Deliverable D3.5

Report on synergies between GEE & EU on international geothermal industry and RD&I projects

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Issue Date:	Month 20	Dissemination level:	Public

The GEO-ENERGY EUROPE project was funded by the European Union's COSME Programme under Grant Agreement N° 951195. The content of this deliverable represents the views of the author only and is his/her sole responsibility; it cannot be considered to reflect the views of the

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Context

To reach a higher level of integration between GEO-ENERGY EUROPE consortium partners and its members and the EU projects/partnerships in geothermal energy, whether they are industry-led or research oriented, the metacluster has identified strategic European projects for geothermal industry, but also key geothermal events. Connexions with RD&I consortia was also in the scope of this work package.

The Covid-19 pandemic, and consequent restrictions on travelling, has led to a series of cancellations of longstanding geothermal related events; several of which have taken place online during 2020 and 2021.

With the immunity rising and the restrictions begin loosen up, several events from the first semester of 2022 are now being organised *in loco* and/or offering the hybrid mode or were postponed to a later date in the year (e.g. PDAC in Canada and GEOTHERM in Germany).

Building synergies and liaise with main projects led in the geothermal European Community

In 2021, GEE 2 consortium had the opportunity to liaise with the GEORISK, another H2020 European project that was in its last months of activity. Specifically, there was a high convergence on the selection of target countries as GEORISK also focused its internationalisation work package on Kenya, Chile and Canada markets. In the scope of GEORISK, very detailed market updates were prepared and the following topics were addressed:

- Structure of the energy market and how the geothermal industry fit in it;

- Political and regulatory framework in favour or not of geothermal energy; and

- Specific focus on risk mitigation tools as they are considered essential to develop deep geothermal projects by reducing barriers of investment dependant to geological resources.

This information has been re-used in the GEE2 project, particularly to build the material for the training session's activities. GEE2 also benefited from contacts made and developed during GEORISK Project.

European Technology and Innovation Platform Deep Geothermal (ETIP-DG)

A good awareness and knowledge of the research and innovation environment is crucial to the GEO-ENERGY EUROPE metacluster: innovation is among the core competitiveness driver of the European geothermal industry. The provision of innovative technology solutions and services allow European companies to be more competitive on the global scale. This is driven by the sound European Framework that funds and invest in the development of Research and Innovation (R&I) with programmes such as Horizon 2020, or more recently Horizon Europe, through these it was and is possible to support many geothermal R&I projects. The conjunction of robust R&I policies and the pull of the domestic European geothermal market is the cornerstone of the global competitiveness of the European geothermal industry. This requires from the GEE metacluster a deep understanding of the R&I dynamics of the sector to best accompany the SMEs towards the target countries.

The ETIP-DG, European Technology and Innovation Platform for Deep Geothermal energy, is a great partner for the GEO-ENERGY EUROPE metacluster in identifying the research and innovation priorities of the European geothermal industry.

Similarly, the RHC-ETIP, European Technology and Innovation Platform on Renewable Heating and Cooling, Geothermal Panel also provides significant expertise on the research and innovation

environment for the geothermal heating and cooling sector, including for the geothermal heat pump industry.

Both ETIPs have a crucial role by providing the GEO-ENERGY EUROPE with a clear picture of the innovation status in the geothermal industry, for example: which technologies are arriving to the market and what priorities there are for investments in R&I in the field. Both the ETIP-DG and the RHC-ETIP geothermal panel have produced Strategic Research and Innovation Agendas[1] in the past 3 to 4 years, which provides a granular assessment of R&I priorities for the current period and the short-term future.

Both ETIPs have been in a transition period during the year 2022, as they are both focused on the evolution of their structure and the drafting of the updated Strategic Research and Innovation Agenda (SRIA). The ETIP-DG has remarkably been active with the organisation of various working group meetings, including on geothermal power generation and on heating and cooling, in which various GEO-ENERGY EUROPE members participated as attendees in order to better understand the existing opportunities for R&I in the geothermal sector. Similarly for the RHC ETIP Geothermal Panel, various meetings were organised during the period of the GEE2 project, attended by various GEE partners and representatives from member SMEs, with presentations being done on funding opportunities for R&I projects on the geothermal energy field, particularly technologies, in Europe with applications that can be translated to GEE2 project target market countries.

GEOENVI

GEOENVI was a European project financed by Horizon2020, running from 2018 to 2021. The main goal of this project coordinated by EGEC was to address environmental concerns on deep geothermal installations, by proposing an adapted methodology to assess environment impacts and risks for project developers. GEOENVI partners elaborated guidelines to make the Life Cycle Assessment (LCA) methodology more applicable to deep geothermal projects and conceived a protocol to generate simplified LCA models, which were tested by LCA-expert partners on a selection of various deep geothermal projects. Since geothermal market actors were the main target group of these outcomes, COSVIG- DTE2V coordinated the GEOENVI consortium efforts in implementing a strategy for stakeholder engagement, to develop shared instruments with a wide applicability range in Europe.

[1] https://www.etip-dg.eu/publication/strategic-research-and-innovation-agenda-for-deep-geothermal/
https://www.rhc-platform.org/content/uploads/2021/10/RHC-Report-MRes-1.pdf

Various GEE2 partners and member companies were directly involved by these engagement initiatives, which consisted of workshops, training activities, questionnaires, meetings and direct contacts with geothermal stakeholders.

In addition, part of GEE metacluster members, including both SMEs and research institutions, participated in the project and had an important role in the preparation of its results and outputs.

GEOSMART

GeoSmart is a Horizon2020 Innovation Action running from 2019 to 2024, it aims to optimise and demonstrate innovation to improve the flexibility and efficiency of geothermal heat and power systems. This will increase the complementary of technologies that use the heat from the underground with the increasing deployment of other renewables, such as sun and wind that cause uncertainty and variability in energy generation and delivery to consumers. In order to achieve these objectives, the GeoSmart project aims to address different significant challenges for geothermal, as heat storage to effectively respond to fluctuations of energy production and demand, innovative cooling systems and increased efficiency of ORC plants, and reduction of geothermal energy costs to make this renewable more competitive in Europe and worldwide.

Two GEE partners (EGEC and COSVIG- DTE2V) are partners in the project consortium, with some GEE member SMEs. In addition, main target actors of exploitation activities are stakeholders from the European geothermal industry, which are engaging with partners to consider the adoption of GeoSmart innovation to increase the competitiveness of geothermal and its resulting share in the energy mix.

Geothermal events

The identification of, and insertion into, key partnerships within the geothermal industry will also be possible through pro-active and visible participation in EU geothermal conferences under GEE2 branding by at least one GEE delegate, plus additional delegates under either GEE or combined GEE partner/cluster identification. The volunteering participants shall: (1) submit a communication, (2) propose a workshop, or (3) book and organize the presence of a GEE booth, so that GEE gets visibility under one form or another in the event program.

In 2021, GEE2 consortium was still very limited when it came to their physical participation in geothermal events, however, key events were chosen and a representative of GEE2 was present.

Date	Event
21rst – 24th of June 2021	**GEOENERGY DAYS** (online) Organisation by Pôle AVENIA A presentation about the GEE2 project was hold by V. Schmidlé-Bloch during a session dedicated to European projects
25, 26 and 27 of October 2021	**World Geothermal Congress 2020+1**, in Reykjavik Virginie Schmidlé-Bloch participation on WGC 2020+1 was a good opportunity to make and gather new contacts for the capacity buildings activities organisation (training session + market visit) in the target countries, namely: • Kenya (representative form the Kenyan Geothermal Association), • Chile (representative from the Chilean geothermal centre of Excellence) Moreover, Virginie Schmidlé-Bloch used the French Pavilion to represent GEE2 project (brochures, kakemono) Another interesting Pavilion was the European Union's, where a group of representatives from EU Research & Innovation presented projects that aimed to reach the EU Green Deal objectives and help to achieve a Climate Neutral Europe. Specifically, this was the opportunity to discuss with Albert GENTER (ESGéothermie) representative of "More Equal Europe Together" (MEET) European project.
2nd and 3rd of June 2022	**GeoTHERM**, in Offenburg The GEE metacluster was represented by EGEC, GEODEEP and Geo-Energy Celle, at the GeoTHERM trade fair that took place in Offenburg in June 2022. For this event, the GEE metacluster participated with a booth that ensured its physical presence and representation at the first major physical event for the European geothermal industry since the implementation of the COVID 19 social and travelling restrictions. The Geotherm fair was attended by 500+ professionals of the European geothermal industry, many of which are members of the clusters that compose GEO-ENERGY EUROPE. The purpose of

	GEE's presence was to increase awareness of the metacluster within its membership base and within the European geothermal industry as a whole. This allowed for a better uptake on recommendations developed by the metacluster and a greater participation in a initiative related to the GEE project. The presence of a booth also allowed the partners representing GEE at Geotherm (namely EGEC, GEODEEP and Geo-Energy Celle) to receive in-person feedback about the internationalisation experiences, expectations and needs of companies of the geothermal sector, especially in the target market countries of the GEE project.
11th to 17th of July 2022	**Kenya Geothermal congress**, in Nairobi The GEO-ENERGY EUROPE metacluster participated in the Kenya Geothermal Congress, one of the main congresses of the sector organized in Africa, in 2022. The Geothermal Association of Kenya (GAK), which signed a MoU with the metacluster (represented by Pôle AVENIA) in 2020, organized the congress. The event was attended by over 300 participants, including representatives of the Kenyan government, professionals and companies from Kenya (one of the GEE2 target countries and amongst world's leading geothermal markets) and other countries of the African Rift Valley area with high geothermal potential, as well as companies from other countries worldwide and delegates from the global geothermal community. The purpose of GEE's participation was to generate opportunities for its members, to develop collaborations in Kenya and spread the awareness on the European geothermal industry and its competences to third countries. Given the importance of this initiative, the GEE metacluster participated in the conference with a booth, and had the opportunity to do a general presentation during the main session of the congress. This ensured a proper visibility to the matacluster, GEE partners attending the congress (COSVIG-DTE2V, Geoscience Ireland, CAPES and GEODEEP) and the European geothermal industry, in general. In addition, all participating member SMEs had the chance to give a presentation of their activities, whereas the booth was also a base for companies to advertise their services and discuss future collaborations with Kenyan stakeholders and attendees from other countries. Site visits were organized on last three days to Olkaria operating geothermal powerplants, Oserian geothermal green houses, Menegai geothermal fields (under development) and Biringo, where the geothermal resources are under exploration, these gave GEE partners and members the chance to better know and understand the characteristics of these areas and how the geothermal resource is explored and used in Kenya.

Innovation

"Innovation", as a way "to constantly improve sustainability of geo-energy industrial projects", has been pursued over the project period by actively preparing a dedicated Session with a focus on geothermal and geo-energy industries during GEODAYS. Each year, Pôle AVENIA organizes its international convention, GEODAYS, based on the promotion of innovation as a way to constantly improve sustainability of geo-energy industrial projects.
In 2020, due to sanitary conditions, it was cancelled. In 2021, it was held virtually over 3 days (22-24 June), with a focus on Quebec. Conferences, open innovation sessions and B2B meetings were organised and virtually well attended. More than 300 people attended the event, including nearly 100 people from outside France. And 116 B2B meetings took place in total. Six people for Geo-Energy Europe partner organisations (GEODEEP (2), COSVIG-DTE2V (1), EGEC (1), JESDER (2)) attended the event and had 7 B2B meetings (GEODEEP (1), COSVIG- DTE2V (4), EGEC (1), JESDER (1)).

In 2022, the event was held in Pau, France, in June 14 and 15, with a focus on Spain and on the promotion of local initiatives to boost innovation. The two day programme included exhibitions, B2B meetings, conferences & workshops, and a space dedicated to open innovation for the subsurface industries. The event was advertised on GEE website, through partners' newsletters, during the Chile market visit, and invitations were sent/offered to Geo-Energy Europe partners. Only one person from GEODEEP and one person from COSVIG- DTE2V registered and attended. More than 230 people attended the event, but only 18 were not French, and 3 were not European. However, 305 B2B meetings were organized.

It is thought that past travel restrictions due to covid sanitary conditions still have an impact on travelling considerations. People are now more reluctant to go to places when they had so many opportunities to virtually attend events.

Discussions are also on-going to organise a workshop dedicated to Innovation during the course of the Celle Drilling Conference, in September 13+14, 2022. This is a 2 days international conference and exhibition for advanced drilling technology organized by GeoEnergy Celle in Celle, Lower Saxony, Germany. This Innovation workshop would be a dedicated session, as a side event, to support the participation of one representative from each target country (Canada, Kenya, Chile & Costa Rica) where they would have the opportunity to have presentations of the latest geothermal activities and developments in Europe, and where they could present their geothermal markets. Site visits are also under consideration, depending on the attendance of representatives from the target countries.

It is also under discussion to organise a presentation of the ETIP-DG's Vision and Implementation Roadmap for Deep Geothermal during a webinar open to all, including representatives and SME's from target countries.