



International Conference

GEO4CIVHIC

**Most Easy, Efficient and Low Cost
Geothermal Systems for Retrofitting
Civil and Historical Buildings**

15th November 2023

Grand Hotel Excelsior - Great Siege Road, La Valletta - Malta



The H2020 GEO4CIVHIC project: main features

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GEO4CIVHIC

Development of compact drilling machines and innovative heat pumps for built environment including historic buildings (2018-2023)

Project duration: 2018-2023
 Total project budget: 8,143,120.97 €
 Project budget financed: 6,841,960.75 €



11 countries

19 partners



AIM OF THE PROJECT



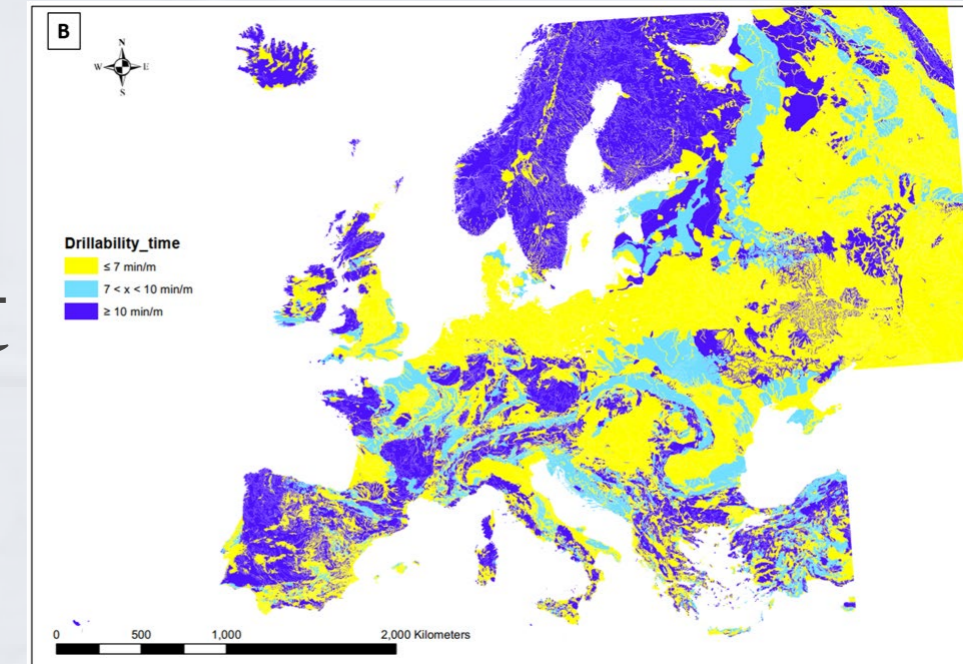
Overcome the main barriers in the application of shallow geothermal installations



- Developing and demonstrating **easier-to-install and more efficient heat exchangers** in buildings (historical (historical and non-historical))
- To use **drilling machine** tailored for the **narrow spaces** of built environment (e.g. small gardens in historical centres)
- To develop **new heat pumps** and other **hybrid solutions** in combination with other RES for retrofits
- **Reducing costs and return on investments.**
- **To improve the impact on environment and reduce the production of CO2**
- **Raising awareness of geothermal and dissemination of technical innovations**

PROJECT INNOVATIONS

➤ **European drilling maps & APP** for on-site drillability assessment



➤ **Tools**

- ✓ Decision support system (DSS) x preliminary feasibility assessment
- ✓ Building Energy Management (BEM) control optimization for RES synergies
- ✓ Application (APP) to guide user towards energy savings actions



➤ **Machines & heat exchangers**

- ✓ Compact Machinery for narrow spaces
- ✓ Rotary, vibration piling of steel co-axial GSHEs (depths 50 – 80 m)
- ✓ Helicoidal GSHE
- ✓ Co-axial heat exchangers (steel and plastic)
- ✓ Adaptation of Well point





➤ **Heat Pumps**

- ✓ Dual source (air/water) heat pumps
- ✓ Two stage heat pump for high temperature terminals
- ✓ Low Global Warming Potential refrigerant heat pump working at low temperature



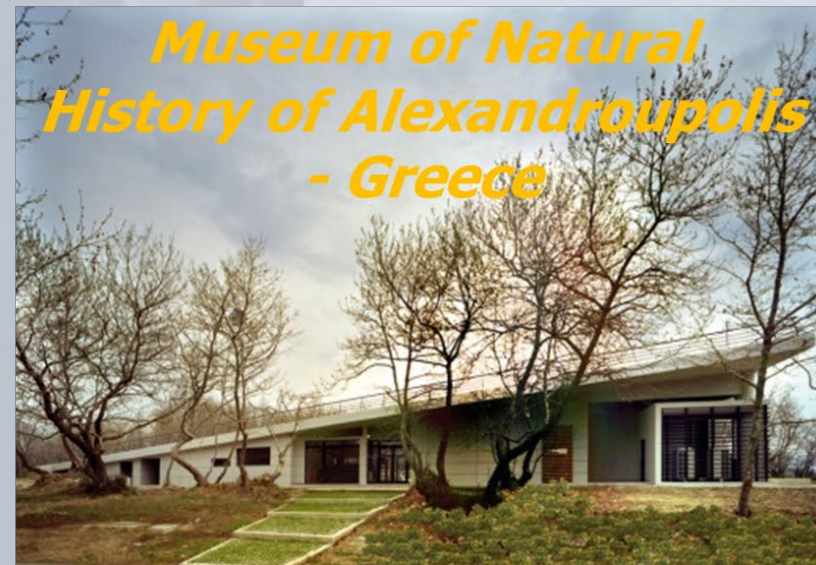
4 REAL DEMONSTRATION CASES

1 civil and 3 historical buildings in different built environments, undergrounds and climatic conditions will be used to test the shallow geothermal system with the innovative drilling machine, the improved GSHE's and the novel heat pumps.

	Msida Bastion Garden, Floriana (Malta)	Angel's Gate, Ferrara (Italy)	Residential building, Mechelen (Belgium)	Historical residential building, Greystones (Ireland)
				
Climate	Warm	Mild warm	Mild cold	Cold
Underground	Consolidated	Soft unconsolidated	Unconsolidated	Consolidated
Heat pump	Dual source low-temperature heat pump	Dual source high temperature heat pump	Water to water heat pump	Two stage high temperature heat pump

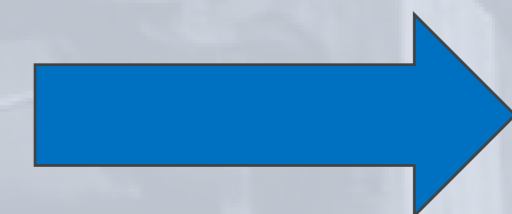
12 VIRTUAL DEMONSTRATION CASES

Virtual Demonstration Case Studies



CONCLUSIONS of GEO4CIVHIC

- ❖ Special solutions were found to **overcome the presence of narrow external spaces**, sometime difficult to reach by means of **an innovative compact and modular drilling machine**
- ❖ **GSHEs and HPs** are often among **the best solutions** to match the requirements of **sustainable energy and also integrity/authenticity of HBs** both in their interior and exterior.
- ❖ **Innovative HPs** were developed during GEO4CIVHIC to avoid the change of the terminals for heating or install radiant thermal panels or floor heating
- ❖ The **environmental impact and visual** is minimised (BHE field) when **compared with air source chillers and gas boilers** (outer units or chimneys).
- ❖ The **demo-cases** performed are a “**demonstration of successful strategies**” for implementation of geothermal systems in civil and historical buildings.





VIDEO



THANK YOU

to be here to share our results and satisfaction

Adriana Bernardi



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