FIRST PROJECT FACT SHEET

EUROPEAN UNION CO-FUNDED PROJECT

under the funding programme

Horizon 2020

LCE-17-2017

Project acronym:

GEO4CIVHIC

MOST EASY, EFFICIENT AND LOW COST GEOTHERMAL SYSTEMS FOR RETROFITTING CIVIL AND HISTORICAL BUILDINGS

Coordinator:

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done in Padova on:

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Project duration: **48 months / 01.04.2018 ÷ 31.03.2022**

Project total cost: **8,143,120.97 € / EU contribution: 6,841,960.75 €**

Coordinating entity: **Institute of atmospheric sciences and climate – National Research Council of Italy**

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Project web site: **http://www.geo4civhic.eu**

1. SUMMARY

The GEO4CIVHIC Project develops several solutions for shallow geothermal energy in the retrofit environment, adapted to the building types, the climate and the geological conditions of the underground, the geothermal system (drilling methodology, GSHE, grouting, ...). Special attention will be awarded to civil and historical buildings.

2. PROJECT SCOPE

The project's **main objectives** are:

- ✓ identify and where missing develop building blocks solutions in drilling (machines and methods), GSHE types, heat pumps and other renewable energy/storage technologies, heating and cooling terminals with the focus on every type of built environment, civil and historical;
- ✓ generate and demonstrate the easiest to install and cost-effective geothermal energy solutions using and improving existing and new tools.

In the area of shallow geothermal further innovations are needed to provide a pan–European solution base for all the parameter combinations. More efficient borehole heat exchangers and lower cost drilling methodologies/machines adapted to the built environment will be realized as improvement or innovation related to the previous projects. This approach will bring to an easy applicability in the building refurbishment presenting different constrains, to reduce the overall drilling cost in the given geological conditions, will to avoid replacement of heating terminals constructing modular high temperature heat pumps and hence to reduce the deep retrofit costs. The association with tools (DSS, APPs, etc.) will enable to find the best solution for each combination of building type/ climate/ geology.

Moreover, the design tools will reduce overall engineering costs, avoid design mistakes and form the basis for a major dissemination effort. Application tools will help the users for different practical aspects. Finally, to help knowledge dissemination and formations of the future experts a pan – European network of centres of excellence based on past expertise but complemented with the new developments should become instrumental in breaking down the barriers in shallow geothermal energy in building renovation.

3. PROJECT TECHNICAL DESCRIPTION & IMPLEMENTATION

The GEO4CIVHIC activities are organized in three blocks:

- The **Technical Block**
- The **Economical & Market Block**
- The **Environmental & Standardization Block**

The **Technical Block** aims at:

- Identifying the main gaps and barriers to deploying shallow geothermal systems in the built environment;
- Improving and developing innovative solutions regarding drilling methodologies and machine components as well as GSHEs for difficult and confined urban settings;
- Developing and demonstrating innovative heat pumps for both low and high temperature terminals suitable for all buildings (including historical), climates and ground conditions;
- Developing and making available different tools for preliminary feasibility assessment and analysis of different solution sets that will achieve user optimized energy management solutions;

- Demonstrating the project developments and innovation in a cascade at 4 different real case study sites and 12 virtual sites.

The **Economical & Market Block** aims at:

- Providing the building retrofit market with a solid economic value basis leading towards a general acceptance of the GSHPs s as a standard renewable energy source in Europe;
- Organizing intensive teaching, training and dissemination activities to convince stakeholders/users of the value and the performance achieved with the shallow geothermal systems using the GEO4CIVHIC innovations.
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The **Environmental & Standardization Block** aims at:

- Enhancing the knowledge on recommendations towards common standards, regulations permits and the awareness of the contribution of the shallow geothermal systems to a more sustainable environment;
- Enhancing the activity inside the committees generating European standards (CEN) for the use of shallow geothermal systems.

4. RESULTS ACHIEVED

The GEO4CIVHIC Project intends to achieve the following **innovative results**:

- **Vibration-rotation drill head**
- **Compact, versatile drilling machine**
- **Semi-automatic feeder for drilling machine**
- **Co-axial heat exchangers (steel and plastic)**
- **Adaptation of Well point**
- **Dual source heat pumps**
- **Two stage heat pump for high temperature terminals**
- **Low mid-term GWP refrigerant heat pump working at low temperature**
- **European drilling maps**
- **Application for on-site drillability assessment**
- **Decision support system**
- **Building Energy Management (BEM) control optimization for RES synergies**
- **Application to guide user towards energy savings actions**

A special work package (WP1 - Barriers identification, case study modelling and preliminary feasibility studies to define key performance indicators and the basis for the innovations) is dedicated to defining the benchmark KPIs to which the innovative results of the project will be related.

5. IMPACT

The project will result in the demonstration of geothermal systems, to be used in existing buildings that make geothermal energy a viable and cost-competitive source of energy for heating and cooling, the proposed technical solutions being thus easily replicable.
The demonstrated systems will be easy to install in built environments in particular if they present different constraints and have a proved efficiency in different geological conditions, with positive effects on jobs development and environment protection.

The project will increase the commercial attractiveness of geothermal energy for heating and cooling and therefore increase the penetration of this renewable energy source and the market transformation.
The project will influence the regulatory framework with regard to shallow geothermal applications, thus supporting the market transformation and the policy in the domain of energy and energy efficiency.

6. ADDITIONAL INFORMATION

The GEO4CIVHIC Project's consortium consists of 19 partners from 9 countries: Italy, Ireland, Belgium, France, Spain, Switzerland, Germany, Romania and Malta. The partners' expertise and their geographical distribution will ensure the proper implementation of the project's objectives.