



New presidency for CO₂GeoNet



**CO₂GeoNet President
2015 - 2019**

Starting as President of CO₂GeoNet in April 2015, I was very lucky to find the Association on firm ground. In the preceding few years, the number of members had strongly increased from 13 to 26 in 2015. This boost was a direct result of the CGS Europe project. In the past 4 years, our Association has experienced a more modest but steady growth to 30 members from 21 countries at this moment in time.

CO₂GeoNet is active in reaching out to CCS stakeholders with an increasing impact in Europe and globally. In doing so, our Association has become more established and professional. The representation of CO₂GeoNet at the COP has become a solid asset in our outreach activities; we organise side events and booths which attract a lot of attention from people who want to be informed on CCS or to discuss the merits of this climate mitigation measure.

CCS has experienced a hard time in Europe in getting off the ground as an effective large-scale emission reduction option. During the past 4 years, interest has grown in CCS applied to industrial sources, particularly in regions with industrial clusters. Many promising initiatives are being developed, in particular around the North Sea area, with prolific storage opportunities. CO₂GeoNet is also keen to keep an eye on onshore storage options as exemplified by the H2020 projects ENOS and ECOBASE.

My role as President was enormously strengthened by the enthusiastic and hard working members of the Executive Committee, chaired by Ceri Vincent. I thank you all that I could be part of this. I am convinced that Ceri, as our newly elected President, will do a great job for our Association and I wish her and all of the ExCo much success and an enjoyable time.

Ton Wildenborg, TNO, The Netherlands



**CO₂GeoNet President
2019 - 2021**

I feel privileged to be elected as the President of the CO₂GeoNet Association, particularly at such an exciting time for both the Association and for CO₂ Capture and Storage (CCS). CCS is receiving growing interest and its role as a flexible emission mitigation technology is becoming increasingly clear. CO₂GeoNet is growing and reaching more stakeholders than ever before.

Hydrogen with CCS and industry with CCS are both hot topics this year. We have seen promising developments over the past few months with projects such as Norwegian Northern Lights, UK Tata chemicals/CCU plant, H21 and HyNet in the UK and the gasification/CCS Magnum project in the Netherlands, taking steps towards implementation. The 45Q tax incentive in the USA also seems to be attracting new companies towards CO₂ storage. I look forward to seeing more CO₂ in the ground with all these new projects (hopefully) coming online.

CO₂GeoNet activity and influence continues to grow through our key event, the Open Forum, as well as through side events/booths at the UNFCCC Conference of the Parties (COP) and collaboration with the European Commission and international organisations such as Bellona, CCSA, CSLF, EERA-CCS, GCCSI and ZEP. International collaboration remains key to getting CCS implemented and I look forward to CO₂GeoNet continuing to work with our national and international colleagues to provide the science supporting CO₂ storage as a key technology for our sustainable future.

Ceri J. Vincent, BGS, UK

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Invitation to Open Forum 2020

The 15th edition of CO₂GeoNet Open Forum will take place between 11 - 14 May 2020. CO₂GeoNet will strive to compile an attractive programme and organise pre- and post-event workshops. More information will be available through our [website](#) in due course.

Come and join us in Venice!





14th CO₂GeoNet Open Forum Act now for zero emissions: the role for CCUS

The 14th CO₂GeoNet Open Forum was held in Venice from 7 – 9 May 2019. Workshops were organised around this event by CO₂GeoNet in collaboration with the Carbon Sequestration Leadership Forum (CSLF) and the H2020 ENabling Onshore Storage (ENOS) project as well as by the Programme for Power Generation with Carbon Capture and Storage (CLIMIT) and Advanced Resources International (ARI) (see later articles in this newsletter). The event was kindly sponsored by French ClubCO₂, SILIXA, BELLONA, OGS, TCCSUA, RVO, CLIMIT and ARI and endorsed by CSLF, EERA-CCS, IEAGHG, ZEP and the H2020 ENOS project.

The Open Forum opened with a lively Keynote Speech '**CO₂ Storage - time to shift gear**' from Chris Davies, a member of the European Parliament for 15 years and rapporteur for the CO₂ Directive. Chris emphasised the need to be bolder in promoting the need for CCS and stated that we are not moving as fast as we should. The technology is ready, what is needed now is action. We've still got our foot on the climate change accelerator, how do we get in front of this? This keynote prompted a lengthy and animated discussion on how to drive CCS forward and what is needed in terms of political and financial support to get CCS implemented at large scale.

This perspective is reflected in [the Key Messages](#) of the Open Forum: 'Everyone – citizens, politicians, industry- has a shared responsibility towards climate sustainability' and 'Pay the bill or face the consequences.....the cost for mitigating

climate change will be dramatically higher without CCS, and extreme if we do nothing or act too late'.

The first technical session set out high-level perspectives on CCS: '**Four years after the Paris Agreement: update on trends and achievements towards climate goals**'. Views on the role for CCS were offered in presentations prepared by DG Research & Innovation, Dutch Ministry of Economic Affairs and Climate Policy, CCUS Division of US Department of Energy and the Korea CO₂ Storage Environmental Management Research Center. These presentations set out differing views on the role for CCS, however, a common message was clear, CCS is part of the package that we need to implement now in order to mitigate emissions. Incentives sometimes work better than punishments; the new tax incentives in the US really seem to be driving new conversations on CO₂ storage forward. The needed scale of technological change is possible; major infrastructure changes have been enacted by urgent need for change before now.

The second session set out **emerging opportunities adding value to CO₂ in order to improve the business case through utilisation**: low carbon cement, using CO₂ to accelerate growth of algae to produce commodities and CO₂ storage for clean hydrogen. These presentations highlighted the ever-evolving role for CO₂ storage and utilisation, with hydrogen and low carbon materials rapidly gaining ground. It was also stated that we need to be clear on messaging;

utilisation and storage are not the same, but can be complementary in achieving climate goals.

The first day closed with a session on '**Plug & Play Storage – how close are we? Providing a transport and storage service**' with industrial perspectives from Total E&P, Norske Shell and Port of Rotterdam, an NGO view from Bellona and the research perspective from the Energy & Environmental Research Center, US. This session highlighted the practical steps and considerations from international and national organisations to drive CCUS forward, answering the challenges CCS faces using experience from inside and outside the emerging CCS industry.

The second day of the Open Forum focused on **linking all stakeholders together through effective communication**. Perspectives on engaging with the local population were given by GCCSI and H2020 ENOS project. The Norwegian Confederation of Trade Unions presented their perspective on employment opportunities offered by sustainable technologies and CCS in particular. These presentations were followed by breakout groups assessing 'how CO₂ storage can contribute to the energy transition towards a low carbon society'. The feedback from the breakout groups was then followed by a short session on 'fitting CCS into our low carbon society', considering legal and regulatory issues and 'how much CO₂ storage is needed and when?'. The Open Forum closed with a session on '**Integrating CCS**' which set out examples from Japan, the US and the Netherlands where applications of CO₂ storage are being explored. Day two of the Open Forum really focused on communication and the need to find common ground to start discussions with a broader stakeholder community, as well as giving positive examples where CO₂ has been tried and tested.

The Open Forum reflected the growing energy in the CCS community that we hope will see CO₂ storage realise its potential as an effective emission mitigation tool that will help us achieve a sustainable future.

Ceri J. Vincent, BGS, UK
Sergio Persoglia, CO₂GeoNet
Rowena Stead, BRGM, France
Marjeta Car, GEO-INZ, Slovenia



The keynote speech by Chris Davies initiated a lively debate at Open Forum 2019 (photo courtesy R. Stead)



Open Forum workshops

CO₂ storage stories; learning by doing:

The [Carbon Sequestration Leadership Forum](#) and CO₂GeoNet organised a workshop ahead of the main Open Forum to share lessons learned from real CO₂ storage projects. The aspects selected for discussion were seismicity, injectivity and monitoring CO₂ storage sites. Experience from projects in the US, Canada, Norway, Japan, Iceland and Algeria were presented, highlighting the value of sharing lessons learned, not just on science, but on practical aspects (e.g. locating a site is not always an entirely scientific process!). The presentations prompted lively discussion and sharing of anecdotes.

The first session on seismicity illustrated the importance of engaging with local stakeholders and building trust so that if natural earthquakes occur, communication can be swift and supported by science. The second session on injectivity highlighted lessons learned from three projects with the clear message that understanding and maintaining your wells was critical to successful injection, not just a good understanding of the local geology. The final session demonstrated the importance of selecting the monitoring tools that would work best for your site goals and that this is an iterative process.

National networking; driving CCS forward:

Following the Open Forum, CO₂GeoNet and H2020 ENOS organised a workshop to establish an informal network between national CC(U)S clubs and to discuss possibilities for future cooperative actions to help drive CCS forward. The workshop was divided into two sections, the first had presentations from European CCS clubs, and the second from the US, Canada, Japan and Taiwan.

The CCS clubs set out the aims of their associations, highlighted key national stakeholders for engagement and the role of their association in advancing CCS in-country. All the clubs highlighted the importance of transparent and clear communication with civil society (especially with CCS hosts), the need for practical projects to accelerate learning by doing and emphasised the role for CCS in supporting the economy and jobs. The exchange of ideas and discussion between national clubs in Europe (where there are only a few CCS projects) and the US/Canada (where there are more commercial projects utilising CO₂-EOR (enhanced oil recovery) and a new tax incentive) proved very fruitful and it was interesting to see the list of key stakeholders and messages develop throughout the morning. A joint statement will

be prepared ahead of COP25 and the national clubs that attended this workshop will be invited to add the support of their association.

Towards commercialisation; insights from US and Norway:

CLIMIT and ARI organised a workshop to present the latest developments towards CCUS commercialisation based on US and Norwegian experience. The workshop brought together an interest group of different stakeholders – researchers, industry and government. The event facilitated knowledge sharing on establishing industrial-scale CCS worldwide. The presentations were followed by individual QA/QC sessions with the audience and plenary discussion at the end. The first session presented US experience, focusing on financial aspects of storage including importance of the governmental role in setting incentives for the storage projects. Successful business cases and experience with CO₂-EOR in the US were presented, followed by stacked storage where EOR is already happening as a relatively cheap pathway to make a bigger impact on emissions. Finally, financial aspects, like the size of the CO₂-EOR prize, and financial mechanisms to enable CCUS in United States were presented.

In the second session, Norwegian presentations focused around the Northern Lights project. Various aspects were covered including countries' current experience with CO₂ injection. Three key questions for storage operators, i.e. safety, capacity and risk management were presented and discussed. Issuing of the First Norwegian storage license and differences from Sleipner and Snøhvit were highlighted. Finally, a talk on streamlining industrial CCS and future upsides was given.

The workshop concluded with plenary sessions where aspects of government involvement, business case creation, difference in socio-economic settings across Europe, pilots as stepping stones and experience building/knowledge sharing platforms were discussed by the speakers and audience.

*Ceri J. Vincent, BGS, UK
Roman Berenblyum, NORCE, Norway*

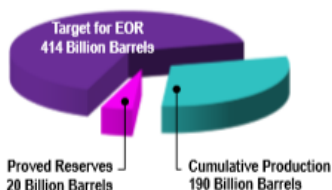
*The slide from the presentation of
Michael Godec, ARI*

Size of the US CO₂-EOR Prize

In the U.S., about 1/3 of the 624 billion barrel conventional oil endowment will be produced with primary/secondary recovery technologies, leaving behind 414 billion barrels.

Much of this "left behind oil", equal to 284 billion barrels, is technically favorable for CO₂-EOR and is widely distributed across the U.S.

Original Oil In-Place: 624 B Barrels
Remaining Oil In-Place: 414 B Barrels



*Does not include 'light' oil production or reserves.
Source: Advanced Resources International, 2015.

Conventional Domestic Oil Resources Favorable for CO₂-EOR



Source: Advanced Resources International internal analysis, 2016





International Master on "CO₂ Geological Storage"

An International Master Course on CO₂ Geological Storage (code 30219) is being offered by the H2020 project ENOS (Enabling Onshore CO₂ Storage in Europe) (<http://www.enos-project.eu/>). Carbon dioxide Capture and Storage (CCS) can significantly contribute to the reduction of CO₂ in the atmosphere. However, each geological storage complex must be properly evaluated, and consequently we need to prepare a new generation of

young professionals able to work on exploration and the successful storage of CO₂ in geological formations.

The course lasts one academic year (condensed from January 2020 to October 2020) and is hosted by the La Sapienza University of Rome (Italy) and the University of Zagreb (Croatia), with the participation of several European research institutes: GEUS (Denmark), Heriot Watt University (Scotland), University

of Nottingham (England), Sotacarbo (Italy), Taltech University (Estonia), NORCE (Norway). Organised in 14 modules, the course comprises three blocks of lectures/exercises, a 1-week joint project and 2 months of individual project work at one of the research institutes listed above. The course will be conducted in English.

The call for the Academic Year 2019-2020 is now open, and the deadline is the 15th of January 2020. More information available at <https://web.uniroma1.it/masterco2>.

*Sabina Bigi, La Sapienza, Italy
Niels Poulsen, GEUS, Denmark*

During the first week of July, CO₂GeoNet, together with the H2020 ENOS project, participated in the 11th World Conference of Scientific Journalists (WCSJ) held this year in Lausanne (Switzerland). This bi-annual event, attended by more than 1000 journalists, aims to foster quality science journalism. For CO₂GeoNet, interaction with the media is regarded as a major channel for effective dissemination to the general public and an important way of supporting the implementation of CO₂ Capture and Storage (CCS). Engaging with journalists is also important to the ENOS project.

CO₂GeoNet organised a booth where representatives from BGS, IGME, GEUS and UNIROMA provided explanations and disseminated material about CCS and ENOS. Our main target was to interest journalists and science communicators in CCS. To promote face-to-face exchange, a "coffee & cake" event was organised which attracted good audience participation. Following the recommendations of the participants at the Journalist work-

shop in Venice last year, key messages were defined (using easy-to-understand language) and summarised in a poster.

The number of visitors during the conference was approximately 100 and almost

half of them (47) signed up for our newsletters, showing special interest in following ENOS and CO₂GeoNet.

Paula Canteli, IGME, Spain

"Coffee & cake" event at WCSJ (photo courtesy N. Poulsen)



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