

Deliverable D4.4

BEMS for GSHP Control and its integration with multiple renewable sources:

Specifications and Reference Architecture

WP4

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	31/03/2020 (M24)
Lead beneficiary	TECNALIA
Other authors	Sarah Noyé, Amaia Castelruiz, Ruben Mulero (TECNALIA)

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	

Publishable summary

The aim of the GEO4CIVHIC project is to foster the retrofitting of civil and historical buildings by facilitating installation, reducing costs and increasing efficiency of the different components through shallow geothermal systems. This will be achieved, on one hand by improving drilling machines and methodology, optimizing GSHE design and materials, and using more compact and hybrid HPs for high and low temperature terminals. On the other hand, a set of software tools will be developed to provide a holistic engineering solution to optimise installation and operation of GSHPs. A Building Energy Management System (BEMS) that aims at operating ground source heat pumps as part of a multi-renewable system. This tool aims at facilitating the practical implementation of Net Zero Energy Buildings (NZEB) and to reduce the Return of Investment (RoI) on GSHP technologies.

The D4.4 “*BEMS for GSHP Control and its integration with multiple renewable sources: Specifications and Reference Architecture*” deliverable is a confidential document delivered in the context of WP4 and linked to Task 4.6: Development of BEMS for GSHP integration with multiple renewable sources and of an Application for easy management of energy, whose aim is to develop and test control strategies for the integration of GSHP with other renewable energy sources.

The objective of the BEMS is to satisfy the maximum of the building heating and cooling load using renewable sources and to inform the end user about his energy consumption. The BEMS will enable the coupling of a GSHP with two categories of renewables energies: 1) electricity generation and storage technologies such as wind energy, PV systems with electrical storage; 2) auxiliary thermal generation and storage systems such as solar thermal collectors with storage tanks (including PCM), source air-ground HP. It will also support a combination of both scenarios with the possibility to couple a hybrid PV-thermal solution to the GSHP.

The GEO4CIVHIC BEMS will build on the theoretical analysis of multi-renewable control strategies carried out in Task T4.5 – Control strategies for integration of geothermal energy with other RES.

This document presents the work carried out in the frame of T4.6, covering the specifications and reference architecture for the BEMS to be developed. It defines the functional and non-functional requirements of the BEMS and a reference architecture to fulfil them. This document is the basis for the subsequent work in T4.6, i.e. the GEO4CIVHIC BEMS engine (D4.11) and its user manual (D4.12). It will be used as internal reference for the consortium in the developments of the BEMS.