Deliverable D3.4

Innovative hybrid high temperature Heat Pumps for renovated Civil and Historical Buildings for high and medium temperature terminals

WP3

Grant Agreement number	792355
Project acronym	GEO4CIVHIC
Project full title	Most Easy, Efficient and Low Cost Geothermal Systems for Retrofitting Civil and Historical Buildings
Due date of deliverable	31/03/2022
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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 D3.4 “Innovative hybrid high temperature Heat Pumps for renovated Civil and Historical Buildings for high and medium temperature terminals” is a confidential document delivered in the context of WP3, Task 3.5 named “Innovative high temperature hybrid Heat Pumps for renovated Civil and Historical Buildings”.

Ground Source Heat Pumps (GSHP) are considered of great interest in the field of building retrofit, as they represent an efficient renewable-based technology. However, it is necessary to increase their competitiveness in the market, as it is still held back by the high investment costs and their need for large spaces for the installation of the geothermal field.

With this aim, the present deliverable describes the study and the optimization of a new heat pump prototype, that is a double source machine using CO_2 as the refrigerant. The use of the two heat sources, the air and the ground, allows to reduce the size of the geothermal field while assuring good efficiencies, even when producing high-temperature heat. The use of CO_2, moreover, is more environmentally sustainable, in comparison to the traditional synthetic fluids.

Simulations of the GSHP system were carried out to identify the optimal design of the machine, applied to the real demonstration case study of Ferrara (Italy). In particular, the case study regards the renovation of the air-conditioning system of a historic building.

The deliverable contains a detailed description of the machine, its components and the optimization strategies adopted in order to obtain the highest efficiencies in its operating conditions.