



## Project no. 256725

#### Project acronym: CGS Europe

### Project title: Pan-European Coordination Action on CO2 Geological Storage

Instrument: Coordination and Support Action

Thematic Priority: SP1-Cooperation, FP7-ENERGY-2010-1

# **Deliverable D4.4**

#### OUTCOMES OF THE INTERNAL KNOWLEDGE-SHARING WORKSHOP 3

"National research programmes" Venice, San Servolo Island, Italy, 19th April 2012

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TTU GI (Tallinna Tehnikaülikooli Geoloogia Instituut)

Authors: Alla Shogenova (TTÜ GI) Photos: Kazbulat Shogenov (TTÜ GI)

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# 3<sup>rd</sup> CGS Europe knowledge-sharing workshop: "National research programmes", Venice, San Servolo Island, Italy, 19<sup>th</sup> April 2012

# Workshop report

The third CGS Europe Knowledge-Sharing Workshop "National research programmes" took place in Venice, San Servolo Island, Italy on 19<sup>th</sup> April 2012. The workshop was organised by Alla Shogenova with the help of the sessions' chairs Roberto Martinez (S-IGME), Kristin Flornes (CO<sub>2</sub>GeoNet-IRIS), Brian McConnell (GSI) and Saulius Sliaupa (GTC). The workshop followed on immediately after the 2-day 7<sup>th</sup> CO<sub>2</sub>GeoNet Open Forum that focused on European research: EU research projects and initiatives, and international research collaboration. The workshop complemented well this overview by homing in on the status at national level in Europe.

Participants:

115 participants took part in the workshop from 31 countries: Austria – 1, Belgium – 2, Bulgaria – 1, Canada – 1, Czech Republic – 1, Croatia –9, Denmark – 4, Estonia – 2, Finland – 3, France – 12, Germany – 9, Hungary – 1, Ireland – 1, Israel -1, Italy – 14, Japan -1, Lithuania-1, The Netherlands - 3, Norway - 8, Pakistan- 2, Poland – 8, Romania – 1, Serbia – 2, Slovakia – 4, Slovenia –1, Spain – 5, Sweden-2, Turkey – 3, UK – 10, Ukraine -1

The workshop was organized into three sessions (see the detailed agenda in Annex I):

- Session 1. National Funding and national CGS research programmes in CGS Europe countries (chair Roberto Martinez, 7 presentations and Panel discussion),
- Session 2. **Modelling in national research and demo/pilot projects** (divided into 2 subsessions: a) chair Kristin Flornes, 3 presentations, and b) chair Brian McConnell, 5 presentations)
- Session 3. **Other national research** (chair Saulius Sliaupa, 4 presentations).

A specific session was dedicated to modelling to take into account the recommendations by the CGS Europe Advisory Body.

Most of the workshop presentations are available via the project website:

http://www.co2geonet.com/NewsData.aspx?IdNews=73&ViewType=Actual&IdType=18

During the **session one**, after an overview of national funding and national research programmes in CGS Europe countries, presentations were made by the national funding authorities and by funded projects in those countries most advanced in CO<sub>2</sub> geological storage research and with sufficient CO<sub>2</sub> storage capacity, such as France, Norway, Germany, The Netherlands and Denmark. CCS Projects with different research fields, including possible

cross-border storage and transport, are funded in Finland, a country without any CO<sub>2</sub> storage capacity, according to what was reported in the Workshop. National funding of research in Romania and Italy is available through industrial support of demo and pilot projects. Bilateral cooperation including PhD students is also on-going in a number of CGS Europe countries, supported by CGS Europe exchange programme (WP.4.3).

"Modelling in national research and demo/pilot projects" was the theme of **session two**. Modelling results were reported from the Hontomin project in Spain, several case studies in Poland, and the Getica project in Romania. Modelling activities in the BIGCCS Project (Norway) cover the whole CCS chain and all the possible problems of CO<sub>2</sub> geological storage. The Norwegian Numerical CO<sub>2</sub> Laboratory project offered collaboration and free access to some of the open-source modelling tools for CO<sub>2</sub> geological storage research. One of the main problems reported in the modelling studies was data availability and, in connection with this, uncertainty. All possible uncertain parameters were considered and analysed in the methodological presentation made by CO<sub>2</sub>GeoNet-IFPEN, France. Uncertainty is a very important issue for the long-term storage of CO<sub>2</sub>.

The results reported by several project partners in the **session three** focused on other national research topics. Among them, the final results of the Slovakian national project included extensive research with original methodology on mineral carbonation, and capacity estimates of new storage sites were made from a very limited national budget over the last four years. An Ireland-UK study in the Irish Sea was presented with transnational GIS and training and attractive geological models. This is a promising start for the organization of future transnational CCS networks, which will be necessary in several European regions (e.g. North Sea, Baltic Sea and Balkan regions). Unfavourable or even non-existent results of CCS legislation in Ireland and some other CGS Europe countries did not hinder or prevent research on  $CO_2$  geological storage. To date, in the countries where  $CO_2$  storage is prohibited or CCS legislation is not yet ready, the exception has been made for  $CO_2$  injections aimed at research and processes development (<100,000 tons of  $CO_2$ ). On the political level, Norway has already shown its readiness to cooperate with other countries, both EU and others, in research and cross-border storage projects, offering its national more-than-sufficient storage capacity for the storage of foreign  $CO_2$  emissions.

Opportunities were made for interactive discussion within the three sessions, i) a panel discussion was held at the end of the first session: "Priorities of national programmes and prospects for bilateral and regional collaboration" with the session speakers as panellists, ii) questions to speakers and general discussion after session 2, moderated by the session chairs and iii) a discussion and conclusions session was held at the end of the day, moderated by Alla Shogenova (TTÜ GI, WP 4.2 leader). Wide interest was shown in the audience and topics raised included both funding and research problems.

# Conclusions

**Session 1**. National Funding and national CGS research programmes in CGS Europe countries

- Different cases and situations with national funding of CCS research were reported.
- Significant national support for CCS research including modelling is available in countries with significant storage capacity, such as France, Norway, Germany, The Netherlands, UK and Spain.
- A less favourable situation of national political and financial support is noted in Denmark, while GEUS participates in a number of EU supported projects, regional and commercial projects and international networks.
- No political support and no targeted CCS research funding is observed in many "follower" CGS Europe countries.
- A CCS Project with different research fields, including possible cross-border storage and transport, is on-going in Finland (country without any CO<sub>2</sub> storage capacity) – a very positive example for other countries with problematic storage capacity.
- Most CGS Europe countries are working now and/or have some research results on CO<sub>2</sub> storage capacity, and there are only some countries where storage capacity has not been estimated yet (Austria, Sweden, Serbia and Turkey).
- National industrial funding for demo projects is also available in Romania and Italy.
- Bilateral cooperation is also ongoing in several CGS Europe countries like UK-Ireland, Czech Republic-Norway, Estonia-France, etc, including participation of PhD students.







## CGS Europe 256725: D4.4 – Outcomes of the internal knowledge-sharing workshop 3





Session 2. Modelling in national research and demo/pilot projects

- The first results from the Spanish pilot project in Hontomín, supported and led by CIUDEN, were reported but are not yet validated.
- Very impressive national results of reservoir rock modelling in CO<sub>2</sub> storage sites is made in Poland and we shall wait also for results of the cap rock modelling at these structures.
- One of the main problems reported is that in many modelling studies there is not always enough data and, in connection with this, there is uncertainty.
- The list of uncertain parameters was long in the modelling capacity example presented by CO<sub>2</sub>GeoNet-IFPEN, but when planning a long-term storage site, it is necessary to consider all possible parameters and factors.
- An open-source GNU GPL numerical CO2 laboratory developed in Norway, and the possibility to colaborate and to use these tools for modelling using GNU GPL license, are very valuable especially for the "follower" countries.
- Other modelling activities in the BIGCCS Project, Norway, cover the whole CCS chain and all possible problems related to CO<sub>2</sub> geological storage.
- The CO<sub>2</sub> Vadose project is an interesting example of combining field measurements of CO<sub>2</sub> with numerical modelling.

 Impressive information was presented from Romanian researchers with the Getica demo project in the development phase, who started research on CO<sub>2</sub> geological storage less than 10 years ago with a budget of 1500 EURO in the CASTOR project, and who are now working on a project with 1.5 bln EURO budget and support from Global CCS Institute and industrial support and very probable support by EC (awaiting decision).





#### Session 3. Other national research

- Very interesting results of CO<sub>2</sub> purity research in Germany and modelling of CO<sub>2</sub> flux during monitoring from a pilot site in France were reported.
- New final results were reported by a Slovakian national project, with extensive research using an original methodology on mineral carbonation, and estimates for new storage sites made with a very limited national budget (0.5 mln EURO for 4 years).
- GSI-BGS study in the Irish Sea with transnational GIS and training and very attractive geological models is a promissing start for transnational CCS networks.
- Such research activities should be carried out despite unfavourable legislation, which is the case for Ireland, prohibiting CO<sub>2</sub> storage at their territory except for research, or prohibiting storage until definite deadline (like in Denmark until 2020).
- In all EU countries (already transposed CCS Directive) CO<sub>2</sub> storage is permitted for research and development, as well as for demonstration and pilot projects. This encourages CGS Europe partners to continue and develop their research activities in CO<sub>2</sub> geological storage, even if industrial storage of CO<sub>2</sub> is temporarily prohibited.















12 74	19 April 2012						
<b>3rd CGS Europe knowledge-sharing workshop: National research programmes</b>							
Session	1. Nati	onal Funding and national CGS research programmes	Chair	Roberto Martinez,			
in CGS E	urope	countries		S-IGME			
9.00	9.05	Introduction	Alla Shogenova				
9.05	9.25	Overview of the national research programmes and	Roberto Martínez,	S-IGME & BGR			
0.25	0.40	National research on CO. storage in France	Heike Rutters	CCS programmo			
9.25	9.40	National research on CO <sub>2</sub> storage in France		manager National			
			Launor	Agency for Research			
				(ANR)			
9.40	9.55	GEOTECHNOLOGIEN programme, Germany	Ute Münch	Head of Coordination			
				Office			
				"GEOTECHNOLOGIEN",			
				GFZ			
9.55	10.10	CATO2 programme, The Netherlands	Jan Brouwer	CAT0-2 Programme			
				Director, TNO			
10.10	10.25	CO <sub>2</sub> storage activities in the CLIMIT programme,	Trygve Utheim Riis	The Research Council of			
10.25	10.40	Norway		Norway			
10.25	10.40	(NORDICCS AOLIADK FOR Skagerrak project)	Niels Poulsen	CO2Geonet-GEOS			
10.40	10 55	CCS Programme Finland	Nicklas Nordhäck	GTK			
10.40	11 15	Panel discussion: Priorities of national programmes	and prospects for hilatera	and regional			
10.55	11.15	collaboration					
11.15	11.45	Coffee Break					
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Session	2a. Mo	delling in national research and demo/pilot projects	Chair	Kristin Flornes			
11.45	11.55			CO <sub>2</sub> GeoNet -IRIS			
		Overview of the national research on modelling in	Alla Shogenova	CO₂GeoNet -IRIS TTU GI			
		Overview of the national research on modelling in CGS Europe countries	Alla Shogenova	CO₂GeoNet -IRIS TTU GI			
11.55	12.15	Overview of the national research on modelling in CGS Europe countries Modelling at the pilot site of Hontomín, Spain	Alla Shogenova Orlando Enrique Silva	CO₂GeoNet -IRIS TTU GI Ciuden			
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11.55 12.15 12.35 <b>Session</b> 14.00 14.20 14.40 15.00 15.20	12.15 12.35 14.00 <b>2b. Mo</b> 14.20 14.40 15.00 15.20 15.40	Overview of the national research on modelling in CGS Europe countries Modelling at the pilot site of Hontomín, Spain Modelling in case studies, Poland Lunch Unch Odelling in national research and demo/pilot projects Numerical CO <sub>2</sub> Laboratory CO <sub>2</sub> -Vadose: 3D modelling of a CO <sub>2</sub> migration across natural carbonates Modelling activities at the BIGCCS International CCS Research Centre in Norway Getica CCS Demo Project, Romania CO2 storage at an industrial scale: a quick methodology to optimize the site location from basin scale simulations	Alla Shogenova Orlando Enrique Silva Bartosz Papiernik Chair Kristin M. Flornes Philippe Delaplace Alv-Arne Grimstad Constantin Sava Florence Delprat- Jannaud	CO2GeoNet -IRIS   TTU GI   Ciuden   AGH-UST   Brian McConnell, GSI   CO2GeoNet-IRIS   CO2GeoNet-IFPEN   CO2GeoNet-SINTEF   GEOECOMAR   CO2GeoNet-IFPEN			

# Annex I – Workshop programme

# CGS Europe 256725: D4.4 – Outcomes of the internal knowledge-sharing workshop 3

Session 3 – Other national research			Chair	Saulius Sliaupa, NRC
16.10	16.30	COORAL - $CO_2$ purity for capture and storage	Heike Rütters	BGR
		(COORETEC research project)		
16.30	16.50	SENTINELLE - Monitoring of geosphere, biosphere	Philippe de Donato	INPL
		and atmosphere at the Lacq-Rousse pilot site, France		
16.50	17.10	The final results of the Slovakian CO <sub>2</sub> storage project:	Ľudovít Kucharič and	SGUDS
		quantitative parameters of selected rocks suitable	Martin Radvanec	
		for CO <sub>2</sub> storage		
17.10	17.30	Joint GSI-BGS study of CO <sub>2</sub> storage potential in the	Brian McConnell	GSI
		Irish Sea		
17.30	18.00	Discussion and Conclusions	Chairing and conclusions	TTU GI
			Alla Shogenova	