



## GEB NEWSLETTER Issue 1: September 2021

## About GEB:

The GEB Project is supported by the Erasmus + Programme Key Action 2, Capacity Building in Higher Education, CBHE, to help reduce the lack of skilled engineers in geothermal engineering in Egypt, in order to unlock the potential of this clean and sustainable energy resource.

## GEB Activities January 2021 to September 2021:

The first 9 months have been very interesting for our project. The project has seen different activities from meetings to workshops to international trainings. The month of July saw two great training programs for our project. These trainings, along with several planned future trainings, are designed to equip the Egyptian staff from the partner Egyptian Universities with the skills and expertise that are needed to dive into the world of Geothermal Engineering. Each training is focused on an aspect that each university is renowned for, to all work together and nourish this multi-disciplinary field of Geothermal Engineering, giving it a chance to grow in Egypt.

## **Kick-off Meeting**

The kick-off meeting for the project took place at Cairo University and was held online in January. The meeting was a chance for the team members to introduce themselves and become acquainted.



The meeting also outlined the project, its goals and timeline, which was modified due to the pandemic and its effect on the mobility of the participating partners.

### **Preparation:**

The Consortium has prepared some surveys which have been completed by academic staff and researchers from Egyptian universities. These surveys aimed to identify present hardware and knowledge gaps that are necessary for the design and deployment of the Geothermal Energy Graduate Diploma.

Furthermore, initial investigations on a shallow geothermal pilot plant selection have proposed two different sites at Cairo University. This is a major deliverable of the project, which will be built for educational purposes and to demonstrate the capabilities of geothermal energy and demonstrate its benefits to the wider stakeholders.

### 1<sup>st</sup> Consortium Meeting

The Consortium meeting was held online in March and was the first fully packed meeting that included several important matters that were to be discussed. The team reached conclusions on the knowledge gap that is to be bridged by the planned trainings of the project, as well as the equipment to be purchased for the project. Finally, the branding of the website and Facebook page were decided, and they were both launched shortly after.

## University of Valladolid Training 5-9 July 2021

The first training of the project was at the University of Valladolid in Spain and focused on the Thermal Engineering aspect of Geothermal Energy. The training at University of Valladolid featured several interesting lectures, as well as visits, delivered by university professors and industry professionals.







## Geothermal Energy Capacity Building in Egypt

The first training day kicked off with an introduction and welcome from Professor César Chamorro, the University of Valladolid team coordinator for this project, and followed with lectures introducing thermodynamic concepts that are especially relevant to geothermal systems, such as Exergy analysis and heat transfer, presented by renowned professors from the university, that are also members of our team. The day was concluded with a visit to the UVa historical library, and the rectorate where the Egyptian team was welcomed by Rector Antonio Largo-Cabrerizo.



More lectures and workshops were presented during the training days including lectures from participating university staff members on topics covering thermal properties of working fluids, heat pump fundamentals, psychrometry, and extracting power from geothermal resources. Additionally, there were lectures from industry professionals from associated partner companies EcoForest and Telur, that provide heat pumps and HVAC systems for geothermal applications. The lectures shed an insight around how these systems are typically applied and assembled in commercial applications and the economic aspects of using geothermal energy for heating and cooling domestically.



The training also included special guided visits that demonstrated practical activities and applications in the geothermal field. The first of which was to the university's calibration lab TERMOCAL, where a demonstration of different temperature and pressure sensors and their calibration equipment was held. The training concluded with a tour of the LUCIA near Zero Energy Building, which is considered the most sustainable building in Europe. The tour was presented by the architect Francisco Valbuena, the designer of the building. The building demonstrated the use of geothermal energy as well as different types of sustainable energy, to reduce the energy consumption of the building.



University of Zagreb Training 12-16 July 2021

The training curated by the University of Zagreb focused on the Geological aspect applied to Geothermal Energy. The training kicked off after a welcome from the faculty Vice Dean to the Egyptian team. The training included lectures on how to identify and classify different types of deep and shallow geological formations. Furthermore, the mapping of different relevant geological characteristics of structures and regions was studied, along with examples of different geothermal reservoirs in Croatia. The characteristics of these reservoirs underground, make such formations perfect for generating power, or for use in climate control systems above ground.





## Geothermal Energy Capacity Building in Egypt



During this training, his Excellency Ali Omar Sery, the Ambassador of Egypt to Croatia, was keen to meet the project team at the University of Zagreb providing every kind of support and emphasizing the importance of the project to Egypt.



The training also included guided site visits to showcase the capabilities of geothermal energy in climate control on a large commercial scale. The first visit was to the doublet geothermal well that heats an Olympic swimming pool in Zagreb and the other visit was to a geothermal well that heats a large shopping mall near the center of the city.



# GEB Showcased in World Geothermal Congress 2020+1

The GEB project was presented in a workshop organized at the World Geothermal Congress organized by the International Geothermal Association held at Reykjavik, Iceland on April 2021 (https://pangea.stanford.edu/ERE/db/WGC/Abstract.php?PaperID=7350). The workshop theme was "Geothermal Education". Professor César Chamorro delivered the presentation on behalf of the GEB team, introducing the project, its background, its objectives, and its activities.

## **Educational Pilot Plant Progress**

The educational pilot plant at Cairo University is the first educational geothermal pilot plant to be established in Equpt. It is an important output of project GEB. Its importance comes from the valuable knowledge gained through different phases of site characterization. design, and implementation processes. This would also provide a basis for the development of other future educational plants in other locations as well as acquiring the know-how needed in industrial applications. Additionally, it will help in the practical teaching activities, during and after the project, of the to-be-developed geothermal energy diploma. Furthermore, it will present, through technical visits, geothermal energy as a viable and feasible alternative energy resource to society, local enterprises, and national decision makers.

The educational pilot plant is based on EU experience gained in GEOTeCH H2020 project (https://ec.europa.eu/inea/en/horizon-

2020/projects/h2020-energy/geothermal/geotech). The pilot plant would be used to provide air conditioning (heating & cooling) to the Rock Engineering Lab (REL) (shown in figure below), at the department of Mining Engineering at Cairo University. The pilot plant will be composed of:

- Generation system: a ground source heat pump (GSHP) linked to borehole heat exchangers (BHE) that would be used to catch geothermal energy from the ground (i.e. extract heat for heating and inject heat for cooling).
- Distribution system: pipelines for hot/cool water inside the Rock Engineering Lab.
- Emission system: Fan coils, 2 units for both heating and cooling, and to control REL temperature all year long.





## Geothermal Energy Capacity Building in Egypt

Control system: Electronic equipment to set temperature in the room and to control the work of the heat pump. Additionally, specific monitoring of the system's efficiency will be done (e.g. inlet and outlet fluid temperatures, fluid flow rates, thermal energy, electrical energy, etc.).



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