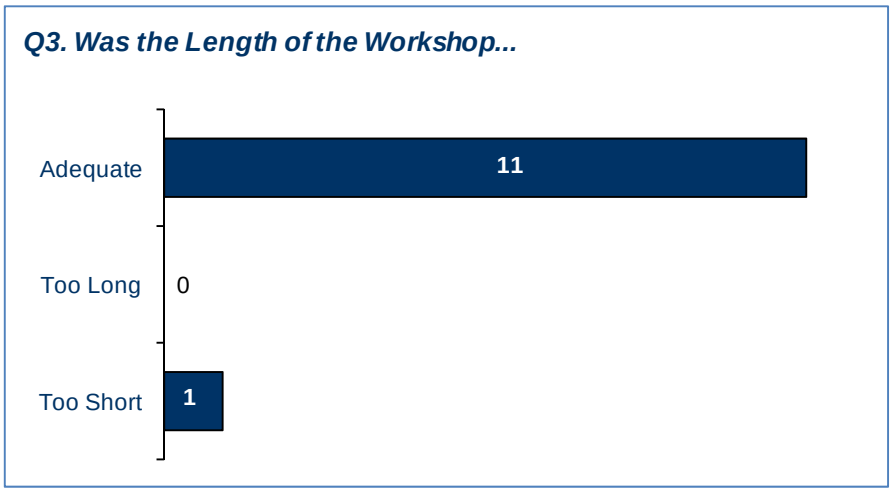
The workshop went well, particularly from an organizational point of view.

- The venue was appropriate for the workshop. The room layout was organized in a U shape seating arrangement with a second tier of chairs around the back of the room. The size of the room made the workshop more intimate and helped to promote interaction between the speakers and participants.

- An external translation company was hired for the workshop. Simultaneous translation services were provided on-site. The two interpreters that were present and did an excellent job with the presentations, especially given the detailed and technical content. In addition, Helena Olivas bilingual capabilities were beneficial in the role of facilitator as she spoke in Spanish for the majority

of the workshop. This greatly helped to engage participants and kept the day on track in terms of timing.

- Participants were asked to rate whether the workshop length (by number of days) was 'adequate', 'too long' or 'too short'. The majority of participants (11) noted the length of the workshop was adequate, none felt it was too long, and one (1) felt it was too short. The chart below illustrates the breakdown of responses.



  - The majority of participants felt that although it's an unfamiliar theme in Mexico, the length of the workshop was enough to give a general view of the CCS. Other participants noted that the main issues were properly addressed and that the times were respected throughout both days.

  - The participant that indicated the workshop was too short noted that the information was provided too quickly due to time constraints.

- The majority of participants attended both days of the workshop and remained for the full time. The box below provides an estimate of the number of participants in the workshop room at various times over the course of both days.

Participant Attendance throughout Both Days

Day 1	Day 2
Start - 29 participants	Start – 25 participants
Morning break – 35 participants	Morning break – 31 participants
After lunch - 28 participants	After lunch – 26 participants
Afternoon break – 26 participants	Afternoon break – 24 participants
Day's end – 25 participants	Day's end – 23 participants

**Number of participants are estimates based on head count at workshop*

6.5 Workshop Structure: Agenda, Presentations and Workshop Booklet

- The workshop format consisted of presentations, case studies and panel discussions - of all which were well received. Participants were particularly engaged in the panel discussions and had good dialogue with the experts during the breaks and lunch. The session "Mapping out the Road Ahead" went particularly well as participants provided insight and frank comments about CCS in Mexico and how to move projects forward.

- The agenda flowed well and the time allocated for each presentation gave speakers sufficient time to make their presentations without being rushed and to answer questions at the end.

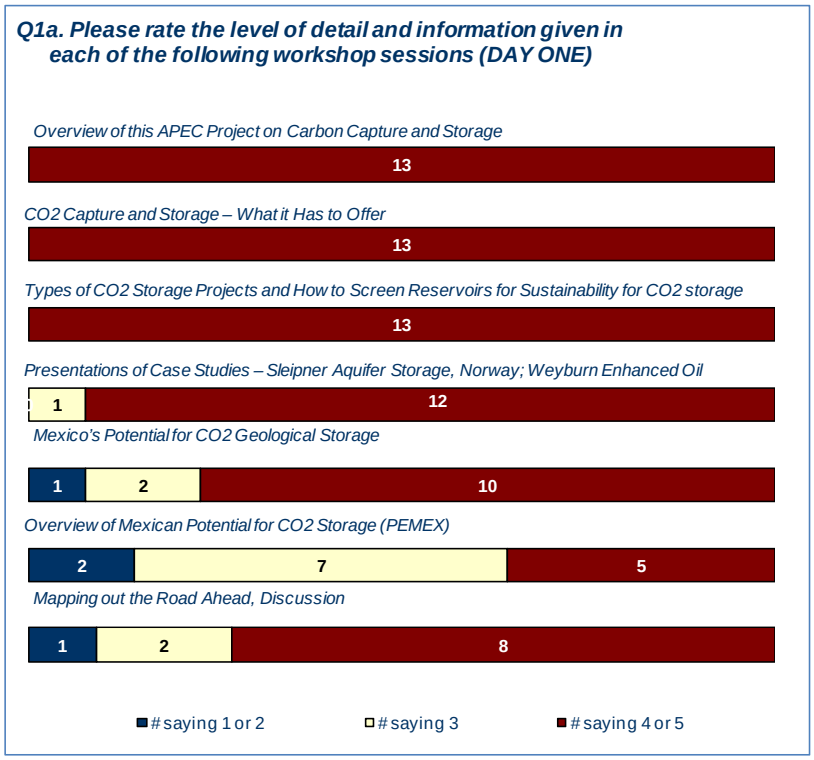
- Workshop materials were provided in a binder containing the agenda and speaker presentations. The binders were distributed to the participants at the start of day one and were generally well received. Feedback from participants indicated that workshop materials are not usually provided. Some of the presentations were printed last minute, however even with these delays in having the presentations ready the participants noted the convenience in having the print material available to them.

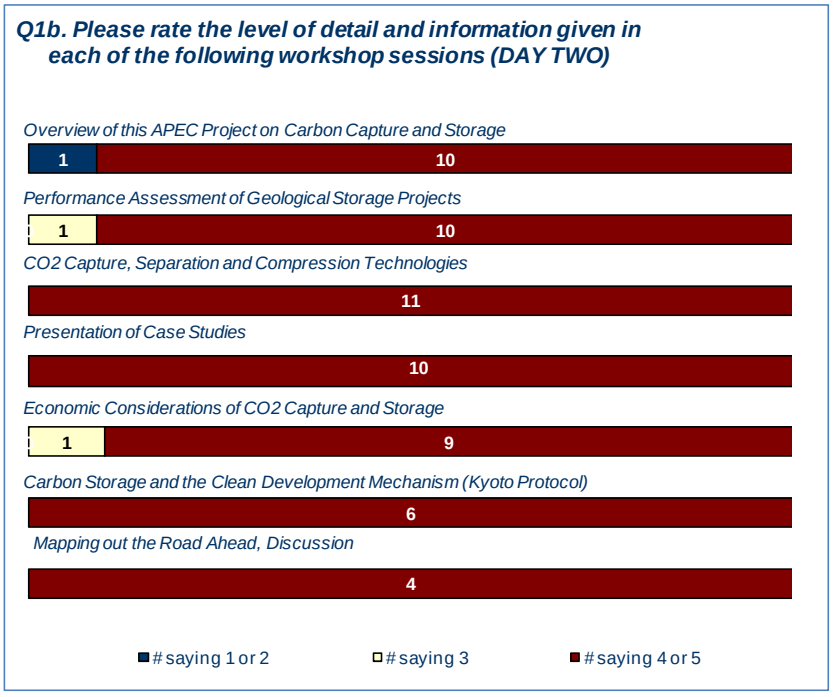
6.6 Training Materials: Information, Presentations and Panel Discussions

The training materials from Phase III formed the flow and content of the workshop. The agenda was adapted to take into consideration the needs of the Mexican region. Upon recommendations from our partner, the agenda was divided to focus on storage and capture separately.

There was quite a bit of positive feedback from participants. Comments were made along the lines of "finally understood it at the level that I need".

Overall, the level of detail and information given during the workshop was well received by participants. Illustrated in the two graphs below, participants were asked to rate the level of detail and information given in each of the workshop sessions on a scale from 1 to 5 ('five' being the highest rating and 'one' being the lowest rating). The charts below are presented individually by workshop day.





- The results demonstrate that the majority of participants felt the sessions provided a high level of information. While the results were close, a higher number of sessions on Day 2 received a more favorable rating. The highest satisfaction ratings were for the overview session, sessions that were more technical in nature and the case studies.

- The *Overview of Mexican Potential for CO2 Storage (PEMEX)* session received the lowest rating, with 50% of respondents giving it an average score of 3, although several participants indicated that having a greater number of presenters from Mexico would have been useful.

- When asked how these sessions could be improved the most common responses were:

Format

- Would like to have participants introduce themselves to get a better idea of who was attending the sessions.
- Some participants indicated that they would have liked to receive the invitation to the event sooner.

Topic

- Provide separate break-out sessions or workshops for carbon capture and carbon storage.
- Include additional speakers from Mexico to provide greater detail on Mexican issues (basins in Mexico, specific regulations, etc).
- Sessions should have gone a bit slower when covering the more technical details.

6.7 Speakers

- When asked if other speakers should have been included in the agenda, approximately half the participants felt that additional speakers would have been appropriate, particularly to address Mexican issues.

- Participants indicated they would like to see the addition of:
  - Speakers from the host economy such as:
    - People from PEMEX – exploration, to speak about the basins in Mexico
    - Local legal specialists
    - Representatives from the Instituto de Geologica de UNAM
    - People involved in European projects (IFP in particular)
    - CFE
    - A speaker from the CO2 capture industry.

6.8 Questions that were not answered for participants during the workshop

Participants approached the speakers with comments rather than questions on the whole. People were eager to share what was needed in Mexico for this issue to be taken to the next level.

The majority of questions that were asked were very specific to Mexico's conditions and focused on how too specifically, to take the general material and adapt it to Mexico's energy profile (power generation from ore,

gas and peticoke – not coal). On the storage side, there was interest in EOR, and specifics to fractured reservoirs.

Other questions that were asked throughout the workshop by participants included:

- Is there any economy or enterprise working to approve these projects as CDM projects at ONU?
- I have many, but I have to work with the specialist to know more, I have the data to contact these people.
- What are the CCS regulations (laws, criteria, etc.) in Canada?
- How can you determine the amount of CO_2 that can be injected for EOR in an oil well?
- Are there any CO_2 capture and storage projects for residual fuel oil electricity generation?

6.9 Options for Moving Forward on CO2 Capture and Storage in Mexico

- When asked what needs to be addressed (technical or policy issues) in order to implement CO2 capture and storage in their economy, participants responded with the following:
  - Both are necessary.
  - The activities of each need to be defined.
  - Currently CCS is not economically feasible. First, regulation changes are required.
  - Inventory of sources and storage sites (detailed and updated).
  - Integral studies analyzing our basins in terms of storage.
  - Political decisions to regulate emissions.
  - Political decisions to develop a national training program for sequestration.
  - Analysis of EOR in national fractured reservoirs injected with CO_2.
  - Technical issues are not so difficult to overcome in order to implement CO_2 capture. The most challenging area in the implementation of CO_2 capture and storage is the policy issue, because in Mexico there's a lack of legislation.
  - It is necessary to create regulatory issues, as we don't have a legal framework around CO_2 capture and storage.
  - First policy, particularly strategic planning on how to address clime change. Subsequently a roadmap, then technical issues.
  - It would be recommendable to be able to get high-level political commitment for carbon storage and capture.
  - Smaller working groups should be defined, establishing some commitments for future dates and workshops.
  - I think it's essential that Mexico participates in the R&D of this technology. I hope you have found interest from the Mexican institutions.

Appendix A: Workshop Agenda (China)

Asia-Pacific Economic Cooperation

BUILDING CAPACITY FOR CO2 CAPTURE AND STORAGE IN THE APEC REGION
WORKSHOP AGENDA
– Beijing, China –
October 24 & 25, 2006

DAY ONE:	Tuesday, October 24th, 2006
08:30 – 09:00	**Opening Ceremony -including taking a picture with all participants** *Research Institute of Petroleum Exploration and Development (TBC)* *Mr. Han Hua, Managing Director of CAPC*
09:00 – 09:30	**Workshop Objectives and Overview of this APEC Project on Carbon Capture and Storage** *Mike Gerbis,The Delphi Group* *Dr. Frank Mourits, Natural Resources Canada* *APEC Expert Group on Clean Fossil Energy*
09:30 – 10:15	**CO_2 Capture and Storage –What it Has to Offer** *Dr. Bill Gunter, Alberta Research Council*
10:15 – 10:30	**Refreshment Break**
10:30 – 12:00	**Types of CO_2 Storage Projects and How to Screen Reservoirs for Suitability for CO_2 Storage** *John Gale, IEA Greenhouse Gas R&D Programme*
12:00 – 13:30	**Lunch**
13:30 – 14:15	**The Potential for CO_2 Storage in the APEC Region (focus on China)** *Andy Rigg, CO2CRC*
14:15 – 16:15	**CO_2 Capture, Separation and Compression Technologies** *Sam Wong, Alberta Research Council*
16:15 – 16:30	**Refreshment Break**
16:30 – 17:45	**Panel: Responding to Questions on Developing and Implementing a CO_2 Capture and Storage Project** *Dr. Bill Gunter, Alberta Research Council* *Sam Wong, Alberta Research Council* *Andy Rigg, CO2CRC* *John Gale, IEA Greenhouse Gas R&D Programme* *Stanley Santos, IEA Greenhouse Gas R&D Programme*
17:45 – 18:00	**Summary and Close of Day 1** *Mike Gerbis, The Delphi Group*
18:00 – 19:00	**Networking Reception**

DAY TWO:	Wednesday, October 25th, 2006
08:30 – 08:45	**Welcome and Overview of the Day's Objectives** *Mike Gerbis, The Delphi Group*
08:45 – 10:15	**Presentation of Two Commercial Case Studies** **- Sleipner Aquifer Storage, Norway** **- Weyburn Enhanced Oil Recovery, Canada** *John Gale, IEA Greenhouse Gas R&D Programme*
10:15 – 10:45	**Refreshment Break**
10:45– 12:00	**Presentation of a Piloting Case Study - Coalbed Methane Enhanced Recovery, Qinshui Basin, Shanxi Province, China** *Sam Wong, Alberta Research Council*
12:00 – 13:30	**Lunch**
13:30 – 15:00	**Performance Assessment of Geological Storage Projects** ***- Risk Management*** ***- Measuring, Monitoring and Verification.*** *Dr. Bill Gunter, Alberta Research Council*
15:00 – 16:15	**Economic Considerations of CO_2 Capture and Storage** *Sam Wong, Alberta Research Council*
16:15 – 16:30	**Refreshment Break**
16:30 – 17:15	**Carbon Storage and the Clean Development Mechanism (Kyoto Protocol)** *Mike Gerbis, The Delphi Group*
17:15 – 18:15	**Mapping out the Road Ahead (Panel Discussion)** *Dr. Bill Gunter, Alberta Research Council*
18:15 – 18:30	**Summary and Workshop Adjourns** *Mike Gerbis, The Delphi Group*

This workshop has been financially supported by the Asia-Pacific Economic Cooperation. The organizers wish to thank Research Institute of Petroleum Exploration and Development (RIPED) and the CNPC-Alberta Petroleum Centre for their assistance and contribution in organizing the logistics for this workshop and our partners IEA Greenhouse Gas R&D Programme (IEA GHG).

Appendix B: Workshop Participants (China)

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Appendix C: Participant Survey (China)

Asia-Pacific
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意见反馈表

姓名：_____单位:：_____

参会时间: ☐ 一天 ☐ 两天 ☐ 全部会议期间

1. 请给下列分组会详细内容打分（请将答案圈出）

第一天	**低**				**高**
对于这次 APEC组织 CO_2捕集和埋存项目的看法	1	2	3	4	5
CO_2捕集和埋存技术的益处	1	2	3	4	5
CO_2 埋存项目的类型	1	2	3	4	5
APEC地区埋存CO_2的潜在能力	1	2	3	4	5
二氧化碳捕集、分离和压缩技术	1	2	3	4	5
分组讨论	1	2	3	4	5
第二天					
两例商业案例研究报告	1	2	3	4	5
个案研究报告	1	2	3	4	5
地质储量工程动态评价	1	2	3	4	5
CO_2 捕集和埋存的经济利益	1	2	3	4	5
CO_2埋存和清洁发展机制(京都议定书)	1	2	3	4	5
分组讨论	1	2	3	4	5

对分组会有何建议？

_____

2. 您在会议期间有哪些问题没有解决？

_____

3.会议时间A)适当、B)太长、C)太短.。(请将答案圈出)，并写下原因。

_____

4. 其他发言者是否也应列入会议议程？

_____

_

5. 在贵国执行CO_2捕集和埋存所需要解决的技术或政策问题 ？

_____

6. 如有任何意见和建议请及时向我们反馈。

Asia-Pacific
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Questionnaire

We appreciate your feedback on how closely this workshop met your expectations.

Name: _____ Organization: _____

I attended: ☐ Day 1 only ☐ Day 2 only ☐ Both days of the workshop

1. Please rate the level of detail and information given in each of the following workshop sessions (please circle):

Day 1	**Low**			**High**
Overview of this APEC Project on Carbon Capture and Storage	1	2	3	4 5
CO_2 Capture and Storage – What it Has to Offer	1	2	3	4 5
Types of CO_2 Storage Projects	1	2	3	4 5
The Potential for CO_2 Storage in the APEC Region	1	2	3	4 5
CO_2 Capture, Separation and Compression Technologies	1	2	3	4 5
Panel Discussion	1	2	3	4 5
Day 2				
Presentation of Two Commercial Case Studies	1	2	3	4 5
Presentation of a Piloting Case Study	1	2	3	4 5
Performance Assessment of Geological Storage Projects	1	2	3	4 5
Economic Considerations of CO_2 Capture and Storage	1	2	3	4 5
Carbon Storage and the Clean Development Mechanism (Kyoto Protocol)	1	2	3	4 5
Panel Discussion	1	2	3	4 5

How could these sessions have been improved?

_____

_____

2. Do you have any questions that were not answered during the workshop? Please elaborate.

_____

_____

3. Was the length of the workshop a) adequate, b) too long, c) too short? (circle one). Please explain.

_____

_____

4. Should other speakers have been included in the agenda? Please explain.

5. What needs to be addressed (technical or policy issues) in order to implement CO_2 capture and storage in your economy?

6. Please provide any other comments or feedback below.

Appendix D: Workshop Agenda (Mexico)

BUILDING CAPACITY FOR CO2 CAPTURE AND STORAGE IN THE APEC REGION
WORKSHOP AGENDA
– Mexico City, Mexico –
May 23rd & 24th, 2007

DAY ONE:	Wednesday, May 23, 2007 (Focus on Storage)
09:00 – 09:15	**Opening Remarks** *Jordy Herrera Flores, Undersecretary for Energy Planning and Technology Development SENER*
09:15 – 09:30	**Workshop Objectives and Overview of this APEC Project on Carbon Capture and Storage** *Helena Olivas, The Delphi Group* *Dr. Frank Mourits, Natural Resources Canada* *APEC Expert Group on Clean Fossil Energy*
09:30 – 10:15	**CO_2 Capture and Storage –What it Has to Offer** *Dr. Bill Gunter, Alberta Research Council*
10:15 – 10:30	**Refreshment Break**
10:30 – 11:45	**Types of CO_2 Storage Projects and How to Screen Reservoirs for Suitability for CO_2 Storage** *Dr. Stefan Bachu, Alberta Energy and Utilities Board*
11:45 – 13:00	**Presentation of Case Studies** **- Sleipner Aquifer Storage, Norway** **- Weyburn Enhanced Oil Recovery, Canada** *Dr. Stefan Bachu, Alberta Energy and Utilities Board*
13:00 – 14:15	**Lunch**
14:15 – 14:45	**Mexico's Potential for CO2 Geological Storage** *Dr. Stefan Bachu, Alberta Energy and Utilities Board*
14:45 – 15:15	**Overview of Mexican Potential for CO_2 Storage. PEMEX** *Technical Exploitation PEMEX Refinación.*
15:15 – 15:30	**Refreshment Break**
15:30 – 16:30	**Mapping out the Road Ahead (Discussion)** *Facilitated by Dr. Bill Gunter, Alberta Research Council*
16:30 – 16:45	**Summary and Close of Day 1** *Helena Olivas, The Delphi Group*
16:45 – 17:45	**Networking Reception**

DAY TWO:	Thursday, May 24, 2007 (Focus on Capture)
09:00 – 09:15	**Second day Opening remarks Workshop Objectives and Overview of this APEC Project on Carbon Capture and Storage** *Helena Olivas, The Delphi Group* *Dr. Frank Mourits, Natural Resources Canada* *APEC Expert Group on Clean Fossil Energy*
09:15 – 10:00	**Performance Assessment of Geological Storage Projects** - **Risk Management** - **Measuring, Monitoring and Verification** *Dr. Bill Gunter, Alberta Research Council*
10:00 – 10:15	**Refreshment Break**
10:15 – 11:30	**CO_2 Capture, Separation and Compression Technologies** *Stanley Santos, IEA Greenhouse Gas R&D Programme*
11:30 – 12:15	**Presentation of Case Study:** • **Development of Oxy-Coal Combustion for Power Generation Industry** • **Experience of Dakota Gasification and future development of pre-combustion capture** *Stanley Santos, IEA Greenhouse Gas R&D Programme*
12:15 – 13:15	**Lunch**
13:15 – 14:30	**Economic Considerations of CO_2 Capture and Storage** *Stanley Santos, IEA Greenhouse Gas R&D Programme*
14:30– 15:15	**Carbon Storage and the Clean Development Mechanism (Kyoto Protocol)** *Helena Olivas, The Delphi Group*
15:15 – 15:30	**Refreshment Break**
15:30 – 16:30	**Mapping out the Road Ahead (Discussion)** *Facilitated by Dr. Bill Gunter, Alberta Research Council*
16:30 – 16:45	**Summary and Workshop adjourns** *Helena Olivas, The Delphi Group*

This workshop has been financially supported by the Asia-Pacific Economic Cooperation. The organizers wish to thank SENER for their assistance and contribution in organizing the logistics for this workshop and our partners IEA Greenhouse Gas R&D Programme (IEA GHG).

DESARROLLO DE CAPACIDADES PARA LA CAPTURA Y ALMACENAMIENTO DE CO2 EN LA REGIÓN DE LA APEC
ÓRDEN DEL DÍA DEL TALLER
–Ciudad de México, México –
23 y 24 de mayo de 2007

PRIMER DÍA:	Miércoles 23 de mayo de 2007 (almacenamiento)
09:00 – 09:15	**Discurso inaugural** *Jordy Herrera Flores, Subsecretario de Planeación Energética y Desarrollo Tecnológico de la SENER*
09:15 – 09:30	**Objetivos del taller y perspectiva general sobre este proyecto de la APEC para la captura y almacenamiento de carbón** *Helena Olivas, The Delphi Group* *Dr. Frank Mourits, Ministerio de Recursos Naturales de Canadá* *Grupo de expertos de la APEC sobre energía fósil limpia*
09:30 – 10:15	**Captura y almacenamiento de CO_2 – Qué ofrece** *Dr. Bill Gunter, Consejo de Investigación de Alberta*
10:15 – 10:30	**Receso**
10:30 – 11:45	**Tipos de proyectos de almacenamiento de CO_2 y formas para evaluar si un depósito reúne los requisitos para almacenar CO_2** *Dr. Stefan Bachu, Consejo de Energía de Alberta*
11:45 – 13:00	**Presentación del estudio de casos específicos:** **- Depósito acuático de Sleipner, Noruega** **- Centro de Recuperación Mejorada de Hidrocarburos de Weyburn, Canadá** *Dr. Stefan Bachu, Consejo de Energía de Alberta*
13:00 – 14:15	**Almuerzo**
14:15 – 14:45	**México y su potencial para el almacenamiento geológico de CO_2** *Dr. Stefan Bachu, Consejo de Energía de Alberta*
14:45 – 15:15	**Perspectiva general sobre el potencial mexicano para el almacenamiento de CO_2. PEMEX** *Explotación Técnica PEMEX Refinación.*
15:15 – 15:30	**Receso**
15:30 – 16:30	**Planeando el camino a seguir (discusión)** *Facilitador: Dr. Bill Gunter, Consejo de Investigación de Alberta*
16:30 – 16:45	**Resumen y clausura del día 1** *Helena Olivas, The Delphi Group*
16:45 – 17:45	**Recepción para establecer redes de contacto**

SEGUNDO DÍA:	Jueves 24 de mayo 2007 (captura)
09:00 – 09:15	**Comentarios de apertura del segundo día / Objetivos y perspectiva general sobre este proyecto de la APEC para la captura y almacenamiento de carbón** *Helena Olivas, The Delphi Group* *Dr. Frank Mourits, Ministerio de Recursos Naturales de Canadá* *Grupo de expertos de la APEC sobre energía fósil limpia*
09:15 – 10:00	**Evaluación del desempeño de los proyectos de almacenamiento geológico** - **Manejo de riesgos** - **Medir, monitorear y verificar** *Dr. Bill Gunter, Consejo de Investigación de Alberta*
10:00 – 10:15	**Receso**
10:15 – 11:30	**Tecnologías para la captura, separación y compresión de CO_2** *Stanley Santos, Programa de Investigación y Desarrollo sobre Gases de Efecto Invernadero de la Agencia Internacional de Energía (IEA GHG)*
11:30 – 12:15	**Presentación del estudio de casos específicos:** • **Desarrollo de oxi-combustión de carbón para la industria de generación de energía** • **La experiencia de Dakota Gasification y el desarrollo futuro de la captura previa a la combustión** *Stanley Santos, IEA GHG*
12:15 – 13:15	**Almuerzo**
13:15 – 14:30	**Consideraciones económicas de la captura y almacenamiento de CO_2** *Stanley Santos, IEA GHG*
14:30– 15:15	**El almacenamiento de carbón y el mecanismo de desarrollo limpio (Protocolo de Kyoto)** *Helena Olivas, The Delphi Group*
15:15 – 15:30	**Receso**
15:30 – 16:30	**Planeando el camino a seguir (discusión)** *Facilitador: Dr. Bill Gunter, Consejo de Investigación de Alberta*
16:30 – 16:45	**Resumen y fin del taller** *Helena Olivas, The Delphi Group*

Este taller cuenta con el respaldo financiero del foro para la Cooperación Económica Asia-Pacífico. Los organizadores quieren agradecer la ayuda y la contribución de la SENER en la organización de la logística de este taller y a nuestros aliados en el Programa de Investigación y Desarrollo sobre Gases de Invernadero de la Agencia Internacional de Energía (IEA GHG).

Appendix E: Participant List (Mexico)

Name	Title	Company	Telephone Number	Email Address	Attended Y/N?
Helena Olivas	Climate Change Manager	The Delphi Group	613-562-2005	holivas@delphi.ca	Y
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Stanley Santos	Senior Advisor	IEA Greenhouse Gas R&D Programme		stanley@ieaghg.org	Y
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ING. CARLOS DE REGULES RUIZ FUNES	GERENCIA CORPORATIVA DE PROTECION AMBEINTAL	PEMEX			N
ING. RODRIGO FAVELA FIERRO	SUBDIRECTOR DE PLANEACION, COORDINACION Y EVALUACION	PEMEX			N
DR. VINCIO SURO PEREZ	SUBDIRECTOR DE PLANEACION Y EVALUACION	PEMEX			N
ING. TEODULO GUTIERREZ ACOSTA	SUBDIRECTOR DE LA COORDINACION TECNICA DE EXPLOTACION	PEMEX			N
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ING. NICOLAS RODRIGUEZ MARTINEZ	DIRECTOR DE SEGURIDAD Y MEDIO AMBIENTE	IMP			N
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REYNALDO MARQUEZ ANGULO	SUBGERENTE	CFE			N
DR. FERNANDO TUDELA ABAD	SUNSECRETARIO DE PLANEACION Y POLITICA AMBIENTAL	SEMARNAT			N
CARLOS MENA	PRESIDENTE	CENTRO MARIO MOLINA			N
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RAUL GUTIERREZ CASTILLO	SUBDIRECTOR	SENER			N
JULIA MARTINEZ FERNANDEZ	COORDINADORA DEL PROGRAMA DE CAMBIO CLIMATICO	INE			N
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ING. JULIAN ADAME MIRANDA	DIRECTOR EJECUTIVO	IIE			N

VICTOR CARREON RODRIGUEZ	DIRECTOR DE LA DIVISION DE ECONOMIA	CIDE			N
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Appendix F: Participant Survey (Mexico)

Asia-Pacific Economic Cooperation

Workshop Feedback Form

We appreciate your feedback on how closely this workshop met your expectations.

Name: _____ Organization: _____

I attended: ☐ Day 1 only ☐ Day 2 only ☐ Both days of the workshop

1. Please rate the level of detail and information given in each of the following workshop sessions (please circle):

Day 1	**Low**				**High**
Overview of this APEC Project on Carbon Capture and Storage	1	2	3	4	5
CO_2 Capture and Storage – What it Has to Offer	1	2	3	4	5
Types of CO2 Storage and How to Screen Reservoirs for Sustainability for CO2 Storage	1	2	3	4	5
Presentations of Case Studies – Sleipner Aquifer Storage, Norway; Weyburn Enhanced Oil Recovery, Canada	1	2	3	4	5
Mexico's Potential for CO2 Geological Storage	1	2	3	4	5
Overview of Mexican Potential for CO2 Storage (PEMEX)	1	2	3	4	5
Mapping out the Road Ahead, Discussion	1	2	3	4	5
Day 2					
Overview of this APEC Project on Carbon Capture and Storage	1	2	3	4	5
Performance Assessment of Geological Storage Projects	1	2	3	4	5
CO_2 Capture, Separation and Compression Technologies	1	2	3	4	5
Presentation of Case Studies	1	2	3	4	5
Economic Considerations of CO_2 Capture and Storage	1	2	3	4	5
Carbon Storage and the Clean Development Mechanism (Kyoto Protocol)	1	2	3	4	5
Mapping out the Road Ahead, Discussion	1	2	3	4	5

How could these sessions have been improved? _____
_____
_____

2. Do you have any questions that were not answered during the workshop? Please elaborate.
_____

3. Was the length of the workshop a) adequate, b) too long, c) too short? (circle one). Please explain.
_____

4. Should other speakers have been included in the agenda? Please explain.
_____

5. What needs to be addressed (technical or policy issues) in order to implement CO_2 capture and storage in your economy?
_____

6. Please provide any other comments or feedback below.
_____

Formulario de Reacción al Taller

Asia-Pacific Economic Cooperation

Le agradecemos rellene este formulario para indicarnos sus observaciones sobre el taller y como este a satisfecho sus expectativas.

Nombre: _____ **Organización:** _____

Atendí: ☐ Día 1 solo ☐ Día 2 solo ☐ Los dos días del taller

1. Por favor indique el nivel de detalle y la información ofrecida durante cada una de las siguientes sesiones (por favor circule un número):

Día 1	**Bajo**				**Alto**
Visión general de este proyecto de APEC de Captura y Almacenamiento de Carbono	1	2	3	4	5
Captura y Almacenamiento de CO2 – ¿Que es lo que ofrece?	1	2	3	4	5
Tipos de proyectos de almacenamiento de CO2 y como identificar reservas para la sostenibilidad del Almacenamiento de CO2	1	2	3	4	5
Estudios de caso – Almacenamiento del Acuífero Sleipner en Noruega y Mejoramiento en la recuperación de petróleo en Canadá	1	2	3	4	5
Potencial en el ámbito del Almacenamiento Geológico en México	1	2	3	4	5
Visión general en el ámbito del Almacenamiento Geológico en México (PEMEX)	1	2	3	4	5
Mapeo hacia el futuro (Discusión)	1	2	3	4	5
Día 2					
Visión general de este proyecto de APEC de Captura y Almacenamiento de Carbono	1	2	3	4	5
Valoración del rendimiento de los proyectos de almacenamiento geológico	1	2	3	4	5
Tecnología de captura de CO2, separación y compresión	1	2	3	4	5
Casos de estudio – Desarrollo de la combustión de Oxy-Carbono para la industria de la energía; Experiencia de Gasificación Dakota	1	2	3	4	5
Consideraciones económicas de la Captura y el Almacenamiento de CO2	1	2	3	4	5
Almacenamiento de carbono y el Mecanismo de Desarrollo Limpio (Protocolo de Kyoto)	1	2	3	4	5
Mapeo hacia el futuro (Discusión)	1	2	3	4	5

1. ¿Como se podría haber mejorado estas sesiones?

_____
_____
_____

2. ¿Tiene alguna pregunta que no fue tratada durante el taller? Por favor explique.

_____
_____
_____

3. La duración del taller fue a) adecuada, b) demasiado larga, c) demasiado corta (circule una respuesta). Por favor explique porque.

_____
_____

4. ¿Debería de haberse incluido a otros interlocutores en la agenda? Por favor explique.

_____
_____

5. ¿Que es lo que se debería de tratar (temas tecnológicos o políticas) para poder implementar la captura y el almacenamiento de CO2 en su país?

_____
_____
_____

6. Por favor proporcione otros comentarios abajo.

_____
_____