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CzGS (Czech Geological Survey)

Authors: Vit Hladik (CzGS), Rob Arts (CO_2GeoNet-TNO), Ender Okandan (METU-PAL), Niels Poulsen (CO_2GeoNet-GEUS), Marie Gastine (BRGM), Amuliu Proca (GeoEcoMar)

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***PU** = Public

Table of contents

1. Introduction

A series of knowledge-dissemination workshops focused CO_2 geological storage (CGS) has been planned within WP5 'Knowledge dissemination', task 5.3 'Workshops'. The idea was to hold these workshops in countries where the first CCS demonstration projects are under preparation, i.e. those co-funded from the EEPR and potentially from the NER300 mechanisms. The main goal of these workshops is to support the first CCS demonstration projects by providing scientific information on CO_2 geological storage and thus increasing the ability to appraise the safety of CGS. Relevant topics can include: Basics of CO_2 geological storage, Frequent misunderstandings, Similarities and differences with natural gas storage, Risk management, Impact on the inhabitants of the storage area, etc. CGS Europe participants are expected to provide presentations at these workshops; other relevant experts from outside of the consortium can be invited whenever suitable, in particular national experts. In addition to the workshops in the 'forerunner' countries, 1-2 proposals were deemed acceptable from countries with significant CO_2 emissions but with limited CCS activities. Altogether, the original plan anticipated organisation of up to 13 workshops of this kind.

An internal call was opened at the beginning of the project (November-December 2010), inviting project participants to submit proposals to prepare these workshops, including suitable dates, locations and main focus (see the call wording in Annex I). In response to this call, 9 proposals were submitted, which was disappointing. Moreover, only five of the proposals came from countries with CCS demo projects under preparation (at that time). The proposals are summarised in Tab. 1.

No	Countries involved	Proposed date	Place	Project participants involved
1	Denmark / Norway	May 2011	Copenhagen	CO_2GeoNet (GEUS, IRIS, SINTEF, NIVA)
2	Spain	October 2011	Not announced	S-IGME
3	Italy	Spring 2012	Rome	CO_2GeoNet (URS, OGS)
4	France	2nd half of 2012	Lorraine	BRGM, CO_2GeoNet – IFPEN
5	Finland	2013	Espoo	GTK
6	Greece	May 2011	Athens	G-IGME
7	Slovakia	Spring 2011	Bratislava	SGUDS
8	Portugal / Spain	June 2011	Lisbon	LNEG, S-IGME
9	Turkey	October 2011	Ankara	METU-PAL

Table 1: Overview of workshop proposals submitted in response to the 1st call for proposals (December 2010)

After intensive discussions, the CGS Europe Management Board decided to accept the proposals No 1-5 that were planned in countries with CCS demonstration activities under preparation (at that time), and proposal No 6 by G-IGME (Greece) as an activity example in a country with carbon-intensive economy but with limited CCS activities.

Proposals No 7-9 were denied; however, the workshops were declared acceptable as CGS Europe actions provided the responsible participants are able and willing to organise them without additional requirements for funding from the CGS Europe budget (i.e., with funding from the participants' budget as allocated at the beginning of the project). METU-PAL (Turkey) have used this option, and a Turkish national knowledge-dissemination workshop was organised in Ankara in December 2011 (see chapter 6).

Further decisions of the Management Board included the following:

- A second call for workshop proposals will be opened at the mid-term of the project and participants from 'forerunner' countries will be encouraged to submit proposals (e.g. the UK, the Netherlands, Poland, Germany, etc.);
- Opportunities will be sought by the Management Board and by the WP5 team to co-organise CGS knowledge dissemination workshops together with other entities like professional associations or national CCS stakeholders in order to approach the relevant target audiences.

The latter decision resulted in CGS Europe engagement in organisation of a CGS workshop within the 73rd Annual Conference of the European Association of Geoscientists and Engineers in Vienna in May 2011, of a Masterclass on CGS within the SciTech Europe conference in Brussels in November 2011, of CGS sessions at the Sustainable Earth Sciences conference in Valencia in November 2011, and of a CGS session at the Romanian Annual CCS conference in Craiova in March 2012.

The approved workshops (1-6 in Tab. 1), however, experienced difficulties with time planning for various reasons, incl. difficult negotiations with demonstration projects' managing entities, overlapping time schedule of various CCS-related events, the financial and economic crisis (hardly affected, i.a, the planned workshop in Greece), etc. These resulted into postponements of most of the workshops. The actual time schedule of the workshops is presented in Tab. 2 (workshops organised in the period 11/2010-3/2012) and in Tab. 3 (workshops planned for the 2nd project period).

No	Title	Date & place	Countries addressed	Project participants involved
1	73rd EAGE Conference – workshop 'CO_2 storage: From demonstration projects to full deployment'	27 May 2011, Vienna, Austria	Europe	CO_2GeoNet-TNO, CO_2GeoNet-OGS, CO_2GeoNet-IFPEN, BRGM
2	Sustainable Earth Sciences conference – CGS sessions	8-11 November 2011, Valencia, Spain	Europe	CO_2GeoNet-TNO, BRGM, CO_2GeoNet-IFPEN, CO_2GeoNet-BGS, SGUDS, CO_2GeoNet-Imperial, CzGS
3	SciTech Europe - Masterclass 'CO_2 geological storage – a key to a cleaner future'	24 November 2011, Brussels, Belgium	Europe	BRGM, CO_2GeoNet-BGS, S-IGME, RBINS-GSB
4	CGS Europe Knowledge Sharing Workshop 'CO_2 Geological Storage in North–western Europe'	12-13 December 2011, Copenhagen, Denmark	Denmark, Norway, Northern Europe	CO_2GeoNet-GEUS, CO_2GeoNet-IRIS, CO_2GeoNet-NIVA, CO_2GeoNet-SINTEF
5	Workshop 'Climate change and CO_2 emissions in Turkey, mitigation plans and need for CCS'	16 December 2011, Ankara, Turkey	Turkey	METU-PAL
6	3rd International Workshop 'Promoting CCS in Romania' – session 'Best practices for a safe geological CO_2 storage'	22-23 March 2012, Craiova, Romania	Romania	GeoEcoMar, BRGM, CO_2GeoNet-URS

Table 2: Overview of workshops organised in the 1st project period (all advertised with the CGS Europe logo)

In the following chapters, the events organised within the 1st project period are described more in detail, in chronological order.

2. EAGE conference Vienna, Austria – CO_2 storage workshop

Event title:	73rd EAGE Conference & Exhibition incorporating SPE EUROPEC 2011 – workshop 'CO_2 storage: From demonstration projects to full deployment'
Date:	27 May 2011
Place:	Vienna, Austria
Number of participants:	40
Type of audience:	geoscientists, engineers, regulators
CGS Europe partner in charge:	CO_2GeoNet-TNO
Other partners involved:	CO_2GeoNet-OGS, CO_2GeoNet-IFPEN, BRGM, CO_2GeoNet-URS
Cooperating entities:	EAGE – European Association of Geoscientists & Engineers

The workshop was a joint effort of CGS Europe, CO_2GeoNet and EAGE. It was organised at the end of the EAGE conference; the main organisers were Rob Arts (CO_2GeoNet-TNO) and Giuliana Rossi (CO_2GeoNet-OGS). The theme 'CO_2 storage: from demonstration projects to full deployment' was expressed in several presentations sharing experiences in current CO_2 storage demonstration projects. The theme was selected in tandem particularly with the European agenda, where large-scale demonstration projects covering the entire CCS chain and running from 2015 onwards are to be funded through the so-called EEPR and NER300 programmes.

The workshop counted more than 40 participants with backgrounds varying from geologists to geophysicists to engineers coming from at least 15 different countries. The kick-off was given by the chairman Rob Arts, providing an overview of the current situation with respect to carbon capture and storage (CCS) including a list of the currently running and envisaged projects worldwide.

Roman Pevzner (Curtin Univ.) followed with an overview of the Otway project in Australia, where CO_2 is injected in a depleted gas field onshore. Roman showed results of seismic monitoring demonstrating that CO_2 migration in this reservoir in practice could not be detected, but in case migration upwards would occur, this could be picked up. Two presentations from respectively Fabrizio Novali (TRE) and Jean-Pierre Deflandre (CO_2GeoNet-IFPEN) focused on another monitoring method, InSar, that has proven very successful at the In Salah CO_2 injection project in Algeria (onshore). Fabrizio Novali discussed the improved acquisition and processing of satellite data leading to sharp images of ground movement in time including a characterization of lateral movements. Jean-Pierre Deflandre showed how these InSar data can provide insight into reservoir behaviour through geomechanical modelling.

The next three presentations covered the European demonstration sites Sleipner (offshore Norway) and Ketzin (onshore Germany). Rob Arts (CO_2GeoNet-TNO) showed on-going work on the history match at Sleipner with respect to the six acquired time-lapse seismic datasets. Stefan Lueth (GFZ) gave an overview of the extensive monitoring programme carried out in Ketzin including results of the repeated 3D seismics and the ERT measurements. Both datasets provided clear indications of preferential flow directions of the laterally spreading CO_2. This was followed by a presentation by Mickael Delatre (BRGM) on the passive seismic monitoring carried out at Ketzin, acquired from the wells from a surface network and from a permanently installed buried shallow array.

The morning session ended with a presentation by Sabina Bigi (CO_2GeoNet-URS), showing how naturally occurring CO_2 migration to the surface in volcanically active regions in Italy can support our understanding of the flow along fractures and faults and be of help in geological storage planning and ruling.

CO_2 storage: From demonstration projects to full deployment – workshop programme:

Time	Title Presentation	Speaker
09:00 - 09:15	Welcome and introduction on the Status of CO2 Storage	Rob Arts
09:15 - 09:40	Seismic Monitoring of CO2 Injection into a Depleted Gas Reservoir – Otway Basin Project	Roman Pevzner
09:40 - 10.05	Measuring ground movement with Insar data at Insalah	Stefano Cespa
10:05 - 10:30	The use of Insar Data at In-Salah to Constrain Geomechanical Modelling	Jean-Pierre Deflandre
10:30 - 11:00	**Coffee break**	
11:00 - 11:25	Monitoring and Modelling CO2 Injection at Sleipner	Rob Arts
11:25 - 11:50	Geophysical Monitoring of Small Scale CO2 -Injection into a Deep Saline Aquifer - the Ketzin Pilot Site	Stefan Lueth
11:50 - 12:15	The Ketzin Pilot Site: Monitoring with Passive Seismic Methods	Mickael Delatre
12:15 - 12:40	Experiences at Weyburn - Malcolm WilsonMicroseismic monitoring at Ketzin -	Malcolm Wilson
12:15 - 14:00	**Lunch break**	
14:00 - 14:25	Seven Years of CO2 Injection in the Nearly Depleted Gasfield K12-B	Vincent Vandeweijer
14:25 - 14:50	Lab Experiment Results Combined with Log Data from Nagaoka	Ziqiu Xue or Dr. Nakajima
14:50 - 15:15	Deep Saline Aquifers and Coal Seams as Potential Sites for the CO2 Geological Storage in Italy	Giuliana Rossi
15:15 - 15:45	**Coffee break**	
15:45 - 16:05	Application of Geofluids Systems Analysis to Succesful Geologic CO2 Storage	Udo Weyer
16:05 - 16:30	A Natural Analogue of a CO2 Reservoir: the Latera Caldera (central Italy). Insight from Field Data to Numerical Modeling of Fluid Flow through a Fracture Network	Sabina Bigi
16:30 - 17:00	Interactive Session – CATO2	Organisation Committee

The afternoon started with experiences gained with CO_2 injection in an almost depleted gas field offshore the Netherlands, the K12-B field, by Vincent Vandeweijer (CO_2GeoNet-TNO). He showed the use of tracers to detect migration pathways in the reservoir and results of a monitoring programme dedicated to well integrity assurance. This presentation was followed by results of lab experiments directly related to the Japanese Nagaoka demonstration project by Takahiro Nakajima (RITE), focusing on the added value of measuring both seismic velocities and resistivity to determine CO_2 saturation in aquifers. Where seismic measurements are sensitive to variations at low concentrations of CO_2, resistivity is more sensitive to variations in the high CO_2 saturation range.

The chair Giuliana Rossi (CO_2GeoNet-OGS) gave an overview of storage options in Italy in deep saline aquifers, object of the past EU GeoCapacity project, and introduced the concept of storing CO_2 below coal layers in Sardinia, object of a project that involved many CO_2GeoNet European partners to study for the first time extensively the Sulcis coal basin in this context.

After the last break a less conventional presentation was provided by Udo Weyer (WDA/WKC) questioning some of the assumptions used in reservoir simulation for CO_2 storage. Udo advocated strongly the incorporation of the effect of gravity in the simulations. The last presentation was on Weyburn, provided by Jan Brouwer (CATO2) on behalf of Malcolm Wilson (PTRC), who participated over the phone to respond to questions. Weyburn is the largest on-going demonstration project in terms of

injected CO_2, located in Canada. The project is basically an EOR operation, but with a strong focus on the storage potential and the monitoring programme. Recent allegations of CO_2 leaking out of the reservoir by a local resident, refuted by PTRC, were discussed extensively with Malcolm over the phone.

The day ended with a more informal game called 'petje-op-petje-af' in Dutch, where participants had to guess the opinion of the general public on a variety of issues related to CCS. The questions, prepared by Sander van Egmond (CATO2) were based on a social science study carried out in the Netherlands in the framework of the National Research programme CATO2.

Overall the day seemed quite successful with very active audience participation in the discussions after each presentation. A broad range of sites including deep vs. shallow, aquifer vs. (almost) depleted gas field vs. oilfield (EOR), sandstone vs. coals, were covered giving access to some of the most recent findings and providing a quick insight into the state of the art with respect to CCS both for experts as well as for scientists new to the CCS community.

3. SES conference Valencia, Spain – CO_2 storage sessions

Event title:	1st Sustainable Earth Sciences Conference & Exhibition – CO_2 storage sessions
Date:	7 - 10 November 2011
Place:	Valencia, Spain
Number of participants:	150
Type of audience:	geoscientists, engineers, regulators, students
CGS Europe partner in charge:	CO_2GeoNet and BRGM
Other partners involved:	CO_2GeoNet-TNO, CO_2GeoNet-IFPEN, CO_2GeoNet-BGS, BGR, SGUDS, CO_2GeoNet-Imperial, CzGS
Cooperating entities:	EAGE – European Association of Geoscientists & Engineers, IEA-GHG, International Geothermal Association, European Geothermal Energy Council, European Federation of Geologists, House of Geoscience

The SES conference was another example of fruitful co-operation between CGS Europe, CO_2GeoNet and the European Association of Geoscientists & Engineers. It focused on sustainable use of the subsurface, incorporating three main technologies – CO_2 geological storage, geothermal energy and deep-earth storage. The main goal of the conference was to boost the exchange of experience and technology in the disciplines involved.

CGS Europe partners played an important role in the conference organising committees: Henk Pagnier (CO_2GeoNet-TNO) was member of the Plenary Sessions committee, Isabelle Czernichowski (BRGM) and Rob Arts (CO_2GeoNet-TNO) worked in the CO_2 Storage committee, and Ton Wildenborg (CO_2GeoNet-TNO) and Peter Gerling (BGR) worked in the Deep-earth Storage Committee as representatives of CGS Europe and CO_2GeoNet. Further engagement included, i.a., chairing of conference sessions by representatives of CO_2GeoNet-TNO (Rob Arts, Henk Pagnier, Cor Hofstee, Tim Tambach), BRGM (Pascal Audigane), BGR (Peter Gerling) and CO_2GeoNet-IFPEN (Noalwenn Sallee), oral and poster presentations, etc.

The following oral presentations were given by CGS Europe participants:
Plenary session – Exploration challenges / Technology:

- Aquifer Problems and Capacities - S. Holloway (CO_2GeoNet-BGS)

Session 'CO_2 storage: Storage capacity':

- Independent Storage Assessment of CO_2 Storage Options in the Offshore Netherlands Close to Rotterdam - R.J. Arts (CO_2GeoNet-TNO), F. Neele (CO_2GeoNet-TNO), F. Wilschut (CO_2GeoNet-TNO), W. Meindertsma (CO_2GeoNet-TNO) & C. Hofstee (CO_2GeoNet-TNO)
- The Feasibility of CO_2 Storage in the Off-shore P18 Depleted Gas Reservoir - C Hofstee (CO_2GeoNet-TNO), R.J. Arts (CO_2GeoNet-TNO), V.P. Vandeweijer (CO_2GeoNet-TNO), J.G. Maas (CO_2GeoNet-TNO), D. Loeve (CO_2GeoNet-TNO) & T. Benedictus (CO_2GeoNet-TNO)

Sessions 'CO_2 storage: Geochemistry I+II':

- Modeling CO_2-rock-brine Interactions in the Highly Saline Reservoirs of the Ketzin, In Salah and Snøhvit Carbon Capture - P. Audigane (BRGM), C. Castillo (BRGM), C.Q. Vong (BRGM), C. Kervevan (BRGM) & N. Jacquemet (BRGM)
- Reactive Transport Modeling of CO_2 Injection into P18 - T.J. Tambach (CO_2GeoNet-TNO), M. Gutierrez-Neri (Free University Amsterdam), M. Koenen (CO_2GeoNet-TNO), F. van Bergen (CO_2GeoNet-TNO), H. Kooi (Free University Amsterdam) & L.G.H. van der Meer (CO_2GeoNet-TNO)
- Numerical Chemo-hydro-mechanical Coupling Method for Well Cement Integrity in a CO_2 Storage Context - I. Gravaud* (BRGM), P. Sochala (BRGM), A. Fabbri (BRGM) & D. Seyedi (BRGM)

Session 'CO_2 storage: Risks and impacts':

- Assessing Impacts of CO_2 Leakage on the Ecosystem - An Overview and Early Results from the RISCS Project - D.G. Jones (CO_2GeoNet-BGS), P.R. Maul (Quintessa Ltd), E.M. Foekema (Wageningen IMARES), D.P. Rasse (Bioforsk), J.C. Blackford (Plymouth Marine Laboratory) & J.M. Pearce (CO_2GeoNet-BGS)

Session 'CO_2 storage: Seismic monitoring':

- Overview of Contributions to 4D Seismics Quantitative Analyses on the CO_2 Storage in the Utsira Formation, Sleipner Site - V. Clochard (CO_2GeoNet-IFPEN), J.P. Deflandre (CO_2GeoNet-IFPEN), N. Delépine (CO_2GeoNet-IFPEN), M. Dietrich (CO_2GeoNet-IFPEN), N. Dubos-Sallee* (CO_2GeoNet-IFPEN), A. Fornel (CO_2GeoNet-IFPEN), K. Labat (CO_2GeoNet-IFPEN), C. Le Bras (CO_2GeoNet-IFPEN), P. Rasolofosaon (CO_2GeoNet-IFPEN) & P. Ricarte (CO_2GeoNet-IFPEN)

The following posters were presented by CGS Europe participants:

- A Geochemical Approach for Monitoring a CO_2 Pilot Site - B. Garcia (CO_2GeoNet-IFPEN), J.H. Billiot (Total), V.R. Rouchon (CO_2GeoNet-IFPEN), M.L. Lescanne (Total), V.L. Lachet (CO_2GeoNet-IFPEN) & N. Sallee (CO_2GeoNet-IFPEN)
- An Elevation Structure Lipany, Slovak Republic – The Example of Sustainable Use of Deep Sub-surface - L. Kucharič - (SGUDS), D. Bodiš (SGUDS) & P. Šesták (SGUDS)
- Optimal Well Placement for Risk Mitigation in CO_2 Storage – E. Sergienko (CO_2GeoNet-IFPEN) & D. Busby (CO_2GeoNet-IFPEN)
- The Effect of Top Surface Structure upon CO_2 Storage Capacity in Open Aquifers – A. Goater (CO_2GeoNet-Imperial), B. Bijeljic (CO_2GeoNet-Imperial), & M.J. Blunt (CO_2GeoNet-Imperial).

Last but not least, CO_2GeoNet-TNO were in charge of the organisation of the students' programme (Rob Arts, Henk Pagnier, Cor Hofstee), and Vit Hladik (CzGS) gave a 90-min lecture on 'CO_2 Geological Storage: a Promising Technology for Combating Climate Change' within this part of the conference.

SES conference Valencia – programme of CO_2 storage sessions:

CO2 Storage: Storage Capacity	
Date	08-11-2011
Room	Room 1
Type	Oral session
Chairman	N. Wildgust - Petroleum Technology Research Centre C. Otto - Shell International Exploration & Production BV

11:20	**B01** Methodologies for CO2 Storage Capacity Estimation - Review and Evaluation of the CO2 Storage Atlases *R.M. Prelicz (Shell), E.A.V. Mackie (Shell) & C.J. Otto* (Shell)*
11:45	**B02** Regional CO2 Storage Capacity Estimation - Insight Gained from Local Volumetric Analyses *C. Hermanrud* (Statoil & University of Bergen), G.M.G. Teige (Statoil), H.M. Nordgård Bolås (Statoil) & A. Dahlø Janbu (Statoil)*
12:10	**B03** RCI-I - Independent Storage Assessment of CO2 Storage Options in the Offshore Netherlands Close to Rotterdam *R.J. Arts* (TNO), F. Neele (TNO), F. Wilschut (TNO), W. Meindertsma (TNO) & C. Hofstee (TNO)*
12:35	**B04** RCI-II - The Feasibility of CO2 Storage in the Off-shore P18 Depleted Gas Reservoir *C Hofstee* (TNO), R.J. Arts (TNO), V.P. Vandeweijer (TNO), J.G. Maas (TNO), D. Loeve (TNO) & T. Benedictus (TNO)*

CO2 Storage: Geochemistry I	
Date	08-11-2011
Room	Room 1
Type	Oral session
Chairman	I. Czernichowski-Lauriol - BRGM

14:00	**B05** Modeling CO2-rock-brine Interactions in the Highly Saline Reservoirs of the Ketzin, In Salah and Snøhvit Carbon Capture *P. Audigane* (BRGM), C. Castillo (BRGM), C.Q. Vong (BRGM), C. Kervevan (BRGM) & N. Jacquemet (BRGM)*
14:25	**B06** Reactive Transport Modeling of CO2 Injection into P18 *T.J. Tambach* (TNO), M. Gutierrez-Neri (Free University Amsterdam), M. Koenen (TNO), F. van Bergen (TNO), H. Kooi (Free University Amsterdam) & L.G.H. van der Meer (TNO)*
14:50	**B07** Coupled Thermal-hydraulic-chemical Numerical Simulations of CO2 Injection into a Carbonate-hosted Saline Aquife *P. Alt-Epping* (University of Bern) & L.W. Diamond (University of Bern)*
15:15	**B08** Simulation of Fluid-mineral Kinetic Reactions during CO2 Storage Using ChemApp and SUPCRT92 Coupled to OpenGeoSys *D. Li* (University of Kiel), C. Beyer (University of Kiel) & S. Bauer (University of Kiel)*

CO2 Storage: Geochemistry II	
Date	08-11-2011
Room	Room 1
Type	Oral session
Chairman	C. Hofstee - TNO P.D. Audigane - BRGM

16:00	**B09** Effects of Impurities on Geological Storage of Carbon Dioxide *L. Basava-Reddi* (IEA Greenhouse Gas R&D Programme), N. Wildgust (IEA Greenhouse Gas R&D Programme) & D. Ryan (Natural Resources Canada)*
16:25	**B10** Near-well Effects During CO2 Injection into Depleted Gas Fields *M. Gutierrez Neri* (Free University Amsterdam), T. Tambach (TNO) & H. Kooi (Free University Amsterdam)*
16:50	**B11** Numerical Chemo-hydro-mechanical Coupling Method for Well Cement Integrity in a CO2 Storage Context *I. Gravaud* (BRGM), P. Sochala (BRGM), A. Fabbri (BRGM) & D. Seyedi (BRGM)*
17:15	**B12** Development and Application of the Coupled Eclipse-GeoSys Modelling System for Simulation of CO2 Saline Aquifer Storage *B. Graupner (Christian Albrechts University Kiel), K. Benisch (Christian Albrechts University Kiel), D. Li (Christian Albrechts University Kiel), A. Mitiku (Christian Albrechts University Kiel), C. Beyer (Christian Albrechts University Kiel) & S. Bauer* (Christian Albrechts University Kiel)*

CO2 Storage: Risks and Impacts	
Date	08-11-2011
Room	Room 3
Type	Oral session
Chairman	C. Bernstone - Vattenfall Research and Development AB C. Hermanrud - Statoil ASA

16:00	**D09** Caprock Systems for CO2 Geological Storage in Deep Saline Formations *L. Basava-Reddi (IEA Greenhouse Gas R&D Programme) & N. Wildgust* (IEA Greenhouse Gas R&D Programme)*
16:25	**D10** Geological Factors Controlling the Safe, Long-term Storage of Carbon Dioxide in Triassic Bunter Sandstone Reservoirs, Onshore Netherlands *J.R. Underhill* (University of Edinburgh) & A.M. Constant (Seis2Geo)*
16:50	**D11** Investigation of Large-scale Pressure Monitoring of CO2 Injection on a Real Site Model *K. Benisch* (University of Kiel), B. Graupner (University of Kiel) & S. Bauer (University of Kiel)*
17:15	**D12** Assessing Impacts of CO2 Leakage on the Ecosystem - An Overview and Early Results from the RISCS Project *D.G. Jones* (British Geological Survey), P.R. Maul (Quintessa Ltd), E.M. Foekema (Wageningen IMARES), D.P. Rasse (Bioforsk), J.C. Blackford (Plymouth Marine Laboratory) & J.M. Pearce (British Geological Survey)*

CO2 Storage: Seismic Monitoring	
Date	10-11-2011
Room	Room 1
Type	Oral session
Chairman	R.J. Arts - TNO S. Persoglia - Istituto Nzle di Oceanografia e Geofisica Sperim.

10:10	**B19** Overview of Contributions to 4D Seismics Quantitative Analyses on the CO2 Storage in the Utsira Formation, Sleipner Site *V. Clochard (IFP Energies Nouvelles), J.P. Deflandre (IFP Energies Nouvelles), N. Delépine (IFP Energies Nouvelles), M. Dietrich (IFP Energies Nouvelles), N. Dubos-Sallee* (IFP Energies Nouvelles), A. Fornel (IFP Energies Nouvelles), K. Labat (IFP Energies Nouvelles), C. Le Bras (IFP Energies Nouvelles), P. Rasolofosaon (IFP Energies Nouvelles) & P. Ricarte (IFP Energies Nouvelles)*
10:35	**B20** CO2 Injection Monitoring by High Resolution Time-lapse Crosshole Seismics (The CO2SINK Team - CO2SINK Project) *C. Cosma* (Vibrometric) & N. Enescu (Vibrometric / currently at Uppsala University)*

Hotel Las Arenas Valencia – venue of the SES conference

4. SciTech Europe conference Brussels, Belgium – CGS Europe Masterclass on CO_2 geological storage

Event title: SciTech Europe conference - Masterclass 'CO_2 geological storage – a key to a cleaner future'
Date: 24 November 2011
Place: Brussels, Belgium
Number of participants: 25
Type of audience: European science policy makers and regulators, funding agencies, leading academics
CGS Europe partner in charge: BRGM
Other partners involved: CO_2GeoNet-BGS, S-IGME, RBINS-GSB
Cooperating entities: publicservice.co.uk Ltd. - Public Service Events

The SciTech Europe conference aimed at promoting breakthrough research, successful innovation networks and potential investment opportunities. The purpose was to bring together some of the leading figures in science, engineering and technology across Europe for a high level meeting on how science can be turned into commerce. The attendance was mostly composed from public servant from across Europe.

SciTech Europe Brussels – Masterclass on CO_2 geological storage. From left to right: Roberto Martinez (S-IGME), Isabelle Czernichowski (BRGM) and Nick Riley (CO_2GeoNet-BGS)

An important part of the conference were the Masterclasses that were designed to educate, inform and spread messages in 45-minutes sessions, aiming at maximum interaction with delegates. The Masterclasses covered 4 main thematic areas: Future technologies, Science for life, Green science and

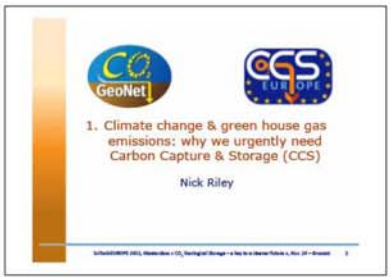
Research to innovation. The CO_2 geological storage topic, proposed by CO_2GeoNet and CGS Europe, was accepted within the 'Green science' theme that should, i.a., introduce frontier research and technologies that can help meet climate change targets and improve our environment.

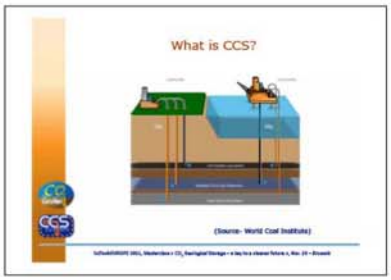
Isabelle Czernichowski (BRGM), Roberto Martinez (S-IGME) and Nick Riley (CO_2GeoNet-BGS) delivered a 45-min Masterclass called "CO_2 Geological storage – a key to a cleaner future". The slides are available on CO_2GeoNet website at http://www.co2geonet.com/UserFiles/file/SciTechEurope_CO2%20storage%20masterclass.pdf, and are also shown below in this report. Around 25 people attended the class and had the opportunity to exchange their views on the topic. The list of registered participants is shown below.

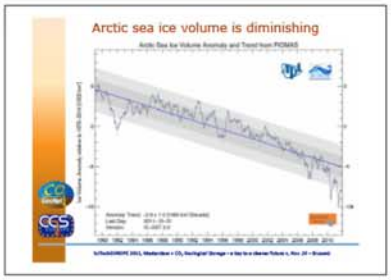
In addition to the Masterclass, an exhibition booth was held at the accompanying exhibition to present the CGS Europe project and the CO_2GeoNet Association. The brochure 'What does CO_2 geological storage really mean?' was distributed, being available in 15 European languages.

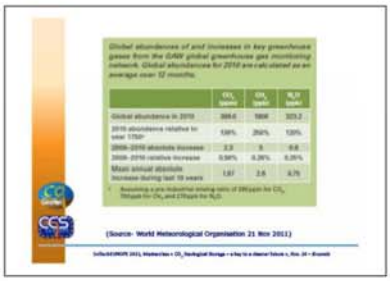
SciTech Europe Brussels – CGS Europe exhibition booth. From left to right: Roberto Martinez (S-IGME), Marie Gastine (BRGM) and Kris Piessens (RBINS-GSB)

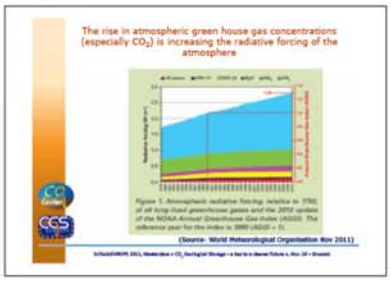
SciTech Europe Masterclass – presentation slides:

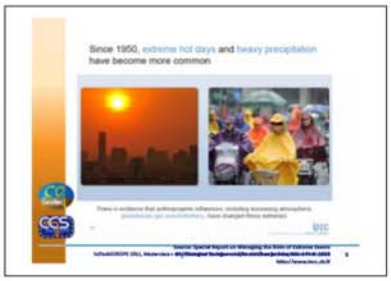


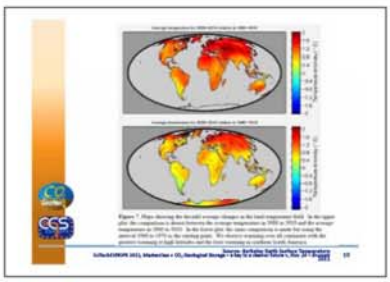


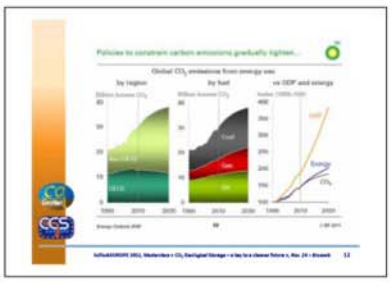


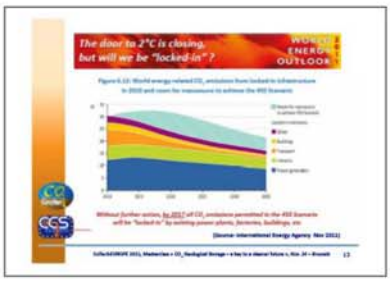


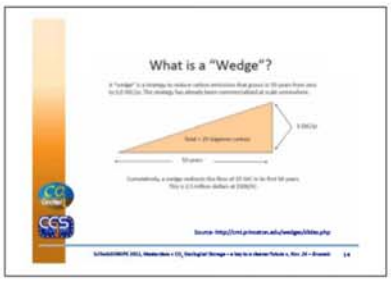


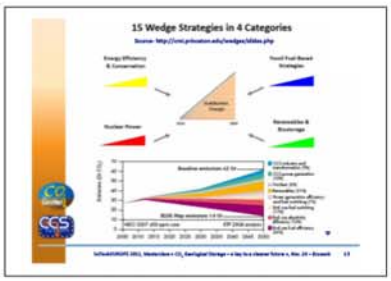


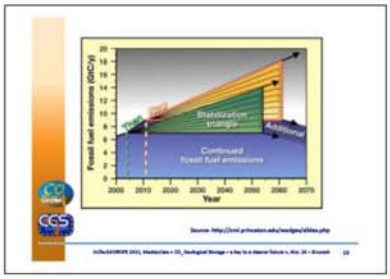


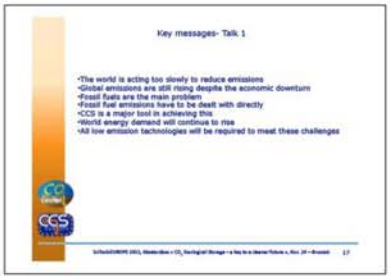






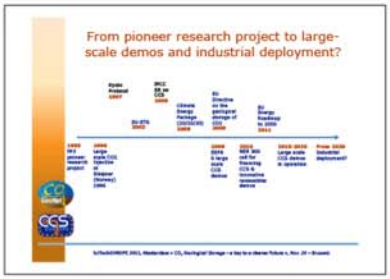



Fossil fuel emissions (GtC/y)
Stabilization triangle
Avoidance
Continued fossil fuel emissions
Year

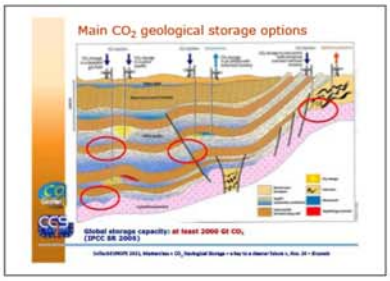

Key messages- Talk 1
•The world is acting too slowly to reduce emissions
•Global emissions are still rising despite the economic downturn
•Fossil fuels are the main problem
•Fossil fuel emissions have to be dealt with directly
•CCS is a major tool in achieving this
•World energy demand will continue to rise
•All low emission technologies will be required to meet these challenges


Some Useful Links
http://www.globalcarbonproject.org
http://www.realclimate.org
http://www.berkeleyearth.org
http://www.iea.org
http://www.wmo.int
http://www.worldenergy.org
http://www.ipcc.ch
http://www.bp.com


2. Where we stand in Europe and where are we going?"
Isabelle Czernichowski-Lauriol


From pioneer research project to large-scale demos and industrial deployment?


Where to store in Europe?

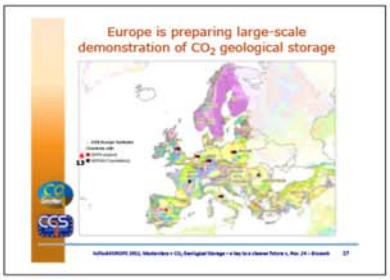

Main CO_2 geological storage options

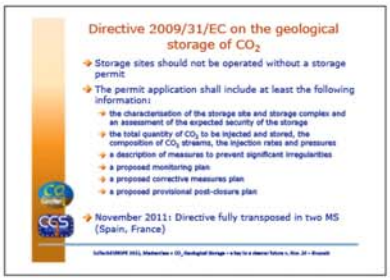

A good level of confidence that CO_2 storage can be done safely has been reached :
Existence of many natural CO_2 accumulations in the subsurface
Pre-existing know-how of the Oil & Gas industry:
Enhanced Oil Recovery (EOR) by CO_2 injection
Seasonal natural gas storage (CH_4)
Large cooperative research programmes on CO_2 geological storage since 1993
Pioneer large-scale industrial CCS projects (e.g. Sleipner (Norway) from 1996, Weyburn (Canada) from 2000, In Salah (Algeria) from 2004
Small-scale CO_2 injection pilots: Frio (USA), Nagaoka (Japan), Ketzin (Germany), Otway (Australia), Lacq (France), etc.
Development of best practice manuals
Networking & knowledge-sharing activities at national, European and international levels


Need now to learn by doing!
Demonstration phase engaged worldwide with 1st generation technologies
EU Flagship Programme: 10-12 integrated, large-scale CCS demonstration projects Europe-wide by 2015 - to demonstrate a diverse range of infrastructure, technologies, fuels and storage locations (announcement in 2007)
10-12 Demo Projects = €7 Billion - €12 Billion in Funding
Anticipated Financing (2009):
European Trading Scheme – New Entrants Reserve (ETS-NER 300) - € 6bn (at ≥€20/Ton)
– 300 million allowances reserved for demonstrating CCS and innovative renewables
European Economic Programme for Recovery (EEPR) - € 1bn
Additional funding by Members States - € 0-5bn
Current status (Nov. 2011): probable delay and funding issues (carbon price at €10/Ton)

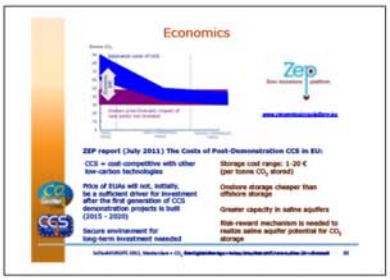

Six demonstration projects financed by EEPR
(Award Decision taken in Dec 2009)
Total: 2 137 Mt


Six demonstration projects financed by EEPR
(Power sector)
Hatfield (UK)
Rotterdam (NL)
Compostilla (Spain)
Porto-Tolle (Italy)
Belchatow (PL)
Jänschwalde (DE)

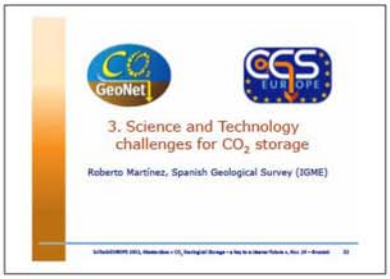

Europe is preparing large-scale demonstration of CO_2 geological storage

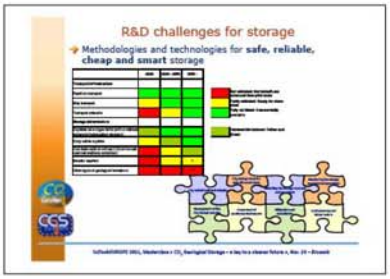

Directive 2009/31/EC on the geological storage of CO_2
Storage sites should not be operated without a storage permit
The permit application shall include at least the following information:
the characterisation of the storage site and storage complex and an assessment of the expected security of the storage
the total quantity of CO_2 to be injected and stored, the composition of CO_2 streams, the injection rates and pressures
a description of measures to prevent significant irregularities
a proposed monitoring plan
a proposed corrective measures plan
a proposed provisional post-closure plan
November 2011: Directive fully transposed in two MS (Spain, France)

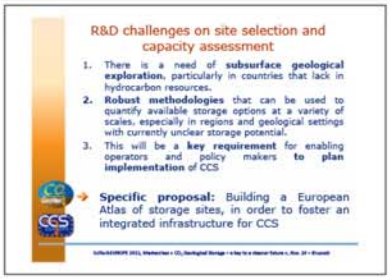

Other regulations in Europe - offshore
London Protocol ... on the prevention of marine pollution by dumping of wastes and other matter (2006) : allows CO_2 storage in sub-seabed geological structures
The amendment of the London Convention for transboundary CCS projects is currently being discussed
OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic adopted similar provisions in 2007

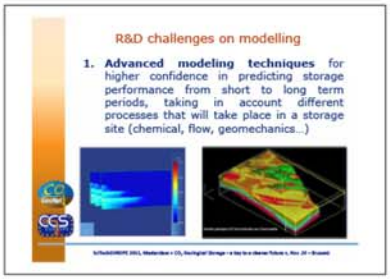

Economics
ZEP report (July 2011) The Costs of Post-Demonstration CCS in EU:
CCS = cost-competitive with other low-carbon technologies
Storage cost range: 1-20 € (per tonne CO_2 stored)
Price of EUAs will not, initially, be a sufficient driver for investment after the first generation of CCS demonstration projects is built (2015 - 2020)
Onshore storage cheaper than offshore storage
Greater capacity in saline aquifers
Secure environment for long-term investment needed
Risk-reward mechanism is needed to realize saline aquifer potential for CO_2 storage


Social support
Demos and further deployment will require support from all stakeholders!
Already a few pilot and full-scale projects implemented successfully
However some cases of resistance to onshore CO2 storage needs to be addressed:
NIMBY
Promotion of alternative energy mix and economic development
Denial of climate change or role of CCS
Conditions for a constructive societal dialogue:
Not only early communication but also real concertation (involve local stakeholders in the decisions - be flexible)
CCS to be part of green growth development at territory level
Benefits – compensations to the local community
Engagement of Members States and Public authorities

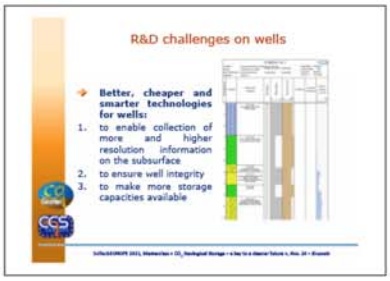

3. Science and Technology challenges for CO2 storage
Roberto Martínez, Spanish Geological Survey (IGME)


R&D challenges for storage
Methodologies and technologies for safe, reliable, cheap and smart storage


R&D challenges on site selection and capacity assessment
1. There is a need of subsurface geological exploration, particularly in countries that lack in hydrocarbon resources.
2. Robust methodologies that can be used to quantify available storage options at a variety of scales, especially in regions and geological settings with currently unclear storage potential.
3. This will be a key requirement for enabling operators and policy makers to plan implementation of CCS
Specific proposal: Building a European Atlas of storage sites, in order to foster an integrated infrastructure for CCS


R&D challenges on modelling
1. Advanced modeling techniques for higher confidence in predicting storage performance from short to long term periods, taking in account different processes that will take place in a storage site (chemical, flow, geomechanics…)


R&D challenges on monitoring
1. Advanced monitoring techniques and methodologies for early, cheap and reliable identification of leakages or significant irregularities
2. Acceptance of monitoring systems into the Monitoring and Reporting Guidelines for CCS within the EU ETS


R&D challenges on wells
Better, cheaper and smarter technologies for wells:
1. to enable collection of more and higher resolution information on the subsurface
2. to ensure well integrity
3. to make more storage capacities available


R&D challenges on storage complex management
1. Optimization of storage performance in terms of capacity, injectivity and integrity by smart operational management of the storage complex during the injection period
Specific proposal: Support of experimental operations in pilot projects


R&D challenges on environmental impact
1. More confidence on the near-zero impact on the environment, better acceptance. Using remote sensing, influence of groundwater ecosystems…


R&D challenges on land planning and transport infrastructure
1. Regional/National/EU coordination across the whole CCS chain for appropriate land planning and infrastructure development
2. Need for integrated transport infrastructures. Further research on results supplied by ongoing projects
3. Work on cross-border schemes for a more effective technology deployment


R&D challenges summary
R&D in identified areas must be initiated and/or continued now and in the years to come in order to reach estimated maturity at the defined time-scales. There are ongoing research projects in several areas (www.ccsforum.org/projects), such as:
- ECCSEL (www.eccsel.org)
- CO2FieldLab (www.sintef.no/co2fieldlab)
- Europipe (www.europipe.com), COMET (www.comet.at)
- ROAD (www.road2030.nl)
- NEARCO2 (www.communicationsnearco2.eu)
Storage is an essential component of the CCS chain and provides critical considerations in the CCS decision-making process and planning
CO2GeoNet & CGS Europe are developing a pan-European scientific body durably engaged in enabling CO2 Geological Storage


www.co2geonet.eu
www.cgseurope.net
4. Discussion
Your views are welcome!

SciTech Europe Masterclass – List of participants:

First Name	Surname	Job Title	Organisation
Christian	Dierick	Senior Advisor	AGORIA
Bruno	Dumas	Doctor	Vrije University Brussels
Philippe	Grosjean	Vice-Dean of the Faculty of Science	UMONS University
Herbert	Gruttemeier	Head of International Relations	INIST-CNRS
Alan	Haigh	Head of Unit	Industrial Technology Directorate
Hermann	Heich	Managing Director	Heich Consult
Phillip	Holiday	European Advisor	UK Research Office
Troels	Jacobsen	Director EU-Unit	University of Stavanger
Damir	Marinovic	Policy Development Officer	EGI.eu
Eduardo	Martin-Guerrero	Researcher	Instituto de Astrofsica de Canarias
Vladimir	Mayer	Research Professor	CNRS
Simon	Millington	Project Engineer	Strata Technology
Frank	Monteny	Director of R and D	Belspo
Julia	Muller	Student	BIOSS
Pero	Munivrana	CEO	Croatian Institute of Technology
Eva	November	Development Co-operative	Royal Museum of Central Africa
Tapio	Rissanen	CEO, Senior Consultant	RegioPKI
Prof Caroline	Robertson-von Trotha	Director	KIT, Karlsruhe Institute of Technology
Carole	Van Der Donckt	Research	University of Antwerpen Pharmacology Lab
William	Van Woensel	Doctor	Vrije University Brussels
Sofie	Vanthournout	Head of Brussels Office	European Academies Science Advisory Council
Jacob Edward	Wang	Senior Advisor	The Research Council of Norway

5. CGS Europe knowledge-dissemination workshop Copenhagen, Denmark

Event title: CGS Europe Knowledge Sharing Workshop 'CO_2 Geological Storage in North–western Europe'
Date: 12 - 13 December 2011
Place: Copenhagen, Denmark
Number of participants: 30
Type of audience: geoscientists, engineers
CGS Europe partner in charge: CO_2GeoNet-GEUS
Other partners involved: CO_2GeoNet-IRIS, CO_2GeoNet-NIVA, CO_2GeoNet-SINTEF
Cooperating entities: University of Oslo

The CGS Europe knowledge-dissemination workshop 'CO_2 Geological Storage in North-western Europe' took place at GEUS, Copenhagen, Denmark, on December 12-13, 2011. The topics of the workshop were most recent research results on geological storage of CO_2 in North-western Europe, for example choosing and characterizing the storage sites, modelling the fate of the injected CO_2, and monitoring its evolution in the deep reservoirs. The format of the workshop was interactive with presentations followed by discussion, especially on needs of further or new research. The topics were chosen with primary focus on the region of Denmark and Norway. The aim of the discussions was, i.a., to hatch new ideas for research and cooperation projects.

The scientific themes were:

- Storage capacity, seal issues, site selection, safety and risk analyses exemplified by ongoing research in the Norwegian-Danish Basin with emphasis on the Skagerrak Graben, and on reservoir- and caprock-properties of the Johansen Fm. in the North Sea;

- Assessment of CO_2 leakage in marine environment and field laboratory experiments, pockmarks, long term fate of CO_2 in the environment;
- Carbonate dissolution in sandstone reservoirs, core scale experiments, CO_2-EHR;
- Understanding the sealing properties of caprocks;
- Discussion on reservoir and caprock, new ideas, areas for research.

The detailed agenda of the workshop is shown below. The workshop was organised in three sessions, all chaired by members of the Workshop Scientific Committee:

- Niels E. Poulsen, CO_2GeoNet-GEUS
- Prof. Per Aagaard, Geology department at University of Oslo
- Ivar Grunnaleite, CO_2GeoNet-IRIS
- Dominique Durand, CO_2GeoNet-NIVA
- Marie-Laure Olivier, CO_2GeoNet-SINTEF

30 participants from 7 countries took part in the workshop (Denmark – 15, Estonia – 1, Finland – 2, Lithuania – 1, Norway – 9, Sweden – 1 and UK – 1 (see List of workshop participants below).

CGS Europe workshop Copenhagen - Agenda

December 12, 2011	
10.00–10.30	Registration, coffee
10.30-11.OO	Flemming G. Christiansen (Deputy Director, GEUS): Welcome to GEUS Niels Poulsen: CGS Europe Niels Poulsen: Idea/scope of this workshop Niels Poulsen: CGS Spring School Niels Poulsen & Lars Henrik Nielsen: GEUS involvement in CCS related work
11.00-11.20	Andrew K Sweetman, Astri J.S. Kvassnes & Dominique Durand: Requirements and technologies for assessment of CO_2 leakage in the marine environment
11.20-11.40	Maike L. Buddensiek: Svelvik CO_2 Field Laboratory: Experiences and preliminary results from the first injection experiment
11.40-12.00	Discussion on CO_2 monitoring and leakage – risks
12.00-13.15	Lunch
13.15-13.45	Jan Inge Faleide, E.M. Jarsve, Caroline Sassier, M. Angeli, M. Kalani, Irfan Baig, Manzar Fawad, Roy Gabrielsen, Jens Jahren, Per Aagaard, M. Heeremans & N.H. Mondol: Regional screening for potential CO_2 storage plays in the Norwegian North Sea
13.45-14.00	Torben Bidstrup: CO_2 storage possibilities in the north-eastern part of the Norwegian-Danish Basin
14.00-14.30	Lars Henrik Nielsen, Rikke Weibel, Lars Kristensen, Carsten Møller Nielsen & Anders Mathiesen: Stratigraphic analyses of reservoir and cap rock distribution – and how do we make intelligent input to geological modelling exercises?

14.30-15.00	Per Aagaard, Irfan Baig, Manzar Fawad, Caroline Sassier, Jan Inge Faleide, Jens Jahren, Roy Gabrielsen, Lars Henrik Nielsen, Lars Kristensen & Per E.S. Bergmo: Potential Triassic and Jurassic CO_2 Storage Reservoirs in the Skagerrak Area
15.00-15.15	Dag Bjørnsen, Hans Aksel Haugen & Per Aagaard: Handling of CO_2 in the Skagerrak/Kattegat area
15.15-16.00	Coffee, tea, and poster session
Poster	Alla Shogenova, Kazbulat Shogenov, Saulius Sliaupa, Filip Neele, Jüri Ivask & Rein Vaher: CO_2 geological storage in the Baltic Region - problems and possible scenarios: state of the art in December 2011
16.00-16.20	Discussion on CO_2 storage possibilities and research needs
16.20-16.40	Martin Hovland: Pockmarks and shallow gas in the Skagerrak
16.40-17.10	Niels Bo Jensen, Snorre Olaussen, Alvar Braathen, Kei Ogata, Kim Senger & Jan Tveranger: The Longyearbyen CO_2 lab, Adventdalen, Svalbard - a test site for storage, flow and leakage of fluids in an unconventional reservoir
17.10-17.30	Antony Benham: The long term fate of CO_2 in the environment
17.30-18.00	Overall discussion of the day, new ideas for research and cooperation projects
December 13, 2011	
09.00-09.30	Rikke Weibel Hansen, Claus Kjøller, Troels Laier, Lars Henrik Nielsen, Niels Springer, Peter Frykman & K. Bateman: Carbonate dissolution in Mesozoic sandstones as a response to CO_2 exposure
09.30-09.45	Claus Kjøller: Core scale experimental study of dry-out effects by CO_2 injection
09.45-10.15	Dan Olsen: CO_2-EOR production properties of chalk
10.15-10.45	Coffee
10.45-11.15	Niels Springer & Holger Lindgreen: Is there a caprock? An integrated approach to understand the capillary sealing properties of mudstones overlying the potential Upper Triassic to Middle Jurassic sandstone reservoirs of the Danish Basin
11.15-12.00	Discussion on reservoir and caprock, new ideas, areas for research Concluding the workshop
12.00-13.00	Lunch and good bye

Summaries of the workshop open discussions

Debates formed an essential part of the workshop with the aim do discuss the presented results in detail and to hatch new ideas for research and cooperation projects. It was recognised, however, that there is a strong need for integrated CO_2 storage research. It is important to identify areas open to development, opportunities for discussion and communicate the outcomes to stakeholders.

CGS Europe workshop Copenhagen – List of participants

Name	Surname	Organization
Antony	Benham	Nottingham Centre for Carbon Capture and Storage (NCCCS)
Astri J.S.	Kvassnes	NIVA
Carsten M.	Nielsen	GEUS
Claus	Kjøller	GEUS
Dan	Olsen	GEUS
Flemming Getreuer	Christiansen	GEUS
Ingebret	Fjelde	IRIS
Irfan	Baig	University of Oslo
Jan Inge	Faleide	University of Oslo
John	Zuta	GEUS
Joonas	Virtasalo	Geological Survey of Finland
Kazbulat	Shogenov	Institute Geology at Tallinn University of Technology (TTU GI)
Lars	Kristensen	GEUS
Lars Henrik	Nielsen	GEUS
Maike	Buddensiek	SINTEF Petroleumsforskning
Martin	Hovland	Statoil
Mikael	Erlström	Geological Survey of Sweden
Morten Leth	Hjuler	GEUS
Monzurul	Alam	DTU Engineering
Nicklas	Nordbäck	Geological Survey of Finland
Niels	Poulsen	GEUS
Niels	Springer	GEUS
Niels Bo	Jensen	IRIS
Per	Aagaard	University of Oslo
Peter	Frykman	GEUS
Philip	Fosbøl	DTU Chemical Engineering, Centre for Energy Resources (CERE)
Rikke	Weibel	GEUS
Saulius	Sliaupa	Institute of Geology and Geography, Nature Research Centre, Vilnius
Torben	Bidstrup	GEUS
Tore	Torp	Statoil Research Centre Trondheim

Essential points identified during the discussions are:

- More research needed on leakage and remediation methods and strategy - comparative studies to gas storage (around 630 gas storage facilities and around 12–13 leakage events); methods for reconditioning of leaking wells, site tracks; research on pressure-release boreholes.
- Faults, sealings, seal-caprock distribution in the Skagerrak–Kattegat area.
- Structures or open aquifers in the Skagerrak–Kattegat area.
- Reservoir thickness and quality in the Skagerrak–Kattegat area.
- Studies on conflict of interest in the Skagerrak–Kattegat area.
- Sequence stratigraphic models for Denmark – need of better correlation towards Norway, i.e. confirmation by biostratigraphic studies; need of new borehole samples from the Skagerrak area near Norway for more detailed studies.

- Communication strategies with different stakeholders – need of more communication between geologists and lawyers at national and EC levels in all countries; need of sharing experience among partners, and need of sharing their knowledge with the public and other stakeholders.
- Next step – funding critical. Test sites – need of more injection pilots.
- Monitoring, identification of best practices for different structures offshore - onshore.
- Conflict of interest with geothermal or other common interests, utilization and exploitation.

6. CGS Europe knowledge-dissemination workshop Ankara, Turkey

Event title:	CGS Europe workshop 'Climate change and CO_2 emissions in Turkey, mitigation plans and need for CCS' within the METU-PAL Seminars series
Date:	16 December 2011
Place:	Ankara, Turkey
Number of participants:	50
Type of audience:	Industry (oil, cement, steel, thermal power plants), researchers from universities, students, officials from Ministry of Energy and Natural Resources and Ministry of Environment and Housing.
CGS Europe partner in charge:	METU-PAL
Other partners involved:	-
Cooperating entities:	-

The workshop was the third one in the series of workshops organized by METU-PAL, which is open to stakeholders. These in-house workshops, during which ongoing research is reviewed, are organized every year.

The workshop started with a discussion on Climate Change and Adaptation Policies of Turkey, and the speaker was Kadir Demirpolat from Ministry of Environment and Housing. Carbon storage options and projects around the world were discussed by Ender Okandan (METU-PAL). Çağlar Sınayuç (METU-PAL) detailed the storage option in coal beds since some of the lignite deposits in Western Turkey have this potential. The review of legal status of CCS around the world was discussed by Ilhan Topkaya (METU-PAL).

A review of CO_2 emissions in Turkey during the last 19 years was presented by Mehrali Ecer from Ministry of Environment and Housing and outcomes from International agreements were summarized. He also mentioned that monitoring of CO_2 emissions from selected industrial sectors will start in 2012.
The working language of the workshop was Turkish.

Agenda of the METU-PAL Seminar in Ankara:

13:00 – 13:15	*Kayıt ve Açılış (Registration)*
13:15 – 13:30	Açılış Konuşması (Opening Remarks) **Ender Okandan (ODTÜ, Petrol ve Doğal Gaz Müh.)**
13:30 – 14:00	İklim Değişikliği ve Türkiye'nin Uyum Politikaları (Climate Change and Adaptation Policies) **Kadir Demipolat (Çevre ve ŞehircilikBakanlığı)**
14:00 – 14:30	CO_2'nin Jeolojik Ortamda Depolanması, Petrol Sahaları ve Derin Akiferler (Storage of CO_2 in Geologic Formations, oil fields and deep aquifers) **Ender Okandan (ODTÜ, Petrol ve Doğal Gaz Müh.)**
14:30 – 15:00	CO_2'nin Derin Kömür Yataklarında Depolanması (CO_2 Storage in Deep Coal Mines) **Çağlar Sınayuç (ODTÜ, Petrol ve Doğal Gaz Müh.)**
15:00 – 15:30	*Çay İkramı (Tea break)*
15:30 – 16:00	CO_2 ' in depolanmasının yasal alt yapısı (Regulatory Issues for CO_2 Storage**)** **İlhan Topkaya (ODTÜ, Petrol ve Doğal Gaz Müh.)**
16:00 – 16:30	Türkiye'deki Uygulamalar (Regulatory Issues in Turkey) **Mehrali Ecer (Çevre ve Şehircilik Bakanlığı)**
16:30 – 17:00	Soru-Cevap (Questions and answers session, all speakers)

METU-PAL Seminar 'Climate change and CO_2 emissions in Turkey, mitigation plans and need for CCS' in Ankara

7. International workshop 'Promoting CCS in Romania' Craiova, Romania – CO_2 storage session

Event title:	3rd International Workshop 'Promoting CCS in Romania' – session 'Best practices for a safe geological CO_2 storage'
Date:	22 – 23 March 2012
Place:	Craiova, Romania
Number of participants:	70
Type of audience:	regulators, local authorities, academia, industry, geoscientists, engineers
CGS Europe partner in charge:	GeoEcoMar
Other partners involved:	BRGM, CO_2GeoNet-URS
Cooperating entities:	CO_2Club Romania, ISPE, Turceni Energy Complex, GETICA CCS Project, Alstom, Schlumberger

The 3rd edition of the International Workshop "Promoting CCS in Romania" took place in, Craiova, Dolj County, in the SW part of Romania. Craiova is the centre of the Oltenia region, the most energy intensive region of Romania, responsible for about 40% (24.5 Mtpa) of the total amount of CO_2 emissions at national level. The region is also home of the GETICA CCS demonstration project, the Romanian national CCS initiative.

CO_2GeoNet has been involved in organisation of the 'Promoting CCS in Romania' workshops since their first edition in 2008. This time, this activity was coordinated within the CGS Europe project where CO_2GeoNet is one of the partners, as well as GeoEcoMar - the National Research Institute of Marine Geology and Geo-Ecology Bucharest – one the main co-organisers of the event. The main responsibility of CGS Europe was organisation of Session V - Best Practices for a Safe Geological CO_2 Storage.

Activities of CGS Europe partners embraced:

- Local co-organisation of the event (GeoEcoMar)
- Planning of the scientific programme (BRGM, GeoEcoMar)
- Presentation 'CO_2 geological storage: Where we stand in Europe' by Isabelle Czernichowski (BRGM)
- Presentation 'CO_2 geological storage safety and risk management' by Jean Charles Manceau (BRGM)
- Presentation 'Monitoring techniques developed at CO_2 natural laboratories to improve risks assessment and safety strategy' by Sabina Bigi (CO_2GeoNet-URS)
- Session chairing by Constantin Sava (GeoEcoMar)

Workshop agenda and list of participants are attached below; a press release issued jointly by the organisers is in Annex III.

3rd International Workshop 'Promoting CCS in Romania' in Craiova – introductory talk by Constantin Sava (GeoEcoMar)

Jean Charles Manceau (BRGM) presenting 'CO_2 geological storage safety and risk management' at the 3rd International Workshop 'Promoting CCS in Romania' in Craiova (photo courtesy CO_2 club Romania).

Agenda of the workshop 'Promoting CCS in Romania' in Craiova:

The 3rd edition of the International Workshop

"Promoting CCS in Romania"

Jiul Hotel, Craiova, 22-23 March 2012

AGENDA

CO_2Club Romania Members

GeoEcoMar, ISPE, Schlumberger Carbon Services, Petrom, geogreen, CEN Craiova, ArcelorMittal, NHN Econvest, KEMENERG, carbon, ASRC, COMOTI, IPCUP

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22 March 2012
MORNING SESSIONS

11.30-12.00 Registration
Welcome Coffee

Chairpersons
Cristiana Ion, Minister's Counsellor, Ministry of Economy, Commerce and the Business Environment
Sava Constantin, President of CO_2Club, Head of Geophysical Department, GeoEcoMar, Member of ZEP Governmental Group

12.00-13.00 **Official opening**
Sulfina Barbu, Deputy, Parliament of Romania
John Scowcroft, General Manager Europe Global CCS Institute, Europe
Peter Arnold, Head of Sales & Marketing, Alstom Carbon Capture, Germany
Cristiana Ion, Minister's Counsellor, METBE
Carmen Suchici, Head of Climate Change Department, Ministry of Economy and Finance
Constantin Balasoiu, General Director, Craiova Energy Complex

13.00-14.00 **SESSION I** **CLIMATE CHANGE – IMPACT and SOLUTIONS**

- CCS globally

John Scowcroft, General Manager Europe, Global CCS Institute, Europe

- CO_2 geological storage: Where we stand in Europe

Isabelle Czernichowski, President of CO_2GeoNet and Coordinator of CGS Europe, France

- CCS in Europe – role in GHG emissions reduction

Paal Frisvold, CA President, Bellona, Belgium

- CCS Roadmap in Romania

Paal Frisvold, Chairman of the Board, Bellona, Norway

14.00-15.00 *Networking Buffet*

22 March 2012,
AFTERNOON SESSIONS

15.00-15.15 **SESSION II** **INSTITUTIONAL ACTIONS for PROMOTING CCS TECHNOLOGY – GENERAL OVERVIEW**

- CCS legal and regulatory framework – current status at global level

Florina Sora, Counsellor and Adriana Stoica, Counsellor, National Agency for Mineral Recourses

15.15-15.45 **SESSION III** **FINANCING MECHANISMS / PROGRAMS**

- EU financing programs

Diana Matei, Funding Projects Expert, ISPE

- Bilateral agreements

Cristiana Ion, Minister's Counsellor, METBE

15.45-16.15 *Discussions on topics related to Sessions I-III*

16.15-16.30 *Coffee break*

ALSTOM

Co-organisers: CO2GeoNet, CCS Europe, GeoEcoMar, ISPE, CET I

Sponsors: ASRC

The 3rd edition of the International Workshop

"Promoting CCS in Romania"

Jiul Hotel, Craiova, 22-23 March 2012

Chairpersons
Maurice Hanegraaf, Manager Projects Europe, Global CCS Institute, Europe
Florina Sora, Counsellor, National Agency for Mineral Resources, NAMR

16.30-16.45 **SESSION IV** **CO_2 CAPTURE AND TRANSPORT – BEST AVAILABLE TECHNOLOGIES**

- *Best technologies for a safe CO2 capture and transport*
  Gabriel Ignat, Project Manager, ISPE

16.45-17.15 **SESSION V** **BEST PRACTICES FOR A SAFE GEOLOGICAL CO_2 STORAGE**

- *Lessons learned and evolution of best practices for CO_2 storage*
  Larry Pekot, Technical Manager, Schlumberger, France
- *CO_2 geological storage safety and risk management*
  Jean Charles Manceau, CO_2GeoNet-BRGM, France
- *Monitoring techniques developed at CO_2 natural laboratories to improve risks assessment and safety strategy*
  Sabina Bigi, CO_2GeoNet-University of Rome, Italy

17.15-17.30 *Discussions on topics related to Sessions I-III*

18.00 *Welcome cocktail*

23 March 2012
MORNING SESSIONS

08.30-09.00 Registration

Chairpersons
Cristiana Ion, Minister's Counsellor, Ministry of Economy, Commerce and Business Environment
John Scowcroft, General Manager Europe Global CCS Institute, Europe

09.00-10.00 **SESSION VI** **ROMANIA ENGAGED TOWARDS A LOW CARBON ECONOMY**

- Romania's potential in promoting CCS technologies at national level
  Cristiana Ion, Minister's Counsellor, METBE
- Getica CCS Demo Project – updates
  Gabriel Ignat, Project Manager, ISPE

Getica CCS animated movie

10.00-11.00 **SESSION VII** **SPONSORS SERVICES OFFER**

- Monitoring the surface of CO_2 geological storage locations using radar interferometry
  Florin Serban, General Director, ASRC
- Alstom role in the Romanian power industry
  Dumitru Manea, Customer Manager, Alstom Romania

11.00-11.30 **Conclusions and QA**
[METBE / Global CCS Institute/ CO_2Club/ ISPE/ GeoEcoMar]

CO_2Club Romania Members

GeoEcoMar, ISPE, Schlumberger Carbon Services, Petrom, geogreen, CEN Craiova, ArcelorMittal, NHN Ecoinvest, Kemenerg, carbon, ASRC, Comoti, IPCUP

www.co2club.ro

ALSTOM

Co-organisers: CO2GeoNet, CCS Europe, GeoEcoMar, ISPE, METBE

Sponsors: ASRC

Workshop 'Promoting CCS in Romania' in Craiova – List of participants:

The 3rd edition of the International Workshop

"Promoting CCS in Romania"

Jiul Hotel, Craiova, 22-23 March 2012

CO_2Club Romania Members

www.co2club.ro

PARTICIPANTS				
Nr. crt.	Company	Name	Job title	Country
1	Advanced Studies and Research Centre - ASRC	Florin Serban	General Director	Romania
2	Advanced Studies and Research Centre - ASRC	Mirela Constantinescu	Director	Romania
3	Alstom Carbon Capture	Peter ARNOLD	Head of Sales & Marketing	Germany
4	Alstom Romania	Dumitru Manea	Customer Manager	Romania
5	Arcelor Mittal	Vasile Dorosencu	Director	Romania
6	AROTT	Gabriel Vladut	President	Romania
7	Bellona	Paal Frisvold	Chairman of the Board	Belgium
8	CO2 GeoNet-BRGM	Jean-Charles Manceau	Research Engineer	France
9	CO2GeoNet	Isabelle Czernichowski	President	France
10	CO2GeoNet-University of Rome	Sabina Bigi	Professor	Italy
11	Craiova Energy Complex	Constantin Balasoiu	General director	Romania
12	Craiova Energy Complex	Sorin Alecu	Marketing-Development Director	Romania
13	Craiova Energy Complex	Bebe Cocosila	Operation Deputy Director	Romania
14	Craiova Energy Complex	Ionel Ilie	Head of Energy Management Dpt.	Romania
15	Craiova Energy Complex	Viorel Gherghina	Isalnita CHPP Subsidiary Director	Romania
16	Craiova Energy Complex	Constantin Hoanca	Craiova II CHPP Subsidiary Director	Romania
17	Dolj Local Council	Teodor Sas	Deputy Mayor	Romania
18	Eninvest	Dorel Badescu	General director	Romania
19	Eninvest	Cristina Pasare	Deputy Director	Romania
20	Eninvest	Adrian Necsulescu	Executive Director	Romania
21	European Bank for Reconstruction and Development	Mihnea Craciun	Principal Banker Power & Energy Utilities	Romania
22	Global CCS Institute	John Scowcroft	General Manager Europe	Australia
23	Global CCS Institute	Maurice Hanegraaf	Manager Projects - Europe	Australia
24	Ministry of Administration and Interior	Marilena Banu	Counsellor	Romania
25	Ministry of Economy, Trade and the Business Environment	Cristiana ION	Minister's Counsellor	Romania
26	Ministry of Economy, Trade and the Business Environment	Tudor Serban	Minister's Counsellor	Romania
27	Ministry of Education, Research, Youth and Sport	Constantin Enachioiu	Counsellor	Romania
28	Ministry of Environment and Forests	Carmen Suchici	Head of Climate Change Department	Romania
29	National Agency for Mineral Resources	Florina Sora	Counsellor	Romania
30	National Agency for Mineral Resources	Adriana Stoica	Counsellor	Romania
31	National Environmental Guard - Dolj	Ivana Serban	Commissar	Romania

Co-organisers:

Sponsors:

The 3rd edition of the International Workshop

"Promoting CCS in Romania"

Jiul Hotel, Craiova, 22-23 March 2012

CO_2Club Romania Members

www.co2club.ro

PARTICIPANTS				
Nr. crt.	Company	Name	Job title	Country
32	NHN Ecoinvest	Nicolae Heredea	Director	Romania
33	Public Health Department - Gorj	Elena Pitian	Counsellor	Romania
34	Public Health Department - Mehedinti	Cornelia Ianculescu	Head of evaluation risk factors department	Romania
35	Regional Agency for Environmental Protection Craiova	Cristina Daniela Marinescu	Counsellor	Romania
36	Regional Agency for Environmental Protection Craiova	Danuzia Eugenia Mazilu	Head of Regulatory	Romania
37	Regional Agency for Environmental Protection Craiova	Maria Stan	Counsellor	Romania
38	Regional Agency for Environmental Protection Oltenia - Gorj	Radu Petre Socolonschi	Executive Director	Romania
39	Regional Agency for Environmental Protection Oltenia - Gorj	Nicolae Giorgi	Director	Romania
40	Regional Agency for Environmental Protection Oltenia - Gorj	Ludmila Liana Bardan	Counsellor	Romania
41	Regional Environmental Protection Agency Oltenia - Mehedinti	Eugenia Chicet	Counsellor	Romania
42	Regional Inspectorate for Emergency Situations - Dolj	Georgel Eugen Sdarna	Officer	Romania
43	Regional Inspectorate for Emergency Situations - Dolj	Adrian Paduraru	Head of Department	Romania
44	Romanian Parliament - Deputy Chamber	Sulfina BARBU	Deputy	Romania
45	Romelectro - Craiova	Corneliu Ditescu	Director	Romania
46	Rovinari Energy Complex	Flavia Pasareanu	Head of environmental protection Department	Romania
47	Rovinari Energy Complex	Florin Popescu	Director	Romania
48	Schlumberger Carbon Services	Larry Pekot	Technical Manager	France
49	South - West Oltenia Regional Development Agency	Nicoleta Dobre	Communication Officer	Romania
50	Turceni Energy Complex	Marian Motocu	Energy Division Director	Romania
51	Turceni Energy Complex	Laviniu Danciu	Department Director	Romania
52	Turceni Energy Complex	Viorel Filip	Head of Technical Department	Romania
53	Turceni Energy Complex	Valerica Banica	Head of Environmental Protection Department	Romania
54	Turceni Energy Complex	Elena Zamfir	PR and C	Romania

Co-organisers:

Sponsors:

8. Planning for the 2nd project period

As mentioned in Chapter 1, some of the planned workshops had to be postponed for various reasons and will be organised in the 2nd project period. At the moment, five workshops are envisaged for the time interval April 2012 – October 2013 (see Tab. 3). In addition, the 2nd call for workshop proposals has been launched on 4 April 2012, and 4-5 further workshops are expected to be approved within this call and organised until the project ending. The call wording is attached in Annex II.

No	Countries involved	Proposed date	Place	Project participants involved
1	Spain	June 2012	Madrid	S-IGME
2	Italy	Autumn 2012	Rome	CO_2GeoNet (URS, OGS)
3	France	2013	Lorraine (probably Nancy)	BRGM, CO_2GeoNet – IFPEN
4	Finland	2013	Espoo	GTK
5	Greece	2013	Athens	G-IGME

Table 3: Overview of workshops planned for the 2nd project period (status March 2012)

Trans-national cooperation and networking in the field of geological storage of CO_2
FP7 Coordination Action

Call for workshop proposals

CGS Europe Management Board invites project participants to submit proposals to prepare and organise CGS knowledge-dissemination workshops as part of WP5 activities. The workshops should be organised in the period 1/2011 – 9/2013, taking into account the approved Description of work (see background information).

The proposals are to be submitted **until 12 December 2010**.

Background information – text from the Description of Work:
A series of CO2 storage knowledge-dissemination workshops will be held in countries where the first CCS demonstration projects are under preparation, i.e. those co-funded from the EEPR and the NER300 (the latter projects are not yet known but will be taken on board as they are decided). An internal call will be opened at the beginning of the project, inviting project participants to submit proposals to prepare these workshops, including suitable dates, locations and main focus. The main goal of these workshops is to support the first CCS demonstration projects by providing scientific information on CO2 geological storage and thus increasing the ability to appraise the safety of CO2 geological storage. Relevant topics could include: Basics of CO2 geological storage, Frequent misunderstandings, Similarities and differences with natural gas storage, Risk management, Impact on the inhabitants of the storage area, etc. CGS Europe participants will provide most of the presentations at these workshops; other relevant experts from outside of the consortium will be invited whenever suitable. The detailed schedule and venues will be presented in the first version of the Dissemination plan in Month 2 of the project.

In addition to the above, 1-2 proposals can be accepted from countries with significant CO2 emissions but with limited CCS activities. Altogether, up to 13 workshops can be organised.

The workshop organisation will be supported by the project as follows:

- 0,5 - 1 staff person-month can be charged under Task 5.3
- up to EUR 1,000 expenditures (other costs) can be covered from the project budget
- speakers from project participants' institutions can be engaged.

Additional financing in form of in-kind contribution of the partner, of a third party, or in form of sponsorship is desirable.

The proposals will be evaluated by the project Management Board according to their fitting with the Description of work, to the costs requested from the project budget and to the expected impact.

To submit a proposal, please fill in the simple form on the following page and send it to the WP5 leader - Vit Hladik (vit.hladik@geology.cz) until 12 December 2010.

Workshop proposal form

Proposer (institution, name):

Preliminary date and place of the workshop:

Duration (1 day / 1,5 days / 2 days):

Workshop topics to be covered:

Will the workshop be attached to another CCS event or co-organised with another project? If yes – which one?

Number of participants expected:

Target audience:

Language to be used:

Budget requirements from the project (person-months, other costs):

Number of speakers required from other participants' institutions:

Expected sponsorship:

Expected impact, relevance to CCS demonstration programme, other benefits:

Trans-national cooperation and networking in the field of geological storage of CO_2
FP7 Coordination Action

Call for workshop proposals – Round 2

The CGS Europe Management Board invites project participants to submit proposals to prepare and organise CGS knowledge-dissemination workshops as part of WP5 activities. The workshops should be organised in the period 7/2012 – 9/2013, taking into account the approved Description of work (see background information below).

The proposals must be submitted **before 30 April 2012**.

Background information – text from the Description of Work:
A series of CO2 storage knowledge-dissemination workshops will be held in countries where the first CCS demonstration projects are under preparation, i.e. those co-funded from the EEPR and the NER300 (the latter projects are not yet known but will be taken on board as they are decided). An internal call will be opened, inviting project participants to submit proposals to prepare these workshops, including suitable dates, locations and main focus. The main goal of these workshops is to support the first CCS demonstration projects by providing scientific information on CO2 geological storage and thus increasing the ability to appraise the safety of CO2 geological storage. Relevant topics could include: Basics of CO2 geological storage, Frequent misunderstandings, Similarities and differences with natural gas storage, Risk management, Impact on the inhabitants of the storage area, etc. CGS Europe participants will provide most of the presentations at these workshops; other relevant experts from outside of the consortium will be invited whenever suitable.

Six workshop applications were approved in the first round (Denmark, France, Italy, Spain, Greece and Finland). In the second round, we encourage applications from partners in **countries with demonstration projects** under preparation. In addition, 1-2 proposals can be accepted from countries with significant CO2 emissions but with limited CCS activities, or from countries where plans for possible future pilot / demonstration projects are under consideration. Altogether, up to 13 workshops can be organised.

The workshops can be either **stand-alone** CGS Europe actions, or actions **co-organised** by CGS Europe in cooperation with other national / international CCS stakeholder entities. They should have national or regional focus. The language should be either the national language or English.

The workshop organisation will be supported by the project as follows:

- 0,5 - 1 staff person-month can be charged under Task 5.3
- up to EUR 1,000 expenditures (other costs) can be covered from the project budget
- speakers from project participants' institutions can be engaged.

Additional financing in the form of in-kind contribution of the partner, of a third party, or in form of sponsorship is desirable.

The proposals will be evaluated by the project Management Board according to their fitting with the Description of work, the costs requested from the project budget and the expected impact.

To submit a proposal, please fill in the form on the following page and send it to the WP5 leader - Vit Hladik (vit.hladik@geology.cz) **before 30 April 2012**.

Workshop proposal form

Proposer (institution, name):

Preliminary date and location of the workshop:

Duration (1 day / 1,5 days / 2 days):

Workshop topics to be covered:

Will the workshop be attached to another CCS event or co-organised with another project? If yes – which one?

Will there be any co-organisers? If yes – please list them.

Number of participants expected:

Target audience:

Language to be used:

Budget requirements from the project (person-months, other costs):

Number of speakers required from other participants' institutions:

Expected sponsorship:

Expected impact, relevance to CCS demonstration programme, other benefits:

Romanian CO_2 Club Members:

Press Release

CCS - the path to a sustainable energy development

***22-23 March, 2012**: "CO_2 Club" Romania, together with CO2GeoNet – France, CGS Europe-pan-European scientific body on CO_2 geological storage, the National Research Institute of Marine Geology and Geo-Ecology – GeoEcoMar and the Institute for Studies and Power Engineering - ISPE, organised in Craiova the 3rd Edition of the International Workshop "Promoting CCS in Romania"*

Main goals:

- Highlighting at the level of the international CCS community and local stakeholders, the experience gained by Romania and progress made in the last three years, in developing CCS technology
- Ensuring transfer of knowledge and best practices from countries with expertise in CCS technologies implementation to specialists from Romania.

Key topics:

- EU Energy Roadmap 2050 – a challenging target for GHG reduction
- CCS at global, European and national level
- General overview on the institutional actions for promoting CCS technology – legal and regulatory framework
- Innovative technologies of CO_2 for capture and transport
- Best practices on safe geological CO_2 storage
- Getica CCS Demo Project - current status

During the official opening of the international workshop, Tudor Serban, Minister's Counsellor, Ministry of Economy, Trade and the Business Environment (METBE) presented the current status of Romania's efforts in developing and implementing CCS technology in the region, as complementary solution to the development of renewable energy sources and the growth of the energy efficiency - European mix of solutions to mitigate climate change.

John Scowcroft, General Manager Europe, Global CCS Institute declared in an interview for TVR Craiova channel that "Climate change is an existential threat to the planet and we need to do something about it. For countries like Romania the power generation sector needs to change and to adapt to low carbon economy. On this background CCS projects are extremely beneficial."

Paal Frisvold, Chairman of the Administrative Board, Bellona Europe Association Belgium announced the news published in English in a Romanian newspaper, on the bilateral agreement signed between Romania and Norway, based on which Romania will receive over a billion EUR grant for different areas of mutual interest, including 40 million EUR for CCS technology development, adding that more funds will be available for the period 2014-2018.

The Romanian Ministry of Environment and Forests – MEF through Carmen Suchici, Climate Change and Sustainable Development Dept. Director highlighted the role and interests of MEF for CCS technology development in Romania.

Romanian CO_2 Club Members:

Cristiana Ion, Minister's Counsellor, METBE announced the success of Romania to the European Commission, by overcoming the technical and financial due-diligence assessment of the European Investment Bank - EIB with the Demo Project proposal Getica CCS. In the next period EC will request the reconfirmation of the Romanian Government support for the Getica CCS Demo Project together with the proposed financing structure. The competent authority responsible for reporting to the EC the evolution of the Getica CCS Demo Project is METBE and the legislative responsibility belongs to NAMR - by following the application and law enforcement of the GEO 64/2011 on the CO_2 geological storage.

In the session dedicated to safe geological storage of CO_2, Larry Pekot, Technical Director, Schlumberger Carbon Services, France underline the great importance of the geological CO_2 storage site monitoring by combining existing methods and techniques.

The audience requested a more thoroughly presentation of the assessed risks which will be managed through preventive actions and intervention if necessary. Also, it has been highlighted the need for transparent dissemination of all technology's features, the risks and benefits, including information and education of the local administration, regulatory authorities and the public. Dr. Amuliu Proca, CO_2 Club Association, recall that "Romania has mineral water tanks (water + CO_2) famous throughout Europe and no one died by drinking mineral water, CO_2 is a GHG, which is not toxic, so it is not unhealthy, CO_2 is not flammable, so it does not explode."

We were honoured by the presence as speakers or chairperson of other international experts also from the Global CCS Institute, Australia; ALSTOM Carbon Capture, Germany; BRGM, France and University of Rome, Italy. The Romanian participants were: Ministry of Economy, Trade and the Business Environment; Ministry of Environment and Forests; National Agency for Mineral Resources; Regional Environmental Protection Agency Craiova, together with local representatives from Gorj and Mehedinti; EBRD; Turceni, Craiova and Rovinari Energy Complexes, Transgaz; Arcelor Mittal Galati; engineering and consulting companies - IPA Craiova, Prospectiuni, ASRC, and last but not least Craiova University, through the Faculty of Electrical Engineering which has shown the interest to involve PhD applicant students in educational programs on CCS.

The topics raise the interest of the local media too, the event being briefly broadcast at afternoon news and live on „Today's topic" show TVR Craiova channel, Craiova radio station interviewed live dr. Constantin Sava, President CO_2 Club Association.

Attached documents: final agenda; news broadcast live on TVR Craiova

For additional information
CO_2 Club - Dr. Constantin Sava, President - mobile: 0748.222.625, E-mail: savac@geoecomar.ro

Background

In December 15, 2011 the European Commission has adopted the "Energy Roadmap – 2050". The European Commission has committed to assure more than 80% GHG reduction until 2050, in comparison with the year 1990. This challenging target puts a high pressure on the energy sector, as it is the main GHG producer.

In order EU to assure in 2050 a secure, competitive and decarbonized energy system, there have been established ten structural changes for the energy system transformation including mainly significant growth of the energy efficiency, substantial rise of the RES share, nuclear energy important contribution and the acceleration of the CO_2 Capture and Storage technology deployment.

For Romania, implementing CCS technology is one of the most important structural changes, which together with significant energy savings and RES use will lead us to fulfil our assumed obligations as member state.

At national level, the electricity production from fossil power plants will be maintained at a relatively constant value of 27, 6 mil toe to 21, 5 mil toe for the period 2011-2030.

Romania remains one of Europe's electricity producers that use coal as primary fuel (coal + lignite) in the main power plants. These make about 40% of the national electricity production.

Oltenia, Euro-region No. 4 South West, is the most energy intensive region in Romania, with about 4600 MW installed in coal, responsible for 40% (24.5million tons ofCO_2/year) of the total quantity of CO_2 emitted annually at national level. It is also considered, economically speaking, to be a disadvantaged area with a low volume of investments, high rate of unemployment and low living standards.

The electricity generation sector in Romania cannot compete at a European level, due to lack of major investment in upgrading programs, thus resulting a low energy efficiency and high levels of CO_2 emissions. Starting from 2013, in Romania the low power plants efficiency will further affect the competitiveness by the CO_2 certificates costs growth, which purchasement will become compulsory.

Therefore, we must urgently identify the financial mechanisms that allow us to promote and implement technologies with low CO_2 emissions in the fossil fuel energy sector, in order to increase the level of competitiveness.

The future implementation of the CCS technologies in Romania, as a priority for the energy sector, will contribute to:

- Maintain operational the existing fossil PPs, including related mining exploitations sites
- Life extension for the oil and gas reserves exploitation capacities
- Increase the geopolitical security through the national resources consumption of oil and natural gas vs import dependence
- Develop new power plants running on (national) coal
- Maintain the existing jobs in the energy industry based on fossil fuels and create new ones (all along the project stages)
- Integrate Romania within the European CO_2 transport infrastructure
- Meet the national CO_2 emissions mitigation targets