

# ENeRG GEO ENeRGY

## Participation of ENeRG in the GHGT-17 conference

The 17<sup>th</sup> Greenhouse Gas Control Technology conference (GHGT-17) was held on October 20-24 in Calgary, Alberta, Canada. The biannual event gathered over 1,500 global experts, including ENeRG members, to discuss advancements in CO<sub>2</sub> capture, utilisation, and storage (CCUS).

The conference featured more than 355 oral and 540 poster presentations across 71 technical sessions, offering a platform for sharing the most recent developments, future scenarios, technological innovations and greenhouse gas mitigation strategies.

ENeRG was well-represented by members from GeoEcoMar (Romania), TalTech and SHOGenergy (Estonia), Sapienza University of Rome (Italy), BRGM (France), CERTH (Greece) and GEUS (Denmark), all of which made valuable contributions to GHGT-17 via posters and oral presentations.



**Figure 1.** ENeRG members at the GHGT-17 conference, which was held from 20 to 24 of October 2024, in Calgary, Alberta, Canada.

Alexandra Dudu, the current president of ENeRG, presented the poster "Methodology for environmental monitoring of CO<sub>2</sub> geological storage sites from Romania", which summarised the operations of a national project. Sorin Anghel presented on behalf of GeoEcoMar another poster, entitled "Getica CCS project – injection simulation scenario".



**Figure 2.** Alexandra Dudu's presentation, ENeRG president from GeoEcoMar.

Dr. Alla Shogenova, the former president of ENeRG, from TalTech and SHOGenergy, presented two posters co-authored with Dr. Kazbulat Shogenov, which showcased findings from Horizon Europe projects. The first, "A framework for selection of promising CCUS value chains in the Baltic and Mediterranean regions: CCUS ZEN project study," highlighted results from TalTech's Work Package 3, which focused on CCUS value chain scenarios. The second, "Regulatory and political readiness of South Europe for industrial implementation of CCUS technology; a case study from Italy and Greece", was a contribution from SHOGenergy for the HERCCULES project, emphasising social and regulatory readiness as outlined in Work Package 8.

Colleagues from the Sapienza University of Rome contributed with two noteworthy posters to the conference. Stan E. Beaubien and co-authors presented a poster entitled "Site Description and Planned Environmental Monitoring of the Prinos CCS Site", which was part of the COREu Project. This work focused on offshore environmental monitoring techniques. Sabina Bigi presented another poster entitled "Storage Potential Evaluation in

the Eastern Mediterranean" as part of the AURORA Project. This work explored comprehensive assessments of the region's geological storage capacity, providing vital insights into the CCS industry.

BRGM presented the poster "Developing CCUS in the Mediterranean Region – Technical Evaluation of Promising Value Chains" led by Ane Lothe (SINTEF) on behalf of the CCUS ZEN team. The second poster, which was entitled "Learning Toolbox Viewer", was presented by Isaline Gravaud (BRGM) in collaboration with co-authors. Dr. Nicola Clarke (IEAGHG) gave an oral presentation entitled "Performance Review and Assessment of Hybrid Systems: Geothermal Energy with Carbon Capture and Storage" with contributions from BRGM co-authors.

Nikolaos Koukoulas (CERTH) delivered a presentation entitled "Geological scenarios and constraints for the implementation of the CO<sub>2</sub>-based Electrothermal Energy and Geological Storage System (CEEES) concept", showcasing innovative solutions to enhance CCUS deployment.

Colleagues from GEUS presented advancements in "Uncertainty Quantification of CO<sub>2</sub>-Brine Saturation Functions from Experimental Data".

ENeRG members, including GeoEcoMar, SHOGenergy and Geothermal Ukraine, also contributed as co-authors to the poster presentation entitled "Direct Injection from Ship for Offshore Storage: CTS CETP Project Overview", which was presented by Roman Berenblyum, the project coordinator from NORCE.

The results presented at the GHGT-17 will be published soon on SSRN.

**Alexandra Dudu**  
ENeRG President



**Yuliia Demchuk**  
Geothermal Ukraine



### The Newsletter content

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# GEOSYN - Geothermal Synergy: Enhancing Industrial Energy Efficiency Through Steam High-Temperature Heat Pumps And Heat-Powered Cooling Systems With Operational Flexibility And Public Trust



Figure 3. Kick-off project meeting of the GEOSYN team in Toscana region, Italy, November 2024.

The GEOSYN is a Horizon Europe project coordinated by APRE (Agenzia Per La Promozione Della Ricerca Europea) with the scientific coordination of UNIFI (University of Florence, Italy) and funded for three-year period (2024-2027). The consortium includes 10 partners from 5 European countries - Italy (APRE, UNIFI, COSVIG, RIVACOLD, S.M.F.), Norway (SINTEF), Denmark (SDU), Ukraine (GEOTHERMAL UKRAINE), France (NEO-ECO). GEOSYN aims to validate a ground-breaking geothermal steam heat pump coupled with heat-powered refrigeration systems for industrial applications, specifically for the cascading use of heat from deep or shallow rock formations. The solution prioritises environmental sustainability, using water as the working fluid in all sub-systems and anticipates improvements in cost-efficiency for geothermal application developments. The expected outcome is a substantial increase in the deployment of geothermal resources for heat and cold generation, offering enhanced efficiency, less environmental hazards, portability and more societal acceptance. Additionally, the solution seeks to enable the use of geothermal energy sources in regions with or without significant hydrothermal

reservoirs, seamlessly integrated with the industrial setting and showcasing adaptability for widespread use. Furthermore, the solution is planned to be integrated

with a variety of thermal sources, such as waste heat and geothermal sources at varying temperatures. A demonstration campaign will be held in a dairy facility in Italy to showcase and validate the results of the GEOSYN project, and virtual case studies (such as a Ukrainian cement plant) will be assessed to demonstrate the solution's applicability.

The deployment of the GEOSYN innovation will be supported by awareness-raising and social acceptance campaigns organised by Geothermal Ukraine, APRE and COSVIG to enhance engagement with civil society. The GEOSYN will engage with policy makers to incorporate the geothermal deployment in local, regional and national policies. Additionally, GEOSYN will inspire young women through the use of female role models to study and take up careers in entrepreneurship and geothermal H&C. Finally, environmental and financial benefit examples of the proposed technology in diverse contexts will demonstrate the affordability of geothermal H&C for production processes,

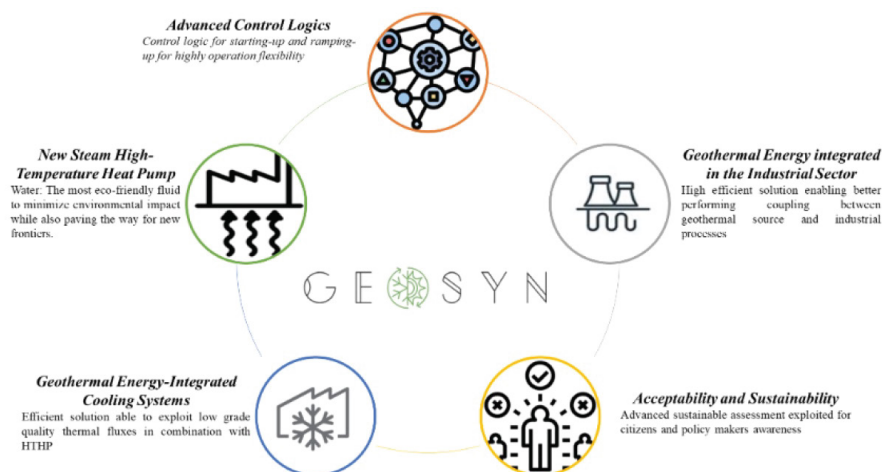


Figure 4. GEOSYN Concept.

with additional renewable energy sources to improve grid stability and power supply dependability, making it suitable for a variety of geological structural conditions, including district heating networks.

By integrating with thermal energy storage systems, the GEOSYN technology will increase adaptability and operate

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# Developing an environmental monitoring methodology for potential CO<sub>2</sub> storage sites in Romania

Considering the increased interest in CCS in Romania and the fact that an actual CCS project will be soon developed, we proposed and began a new project, "Development of an Environmental Monitoring Methodology for Potential CO<sub>2</sub> Storage Sites in Romania" (PN 23300404), which is funded by the Ministry of Research, Innovation and Digitalization. The project started in January 2023, with a duration of 4 years.

storage, including natural emission sites (analogue for CO<sub>2</sub> leaks) and natural CO<sub>2</sub> reservoirs. We also want to understand the underlying mechanisms of CO<sub>2</sub> leaks by conducting a comparative analysis of geological and structural models of sites where CO<sub>2</sub> rises to the surface versus those where CO<sub>2</sub> remains within the reservoir, which is critical for planning the environmental monitoring and detecting potential leaks.

fields: one CO<sub>2</sub> field and one with natural CO<sub>2</sub> emissions.

In 2024 we finalised the selection of the test sites. As a natural analogue for CO<sub>2</sub> leakage into the environment, we selected the Lăzărești site (Harghita County), which has post-volcanic natural CO<sub>2</sub> emissions. As a natural analogue for storage integrity, we selected the Bodoc site (Covasna County), which corresponds to the Talomir-Bodoc carbonated mineral water deposit, for testing. From the analysis of the inventoried data, the CO<sub>2</sub> in the aquifer of the deposit is naturally retained in the reservoir, thus it can be considered as a good analogue to a saline aquifer where CO<sub>2</sub> is injected and stored safely underground.

Following the selection of the test locations, both sites underwent preliminary geological and geochemical evaluations. Furthermore, this autumn, we conducted the first field campaign to evaluate the newly established monitoring methodology (Figure 5). New tests will be done in the spring next year, and the final methodology will be formulated by the end of that year. Best practices will be completed during the project's final year.

More information about the project can be found at: <https://geoecomar.ro/en/proiecte/pn23300404-development-of-an-environmental-monitoring-methodology-for-potential-co2-storage-sites-in-romania/>.

**Alexandra Dudu**  
ENeRG President  
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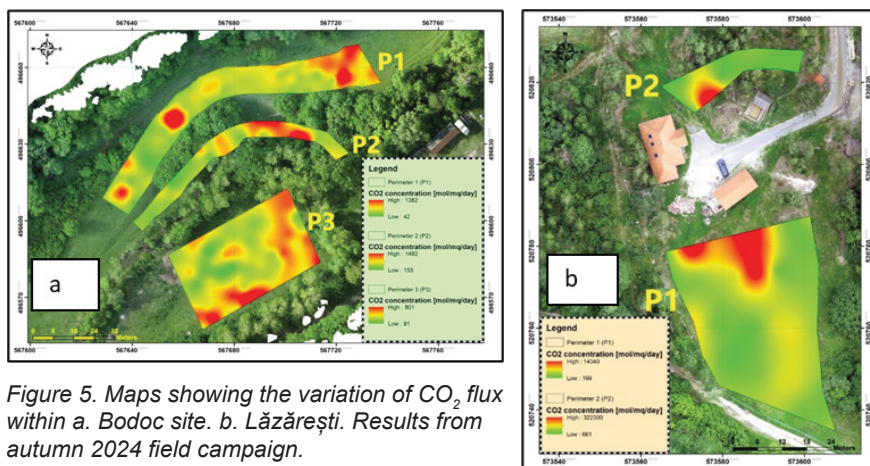


Figure 5. Maps showing the variation of CO<sub>2</sub> flux within a. Bodoc site. b. Lăzărești. Results from autumn 2024 field campaign.

The primary goal of the project is to create and implement an innovative environmental monitoring methodology (specifically for CO<sub>2</sub> leakage) for potential geological CO<sub>2</sub> storage sites in Romania. This methodology, designed for potential onshore CO<sub>2</sub> geological storage projects, where the first storage projects in the country are already planned, will be based on the application of methods already used in the field of CO<sub>2</sub> leakage monitoring (e.g., geochemical methods – soil-flux and soil-gas surveys; shallow seismics), as well as methods less popular for this use (e.g., electrometry, GPR, microgravimetry). Thus, we want to demonstrate that the application of geophysical methods is also feasible in the environmental monitoring of CO<sub>2</sub> sites. The newly developed methodology and procedures will be evaluated on natural analogues of geological CO<sub>2</sub>

The primary outcome of the first year of the project, 2023, was the development of the preliminary environmental monitoring methodology. This methodology has low implementation costs and it is based on a combination of monitoring methods, some of which are mature methods in the field of CO<sub>2</sub> monitoring, such as the geochemical methods and near-surface seismic, and methods that require further validation in this field, such as GPR and resistivity methods. We developed preliminary implementation procedures for each of these methods with the goal of achieving the best possible results for leakage detection near the surface. These procedures will be applied and tested comparatively on two selected natural

## 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 in the field of sustainable use of the underground for the energy transition.

**ENeRG president** is Dr. Alexandra Dudu, the Head of the CO<sub>2</sub> Geological Storage Department in GeoEcoMar (Romania), alexandra.dudu@geoecomar.ro

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# Baltic Carbon Forum 2024 in Vilnius, October 3-4

The annual Baltic Carbon Forum 2024 (BCF 2024) took place this year in Vilnius on October 3-4. Lithuanian and Baltic policymakers, industry, NGOs, and academia representatives delivered presentations and actively engaged in the discussions on CCUS policies, technology and business models, as well as regulatory and social aspects during two days at the Radisson Blue Lietuva hotel in Vilnius. The Keynote Lecture, made by Inga Žilienė (Deputy Minister, Ministry of Energy, Lithuania), was very encouraging concerning CCUS technology implementation in the region, planning to capture 2.7-3.5 Mt CO<sub>2</sub> annually by 2050 and to build CO<sub>2</sub> storage sites and CCUS infrastructure in Lithuania.

ENeRG President Alexandra Dudu and a number of the ENeRG members participated actively in the conference. Alla Shogenova (TalTech & SHOGenery), a BASRECCS Board Member, was a convener of Sessions 1 (Status of CCUS in Nordic and Baltic Regions) and Session 2 (Carbon Capture Storage in Industrial Sector) on the first day, as well as a co-author of Kazbulat Shogenov's (SHOGenery & TalTech) presentation about the Baltic CCS scenario (CETP CTS project) in session 4, where Kazbulat participated as a panellist.

Janis Volberts (Bellona Latvia) convened session 4 (Panel Discussion) on the first

day and session 6 (Commercialization Models for CCS) on the second day.

Monika Konieczynska (PGI-NRI), BASRECCS Board Adviser, convened.

Session 5 (Recent Advances in CCS) on the second day. In this session Prof. Andreas Busch (Heriot-Watt University) presented the study on the geological risks of subsurface CO<sub>2</sub> storage, and Adam Wojcicki (PGI-NRI) made presentation about development of CCUS value chain scenarios in northern Poland (CCUS ZEN project).

Alexandra Dudu, Constantin Sava and Sorin Anghel (GEOECOMAR) presented three posters in which they all collaborated as the first and co-authors.

BCF2024 was funded by Nordic Energy Research and supported by industrial companies ORLEN, SCHWENK Cement, Minijos Nafta, Akmenes CEMENTAS and Lime PETROLEUM.

The presentations and posters of the BCF 2024 are now available online at <https://baltic-carbon-forum.com/2024/schedule/> and <https://bcforum.net/forum.php>, along with the presentations from the previous years' BCF meetings.

**Alla Shogenova**  
(TalTech & SHOGenery)

**TAL TECH**



Figure 6. Participants of the Baltic Carbon Forum 2024 in Vilnius, October 3-4, 2024.

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