

Sixth Annual Conference on Carbon Capture & Sequestration

Capacity Building

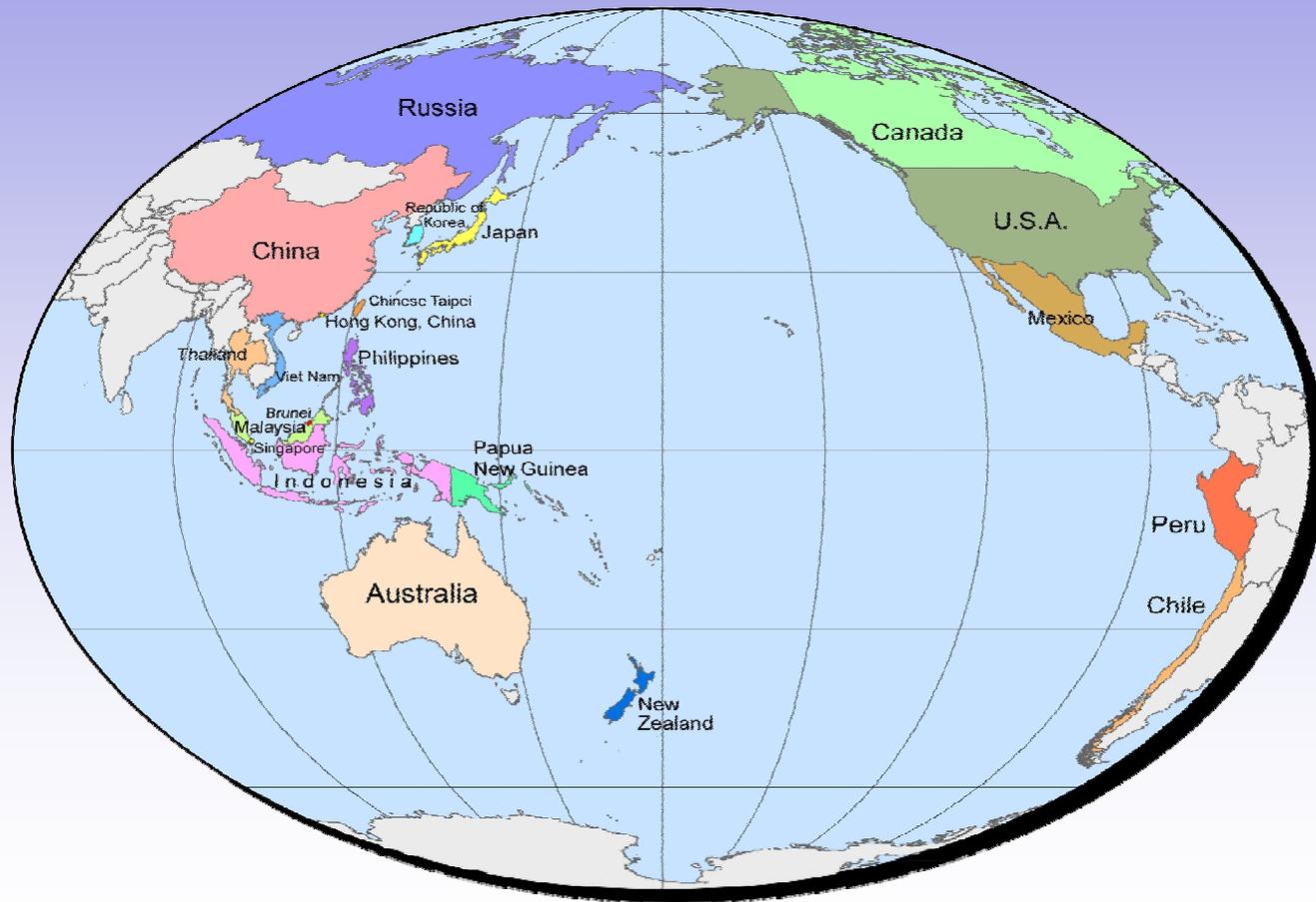
CCS Capacity Building in APEC Emerging Economies: Sharing the Canadian Experience in Training

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Member Economies in the Asia Pacific Economic Cooperation (APEC)



APEC Member Economies

Australia

Chile

Indonesia

Mexico

Peru

Republic of Korea

Thailand

Brunei Darussalam

Chinese Taipei

Japan

New Zealand

People's Republic of China

Russia

United States

Canada

Hong Kong, China

Malaysia

Papua New Guinea

Philippines

Singapore

Viet Nam

Background

- APEC Expert Group on Clean Fossil Energy initiated a three-phase project to explore the potential for geological CO₂ Capture and Storage and build CCS capacity in APEC regions.
- Initiative designed to:
 - Help non-industrialized member economies successfully identify, evaluate and develop prime CO₂ capture and geological storage projects in their countries; and
 - Build capacity for implementation of CCS projects

Financial Support

- APEC
- US Government (DOE – NETL)
- Australian Government
- Canadian Government (NRCan)
- IEA – GHG Programme

Delivery

- The Delphi Group
- Alberta Research Council
- CO2CRC
- Alberta Energy and Utilities Board
- IEA – GHG Programme

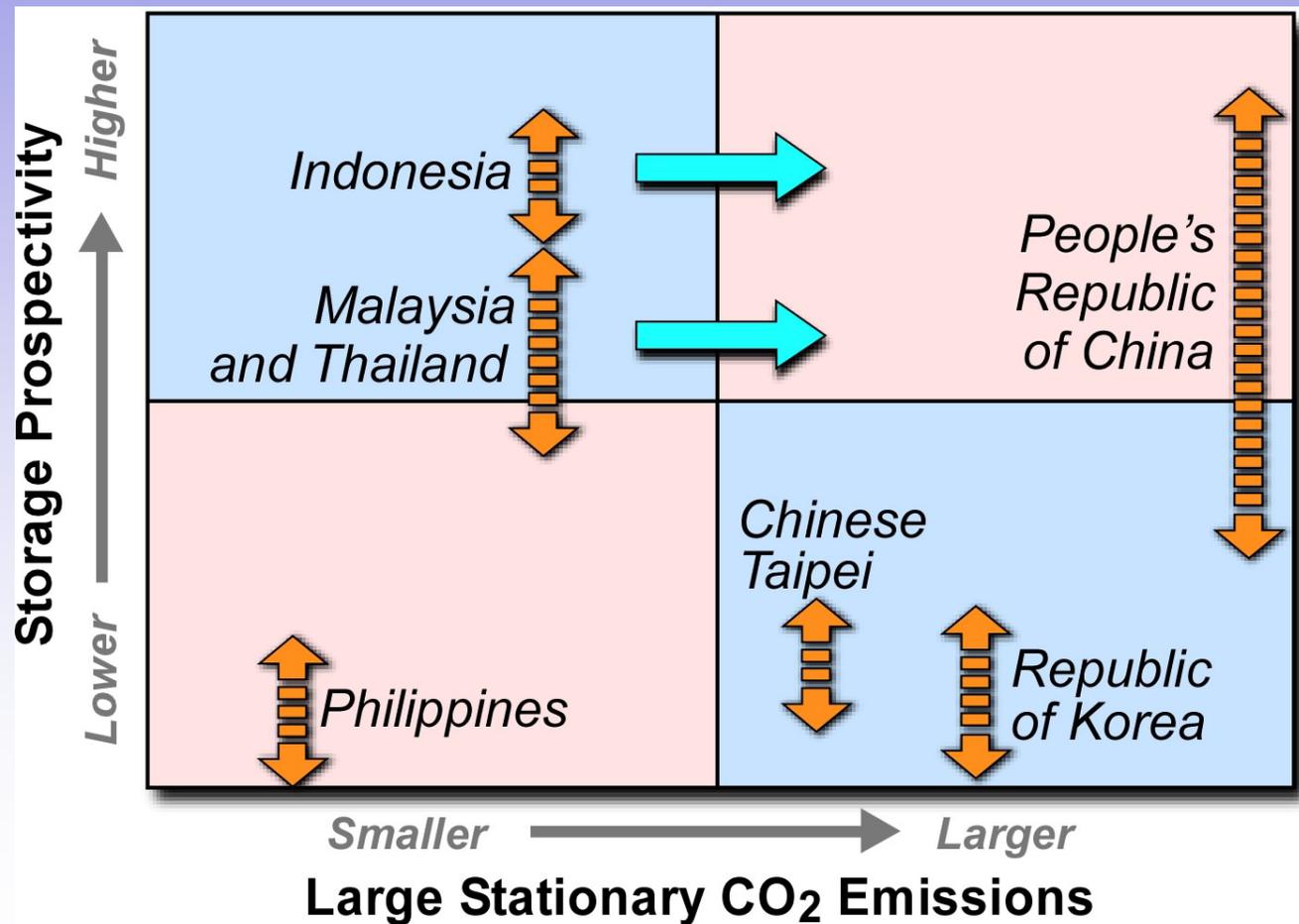
Phase I – Assessment of CO₂ Storage Potential

- Timeline: 2004 –2005
- Executed by Australian Team
- Results
 1. Selection of APEC Economies for study: Asia Pacific Rim, exclusive of Japan and Russia
 2. Inventory of CO₂ emissions
 3. Assessment of CO₂ storage potential (high, medium and low) by basin and by economy



Sedimentary Basins Assessed for CO₂ Storage Capacity in APEC Economies

Potential for CO₂ Storage in Asian APEC Developing Economies



Phase II – Development of Training Material and Provision of a Training Workshop

- Timeline: 2004 –2005
- Executed by Canadian Team
- Results
 1. Development of 2-days course training material:
 - a. Fifteen PPT-slide modules
 - b. Training manual
 2. Provision of pilot training workshop in Seoul, Republic of Korea, in February 2005

Phase III – Improvement of Training Material and Provision of Two Training Workshops

- Timeline: 2006 –2007
- Executed by Canadian-Australian and IEA-GHG Team
- Results
 1. Review and improvement of training material
 2. Provision of training workshop in People's Republic of China, in October 2006
 3. Evaluation of CO₂ storage potential in Mexico
 4. Preparation for a training workshop to be delivered in Mexico City in May 2007

Phase II and III Objectives

- Enhance the capacity of APEC developing economies to undertake CCS projects through the use of training materials and workshops
- Build awareness and knowledge & skills capacity around the potential for CO₂ capture and geological storage
- Contribute to sustainable development objectives

Training Materials - Subjects

1. CCS Overview
2. CO₂ Capture: Post-Combustion
3. CO₂ Capture: Pre-Combustion
4. CO₂ Compression and Transportation
5. Storage Options for CO₂
6. Screening and Selection of CO₂ Storage Sites
7. Health, Safety and Environmental Issues
8. Performance Assessment
9. Legal, Regulatory and Public Opinion Issues
10. Economic Considerations in CCS
11. Clean Development Mechanism

Training Materials – Case Studies

- CCS Potential in Asian APEC Developing Economies
- CCS Potential in Mexico
- SACS (Sleipner) Project: CO₂ storage in deep saline aquifers
- Weyburn CO₂-EOR MMV Project
- Experience of Acid Gas Injection in Canada
- Quinshui Basin CO₂-ECBM in China

Workshop Experience - 1

- Korea workshop held in conjunction with a technical conference, audience mostly academic
- China workshop held for Oil & Gas Industry audience, interested mostly in CO₂-EOR
- Decision makers present mostly at opening and closing ceremonies
- Mixed audience: technical and mid-management, academia, government, industry, with few or no policy makers
- Varied technical background, some unrelated
- Broad range and level of expertise makes it a challenge to meet everybody's needs

Workshop Experience - 2

- The majority of the audience, selected by the host country, was not in the position to decide on, participate in, or be involved with CCS in some way
- Participation fluctuated during the day/workshop
- Since CCS covers a very broad and diverse technical spectrum, some information is at a too detailed level
- English language and printed materials can be a challenge
- Workshop format: presentations and panel discussions, worked well, although some presentations were too long

Workshop Experience - 3

- The workshops need to be tailored to the host country in terms of its potential for CCS
 - More on the capture side for a country with limited storage potential but strong industrial base like the Republic of Korea
 - More on the storage side for a country with significant storage potential like Mexico
 - Balanced between the capture and storage for a diverse country like People's Republic of China

Recommendations for the Future - 1

- Training material and workshops are an invaluable tool in educating policy makers and building technical capacity in CCS in developing countries
- The training material should be continuously updated to maintain its relevance
- The slides and printed format should be consistent, using standard terminology and units (important when different authors of various modules)
- A mix of presentations, panel discussions and breakout sessions would probably be the most optimal, allowing interaction with the audience

Recommendations for the Future - 2

- The material should consist of:
 - An introduction to put the role of CCS in the context of energy production, other forms of energy and mitigation measures, including comparative costs and benefits, and an international overview
 - Short review of all forms of CO₂ storage and their potential (geological, ocean and surface carbonation)
 - Several basic, “fixed” modules, that describe the technical principles of CCS
 - Interchangeable modules that can be easily applied to the particular conditions of the host country (e.g., relevant case studies),
 - Modules that focus on legal and regulatory aspects, and other barriers to implementation that are addressed particularly to policy makers, and
 - Special modules designed specifically for the host country and addressing its conditions and needs

Recommendations for the Future - 3

- The material should be grouped to allow separation, such that participants with different interests and lack of time can attend only those parts of the workshop of specific interest to them
- Printed material should be provided in advance, translated if possible
- Simultaneous translation should be provided, otherwise it slows down the workshop and frustrates those who understand English
- It is important to provide information about authors/speakers and their credentials

Recommendations for the Future - 4

- The audience has to be the right audience!
 - Policy and decision makers
 - Reservoir engineers and geologists
 - Facilities, mechanical, process engineers
 - Economists
- The audience should be involved in some capacity with climate change policies, economic development and/or CCS implementation in the host country

Recommendations for the Future - 5

- Various current initiatives by APEC, EC, UK, US, Australia, should be coordinated and should build on previous experience
- Developed countries should work collaboratively rather than competitively in building capacity in developing economies, particularly in China and India
- Capacity building should go beyond training and extend into capacity assessment and site selection

Project Future

- IEA-GHG Programme is considering supporting and developing further the training material
- CSLF may consider building from this material and experience in Capacity Building in developing member economies
- APEC is considering providing more workshops in the near future

APEC Website: <http://www.apec.org>