



COP24 KATOWICE 2018 UNITED NATIONS CLIMATE CHANGE CONFERENCE

Negotiators from almost 200 countries will meet in Katowice, Poland, from 3–14 December 2018, for the 24th annual Conference of the Parties on climate change, COP24. This conference is expected to build on the COP21 Paris Agreement that promises to keep the global temperature rise this century well below 2°C compared to pre-industrial levels and as close as possible to 1.5°C. The aim of COP24 is to engender urgent action to halt climate change and to prepare for sustainable, low-carbon development under a changing climate. Achieving the primary goal of the Paris Agreement is vital, but global average temperatures have already increased by around 1°C since pre-industrial times, underlining the urgency of action. Pursuing the Paris Agreement requires rapid reduction of greenhouse gas emissions. The process for achieving these targets, including the methods, technologies and financing, should be completed by 2018 at COP24 in Poland.

CO₂GeoNet played a major role in raising the visibility of CO₂ geological storage during previous COPs. This year, CO₂GeoNet has proposed the following activities with

CO₂GeoNet; planned actions at COP24

other major CCS organisations such as *Bellona*, *CCSA*, *TCCSUA* and *University of Texas* as co-organisers at COP24:

- **Renewables and CO₂ storage: 1/2 of your climate solution**
(side event in the first week)
- **Demystifying negative emission technologies**
(event organised within the DG Climate Action panel on the EU Longterm strategy for GHG emissions on 12th December, 16.30 - 18.00).

In previous COPs, the CO₂GeoNet-led booth attracted much interest from delegates and observers. This time, CO₂GeoNet will again organise and run a booth at COP24:

- **We need CO₂ capture and storage (CCS and CCUS) to meet the Paris Agreement Targets**

CO₂GeoNet has started a new cooperation with *GIG Institute (Główny Instytut Górnictwa - Central Mining Institute)* from Katowice. GIG is a scientific and development institute in Upper Silesia with over 90 years of research in mining and environmental engineering, education and training. Together we are preparing an attractive side event at the GIG venue, 200 m away from the COP area in Katowice:

- **CCUS - Capturing CO₂ emissions in industrial regions**
in cooperation with the local university, mining institute GIG on 10th December.

CO₂GeoNet welcomes you to our events at COP24!

Niels Poulsen, GEUS, Denmark

Editorial

CCS shifting focus, shifting gear

The current Netherlands Government, which was installed last year, defined a very ambitious emission reduction goal for 2030. All sectors, energy, industry, buildings, mobility and agriculture should together achieve a reduction of 49% compared to 1990 levels by 2030 - only 12 years from now. CCS is playing an important role in achieving the goal set not only for the energy sector, but also for the industry sector. Coal fired power plants like those in the Rotterdam Harbour, were initially the centre of attention to be refurbished with CCS but now are planned to be phased out. Industry stakeholders carried out a first assessment, which should result in an annual reduction of CO₂ emissions from industrial sources of 7 Mt with CCS in the year 2030.

This shift in focus is not restricted to the Netherlands. Industry stakeholders in

Germany (*National Academy of Science and Engineering*) asked for an open debate on CCS and CCU to reduce emissions from German industry (the article can be assessed at <https://www.cleane-energywire.org/news/call-open-debate-ccu-and-ccs-save-industry-emissions>).

This major change will also influence the work of the CO₂ storage community: the location, mass flow and composition of CO₂ streams from industrial sources will be different from CO₂ streams captured from power plants. Our Association and its Members will need to engage more with industrial stakeholders. The upcoming GHGT-14 in Melbourne, Australia, and the COP24 in Katowice, Poland, are excellent opportunities to do so.

Ton Wildenborg, President CO₂GeoNet

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ENOS
Enabling Onshore CO₂ Storage

ENOS progress - year 2



The ENOS project is a CO₂GeoNet initiative with 29 partners from 17 European countries. The project aims to advance CO₂ storage onshore, where the majority of large, fixed CO₂ sources are located. Enabling onshore storage will support management of decarbonisation strategies at territory level while enhancing security of energy supply and local economic activities and securing jobs across Europe.

The project relies on a comprehensive portfolio of five field sites (Hontomín, Spain; Sulcis Fault Lab, Italy; GeoEnergy Test Bed (GTB), UK; LBr-1, Czech Republic; Q-16 Maas, Netherlands), representing a variety of geological and socio-economic contexts. The project started in September 2016 and will continue until September 2020. Status and developments will be presented through a range of publications including papers prepared for GHGT-14. Please follow us on www.enos-project.eu for updates.

To date, 490 tons of CO₂ and 430 m³ of brine have been injected and monitored at Hontomín to improve understanding of flow properties in tight and fractured carbonates. The geological model was updated, and the site fracture network was better characterised. Other surveys to improve the geological model and to provide more data carried out include the first 3D VSP campaign on site using I DAS Fiber optic, deep reservoir wa-

ter sampling and placement of surface gas monitoring stations. Interpretation of these new data were carried out by ENOS project partners.

The GTB and Sulcis field sites are preparing for injection and work through ENOS has focused on baseline data collection, geological modelling and planning for injection. The ENOS partners responsible for the sites also teamed up with colleagues from Carbon Management Canada (CMC) Field Research Station in Alberta, South Korean K-COSEM and KIGAM sites, the shallow injection project at the Otway site in Australia, the CO₂ Field lab (Svelvik) site in Norway and the CO2MOVE site in Brazil to form an alliance that will share knowledge on leakage risks as well as practical information on setting up test injection sites.



The ENOS project will be presented at the GHGT-14 conference in Melbourne, Australia:

Poster Session B
24 Oct 2018, 14.00 - 16.00.

Please come and see us!

The ENOS partners studying LBr-1 and Q-16 Maas teams are working on integration of CCS into socio-economic

activities. For Q-16 Maas reservoir, simulations of cyclic injection in winter and back-production in summer via a huff and puff operational scheme demonstrated that the buffer potential could increase the offtake of CO₂ by greenhouses from a current annual amount of 500 ktonne to 816 ktonnes. The LBr-1 team worked on new methods to co-optimize EOR potential and storage capacity using the oil field as a modelling case study.

Work on public awareness and involvement near the ENOS field sites started with extensive knowledge sharing between the teams in Spain, Italy, UK and the Netherlands. The goal was to learn about the situation in the different social contexts, CCS perception in each area and to understand how to implement the project's objectives and work plan in the local environment. Finding a common terminology and a shared understanding of the research concepts has provided a sound basis for the dialogue with civil society and resulted in a booklet for the general public entitled "Participating in CO₂ Geological Storage Research" which is currently available on the project website.

ENOS partners have developed a joint international Master programme covering all aspects of geological storage of CO₂ so that students can both understand the various aspects involved in CCS projects (reservoir engineering, geology, sedimentology, stratigraphy, geophysics, structural geology, geochemical modelling, regulations, etc.) and further develop their own field of specialisation.

*Roman Berenblyum,
NORCE, Norway*

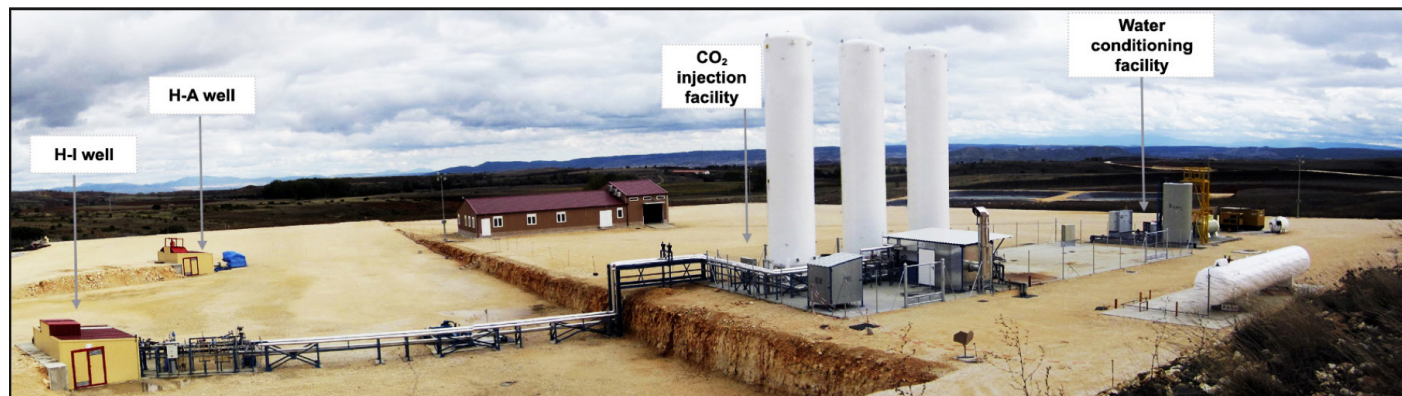
ENOS 2nd Spring School

Advanced course on geological storage of carbon dioxide

Date & place: May, 22nd to 29th 2019 in Hontomín, Spain

*The course is aimed at interested students and early career scientists
For more information and application forms please visit www.enos-project.eu.*

Below: Hontomín Technology Development Plant, Spain (courtesy of Fundación Ciudad de la Energía)





CO₂GeoNet assists in deploying the SET implementation Plan on CCS and CCU

In September 2015 the EC communicated a number of actions to achieve “an Integrated Strategic Energy Technology (SET) Plan: accelerating the European Energy System Transformation”. The latest SET Plan proposes 10 actions, one of them, Action 9, is directed towards “Renewing efforts to demonstrate carbon capture and storage (CCS) in the EU and developing sustainable solutions for carbon capture and use (CCU)”. The EC wrote an issues paper on CCS and CCU and invited comments from stakeholders. In early 2016, CO₂GeoNet was asked to contribute to the development of the issues paper via a Declaration of Intent (DoI). This was finalised in May 2016. CO₂GeoNet together with EERA-CCS and

ENeERG focused on two aspects of the actions needed to achieve the SET plan; the development of a comprehensive web-enabled storage atlas and the development of new storage pilots.

The next phase was to define a plan for implementing the targets in the Declaration of Intent. To this end, a Temporary Working Group was set up chaired by ETIP-ZEP and the ministries of Norway and the Netherlands. The process of developing the plan lasted until September 2017 when it was finalised and endorsed by the SET Plan Steering Committeeⁱ.

During early 2018, we reached the phase of executing the Implementation

Plan. The Temporary Working Group was transformed into the Implementation Working Group (IWG) and the various Research and Innovation activities were organised into subgroups. One of these is the Subgroup on Storage lead by Jonathan Pearce (representing EERA-CCS) and myself (representing CO₂GeoNet). We are now busy expanding the subgroup to six to eight members with a balanced representation of the various stakeholder groups. The subgroup co-leads report two times a year in the meeting of the IWG on the progress made, and suggest actions to support the execution of the research and innovation activities.

ⁱ More detailed information is available at https://setis.ec.europa.eu/system/files/set_plan_ccus_implementation_plan.pdf

Ton Wildenborg,
TNO, The Netherlands

Scientific diving training for underwater monitoring

The third edition of the Scientific Diving Summer School was held in Panarea (Aeolian Archipelago, Italy) from the 18 to 27 of September 2018. Sapienza University of Rome, OGS (Istituto Nazionale di Oceanografia e Geofisica Sperimentale) from Trieste, Stazione Zoologica Anton Dohrn from Naples, the Palermo Unit of INGV (Istituto Nazionale di Geofisica e Vulcanologia) and Amphibia Diving organise the school which is held annually. The school is endorsed by AIOSS and CO₂GeoNet. As in previous years, this third edition was hosted at the ECCSEL NatLab, one of the Italian components of the European Carbon Dioxide Capture and Storage Laboratory Infrastructure (<http://www.eccsel.org/>), managed by OGS.

This year, the school was taught in English to make it more accessible to international participants. The group of students included PhD and professionals, coming from France, Italy and Ireland.

Panarea Island is an active volcanic area characterised by high natural CO₂ emissions and by the occurrence of active gas vents (hot and cold) at different depths (from 20 to 40 m) below sea level. From a biological point of view this area is also unique; the ecosystem is adapted to natural seawater acidification due to the



Participants of the Scientific Diving School at Panarea 2018 (photo courtesy A. Conti)

long term CO₂ leakage and also to hot hydrothermal fluids. The programme this year provided eight dives and 25 hours of lessons and practice. During the dives, participants were trained in multi-parameter monitoring techniques, using sensors and instruments provided by the NatLab and the organising institutes. Attendees worked on definition of experimental protocols for sampling and performed sampling and analysis both of chemical and physical parameters (water, sediments and gas sampling) and of planktonic and benthonic organisms. The aim of these exercises was to focus on assessing the effects of acidification on organisms, communities and the habitat. Theoretical and practical

lessons after the dives guided the students in collation and interpretation of the data.

Next year CO₂GeoNet will be one of the organisers. The whole Scientific Diving Summer School team welcomed the support of the CO₂GeoNet Association, considering this a great opportunity for the school to reach a wider audience of researchers involved in CCS research.

Please visit the facebook page of the Scientific Diving Summer School Panarea Island <https://www.facebook.com/scuolasubpanarea/>!

Sabina Bigi, Sapienza, Italy

CO₂GeoNet presenting at an international work- shop in South Korea

During July 2010, the presidential committee on green growth (PCGG) of the Republic of Korea announced the national CCS master action plan based on the Framework Act on Low-Carbon Green Growth. The key categories of actions include:

- 1) innovative CCS technology development
- 2) large-scale integrated CCS demonstrations
- 3) developments of environmental managements and regulatory frameworks.

Various groups of researchers in South Korea currently conduct multiple projects related to CCS, among which the on-going CCS project "Integrated Predictions and Assessments of Environmental Risk with Near Surface CO₂ Leakage" supported by the Ministry of Environment.

Every year, the project group organises the workshop associated with various subjects related to CO₂ geological storage and invites 5-7 researchers from around the world to jointly define areas of technical collaborations. CO₂GeoNet has been invited to present at this **International CCS forum**, alongside reputed speakers from Japan CCS Co. Ltd., the Chinese Academy of Sciences,

the Spanish National Research Council, the Purdue University (USA) and Sotacarbo (Italy).

The **International CCS forum** will be held in Seoul on November 6, followed by a seminar at Korea University for students and researchers on November 8.

Sergio Persoglia from CO₂GeoNet will speak about **"CCS Initiatives in Europe and the role of CO₂GeoNet"** at the International workshop and then present **"The ENOS project"** in the seminar at the university.

*Sergio Persoglia,
CO₂GeoNet Secretary General*

ENOS project recognised by the CSLF

At their meeting in Melbourne, the Carbon Sequestration Leadership Forum Policy Group formally recognised the valuable contribution of the ENOS (ENabling Onshore Storage) project to advancing CO₂ capture, utilisation, and storage technologies. The ENOS project was recommended for recognition by the Technical Group meeting in Venice following a presentation by Marie Gastine (ENOS Coordinator, BRGM). Formal CSLF recognition was subsequently granted by the Policy Group meeting in Melbourne. This raises the visibility of ENOS and place it alongside other high-impact CCS projects. Projects recognised by the CSLF are shown on <https://www.cslforum.org/cslf/Projects/Summaries>

The ENOS project is an initiative of CO₂GeoNet and around two thirds of the CO₂GeoNet Members are working together on this H2020 project alongside other European institutes.

Ceri J. Vincent, BGS, UK

Photo: Didier Bonjoly (L), BRGM, France and Sergio Persoglia (R), Secretary General of CO₂GeoNet, receiving the Recognition Award from Steven Winberg, CSLF Policy Group Chair (photo courtesy P. Deiana, ENEA)



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