



GLOBAL
CCS
INSTITUTE



CCOP CO₂ Storage Mapping Program (CCS-M)

**Launching Seminar (S1), 29 April 2013
and
CCS Training Course on Geological Storage Selection and
Characterization (T1), 30 April – 3 May 2013
Bali, Indonesia**

A. Objectives:

1. To launch the CCS-M, a new 4-year regional capacity building program on CCS to benefit the CCOP member countries (MC), and
2. Enhance the capacity of the participants in the assessment of geological sites for the safe and long-term storage of CO₂.

B. Participants and Resource persons:

1. Representatives from oil and gas regulatory and supervisory agencies, research organizations, national oil and gas companies, data management organization, geological agencies, geo-environmental organizations, and academic institutions with geoscience and environmental programs in the CCOP MC.
2. Resource persons from Norway, GCCSI and other Australian agencies, partner agencies in CCOP MC and cooperating countries.

C. Date & venue:

1. Date:
 - a. CCS-M Launching Seminar (S1) : 29 April 2013
 - b. CCS Training Course (TC1) : 30 April – 3 May 2013
2. Venue: Patra Jasa Bali Resorts & Villas, Bali, Indonesia

D. Implementing / Coordinating organizations

1. CCOP Technical Secretariat
2. Global CCS Institute
3. Norway: Royal Norwegian Embassy – Jakarta & PETRAD
4. Indonesia: Ministry of Energy and Mineral Resources (Geological Agency & others)

E. Final Draft Program:

Num ber	Time	Item	Person/Organization
1		Arrival of participants/resource persons	CCOP TS
29 April 2013			
2	0830	Registration	CCOP TS
3	0900	Opening Ceremony <ul style="list-style-type: none">• Welcoming Remarks<ul style="list-style-type: none">○ Chairman of CCOP Steering Committee○ CCOP Director• Opening Remarks<ul style="list-style-type: none">○ Royal Norwegian Embassy - Jakarta <p>Exchange of Tokens</p>	<p>Dr. R. Sukhyar Permanent Representative of Indonesia to CCOP Head, Geological Agency, Indonesia</p> <p>Dr. Adichat Surinkum Director CCOP Technical Secretariat</p> <p>Ms. Marianne Damhaug Minister Counsellor RNE-Jakarta</p> <p>CCOP TS</p>
4	0920	Keynote Address 1 State of the Art on the 40+ years of success for Norway's E & P Business and what is the next challenge?	Ms. Tone Skogen Deputy- Director General Ministry of Petroleum and Energy, Norway
5	0940	Keynote Address 2 Role of the GCCSI in accelerating the Deployment of CCS	Dr. Steve Whittaker Principal Manager – Storage Global CCS Institute
	1000	Group Photo / Coffee - Tea	CCOP TS/Indonesia

6	1030	Introduction and Background of the Seminar	Mr. Simplicio P. Caluyong CCS-M Coordinator CCOP Technical Secretariat
7	1045	CCS overview – the global perspective <ul style="list-style-type: none"> • What is CCS and where are we now? • Climate change issues- the global challenges • Where are we heading? 	Dr. Per Christer Lund NETC Royal Norwegian Embassy - Tokyo
8	1105	CCS Applied Technologies and case studies: <ul style="list-style-type: none"> • CO2 Injectivity and pressure control 	Mr. Harald Johansen Principal Research Scientist & Manager Institute for Energy Technology (IFE) CO2 Center Norway
9	1125	Guidelines for the Qualification of CO2 Storage <ul style="list-style-type: none"> • Case studies of independent verification • Technologies • Application of DNV certification 	Mr. Mike Carpenter Principal Consultant DNV KEMA CCS Unit Oslo, Norway
	1200	Lunch Break	
10	1300	CCS Applied Technologies <ul style="list-style-type: none"> • CO2 containment and monitoring • Long term storage safety 	Mr. Harald Johansen
11	1340	CCOP Country Presentations (~10 min) <ul style="list-style-type: none"> • Status of CCS –related activities <ul style="list-style-type: none"> ○ Legal framework ○ Specific research works ○ Government initiatives • Potential geological storage of CO2 • Future plans- CCS 	CCOP Member Countries (MC)
	1500	Coffee/Tea	
	1520	Continue with Country Presentations	
12	1700	Discussion/Summary	CCOP TS/CCS Experts
	1830	Welcome Dinner	Hosted by Indonesia Attire: smart casual

CCS-M Training Course on Geological Storage Selection and Characterization (T1)

Lead Lecturers:

1. **Prof. John Kaldi**, Chief Scientist, CO₂CRC (Australia)
2. **Dr. Peter Neal**, CO₂CRC and University of New South Wales (Australia)

	Tuesday 30 th	Wednesday 1 st	Thursday 2 nd	Friday 3 rd
0900 – 0945	Introducing CO ₂ CRC and why the need for CCS	Geological Storage: Modelling & Monitoring	Economic Methodology	Economic Opportunities
0945 – 1015	TEA BREAK	TEA BREAK	TEA BREAK	TEA BREAK
1015 – 1100	Geological Storage: The Fundamentals	Geological Storage: Modelling & Monitoring continued	Economic Methodology continued	Economic Opportunities continued
1100 – 1200		Storage Exercise	Estimating the effectiveness of CCS	
1200 – 1300	LUNCH	LUNCH	LUNCH	LUNCH
1300 – 1400	Geological Storage: Site Selection	Capture: The Fundamentals	Evaluating CCS Projects	CCS Projects around the world
1400 – 1500				
1500 – 1520	TEA BREAK	TEA BREAK	TEA BREAK	TEA BREAK
1520 – 1600	Geological Storage: Containment	Capture: The Fundamentals continued	Variability, uncertainty and learning	
1600 – 1700		Transport: The Fundamentals		

Topic 1. Climate change and carbon dioxide emission reduction

Summary of topic content and learning objectives

This topic provides an overview of the need to reduce carbon dioxide emissions and introduces carbon capture and storage as a key emission reduction measure.

By the end of the topic, participants should be able to accomplish the following:

- Understand greenhouse gases and the argument for their contribution to global climate change
- Identify carbon capture and storage (CCS) as a key greenhouse gas emissions mitigation technology
- Outline the key steps in the carbon capture and storage process

Content of topic

- Climate change and carbon dioxide

- Greenhouse gases
- Stationary and non-stationary sources
- Emissions around the world
- Emitting industries– CCS potential
- CCS as a greenhouse gas emission reduction measure
- Overview of carbon capture and storage (CCS)

Topic 2. Geological storage of carbon dioxide

Summary of topic content and learning objectives

This topic provides the geological principles behind storing carbon dioxide geologically and covers the location of suitable sites, the behaviour of carbon dioxide in storage, operational issues, monitoring and verification and carbon dioxide projects around the world.

By the end of the topic, participants should be able to accomplish the following:

- Distinguish between reservoir rocks and sealing rocks
- Describe the importance of permeability and porosity to storing carbon dioxide
- Contrast the geological structures and trapping mechanisms for storing carbon dioxide
- Describe the changes in geologically stored carbon dioxide over time
- Outline the monitoring techniques employed to ensure the carbon dioxide is safely stored

Content of topic

- Overview of Geological storage systems
- Reservoirs, seals, structural and stratigraphic traps
- Storage Capacity Estimation
- Site selection
- Migration pathways
- Geochemistry and hydrodynamics
- Reservoir characterisation
- Modelling and simulation
- Drilling & Injection
- Containment (caprocks, faults, wellbore integrity)
- Long-term fate of CO₂ (dissolution, residual trapping and mineralization)

- Monitoring and verification

Topic 3. Carbon dioxide capture and transport – The Fundamentals

Summary of topic content and learning objectives

This topic provides an overview of where and how carbon dioxide can be captured and the range of technologies that can be employed in the capture process. In addition, it provides the details behind compression and transport of carbon dioxide.

By the end of the topic, participants should be able to accomplish the following:

- Appreciate the industrial applications of carbon dioxide capture
- Recognize the scale of industry required for transporting and storing carbon dioxide.

Content of topic

- Fuel types and emission sources
- Combustion processes
- Natural gas separation
- Industrial applications -
- Capture technologies
 - Solvent
 - Membrane
 - Adsorbent
 - Emerging technologies
- Compression and methods of transport
- Pipeline transport

Topic 4. Economics of CCS

Summary of topic content and learning objectives

This topic provides the principles behind analysing the costs of a CCS project and modelling to determine an optimal source-sink matching.

By the end of the topic, participants should be able to accomplish the following:

- Describe economic considerations for CCS

Content of topic

- Measuring the effectiveness of CCS
- Calculating CCS costs
- Source to sink matching

- Economic drivers for CCS

Topic 5. CCS storage opportunities and projects around the world

Summary of topic content and learning objectives

This topic examines the possibility of using carbon dioxide injection in extraction industries and in conjunction with other technologies.

By the end of the topic, participants should be able to accomplish the following:

- Outline the economic and environmental opportunities and challenges with using carbon dioxide injection in a range of applications.
- Review Malaysia-specific issues

Content of topic

- Enhanced oil recovery
- Enhanced gas recovery
- Niche opportunities for CO₂ storage (coal seams, basalts, salt and others)
- CCS projects around the world

Notes:

1. **Farewell Dinner on 3 May 2013** – Hosted by CCOP Technical Secretariat (venue-TBA)
2. All participants are required to bring their notebook or Laptop - at least 1 (one) for each country.