



Report of the « Underground Pub session » in the Workshop for Underground Laboratories for CO₂ geological storage research (5-6 June 2019, Nancy).

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Context of the Underground Pub session:

The audience of the workshop has been challenged to answer several questions during a World Café animation entitled “underground Pub session”. World café is a whole group interaction method focused on conversations. The core design philosophy is that people possess an intrinsic ability and insights to address issues of decision-making or planning effectively, and that natural conversation is one of the best options for eliciting such dialogue. As participants rotate between tables over the course of a session, individual conversations build off one and other, and ideas and issues “cross-pollinate”. In doing so, the collective intelligence, focus, and experiences of the group are brought to bear on a particular issue or issues with a collective sense of purpose and direction.

In that particular session, the world café was designed to generate proposals for CCUS underground experiments in the ANDRA Bure Facility.

There were 8 tables of about 3 to 6 peoples that were asked, at each step, to answer a question during 15 to 20 min and then to rotate to another table. One host was designed per table (and for the whole session) in order to ensure the transmissions and recording of the answers from one group to the next one.

Four questions were thus asked sequentially:

1. What are the most pertinent CCUS processes and parameters to be studied in an underground facility?
2. Describe one experiment that would allow to study two or three of the previous items in Bure?
3. What would be the main difficulties to overcome in order to build and use such setup?
4. Elaborate answers to these difficulties

At the end of the questioning process, the tables host were asked to summarize in a general session the outcomes of their tables.

Main conclusions and observations:

Globally, the approaches that were presented were focused on security issues. This can be mainly explained by the fact that the underground laboratory give access to a clay layer and that this type of

formation can be assimilated to the cap-rock of a CCS storage sites. The cap-rock and wells are considered as the main contributors to the sealing and thus security of a CCS site.

More specifically, the tables demonstrated an interest in different processes associated with the wells and cap-rock integrity (Question N°1):

- leakage processes
- corrosion issues
- Geochemical reactivity
- fracking and fault evolution
- cap-rock resilience
- up-scaling and 3D processes, modelling

Experimentally, this has led to different set-ups that can be classified and summarized this way (Question N°2):

- In situ injections tests and observations with horizontal or vertical wells
- Interfacial tests on rock samples or cores that would be plugged into the Callovian-Oxfordian formation
- Drilling a well from the surface to reach different tunnel vicinities and formation layers

These set-ups could then be used for different type of experimental approaches:

- Monitoring activities and development
- remediation tests regarding leakage
- fracking stimulation, Injections

The tables groups also have also listed different issues that may hinder such experiments (Question N°3). However, they also have formulated different answers to them (Question N°4):

-Funding: some of the proposed set-up would require high investments (e.g. boring a new well from the surface). → [Look for national and international funds \(ANR, H2020, ERANT...\)](#), [set a business model](#), [work with ITE \(Institut Transition Energétique\)](#) and [get industrials involved](#).

-Security issues: Handling pressurized CO₂ (and associated gas/impurities) in experimental set-up in closed space (gallery) can be an issue, especially in case of leakage. → [Accommodate dedicated spaces with sensors](#); [develop specific procedures with the help of ECCSEL](#). [Try to keep away the pressurized experiments](#). [Work with small quantities](#). [Create specific niches for such experiments and improve parallel modelling](#).

-Technical issues: boring wells might be troublesome due to the limited space of access; moreover, the presence of these experimental set-ups may cause interference with other usual Bure activities. → [Use the dead end of unused galleries](#); [work with the digging devices already developed by ANDRA](#); [dig the wells from the surface](#).

-Public acceptancy: the fact of performing new types of experimentation concerning CCUS in Bure may cause public reaction or rejection. → [Establish a dedicated communication plan for the public](#).

Finally, during a panel session organized by the facilitator (S. Dupraz) with ECCSEL and ANDRA representatives (Volker Röhling and Aliouka Chabiron, respectively) the different proposals were discussed altogether with the other exchanges and presentations that did occur during the workshop. It was concluded that interesting ideas for future experiments at URL-ANDRA have arisen and needed now to progress towards detailed specifications and projects. Then, they can be submitted to ANDRA, however, care should be taken in consideration of the time that will be required to administratively authorize this type of experiments.