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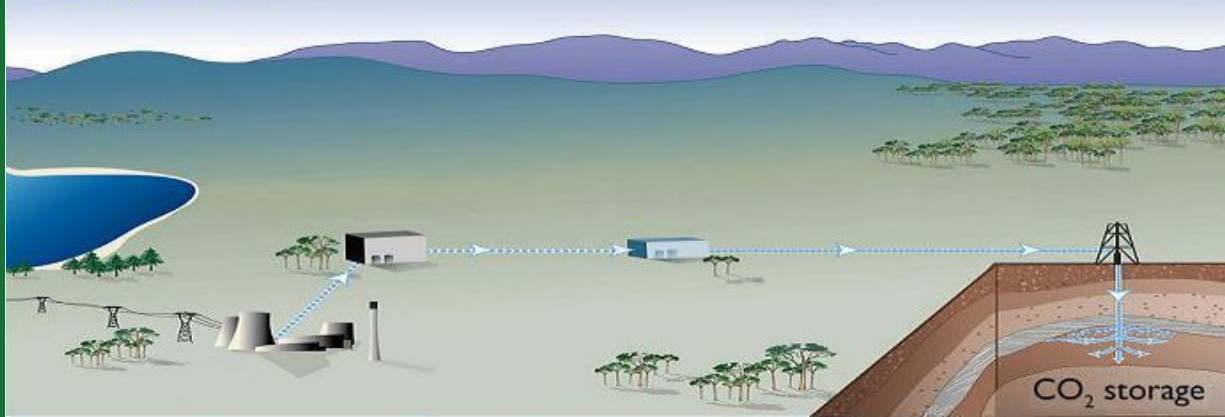
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SPE APPLIED TECHNOLOGY WORKSHOP

Carbon Management: Where CO₂ Capture and Storage Meets Oil and Gas Challenges

(Courtesy of CO2CRC)



Meeting the world's growing demand for affordable, secure and convenient energy while reducing Green House Gas emissions - particularly CO₂ - is the main challenge facing our industry today. Global energy demand is expected to double over the next quarter of a century and fossil fuels will dominate the supply of energy for the next three decades. In 2008, the G8 shared a goal of reducing global greenhouse gas emissions by at least 50% by 2050, and recognised Carbon Capture and Storage (CCS) as one of the options to reduce emissions. While CCS won't solve society's energy and environmental problems on its own, it provides a means to make use of the abundant fossil fuels needed in the energy mix which could make an important contribution over this timeframe. Currently nearly all of the CO₂ injected underground - nearly 0.5 gigatons (Gt) of CO₂ thus far - has been a consequence of CO₂ flood enhanced oil recovery, however, this amounts to a fraction of a percent of the world's CO₂ emissions from fossil fuels. For CCS to play a major role in reducing CO₂ emissions, it should be increased significantly.

The Middle East accounts for approximately 5-6% of global CO₂ emissions with annual emissions of approximately 1.5 Gt CO₂, roughly equally divided between oil and gas and with only a small contribution from use of coal. Gas flaring in the MENA region is about 50 billion cubic meters (bcm) annually, which makes it the second flaring region in the world after Russia and the Caspian region. Whereas, emissions from power/desalination plants constitute the largest fraction of CO₂ emissions (~40%) of which emissions from power plants are predicted to increase by approximately 5% annually. On the other hand, the Middle East has sufficient storage capacity of 500 Gt of CO₂ with an estimated scope for oil recovery from CO₂-EOR and Acid Gas of more 76 billion barrels.

This workshop will discuss the challenges and opportunities that CCS faces with a focus on:

- The role of CCS in meeting oil and gas challenges globally and in the Middle East
- Public policies, public support and acceptance, and the economics and business models to make CCS a reality particularly in the Middle East
- Technological advancements for capturing, handling, compressing, transporting and injecting CO₂ and/or CO₂/H₂S streams
- Opportunities and issues for EOR as a mid-term solution for CCS
- Sour gas developments and CCS (sources of CO₂ and potential sinks)
- Safe and reliable reservoir development and production addressing reservoir and well integrity issues of CO₂ injection in depleted oil and gas fields, saline aquifers and throughout full life cycle including monitoring and surveillance
- Methodologies and technology for monitoring and surveillance of the CO₂ geological storage

Workshop Objectives

Share the latest experiences in CO₂ capture, compression transport and injection into suitable geological formations for EOR and/or storage. Present the existing and future developments in well designs and completions highlighting the main problem areas with respect to HSE and operations and share best practices with strong emphasis on life cycles and well integrity including, leakage, new cement formulation, novel materials and artificial lift equipment designed for CO₂ services. Discuss production optimisation tools to assess CCS project economics to understand how to assess the technical and operational risks while bringing down the costs and assuring that CCS can be done safely. Finally outline steps to speed up the implementation of CCS in the Middle East and how to enhance the capabilities in this field while encouraging young people to specialise in this field.

Who Should Attend

This workshop is primarily aimed for petroleum and reservoir engineers, geoscientists, EOR and carbon management specialists in gas processing and in power generation, HSE engineers and economists. Also government, energy industry and private sector professionals who have an interest in climate change mitigation, who can play a vital role in identifying industrial sources of CO₂, and who can provide innovative technologies in the area of CCS are invited.

1-4 February 2009
Al Murooj Rotana Hotel
Dubai, United Arab Emirates

>>Registration deadline:
18 January 2009

Register by fax, email or
online at www.spe.org/atws

Tentative Technical Agenda

Sunday, 1 February

1700 – 1900 hours

Collection of Badges and Documentation

1900 hours

Welcome Reception and Dinner

Monday, 2 February (0830 – 1700 hours)

Session 1: Industry Challenges and Carbon Management

Meeting the world's growing demand for affordable, secure and convenient energy while reducing Green House gas emissions - particularly CO₂ - is the main challenge facing our industry today. This panel will host executives from NOCs, IOCs, service providers, government and institutions. Panelists will address the global issues and challenges and provide their views on how to promote effective actions to tackle carbon dioxide emissions via holistic, strategic and/or systematic changes within their own environment, and the energy industry.

Session 2: Carbon Management: Emerging Trends

There is a big challenge on whether increasing energy efficiency and changing our way of life will be sufficient for mitigating CO₂ emissions. Coupling the industry with CCS, the associated policies and regulations as well as cost of implementation has been challenged particularly with the uncertainty of who owns the CO₂ and who would be responsible and liable for the long-term sustainability of the CCS sites. A broad range of stakeholders needs to fully understand the high value of clean systems in order to ensure the sustainable use of fossil fuels. This session will host panelists from power and desalination industry, private sectors, community leaders, regulators and policy makers from global and local governments. The panelists will address existing regulatory and legal frameworks and present the challenges that may face the industry in establishing CCS frameworks that are acceptable to both, the communities and the private sector.

Session 3: Industrial Sources and Supply of CO₂

The Middle East also accounts for approximately 5-6% of global CO₂ emissions with annual emissions of approximately 1.5 Gt equally divided between oil and gas and with only a small contribution from use of coal. Emissions resources include power/desalination plants, cement industries, chemical/ammonia plants, fuel transformation refineries, and steel plants. There is considerable confusion on the availability and economical recoverability of these CO₂ resources. This session will highlight the sources and the opportunity for capturing and supplying it to the customers, starting from current best large-scale industrial point sources and ending with the evolving resources from gasification and oxy-combustion processes.

Session 4: CO₂ Capture Technologies

The "Capture" of CO₂ from large point sources such as power production, gas processing, or other industrial sources involves technologies to yield CO₂-rich streams suitable for transport and geological storage. Capture processes can utilise separation technologies for a range of gases - e.g. CO₂, N₂, H₂, CH₄, H₂S, and O₂. This session will focus on:

- Capture technologies best suited for different CO₂ sources
- Cost, performance, and readiness of capture technologies
- Gaps and needs

Tuesday, 3 February (0830 – 1700 hours)

Session 5 : The Role of CO₂ EOR in CCS

CO₂ EOR is one of the ways to "put carbon back where it came from" as it stores CO₂ in geological formations. CO₂ EOR is a proven technology. Other methods proposed for geological storage of CO₂, in descending economic order, included: storage in gas reservoirs, in depleted fields and in saline geological formations. What sets CO₂ EOR apart from these other sequestration options is its ability to create additional value by enhancing hydrocarbon recovery beyond levels possible with primary and secondary recovery methods. In fact, CO₂ injection has been identified as one of the most promising EOR methods worldwide and for many of the Middle East reservoirs.

This session will focus on:

- CO₂ storage potential by a conventional CO₂ EOR operation (value / significance from sequestration point of view)
- CO₂ EOR/ storage past experiences and learnings
- Unique challenges of applying CO₂ EOR in the Middle East
- Regulatory and legal issues in the transition from "Enhanced Recovery" to "Storage"

Session 6: Acid Gas Injection for EOR and Storage

Sour hydrocarbon resources worldwide exceeds 500 bln boe of which 2/3 exists in the MENA region. The H₂S content in the gas ranges from < 0.5% up to 35% while the CO₂ content could be as high as 25% with few fields having high levels of N₂. Development of these fields to recover the hydrocarbons requires safe and economical means to handle these non-hydrocarbon streams. This session will address the present and expected future challenges these fields will face in their development and will discuss the opportunities, technologies and capabilities that will enable their development. It will focus on field cases to separate H₂S and CO₂ and solutions to create either value products of these streams and or store them via acid gas injection in reservoirs.

Tentative Technical Agenda

Session 7: Special Session Games/ Networking

This is a team building session with Learnings on CO₂ trading

Session 8: CO₂ Transport and Facilities Poster Session for EPC

This session is designed to be a dynamic poster session. Technology companies, pipeline companies, engineering, procurement and contractors will be invited to present their latest technologies or projects in an active session. The attendees will be divided into groups and will visit all posters in a scheduled time. Multi-media, posters and table power point presentations are encouraged in addition to regular posters.

Wednesday, 4 February (0830 – 1700 hours)

Session 9: Materials Selection, Integrity, Risk Management and HSE

Materials requirements for CO₂ transport and injection facilities constitute the major share in the unit technical cost. Established industry guidelines are well suited for acid gas or sour gas practices. However CO₂ is not as corrosive as H₂S. Direct use of these specs for CO₂ services with large safety margins will unnecessarily inflate the project costs. A new class of material specifications between the CRA and carbon steel are needed for CO₂ services.

In this session the following will be discussed:

- What is unique for CO₂ in terms of materials integrity, tubulars, cement, elastomers?
- How to address specific challenges for CO₂ handling?
- What are the tools available today for performance monitoring and managing the integrity risks related to surface handling and downhole injection of CO₂?
- How to develop customised material specifications for CCS projects? Who is in charge?

Session 10: Storage Modelling and Monitoring Capabilities

Reactive fluid transport phenomena through porous media are a complex problem. Conventional flow simulation software fails to address multi physics in a unique model. Challenges are arising from three different domains, fluid flow, rock fluid interactions and geomechanics. This session will focus on site characterisation, modelling and monitoring and verification techniques to deliver bankable storage projects in an economical, credible and timely fashion.

Discussion topics will include:

- The challenges of consistency in data compilation, interpretation and modelling for commercial-scale CCS, given the variability in the extent and quality of engineering, geological and geophysical data.
- Developing (and agreeing) on “best practice” of characterising potential CO₂ storage sites, where characterisation includes estimating volumetric CO₂ storage capacity, injectivity and containment.
- Detailed modelling of the behaviour of the injected CO₂ both during and post injection, especially with respect to plume migration, chemical evolution, and potential interaction with reservoir and caprock.
- Learnings and analogs from current state of modelling tools from field cases of geological storage, EOR, EGR and ECBM projects
- Implementation of appropriate monitoring and verification (M&V) methodologies in light of almost certain regulatory agencies' requirements. Should the M&V program be taking into account surface and atmospheric CO₂ movement or only subsurface systems? What seismic, geochemical, geomechanical or airborne techniques are available?

Session 11: CCS Projects Economics, Financing Challenges

CCS technology utilized with new large plants can reduce emissions by 80% – 85%. However, capture technologies require additional energy, which reduces overall efficiency. Conversion loss estimates range from 4% to 13% with the lowest being for future integrated coal gasification combined cycle (IGCC) designs. The margin for profits with plants equipped with CCS will increase with an increase in energy conservation and efficiency particularly in the capture process. CCS competitiveness will also be influenced by the proximity of sources to sinks and other local circumstances. Additionally, policy choices that favor one technology over others will have a huge bearing on the economics of CCS as well as the emerging carbon credit market. This session will address the cost of CO₂ from source to storage and will explore the range of uncertainty regarding the cost of deploying CCS technologies and how to turn such waste into a valuable product through a life cycle assessment approach and how the regulatory framework and policies will support and subsidise the first movers. In addition, comparison of competitiveness relative to other CO₂ emission reduction options and the uncertainty of CCS cost vs. the uncertainty of costs of other options will be explored.

Session 12: How to make CCS reality in ME

Carbon management projects are an effective way of mitigating climate change challenges while providing value added benefit to the local community. It will create new synergies between earth sciences and industry. From the economic perspective it will introduce new opportunities for private/public partnership. In this plenary session a potential road map will be debated to make CCS projects reality in the Middle East.

General Information

Format:

Welcome Reception and Dinner followed by 3 days of informal discussions prompted by selected keynote presentations and discussions. Attendees will be assigned to discussion groups on a random basis for the breakout session on the second day to maximise the opportunity to interact with other participants.

Poster Sessions:

The Steering Committee encourages registrations from professionals who are able to prepare and present a poster on a relevant project. Details of the poster size and facilities will be provided in the joining instructions.

Attendance:

Registrations will be accepted on a first-come first-serve basis. The Steering Committee encourages attendance from those who can contribute to the workshop most effectively either in discussions or with posters. A mix of attendees in terms of geographic origin, companies and discipline will be encouraged.

Documentation:

- Proceedings will not be published; therefore, formal papers and handouts are not expected from speakers.
- Work in progress, new ideas and interesting projects are sought.
- Professionally-prepared visual aids are not required; handwritten view graphs are entirely acceptable.
- Note-taking by participants is encouraged. However, to ensure free and open discussions, no formal records will be kept.

Workshop Deliverables:

- The Steering Committee will appoint a "scribe" to record the discussions and to produce the full workshop report for SPE.
- This report will be circulated to all attendees as the workshop deliverable within 4-6 weeks following the workshop. The copyright of the report is with SPE.
- PowerPoint presentation materials will be posted on a specific SPE URL address after the Workshop. Provision of the materials by the discussion leaders will signify their permission for SPE to do so.

Commercialism:

In keeping with ATW objectives and the SPE mission, excessive commercialism in posters or presentations will not be permitted. Company logos must be limited to the title slide and used only to indicate the affiliation of the presenter and others involved in the work.

Attendance Certificate:

All attendees will receive an attendance certificate attesting to their participation in the workshop. This certificate will be provided in exchange for a completed workshop questionnaire.

Continuing Education Units:

Attendees at this workshop qualify for SPE Continuing Education Units (CEU) at the rate of 0.1 CEU per hour of the workshop.

Registration Information:

The registration fee is **USD 1,850** for **SPE members** and **USD 1,950** for **non-members**.

The fee includes the following:

- All workshop sessions
- Welcome reception followed by dinner on Sunday, 1 February 2009
- Daily coffee breaks and luncheons
- Workshop Workbook and Certificate of Continuing Education Units (CEU)

Note: Accommodation is NOT included in the workshop registration fee. Lodging space is limited, so you are encouraged to place your reservation early. Each registrant will receive housing information once they register for the workshop. SPE has negotiated a special discounted rate at the Al Murooj Rotana Hotel for the workshop attendees.

Registration Policy:

- Registration fee **MUST** be paid in advance for attending the Applied Technology Workshop.
- Full fixed fee is charged regardless of the length of time that the registrant attends the Workshop.
- Fixed fee cannot be prorated or reduced for anyone (workshop chairpersons, committee members, speakers, discussion leaders, students and registrants).
- Attendees are expected to attend all workshop sessions and are not permitted to attend on a partial basis.

Cancellation and Refund Policy:

- A processing fee of **USD 100** will be charged for cancellations received before the registration deadline **18 January 2009**.
- For cancellations received after the registration deadline, **18 January 2009**, 25% refund will be made to the registrant.
- No refund on cancellations received within seven (7) days prior to the workshop date, i.e. on or after **25 January 2009**.
- No refund will be issued if a registrant fails to attend the workshop.

Workshop Venue:

Al Murooj Rotana Hotel
P.O. Box 117546, Dubai, U.A.E.
T: +971.4.321.1111
F: +971.4.321.5555
almurooj.hotel@rotana.com

Attendees' Information:

Upon registration, general and detailed accommodation information will be forwarded to registrants along with the registration confirmation.

Attention Non-Members!

Sign Up On-Site for One Year Membership and Get One Additional Year!

Call SPE Middle East, North Africa and India on +971.4.3903540 or Email dmakhija@spe.org for more information

Carbon Management: Where CO₂ Capture and Storage Meets Oil and Gas Challenges & Opportunities

Registration Form

First Name: _____ Last Name: _____

Job Title: _____

Company: _____

Address: _____

Town/City: _____ Postcode: _____ Country: _____

Email: _____

Tel: _____ Fax: _____

SPE Member: Yes No If Yes, SPE Membership Number: _____

Details of relevant experience: _____

Do you wish to present a poster? (subject to selection) Yes No

Do you wish to be considered a Discussion Leader? (subject to selection) Yes No

If yes, please indicate which subject you would like to present on:

Registration Fees : USD 1,850 for SPE Members USD 1,950 for Non-members

Payment by Credit Card:

Credit Card (Check one) American Express MasterCard Visa

Card Number (will be billed through Society of Petroleum Engineers)

Expiry Date (mm/yy)

Name of Credit Card Holder (printed): _____

Billing Address including Zip Code/Postal Code of Card: _____

Signature (required): _____ Date: _____

Cancellation and Refund Policy:

Payment by Bank Transfer: IMPORTANT - For Reference: Please Quote "09ADB2" and Name of Delegate
 Make Payment to: HSBC Bank Middle East, Jebel Ali Branch, PO Box 66, Dubai, UAE
 Account Name: SPE Middle East FZ-LLC Account Number: 035-129709-100 Swift Code: BBMEAEAD

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To submit your registration online, please visit the SPE Web Site at: www.spe.org/events/09adb2
 or email this form to : formsdubai@spe.org.
 or fax this form to: +971.4.366.4648

