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## **Deliverable D4.5**

### **OUTCOMES OF THE INTERNAL KNOWLEDGE SHARING WORKSHOP 4**

#### **Lessons learned and to be learned from pilot and demonstration projects**

**Spain, 27 - 28 September 2012**

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## 1. Workshop report

4th CGS Europe Knowledge Sharing Workshop

***“Lessons learned and to be learned from pilot and demonstration projects”***

**Spain, Monday 27<sup>th</sup> - Wednesday 28<sup>th</sup> September 2012**

The fourth CGS Europe Knowledge Sharing Workshop “Lessons learned and to be learned from pilot and demonstration projects” took place in Spain, 27-28 September 2012. The workshop was organised by Roberto Martinez, (IGME, WP4 leader) with the help of José Carlos de Dios and Andrés Pérez-Estaun (CIUDEN), the mayor of Hontomín (Burgos, Spain) and sessions chairs Alla Shogenova (TTUGI, WP 4.2 leader) and Niels Erik Poulsen (GEUS).

During the two days of the workshop, participants went on a field trip to Hontomín test site and attended presentations by CGS Europe partners and external speakers. The programme of the event is given in annex to this report.

40 participants attended the workshop from 22 CGS Europe countries (Table 1).

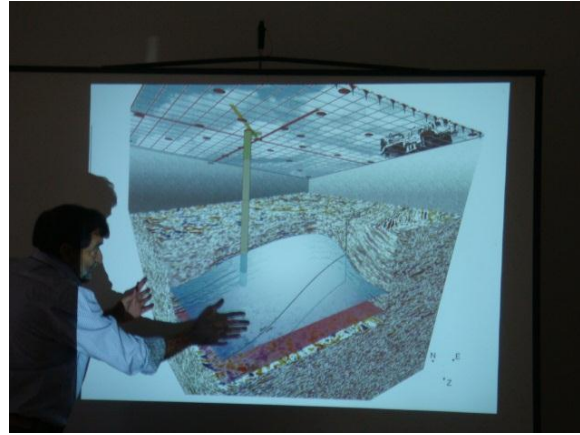
Country	N	Country	N
Austria	2	Latvia	1
Belgium	1	Lithuania	2
Bulgaria	1	Netherlands	2
Croatia	1	Norway	2
Denmark	1	Poland	1
Estonia	1	Romania	1
Finland	1	Serbia	1
France	4	Spain	6
Germany	3	Turkey	2
Hungary	1	UK	2
Italy	3		

Table 1: Number of participants per country

### **Day one – Field trip to Hontomín pilot CO<sub>2</sub> storage site in Burgos**

Before the actual site visit two presentations introducing the project, the geology of the storage site and monitoring methods were made in the Civic Centre of Sotopalacios (Burgos) by:

- José Carlos de Dios (CIUDEN) on “Hontomin Technological Development Plant (TDP) on CO<sub>2</sub> Geological Storage”.
- Andrés Pérez-Estaun (CIUDEN) on “Characterization and Monitoring at Hontomin site”.



Figures 1-2. Presentations on 27th September in Sotopalacios (Burgos, Spain) before field excursion to Hontomin pilot site

The field excursion was guided by Andrés Pérez-Estaun (CIUDEN) (Figs. 5-12). The detailed agenda of the field trip and workshop is given in the Annex 1.

### **Day two – presentations on pilots and demonstrators in Europe**

During the second day (September 28<sup>th</sup> 2012) at IGME Headquarters in Madrid, presentations were made by invited speakers (Niels Peter Christensen - Gassnova and ZEP; Sonja Martens - GFZ and Silvana Iacobellis - ENEL) and by the project participants (Roberto Martinez - IGME; Franz May - BGR; Rob Arts - TNO and Nick Riley - BGS)

After the presentations time was dedicated to discuss the following issues:

- 1) What striking points emerge from this workshop concerning pilots and demos?
- 2) What can CGS Europe/CO<sub>2</sub>GeoNet do to facilitate the preparation and implementation of storage pilots in an economic crisis environment?
- 3) How can CGS Europe/CO<sub>2</sub>GeoNet get closer to the large-scale CCS demonstration projects? What urgent actions could be taken, in particular to get involved in the independent research blocks?

The conclusions reached by the workshop participants are summed up here below.

## **2. Conclusions from the workshop**

### ***Problems and lessons to be considered***

- Local regulations for pilot projects should take into account many criteria, yet to be defined and that should be rather neutral than case-specific
- Financial matters are crucial for project implementation: clear funding schemes are needed. The project costs can be higher than predicted at the planning phase. Due to the low price of CO<sub>2</sub>, the NER 300 funding scheme will be able to actually support less than half the number of projects planned when the Program was launched
- All risks arising from CO<sub>2</sub> storage should be studied, modeled and monitored in details
- Uncertainties should be modeled and then compared with results obtained at the pilots after injection and monitoring
- Full chain CCS pilots and demos are preferable (a condition in the UK and Dutch calls for demonstrators)
- Difficulty of choice between offshore and onshore: lower public opposition, but much higher cost for storing offshore, especially in the case of saline aquifers.

### ***Positive results and lessons learned***

- The first Spanish CGS pilot project at Hontomín is progressing nicely and baseline measurements are being done.
- A successful example of public outreach was shown in Burgos, Spain
- Cooperation with renewable energies and CO<sub>2</sub> uses is possible and to be sought. (geothermal, biomass etc.)
- Some pilots (example of Mongstad in Norway) will be upgraded up to industrial scale after pilot phase
- No leakage was detected at Ketzin pilot, neither in boreholes nor in soils
- Good correlation of seismic monitoring and modeling of plume behavior at Ketzin pilot was obtained
- Interest in EU pilots is increasing worldwide and many CGS Europe partners would like to participate in the start and implementation of new pilot projects
- Fruitful cooperation of research organizations and industry is demonstrated at CGS pilots

### ***Additional needs and requirements arisen during discussion***

- With regards to today's economic crisis, funding should be shifted towards smaller scale CO<sub>2</sub> storage demonstration projects, i.e. CO<sub>2</sub> storage pilots, to lower the costs and the risk to see the project fail. Reduced scale projects can still produce significant results and are needed for further developing the knowledge on CO<sub>2</sub> geological storage. In addition research pilots have higher acceptance by the public than industrial projects.
- CGS Europe partners should feed the discussion on Horizon 2020 to include pilots opportunities in the framework;
- There is a need for transnational pilots for low capacity countries, such as in the Baltic region.



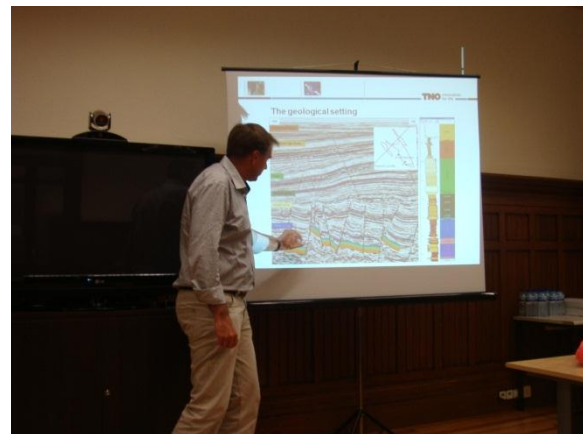
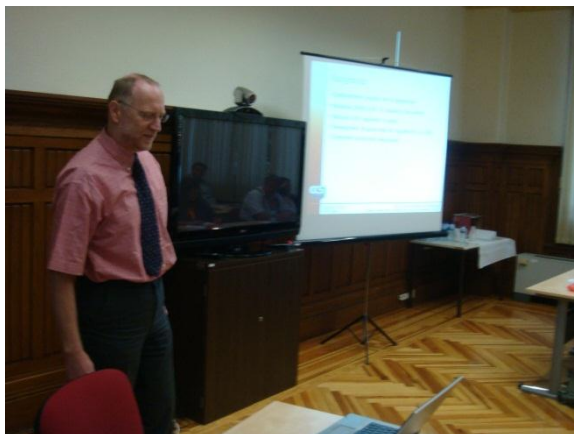
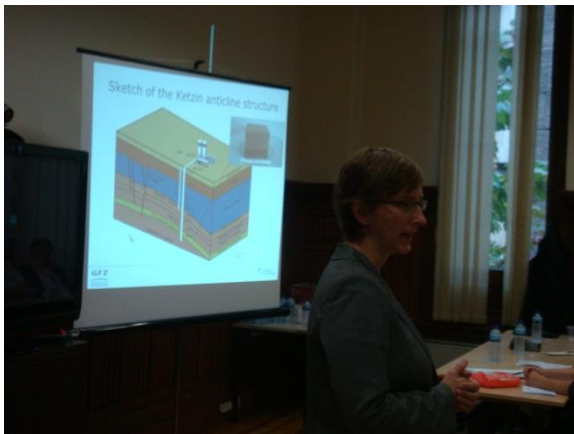


Figures 3-8. Equipment for monitoring of CO<sub>2</sub> storage at Hontomin “monitoring field laboratory” site



Figures 9-10. Participants of the Hontomin pilot site field excursion





Figures 11-15. Second day of the workshop (Friday, September 28<sup>th</sup> 2012) at IGME headquarters in Madrid



## ***4<sup>TH</sup> CGS EUROPE KNOWLEDGE SHARING WORKSHOP***

### ***“Lessons learned and to be learned from pilot and demonstration projects”***

#### **DAY 1 (Thursday, September 27<sup>th</sup> 2012) Field trip to the Hontomín CO<sub>2</sub> storage pilot site**

**8:00** Departure from IGME Headquarters in Madrid by bus

**11:00** Arrival to Hontomín (Burgos).

Reception from City of Energy Foundation (Ciuden) and visit to the site.

Presentations about the future of the project, seismic control system, hydrogeological control, gravimetry

- Hontomín Technological Development Plant (TDP) on CO<sub>2</sub> Geological Storage. José Carlos de Dios (CIUDEN)
- Characterization and Monitoring at Hontomín site. Andrés Pérez-Estaun (CIUDEN)



A lunch was included during the visit.

**16:30** Departure from Hontomín by bus

**19:30** Arrival at IGME Headquarters in Madrid

**DAY 2 (Friday, September 28<sup>th</sup> 2012) Workshop at IGME Headquarters, Madrid.**

*Chair: Alla Shogenova (TTUGI)*

**9:00** Welcome and practical information

Roberto Martínez (IGME)

**9:15 – 9:45** CO<sub>2</sub> Storage Project in Norway

Niels Peter Christensen (Gassnova)

**9:45 – 10:15** CO<sub>2</sub> Storage Demonstration Projects in Europe

Niels Peter Christensen (ZEP)

**10:15-10.45** CGS Europe - ZEP Proposals for storage pilots

Roberto Martínez (IGME)

**10:45 – 1100** Discussion

**11.00 – 11:30** Coffee Break

**11:30 – 12:00** The Ketzin pilot. CO<sub>2</sub>Sink Project: lessons learned

Sonja Martens (GFZ)

**12:00 – 12:30** Practical challenges for the regulation of CO<sub>2</sub> storage projects

Franz May (BGR)

12.30-12.45 Discussion

**12:45 – 13:45** Lunch

*Chair: Niels Erik Poulsen (GEUS)*

**13:45 – 14:15** CO<sub>2</sub> Storage in the UK. NER300 Demonstration projects

Nick Riley (BGS)

**14:15 – 14:45** The CO<sub>2</sub> Storage Demonstration Programme in The Netherlands

Rob Arts (TNO)

**14:45 – 15:15** A CCS Project in Italy: Porto Tolle. Silvana Iacobellis (ENEL)

**15:15 – 16:00** Discussion and conclusions trying to answer next questions:

- 1) What striking points emerge from this workshop concerning pilots and demos?
- 2) What can CGS Europe/CO<sub>2</sub>GeoNet do to facilitate the preparation and implementation of storage pilots in an economic crisis environment?
- 3) How can CGS Europe/CO<sub>2</sub>GeoNet get closer to the large-scale CCS demonstration projects? What urgent actions could be taken, in particular to get involved in the independent research blocks?
- 4) What can be done to raise CGS Europe /CO<sub>2</sub>GeoNet's profile amongst the project promoters? Can this be carried out in a Pan – European level?