

GEO ENeRGY

COST Action 18219 Geothermal-DHC

“Research network for including geothermal technologies into decarbonized heating and cooling grids”

Geothermal energy at temperature levels between less than 10 °C (ambient geothermal for heat pump supported heating or direct cooling) and more than 100 °C can be integrated in conventional as well as unconventional heating grids (4+ DH grids) to serve as a source for heating, cooling and underground thermal energy storage. Geothermal energy has the potential to become a key element in decarbonizing the European heating and cooling sector.



Many ENeRG members participate in **Geothermal DHC** - a COST funded network, which addresses the inclusion of geothermal energy in decarbonized heating and cooling grids across Europe. Its aim is to provide scientific expertise to raise the share of renewables in heating and cooling grids by at least 30% in 2030 and 50% in 2050.

Geothermal-DHC had its 1st partner meeting last February, in Munich, Germany. It was a 3-day meeting, which included keynote lectures on topics addressing the inclusion of geothermal energy into heating and cooling grids and the first workshop of our Permanent Working Groups (PWG). For more information on the Munich meeting and for downloading the presentations please access the following link: <https://projects-gba.geologie.ac.at/index.php/s/W4R9pgxpKuywnfn>

In the Munich meeting, eight Ad-Hoc working groups were formed as part of PWG 1 – Technology:

- Ad Hoc WG Shallow Geothermal
- Ad Hoc WG Underground Thermal Energy Storage
- Ad Hoc WG Heating and Cooling Grids
- Ad Hoc WG Deep Geothermal
- Ad Hoc WG Medium Depth Geothermal
- Ad Hoc WG CCUS geothermal & unconventional geothermal use
- Ad Hoc WG Energy Conversion
- Ad Hoc WG Sustainability

Geothermal-DHC is open to new members who will contribute with new ideas, experiences and knowledge. To participate in the Action and in the Ad Hoc WGs, you need to register in the Yellow Pages: <https://form.jotformeu.com/93282368524362>



Please note: Joining a COST Action as a Management Committee member is possible until the end of its 3rd year, i.e. 15th of October 2022.

The Action covers networking, knowledge exchange, transfer and training. Short Term Scientific Missions (STSM) and ITC (Inclusiveness Target Country) Conference Grants are part of the promotion of scientists.

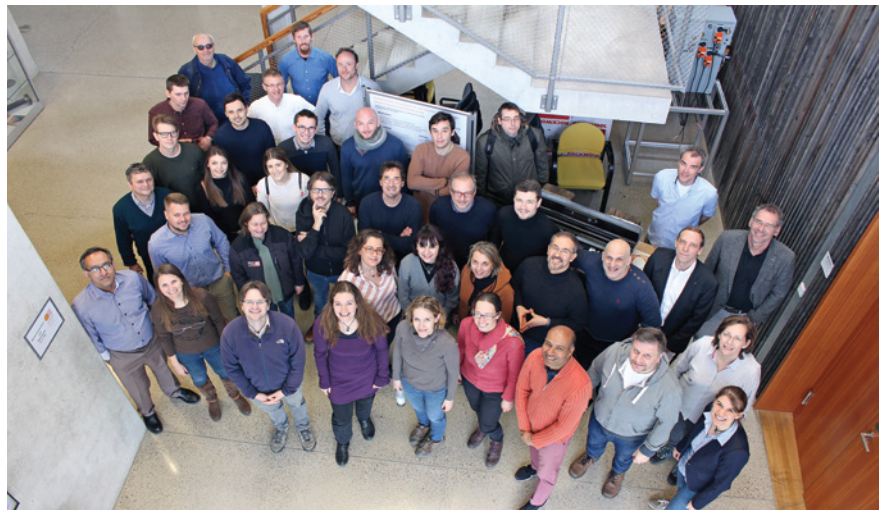


Figure 1. 2nd Management Committee Meeting, 18-20 February 2020, Munich, Germany

If you are a PhD student, postdoctoral fellow or an employee **with clear association to Geothermal-DHC** research interest, you can participate on our **Short-Term Scientific Missions (STSM)**. The second round for applications has a deadline in October 2020. **ITC (Inclusiveness Target Country) Conference Grants** are aimed at supporting PhD students and Early Career Investigators (ECI) from ITC to attend international conferences on the topic of ‘Geothermal Energy for Heating and Cooling’ that are not organised by this COST Action.

For the 2nd Grant Period and due to the CoVID-19 crisis, Geothermal-DHC will focus on digital events and activities having as a priority the technical topics to be developed in PWG1 and the stakeholder

interaction including knowledge transfer (PWG2, PWG4). In addition, joint webinars with our Canadian partners and other colleagues will be established.

Finally, our Action will join forces with the Action CA18204 “Dynamics of place-making and digitization in Europe’s cities” through internal and/or public joint webinar, and other activities.

Recently, we launched our website! You can visit us at: <https://www.geothermal-dhc.eu/> where, you can find more information related to Geothermal-DHC, simple step by step instructions on how to join our network, our newsletters, events, STSM

and ITC calls, and success stories in the Blog section.

We wish you established this website as a source of information for learning about geothermal district heating and cooling grids.

Don’t forget to subscribe to our newsletter and check our social media accounts on Twitter (@Geothermal_DHC) and LinkedIn (COST Geothermal DHC)!

Vasiliki Gemeni & Dr. Nikolaos Koukouzas, Centre for Research & Technology Hellas (CERTH)



CERTH
CENTRE FOR
RESEARCH & TECHNOLOGY
HELLAS

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Coordination of the EFG Panel of Experts on CCS

European Federation of Geologists (EFG) is a non-governmental professional organization, established in 1980, currently including 27 national association members. Its main objectives are: a) contribution to a safer and more sustainable use of the natural environment, b) public protection and awareness, c) promotion of more responsible exploitation of natural resources and d) insurance of competent and ethical practice among geoscientists in Europe, while representing the profession across the continent.

The Panels of Experts (PE) were created by EFG in December 2003 to provide high quality advice and information to the European Commission, the European Parliament, international NGOs and global professional associations. They also participate in EC congresses, working groups and consultation meetings. PEs respond to relevant issues in the press, emphasizing on the importance and benefits that geology provides to society, as well as on the promotion of the geo-scientific profession.

The PE on CO₂ Geological Storage supports the European Technology Platform for

Zero Emission Fossil Fuel Power Plants (ZEP). It promotes best practices and responsible use of resources establishing policies on environmental matters and sustainability. The success of CCS will largely depend on the reliability of CO₂ storage, justifying the dedicated mission of the PE CO₂ Geological Storage. This can be accomplished by emphasizing the role of professional geologists and the importance of the geological perspective in the concept of CO₂ capture and storage.

ENeRG member, Dr. Nikolaos Koukouzas, was appointed by the EFG Board as the new coordinator for the European Federation of Geologists (EFG) Panel of Experts on CO₂ Geological Storage (CCS), in November 2019 (EFG, 2019). He is Director of Research of the CERTH/CPERI and has more than 25 years of experience in CCS. He represents Greece in the Government Group of the ZEP Platform, the European Energy Research Alliance - Joint Programme CCS, the Executive Committee of EURACOAL, and the Carbon Sequestration Leadership Forum (CSLF). He is also member of the Editorial Board of

the International Journal of Greenhouse Gas Control and seconded Expert in the DG Energy, European Commission (EFG, 2020).

For more information please visit www.eurogeologists.eu.

Eleonora Manoukian, Centre for Research and Technology Hellas (CERTH)
Pavlos Tyrologou, EFG External Relations Officer and Centre for Research and Technology Hellas (CERTH)

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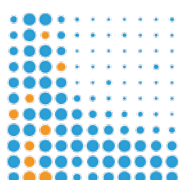
EFG (2019). Panel of Experts. <https://eurogeologists.eu/european-network/>.

EFG (2020). Interview with Nikolaos Koukouzas - Coordinator of the EFG Panel of Experts on CCS.

<https://eurogeologists.eu/interview-nikolaos-koukouzas/>.



The LEILAC Projects: Capturing Cement's CO₂



Leilac 2

The majority of carbon dioxide (CO₂) emissions from cement manufacture are unavoidable: released when limestone is transformed into lime during the production process. Cement and lime production currently account for up to 8% of global CO₂ emissions. A cost-effective, timely option for producing low carbon cement and lime is critical.

Supported by the European Union, the LEILAC (Low Emissions Intensity Lime And Cement) projects will develop a breakthrough technology that aims to enable the cement and lime industries to capture the CO₂ emissions emitted from the raw limestone as it is processed, for minimal environmental or economic burden. The Calix process does not involve any additional processes or chemicals, and simply involves a novel "calciner" (kiln) design.

The follow-on project – LEILAC2, following the success of the previous H2020 LEILAC1 project, will build a Demonstration Plant that will capture 20% of a full-scale cement plant's (and 100% of a large lime kiln's) process emission – capturing around 100 ktpa of CO₂ for



Figure 2: LEILAC1 Pilot Plant

minimal energy penalty (just compression). This will be built and fully integrated into one of Heidelberg Cement's operating plants in Germany. This project is receiving support from the European Union and industrial partners.

Another objective of LEILAC2 is developing a feasible, near-term business plan for storing and/or using the CO₂ that has

been captured by this Demonstration Plant, developing four different scenarios, with onshore and offshore storage and transportation options. The provision of a relevant quantity of CO₂ from the Demonstration Plant will accelerate commercial discussions for supplying industrial CO₂ to potentially form a vital backbone for a CO₂ transport network reaching into Europe, with permanent storage in the North Sea.

LEILAC2 will also oversee the electrification of the LEILAC 1 Pilot plant. This will enable a calciner/lime kiln to have zero-emissions. It will also demonstrate the ability for fast ramp up/down times for the process using electricity (switching rapidly from fuel to electricity), allowing a cement plant to undertake load balancing of renewables on the grid – enabling the electrification of the cement industry and a resulting low cost, local, and effective solution for grid stability with high renewable use.

In this project, CERTH is participating being in charge of stakeholder engagement and it will minimize the design risks by developing a CFD (Computational fluid dynamics) modelling and Life Cycle analysis and costing.

Daniel Rennie
Calix



THE ECCSELERATE PROJECT

ECCSEL ERIC, the European Carbon Dioxide Capture and Storage Laboratory Infrastructure, has been granted a new INFRADEV-3 H2020 project, aimed at increasing the use and ensuring the long-term sustainable operation of the Research Infrastructure.

The ECCSELERATE project, started on 1st January 2020, with a 3 years duration, has a strong focus on industry and SMEs (small and medium-sized enterprises). The project will develop dedicated marketing, access and service models and implement a cost-effective sharing and use of ECCSEL ERIC by industry and SMEs. The project will also increase the involvement of the Research Infrastruc-

ture with ongoing industrial CCS projects.

The project will explore the scope for extension of ECCSEL ERIC activities from CCS to CCUS, analysing CO₂ utilisation technology developments and potential synergies. It will be addressed to increase international collaboration and to expand ECCSEL ERIC membership.

National Nodes of ECCSEL RI (Research Infrastructure) will be implemented, harmonizing procedures, strengthening collaborations, extending the partnership at the country level. There are 5 National Nodes (Figure 3), located in the 5 Member Countries who committed to the ERIC: NTNU (Norway), OGS (Italy), BGS

(UK), BRGM (France), TNO (The Netherlands). Their role is to promote the use of the facilities and to align the national investments and policies to the ECCSEL's mission and priorities. National Nodes are directly linked to the headquarters of ECCSEL ERIC, located in Trondheim (Norway).

Two important ENeRG members are involved in ECCSELERATE project, OGS and BRGM. Overall, the consortium comprises 11 partners and 10 linked third parties from the 5 different countries mentioned before, for a total of 20 facility owners and 71 facilities. Access to these facilities will be encouraged through a dedicated Transnational Access programme, which will finance proposals aimed at testing the newly developed services. Two calls will be launched, one dedicated to industry and one open to everyone and addressed to fill the research gaps on CCUS identified by the consortium. The first call will be launched at the end of this year (depending on Covid-19 restrictions).

The project is also developing a new capacity building programme, addressed to increase the awareness of ECCSEL ERIC and to further engage users and stakeholders to the Research Infrastructure. A webinar series will start in September and will consist of 12 talks focussing on different scientific and technological aspects of CCUS; an overview of the facilities linked to these topics will be presented, together with the services offered, so to attract users to visit the facilities and to perform excellent research.

For further information and update, please visit www.eccsel.org.

Dr. Michela Vellico
ECCSEL Italian National Node coordinator and ECCSELERATE WP3 leader

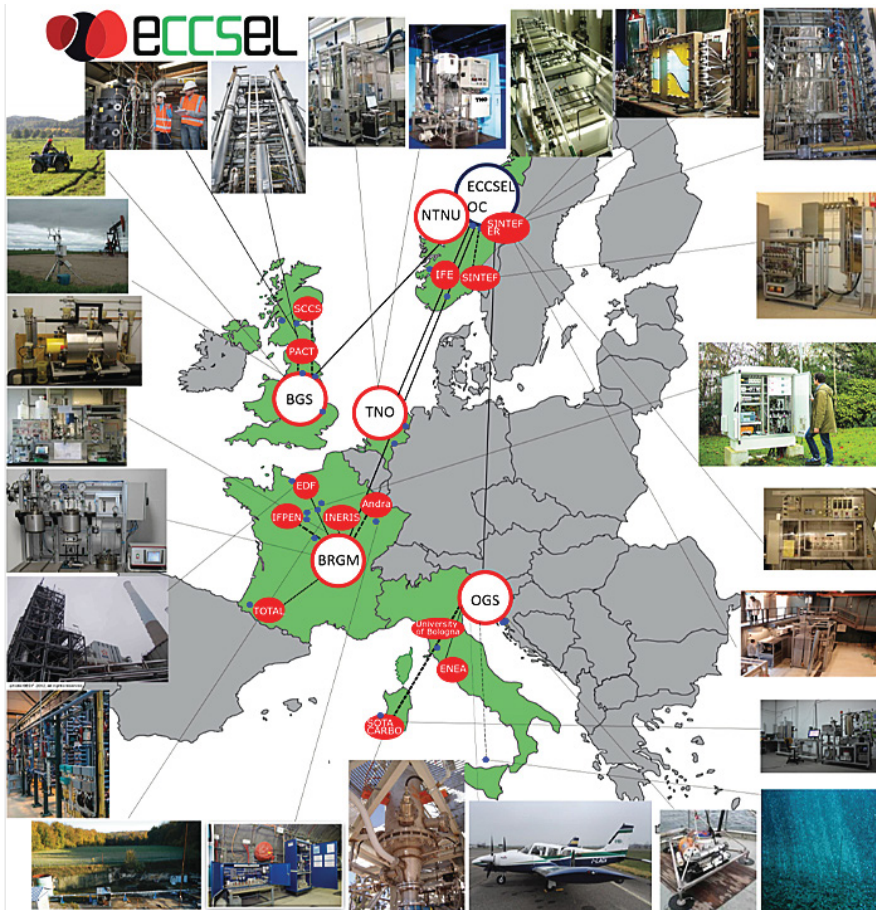


Figure 3. ECCSEL ERIC map: Member countries (in green) National Nodes (in white), facility owners (in red) and their facilities. The central hub, ECCSEL ERIC Operation Centre, is located in Trondheim.



ENeRG – European Network for Research in Geo-Energy

ENeRG – European Network for Research in Geo-Energy is an informal contact network open to all European organisations with a primary mission and objective to conduct basic and applied research and technological activities related to the exploration and production of energy sources derived from the Earth's crust. **ENeRG president** is Sergio Persoglia from OGS - National Institute of Oceanography and Experimental Geophysics, spersoglia@inogs.it **ENeRG secretariat** is run by Centre for Research and Technology Hellas, Athens, Greece **Contact person:** Eleonora Manoukian, manoukian@certh.gr

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ENeRG Newsletter – GEO ENeRGY
The Newsletter is published by Department of CO₂ Geological Storage, GeoEcoMar, Romania. Editor: Dr. Alexandra Dudu, alexandra.dudu@geoecomar.ro Layout and computer typesetting: Point Media Concept SRL Language review: Dr. Gillian E Pickup, Heriot-Watt University, UK, G.Pickup@hw.ac.uk **Copyright © All rights reserved / ENeRG**

REX-CO₂ - RE-USING EXISTING WELLS FOR CO₂ STORAGE OPERATIONS

REX-CO₂

More than 150 years of oil and gas exploration worldwide has left in place numerous wells which present both an opportunity and a challenge for CO₂ geological storage. The opportunity is the possibility to re-use these wells for CO₂ storage and obtain substantial savings, a key hurdle in deploying this emission-reducing technology. The challenge is the potential risk that these wells could pose to long-term storage, as they could become leakage pathways for the injected CO₂. In this context, the REX-CO₂ project, funded under the second call of the ACT (Accelerating CCS Technologies) program, is meant to answer a very important research question: How do you assess if a hydrocarbon well can be re-used for CO₂ storage in a reliable and economically feasible manner?

The project consortium, involving an ENeRG member, GeoEcoMar, is coordinated by TNO and is made up of research institutions and industrial partners from six countries (Figure 4): the Netherlands, Romania, the United Kingdom, the United States, France and Norway. In addition, the project has regulators as associated partners from the Netherlands, the United Kingdom and Romania.

The main objective of this 3-year project, which started on 1st of September 2019, is to develop a methodology and tool for evaluating the re-use potential of existing hydrocarbon wells for CO₂ operations, considering technical, environmental, economic and social elements. This well re-use screening tool will be publicly

available and will help stakeholders (researchers, industry, regulators) make informed decisions on the CCS re-use potential of certain wells and will be tested on selected wells and depleted fields from the partner countries.

Key findings from laboratory experiments will lead to recommendations for smart material selection in re-used wells, feed into coupled thermo-hydraulic-mechanical-chemical (THMC) models and improve well failure predictions. The analysis of regulatory and environmental framework for the re-use of hydrocarbon wells in CO₂ storage in participating countries will highlight the gaps to be addressed from the regulator's perspective and provide guidance for re-use permit applications. Another objective of the project is to gain an improved understanding on public acceptance of well re-use for CO₂ storage by implementing

and interpreting a public survey deployed in the six partner countries, which will be finalized by the end of 2020.

These findings will be collected for best-practice recommendations for the re-use of wells for CO₂ storage operations.

The work in the first months focussed on establishing the technical and regulatory framework for the re-use tool, setting up the experimental campaign and defining the national well re-use case studies. More information can be found on the project website, where all public deliverables and open-access publications will be shared: <https://rex-co2.eu>.

To stay informed on future progress, subscribe to the newsletter:

<https://rex-co2.eu/subscribe.html>.

Jens Wollenweber
Project coordinator



Figure 4. The REX-CO₂ project team together with representatives from ERA-ACT at the kick-off meeting at the TNO office in Utrecht in October 2019

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