Deliverable D3.3

Second generation Heat Pump technologies based on solutions proposed in GEOTeCH and Cheap-GSHPs H2020 projects

WP3

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Lead beneficiary	02 – UNIPD-DII (Michele De Carli, Angelo Zarrella, Giuseppe Emmi, Laura Carnieletto, Sara Bordignon)
Other authors	01 – CNR - ITC (Sergio Bobbo, Laura Fedele, Davide Menegazzo) 06 – GALLETTI (Pierre Vueghs, Fabio Poletto, Andrea Tarabotti, Martina Saggiorato) 18 – DLH (Daniel Micallef) 04 – RED (Giulia Mezzasalma) 05 – GEOSERV (Riccardo Pasquali)

Dissemination Level

PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services)	X
CI	Classified, as referred to in Commission Decision 2001/844/EC	

1 Summary

The deliverable D3.3 “Second generation Heat Pump technologies based on solutions proposed in GEOTeCH and Cheap-GSHPs H2020 projects” is a confidential document delivered in the context of WP3, Task 3.4 named “Second generation GSHP solutions developed in GEOTeCH and Cheap-GSHPs H2020 projects”.

The H2020 project GEO4CIVHIC (Most Easy, Efficient and Low-Cost Geothermal Systems for Retrofitting Civil and Historical Buildings) aims at declining the barriers and increasing the market of Ground Source Heat Pumps in the retrofit of buildings in urban environments. According to this objective two novel heat pumps which have been already introduced in both GEOTeCH and Cheap-GSHPs H2020 projects have been further developed and second generation machines have been analysed and developed in this Task.

UNIPD-DII and CNR-ITC have built the theoretical models of the heat pumps, starting from the heat pumps developed in the two previous projects. In particular the parameters which have been considered have been the different operating conditions as well as the temperature of the terminals. The energy loads have been first considered based on preliminary data coming from the archetypes of *Task 1.3 “Modelling energy demand and plant typologies for different renovation levels in different types of building, climates and undergrounds”* and then they have been fined tuned based on the buildings where they are going to be installed as shown in the next chapters. The prototypes will be installed in the demonstration facilities (WP5). The three heat pumps are:

1. Dual-source low-temperature HP: based on the actual load of the building, the power may be shared among air and water source depending on the outdoor temperature. This prototype will be installed in Malta (warm climate). This HP is the development of the prototype developed in GEOTeCH project.
2. One source (water-to-water) high temperature HP: the prototype developed in Cheap-GSHPs has been further investigated looking at the different operating conditions as a function of the climate and of the building load. The components have been optimized for a small size solution, which will be tested in a historical single-family house in Ireland (cold climate).
3. One source (water-to-water) heat pump with two levels of temperature distribution: the high-temperature heat pump developed during Cheap-GSHPs has been further investigated for working at different levels of temperatures. This solution is particularly suitable for buildings with part of terminals at high temperature and part of terminals at medium/low temperature. This may happen in the enlargement of existing buildings or in the partial retrofit of historical and existing buildings. This prototype will be installed in the real demonstration facility in Belgium (mild cold climate).

This deliverable shows the applications of the prototypes, the study for developing the solutions and the design of the three heat pumps.