Workshops on Carbon Capture and Storage

Instituto de Ingeniería, UNAM

Program

CO_2 Geological Storage and Enhanced Oil Recovery (EOR)

March 21-23, 2012

http://eventos.iingen.unam.mx/CCSworkshops

INSTITUTO DE INGENIERÍA UNAM

carbon sequestration leadership forum

Organizing Committee

- Dr. Adalberto Noyola Robles
  II-UNAM (Chair of CCS Workshops)
- Dr. José Miguel González Santaló
  CSLF (Representative of Mexico)
- Dr. Claudia Arango Galván
  (Chair of the CO_2 Geological Storage and Enhanced Oil Recovery (EOR) Workshop)
- Dr. Javier Aguillón Martínez
  II-UNAM
- Dr. David Morillón Gálvez
  II-UNAM
- Dr. Michiko Amemiya Ramírez
  II-UNAM
- MEng. Dulce Merari Cid León
  II-UNAM

Acknowledgments

- BA. Berenice de las Heras Sánchez (II-UNAM)
- BA. Sandra Lozano Bolaños (II-UNAM)

Organized by

INSTITUTO
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UNAM

carbon
sequestration leadership forum

General Information

Badges

The name badge issued to all participants at registration desk serves as an admission pass to all sessions and lunch. Participants are asked to wear their name badge at all times.

Binder

Each participant will receive a binder for notes with supplementary material and the program of the workshop.

Certificate of Participation

A Certificate of Participation for speakers will be provided at their specific session.

Certificate of attendance

A Certificate of attendance will be provided during the last day of the workshop.

Language

English is the official language of the workshop. No translation will be provided.

Lunch

Lunch will be provided at no cost to all participants and speakers in the restaurant "Azul y Oro" located at the lobby of the venue.

Proceedings

A CD including the presentations will be packed into participant´s binder.

Registration Opening Time

Registration area will be open on Wednesday 21st from 8:00 to 9:00 a.m.

Venue

Torre de Ingeniería, UNAM
Conference Rooms: North 3 and North 4,
Address: Circuito Escolar, Ciudad Universitaria, 04510, México, D.F.

Welcome Letter

March 21, 2012

Dear Participants in the Mexico City Geological CO_2 Storage Workshop

We would like to extend to all of you a warm welcome to this workshop that has been organized with the financial support of the CSLF Capacity Building Program and is hosted by the Institute of Ingineering of UNAM.

The workshop has benefited from a lot of voluntary work on the part of the presenters. This contribution is of great value and it is deeply appreciated.

Since the main purpose of the workshop is to introduce the topic of Geological Storage of CO_2 in the Academic Environment, the participation of all the participants is also equally important. We thank you for setting up time apart to participate in this effort and hope that the information that will be discussed over the next three days ends up being useful in your regular academic activities, either as topics in your regular courses or as ideas for research and thesis topics.

Also our deep appreciation to everyone involved in the organization of the event that, as it is normally the case, ended up requiring much more time from all of us than it was anticipated.

This effort by the CSLF and everyone involved responded to our strong conviction that CO_2 Capture and Storage is a needed technology to mitigate climate change and it is of outmost importance for humankind. We are very proud of the response received and want to express our best wishes for a productive workshop.

Sincerely Yours

Dr. Adalberto Noyola Robles
Chair of CCS Workshops and
Director of the Institute of Engineering, UNAM

Dr. José Miguel González Santaló
México's representative to the CSLF

Speakers' Profiles

John Panek
US/DOE, USA

John M. Panek is the Deputy Director of the Carbon Sequestration Leadership Forum (CSLF) Secretariat. Mr. Panek has 30 years of experience working for the U.S. Department of Energy including assignments at several DOE National Laboratories. Most notably Mr. Panek has worked on the construction and operation and served as the Program Manager of the Great Plains Coal Gasification Project which has operated successfully for 25 years as the only commercial scale coal-to-natural gas facility in the United States. During the past 10 years the Great Plains Project has successfully captured, compressed and transported more than 20 million tons of CO_2. The Great Plains Project currently captures 3 million tons of CO_2 annually and transports the CO_2 more than 200 miles to an oil field in Canada for enhanced oil recovery.

John Panek has a B.S. Degree from the University of Illinois, Chicago and an M.B.A. from Keller Graduate School of Management in Chicago.

Stefan Bachu
Alberta Innovates – Technology Future, Canada

Stefan is a Distinguished Scientist at Alberta Innovates – Technology Futures in Alberta, Canada. For the last two decades Stefan has focused his research interest and efforts on the potential for, and risks of CO_2 storage in geological media as a mitigation strategy for reducing greenhouse gas emissions into the atmosphere. Between 2002 and 2005 Stefan contributed as a Lead Author to the IPCC Special Report on CO_2 Capture and Storage, in which capacity he is co-sharing in the 2007 Nobel Peace Prize awarded to IPCC. Between 2005 and 2007 Stefan represented the Alberta Energy Resources Conservation Board on the Interstate Oil and Gas Compact Commission Task Force on CO_2 Storage. In 2007 Stefan served on the Technical Working Group of the Canada-Alberta EcoEnergy Task Force on Carbon Capture and Storage. Since 2004 Stefan represents Canada on the Technical Group of the Carbon Sequestration Leadership Forum (CSLF), where he chaired the CSLF Task Force on CO_2 Storage Capacity Estimation.

Stefan is Associate Editor of the International Journal of Greenhouse Gas Control. He has published more than 175 papers in journals and conference proceedings, made more than 300 presentations and wrote more than 100 professional reports, of which more than half are on the subject of CO_2 sequestration in geological media as a climate-change mitigation strategy.

Ramón Carbonell
Geología, CIUDEN, Spain

R. Carbonell received a M.S. (1986) in physics, (Univ. of Barcelona, Spain) and a Ph.D. (1991) in Geophysics (Univ. of Wyoming, WY US). He did postdoctoral research at: Univ. Wyoming; the Houston Advanced Research Center (Geotechnology Research Institute), Rice University (TX, US). Since 1993 is developing research in Earth Sciences at the Spanish National Research Agency. He is Visiting Professor at the Earthquake Research Institute, Tokyo University (Japan) and at Rice University. Key Research topics are centered in control source seismology, seismic imaging and tectonophysics. Has been involved in acquisition, processing and interpretation of seismic reflection programs: Seismic Studies of the Iberian Crust (ESCI), Iberian Atlantic Margins (IAM), Urals Reflection Seismic Experiment and Integrated Studies (URSEIS), Crustal structure of the transpressional Variscan orogen of SW Iberia (IBERSEIS). He has: published more than 70 research manuscripts in peer reviewed journals; advised 20 students (Master and Ph) and been PI in over 50 research projects. Has hold several professional offices including, President of the Seismological Division of the European Geoscience Union (2007 to 2010). His research interests included the development and application of methodological aspects of seismic imaging (wave propagation, inverse problems), studies concerning the structure, nature, evolution of the Earth's crust and the use of applied geophysics to shallow environmental problems. Has been PI for several projects dealing with deep geological reservoirs for radioactive waste, geotechnical assessment for the construction of subsurface infrastructures (tunnels, subway, etc), since 2009 is responsible of the geophysical research in characterization and monitoring for the CO_2 geological storage program (CIUDEN Foundation).

Marcelo Ketzer

Pontifical Catholic University of Rio Grande do Sul, Brazil

J.M.Ketzer graduated in Geology (1994) in the Federal University of Rio Grande do Sul and got his Master degree in Geosciences (1997) from the same university. He obtained a Ph.D. degree in Mineralogy, Petrology and Tectonics (2002) from the Uppsala University, Sweden and conducted post-doctoral work on CO_2 storage in mature oil fields (2003) with the French Petroleum Institute. Currently, he is associated professor of the Pontifical Catholic University of Rio Grande do Sul (PUCRS), and head coordinator of the Brazilian Carbon Storage Research Center (CEPAC). J.M. Ketzer is permanent member of the post-Graduate Program on Engineering and Material Technologies and the post-Graduate Program on Economy of PUCRS, and researcher of the National Research Council (CNPq). His main research interests are: (1) Stratigraphy and petrology of sandstone reservoirs applied to hydrocarbon and groundwater exploration and CO_2 storage; (2) unconventional sources of fossil fuels such as gas hydrates and coal bed methane; (3) clean technologies for the use of fossil fuels such as carbon capture and storage.

Edward Steadman

Energy and Environmental Research Center, University of North Dakota (EERC UND), USA

Mr. Edward N. Steadman is a Deputy Associate Director for Research at the Energy & Environmental Research Center, where he currently oversees the oil and gas research area, including the Plains CO_2 Reduction (PCOR) Partnership Program. The PCOR Partnership is one of seven regional partnerships funded by the U.S. Department of Energy's National Energy Technology Laboratory Regional Carbon Sequestration Partnership Program to assess the technical and economic feasibility of capturing and storing (sequestering) CO_2 emissions from stationary sources in the northern Great Plains and adjacent area. Under this program, Mr. Steadman leads a multidisciplinary team of researchers working on an assessment of CO_2 sources, potential CO_2 storage sites, enhanced oil recovery (EOR) opportunities, saline formations, unminable coal seams, and sequestration infrastructure.

Mr. Steadman's principal areas of interest and expertise include carbon sequestration, chemical transformations during coal combustion, and materials science. He holds an M.A. degree in Geology from the University of North Dakota and a B.S. degree in Geology from the University of Pennsylvania–Edinboro.

Barbara Dietiker
Geological Survey of Canada, Canada

Barbara Dietiker is the data administrator and integrator of Weyburn-Midale CO_2 Project. Before starting in the GSC-PTRC collaboration on the Weyburn-Midale Research Project in 2007, she held different contracts with the Geological Survey of Canada (GSC). Dietiker received her MSc in Applied Geophysics from Federal Institute of Technology (ETH), Zurich in 2005. She has worked on calibration of 3D time-lapse seismic data with a special interest in measuring acquisition differences. In the Weyburn-Midale CO_2 Project, she has been responsible for the project's data exchange between the researchers. Currently she is focussing on creating a data archive for future use and reference.

Amparo Martínez Arroyo
Center for Atmospheric Sciences, UNAM, Mexico

She graduated as Biologist and obtained her Master´s Degree from the Faculty of Sciences in the National Autonomous University of Mexico. She obtained a Ph.D. in Ecology from the Faculty of Biology in the University of Barcelona and accomplished a research stay in the Institute of Marine Sciences in Barcelona. She is a researcher at the Atmospheric Sciences Center (CCA), and Coordinator of the Atmospheric Aerosol Group. From December 2009 was elected the Director of the CCA.

She has been a pioneer in the study of atmosphere-biosphere interactions in aquatic systems considering processes of photosynthesis, such as biogenic emission and biogenic

capture of other climatically active gases in continental, urban, coastal and marine ecosystems.

She is an expert in analyzing environmental problems; her research includes topics such as variability and climate change. She has done an extensive outreach in spreading the scientific work in the UNAM, and has helped to establish strong relationships between science and society.

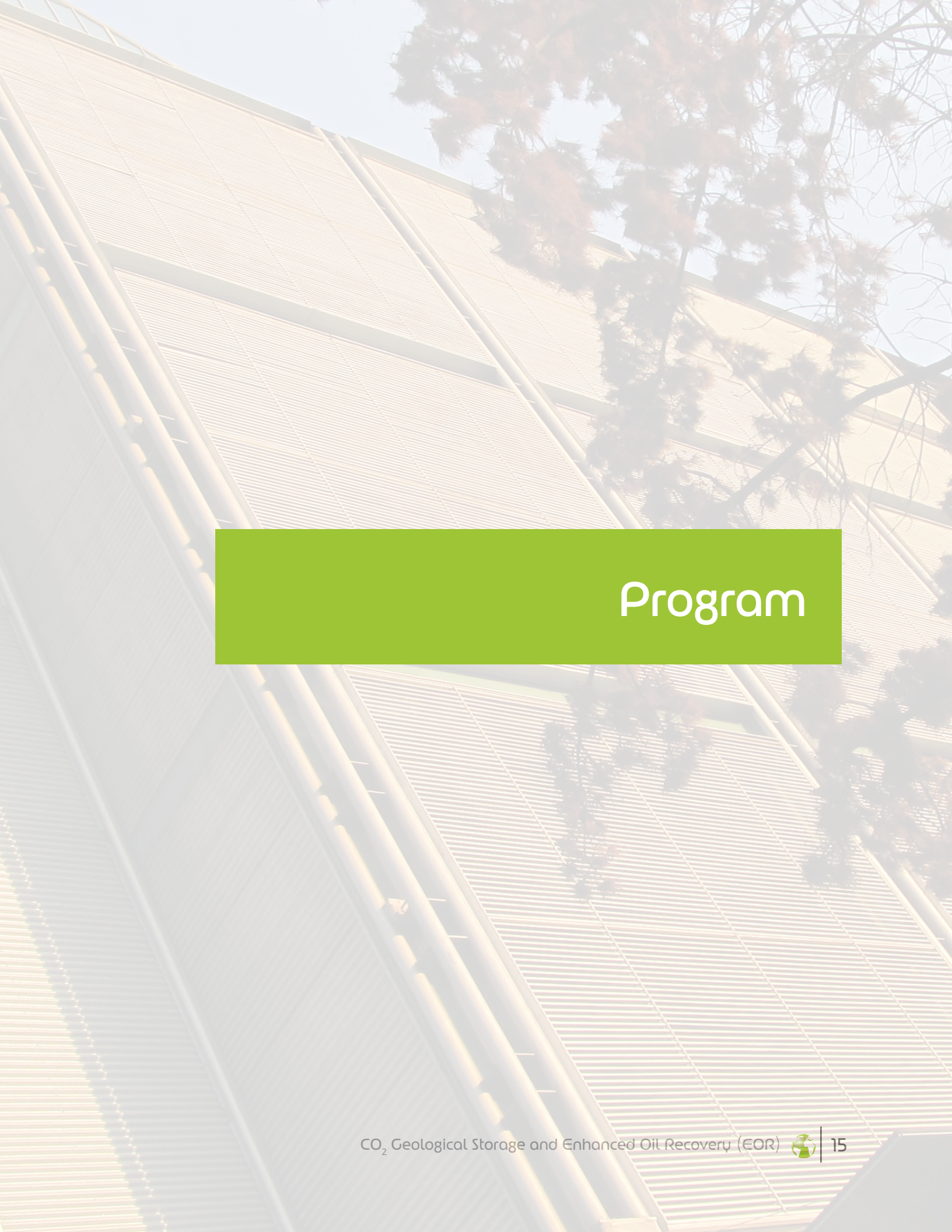
Rodolfo Lacy
Mario Molina Center, México

He graduated in Environmental Engineering from the Autonomous Metropolitan University and had a scholarship from the Rockefeller Foundation in the Environmental and Sustainable Development Leadership Program. He obtained a Masters Degree in Environmental Planning from the Massachusetts Institute of Technology. He coordinated and edited the first report on Environmental Condition in Mexico and is author of the book "Air Quality in the Mexican Valley." He was the Founding President of the College of Environmental Engineers of Mexico, General Director of the Environmental Pollution Control and Prevention Agency of the Federal Government of Mexico, D.F. and Coordinator of Advisors in the Secretary of Environment and Natural Resources. He is currently the Coordinator of Mario Molina Center for Strategic Studies on Energy and Environment.

Moisés Dávila
Federal Electricity Commission (CFE), México

He graduated in Geological Engineering from the Autonomous University of San Luis Potosi, Mexico in 1980; he earned a Master´s degree in Engineering in 2001 and a PhD in Science from the National Polytechnic Institute in 2011. For over 32 years he has developed projects in different aspects of geology applied to the Federal Electricity Commission (CFE) and other national and international entities, from exploration of sites up to the operation. In this company he has had the position of Superintendent of Studies from 1986 to 2004, Manager of Galleries Excavation from 1991 to 1992, Manager of the Treatment and Supervision from 1998 to 2004, and since 2004 is currently a Submanager for Geological Survey. He has written several monographs and articles that have been published in indexed journals on Geological topics. He has been awarded the Adolfo López Mateos Medal of Merit from CFE and earned Honorable Mentions for his studies in Masters and PhD, and graduated with Academic Merit from the Autonomous University of San Luis Potosi, Mexico.

He is currently Vice President of the Mexican Geological Society and Founding Partner and Secretary of the Earth Pro Science Foundation.



Program

CO_2 Geological Storage and Enhanced Oil Recovery (EOR)

Wednesday, march 21st, 2012

8:30-9:00	**Opening Remarks** Dr. Adalberto Noyola, Director of the Insitute of Engineering, UNAM Dr. José Francisco Valdés, Director of the Institute of Geophysics Dr. John Panek, CSLF Secretariat
9:30 - 10:30	**GHG and CO_2 emissions in the world and in Mexico** Dra. Amparo Martínez Arroyo, Center for Atmospheric Sciences, UNAM
9:30 - 11:15	**Fundamentals and options for CO_2 Geological Storage** Stefan Bachu, Alberta Innovates – Technology Futures, AB, Canada
11:15 - 11:30	**Break**
11:30 - 13:00	**Site screening, selection and characterization** Stefan Bachu, Alberta Innovates – Technology Futures, AB, Canada
13:00 - 14:30	**LUNCH**
14:30 - 15:30	**Estimation of CO_2 Storage Capacity** Stefan Bachu, Alberta Innovates – Technology Futures, AB, Canada
15:30 - 16:30	**Specific site Assessment** Ramón Carbonell, CSIC, España
16:30 - 16:45	**Break**
16:45 - 18:30	**Geophysics, Geomechanics and Geochemistry of CO_2 Geological Storage** Marcelo Ketzer, PUCRS, Brazil

thursday, march 22nd, 2012

Storage in saline acquifers

9:00 - 10:00	**Modelling of the CO_2 plume** Ramón Carbonell, CIUDEN, España
10:00 - 11:00	**Hontomin project presentation** Ramón Carbonell, CIUDEN, España
11:00 - 11:30	**Break**
11:30 - 13:00	**Storage in EOR operations** Edward Steadman, EERC UND, USA
13:00 - 14:30	**LUNCH**

R&D Topics (Discussion panel)	
14:30-16:00	**Suggested Topics** **Effectiveness of CO_2 injection for oil recovery** **Impact of field characteristics** **Techniques to improve performance** **CO_2 separation from oil** **EOR economics** Panelists John Panek, US/DOE (Moderator) Stefan Bachu (2), Alberta Innovates – Technology Futures, AB, Canada Marcelo Ketzer(2), PUCRS, Brazil Barbara Dietiker, PTRC, Canada Edward Steadman, EERC UND, USA
16:00 - 16:30	**Break**
16:30 - 18:30	**R & D session continued**
Friday, march 23rd, 2012	
Risk Assessment	
9:00 - 9:45 10:00 - 10:45	**Monitoring** Rodolfo Lacy, Mario Molina Center, México Ramón Carbonell, CIUDEN, España
10:45 - 11:15	**Break**
11:15 - 13:00	**Monitoring. The Weyburn-Midale case** Barbara Dietiker, PTRC, Canada
13:00 - 14:30	**LUNCH**
Preliminary assessment of Mexico's potential for CO2 storage	
14:30 - 16:15	**CO_2 Storage Site Atlas for Mexico** Moisés Dávila, CFE, México
16:15 - 16:45	**Break**
16:45 - 18:00	**Oil and gas fields in Mexico** Fernando Rodríguez de la Garza, PEMEX (to be confirmed)
18:00 - 18:30	**Conclusions**

Notes

Notes

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