



**THIRD 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 €

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1. SUMMARY

Between month 19 (October 2019) and month 36 (March 2021), the GEO4CIVHIC Project has attentively followed the tasks' schedule stipulated in the Grant Agreement, so far covering the domains: barriers' identification, drilling technologies, decision support system, demo sites description, regulations, TED actions, project management and ethics.

In spite of the pandemic outburst in Europe – which was officially acknowledged in February - March 2020, and was followed by drastic measures to limit its spread - for the activity period mentioned, all the tasks have been fully completed, and the deliverables were submitted on time. The most affected activities were those regarding the demo sites, because the sanitary measures imposed all over Europe limited or even blocked the free circulation of the innovative drilling equipment to the different real demo sites.

2. PROJECT SCOPE

The project's main objectives are:

- Objective 1: To identify the main gaps and barriers to deploying shallow geothermal systems in the built environment.
- Objective 2: To improve and develop innovative solutions regarding drilling methodologies and machine components as well as Ground Source Heat Exchangers targeted at the difficult and confined urban settings.
- Objective 3: To develop and demonstrate innovative heat pumps for both low and high temperature terminals suitable for all buildings, climates and ground conditions.
- Objective 4: Develop and make available different tools for preliminary feasibility assessment and analysis of different solution sets that will achieve user optimized energy management solutions.
- Objective 5: To demonstrate the project developments and innovation in a cascade at 4 different real case study sites and 12 virtual sites.
- Objective 6: To provide the building retrofit market with a solid economic value basis leading towards a general acceptance of the ground source heat pumps as a standard renewable energy source in Europe.
- Objective 7: To organize 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.
- Objective 8: To enhance 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.
- Objective 9: To enhance the activity inside the committees generating European standards (CEN) for the use of shallow geothermal systems.

3. PROJECT TECHNICAL DESCRIPTION & IMPLEMENTATION

The project implementation for the time period from M19 up to M36 has set the overall frame for reaching the assumed objectives, and – in some directions – technological developments were also performed (concerning the drilling and the heat pump technologies). The project implementation has developed in the domains:

- **Powerful vibration-rotation drilling head mounted on compact drilling machine to install the improved co-axial heat exchangers (WP2)**

- Development of a versatile, compact drilling machine to operate in urban areas – Deliverable D2.3 (M20)
- Definition of best grouting mix and process for developed geothermal heat exchangers – Deliverable D2.5 (M24)
- Adapted well point technique and subsequent field evaluation for the installation – Deliverable D2.6 (M24)
- Overview of the existing very shallow and horizontal solutions – Deliverable D2.7 (M30)

- **Innovative Heat Pumps for Civil and Historical Buildings & NZEB (WP3)**
- Second generation Heat Pump technologies based on solutions proposed in Geo-Tech and Cheap-GSHPs H2020 projects – Deliverable D3.3 (M24)
- Innovative hybrid high temperature Heat Pumps for renovated Civil and Historical Buildings for high and medium temperature terminals – Deliverable D3.4 (M24)
- First report on the results of pilot facilities demonstration n.1 in Padua: performance of the plug & play solutions and of the adaptation of well point technique – Deliverable D3.5 (M30)

- **Decision Support System with design tools, Building Energy Management System and Apps (WP4)**
 - BEMS for GSHP Control and its integration with multiple renewable sources: Specifications and Reference Architecture – Deliverable D4.4 (M24)

- **Demonstration of efficiency of installation of shallow geothermal and H&C in individual retrofitted installations (WP5)**
 - Report on data collection, preliminary design of the building and/or the HVAC system with related costs of the virtual cases – Deliverable D5.3 (M24)

- **Environmental impact, Risk assessment and Standard Regulations (WP6)**
 - Recommendations for the planning and implementation of new GSHP systems in dense urban environments and related tool – Deliverable D6.3 (M23)
 - Common MCDA Methodology & Risk Assessment of individual case study sites – Deliverable D6.4 (M36)

- **Demonstration of cost-effectiveness and efficiency for the systems, exploitation and market (WP7)**
 - Market and Business innovation 1st version – Deliverable D7.3 (M30)

- **Training, education, dissemination and knowledge sharing (clustering) (WP8)**
 - Second Report on implementation of Training, Education and Dissemination activities – Deliverable D8.5 (M24)
 - Third Report on implementation of Training, Education and Dissemination activities – Deliverable D8.6 (M36)

- **Project and consortium management (WP9)**
 - The management continued in function of the difficulties due to covid and that no deliverables were foreseen in that period.

- **Ethics requirements (WP10)**
 - The consortium leadership is continuously concerned with the ethics requirements imposed by the research activities.

4. RESULTS ACHIEVED

The project has achieved important results in defining key performance indicators for monitoring the project's progress and objectives, and also in technological developments for the drilling, grouting and heat pump technologies, fitted for restrained urban environment and different types of buildings, civil and historical included. First results for the pilot facility in Padua are outlined. The Decision Support System has set its specifications and reference architecture with respect to the BEMS for GSHP control and its integration with multiple renewable sources.

Comprehensive information on the virtual demo sites have been gathered from the consortium partners and recommendations for planning and implementing GSHP systems in dense urban environment have been provided.

First orientations for the market and business innovation are given.

The training, education and dissemination process was continued through specific activities.

5. IMPACT

The consortium partners have constantly actioned towards communicating their achievements to the socio-economic environment and to the interested stakeholders. This was done by direct participation at public events and – since the restrictions imposed by the Covid-19 pandemic – through on-line events, such as:

- Fair "TICINO IMPIANTISTICA" – October 10 -12, 2020 - Giubiasco (Switzerland - SUPSI co-workers presented and explained the GEO4CIVHIC Project to participants and handed them the project's brochure and leaflet
- "LONG NIGHT OF SCIENCE" – "LANGE NACHT DER WISSENSCHAFTEN" at Friedrich Alexander University (FAU) – October 19th, 2019 – Germany - Project partner FAU presented a poster about the main project objectives and goals.
- "KEY ENERGY" Renewable Energy Expo 2019 – November 5th – 8th, 2019 – Rimini (Italy) – Partner RED SRL distributed printouts and displayed a poster presenting both projects GEO4CIVHIC and Cheap-GSHPs.
- ECOMONDO Fair 2019 – November 5th-8th, 2019 – Rimini (Italy) - Partner Hydra exhibited a GEO4CIVHIC poster at its stand.
- GEOTHERMIE KONGRESS – November 20th-21st, 2019 – Munich (Germany) – Partner FAU (Friedrich Alexander Universität) presented the GEO4CIVHIC Project
- 50th Congress for Heating, Ventilation and Air Conditioning of the Serbian HVAC Association - December 4th - 6th, 2019 – Belgrade (Serbia) – RGS presented a paper and displayed a poster presenting both the Cheap-GSHPs and GEO4CIVHIC projects
- FAU Webinar within EUSEW 2020 Energy Day "Very Shallow Geothermal Energy – A Sleeping Giant of the Energy Revolution" – June 29th, 2020
- 1st International Workshop (on-line) - ESOF 2020 Trieste (Italy)- Sept. 3rd, 2020: "Shallow Geothermal – A Promising Renewable Resource for Heating and Cooling"
- BRENET Conference (SUPSI) – Aarau (Switzerland)- 3rd-4thSeptember, 2020 – Partner SUPSI presented a poster on planning of geothermal systems
- FOREN 2020 Romania (on-line) – 7th September 2020 – Partner RGS presented a paper on the technological achievements from projects GEO4CIVHIC and Cheap-GSHPs
- The Romanian Ministry for Investments and European Projects includes among the "**best practice examples**" directly managed by the European Commission the projects **Cheap-GSHPs** and **GEO4CIVHIC**.

- Webinar “World Engineering Day for Sustainable Development - Engineering for a Healthy Planet, Celebrating the UNESCO Engineering Report” – March 4th, 2021 – Initiated by partner UNESCO Venice

6. ADDITIONAL INFORMATION

The consortium partners have advanced significantly towards the implementation of the “pan – European network of centers of excellence”, by setting the structure of each singular center and the agreement among partners.

Due to the difficulties produced by the Covid 19 pandemic, several deliverables presented in this third factsheet are only a draft and need to be completed in accordance with the up-dated activities calendar allowed by the pandemic.