R&D PROJECT

PROJECT PARTNERS
•COMSA
•SOLINTEL M&P S. L.
•D'APPOLONIA S.P.A.
•GROENHOLLAND GEO-ENERGIESYSTEMEN BV
•CONRAD STANEN BV
•ARMENGOL & ROS CONSULTORS I ASSOCIATS, SLP
•STÜWA KONRAD STÜKERJÜRGEN GMBH.
•GEOTHEX B.V
•HIREF S.P.A.
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•UNIVERSITY OF BOLOGNA
•KATHOLIEKE UNIVERSITEIT LEUVEN
•UNIVERSITÀ DEGLI STUDI DI PADOVA

BUSINESS AREAS
Infrastructures / Energy Efficiency
COMSA / COMSA INDUSTRIAL

DURATION
2015-2019

BUDGET
Consortium Budget: 9.025.458,75 €
COMSA Budget: 1.042.593,75 €

KEYWORDS
Geothermal energy, Smart buildings, heating, cooling, renewable energy

COORDINATOR
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EXTERNAL FUNDING

Title of the project
Geothermal Technology for Economic Cooling and Heating

Acronym
GEOT€CH

Content of the project
Ground source heat pumps, using shallow (low temperature) geothermal energy can be considered as a renewable energy source with large potential for reducing CO_2 emissions. The ground is suited as a heat source during winter or heat sink during summer below depths of approximately 10 meters.
Moreover, the ground can be used as a thermal energy store. This can be taken advantage of as large-scale deployment of heat pumps increases and such energy storage can play an important role in smart grid energy systems. Geothermal heat pump technology furthermore offers the best opportunity for both maximizing the benefits of renewable electricity sources and reducing energy consumption from conventional power sources for heating applications.

General objectives
As part of the push to achieve Near Zero Energy Buildings (NZEB), geothermal energy is a renewable, reliable, widespread energy source that can be used to get there. In the building sector, this can be done through Building-integrated Geothermal Energy systems (BiGEO) based on FHX which perform the thermal exchange with the ground taking advantage of the renewable geothermal energy source to be used for building heating and cooling.
FHX is a new concept for a cost-effective ground heat exchanger embedded in building's foundation that can be connected to water-to-water or water-to-air heat pump for building's HVAC systems.

Results and conclusions
This building-integrated FHX (Foundation Heat Exchanger) geothermal implementation has the following benefits:

- FHX **don't require additional geothermal** drilling as BHX (Borehole Heat Exchanger) do. The ground excavation is already performed for the construction of the building's foundation elements.
- Significant reduction of investment costs compared to BHX systems: **82% of cost reduction in the installation of the heat exchanger for FHX technology** (FHX has a marginal cost on the construction of building's foundation), and **40% of cost reduction in the turn-key BiGEO geothermal system compared to BHX systems**.
- Significant **Payback reduction** compared to BHX systems. The simple payback period for BiGEO system in office buildings is about 4 years.
- The solution **doesn't require additional ground-level footprint** beyond the building itself for geothermal heat exchangers array, while conventional BHX do. This is particularly important in high-density areas such as cities.
- Reliable solutions for geothermal renewable energy generation integrated towards NZEB requirements.