GEOFIT
SMART GEOTHERMAL

GEOFIT preliminary results

Easy-to-install, economical and enhanced geothermal systems for energy efficient building retrofitting

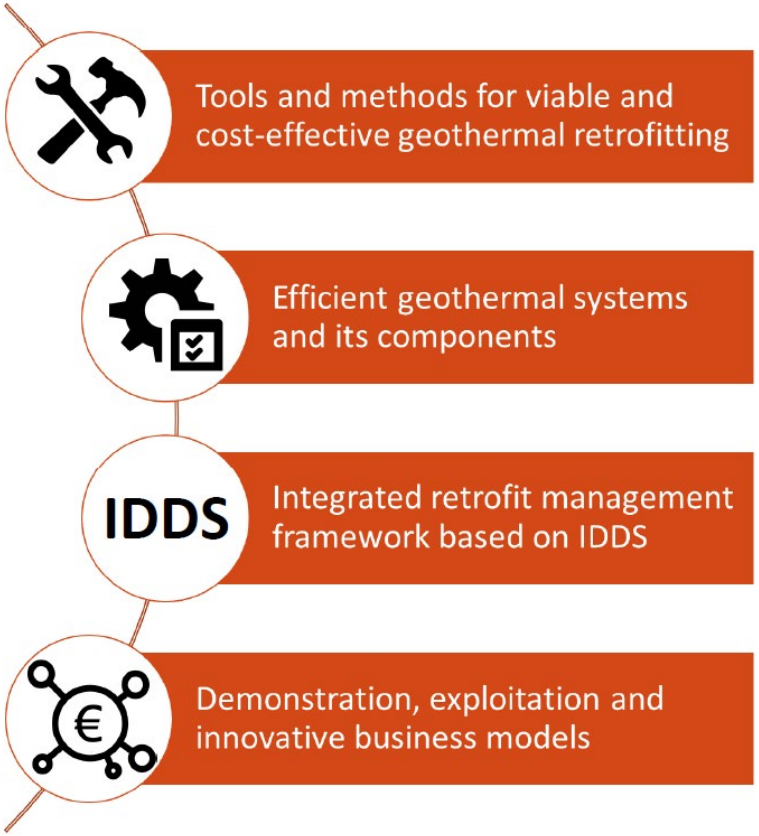
Marco Calderoni – R2M Solution

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 792210.

THE PROJECT

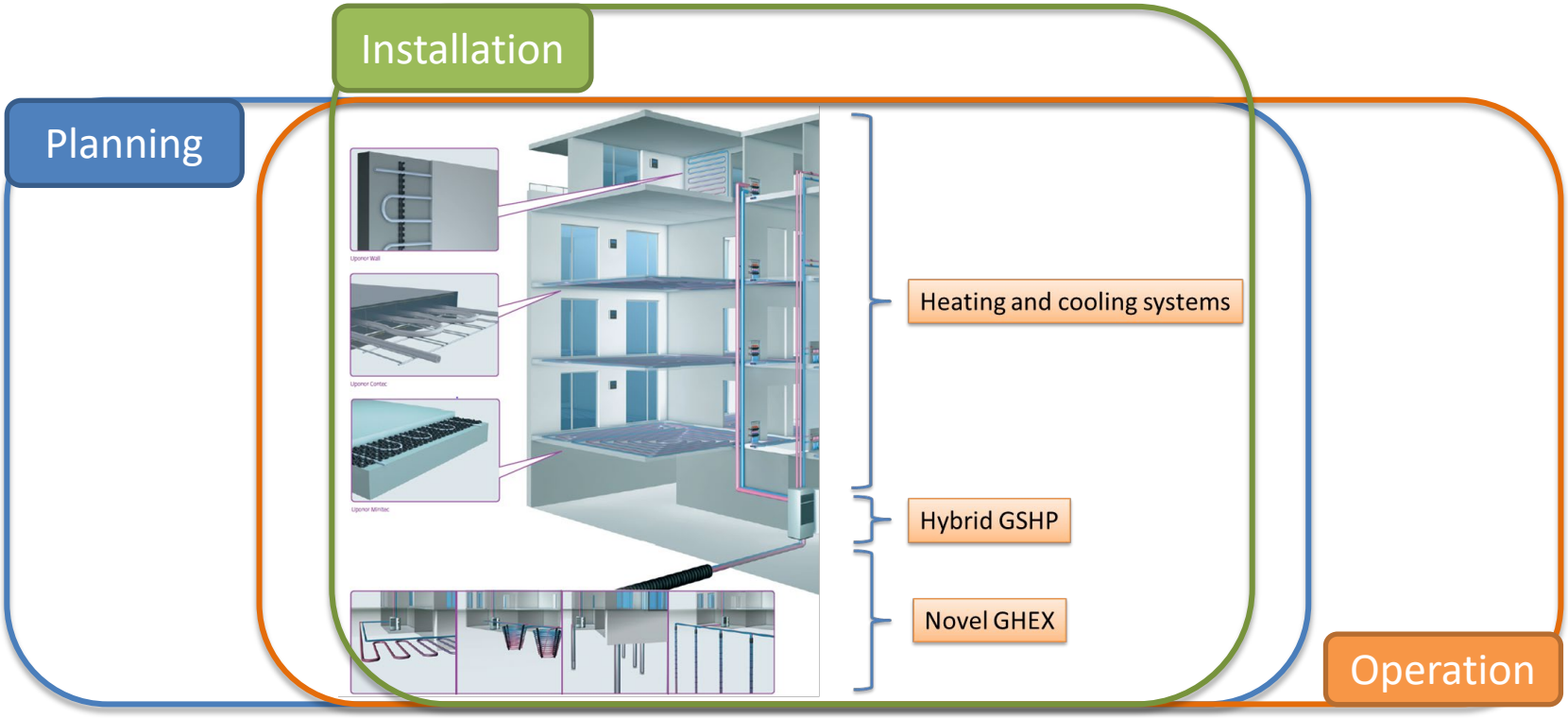
GEOFIT: *Economical enhanced geothermal systems for energy efficient building retrofitting*

- 4 year H2020 project (May 2018-April 2022)
- 24 Partners
- Innovation Action supporting the H2020 Societal Challenge of Secure, Clean and Efficiency Energy
- Part of INEA's Energy Portfolio (Low Carbon Economy (LCE), Renewable Energy Technologies (RET)
- € 9.7 million cost / € 7.9 million funding



PROCESSES: PLANNING, INSTALLATION, OPERATION

No groundbreaking technologies, rather **smart use of existing technologies at system level**, technology toolsets to support the processes around the technology couplings and building-up design know-how.



BIM / Survey / Baseline Drilling, Monitoring & Integration Geothermal as a smart asset

Concept image courtesy of partner Uponor

(OPEN) PILOTS

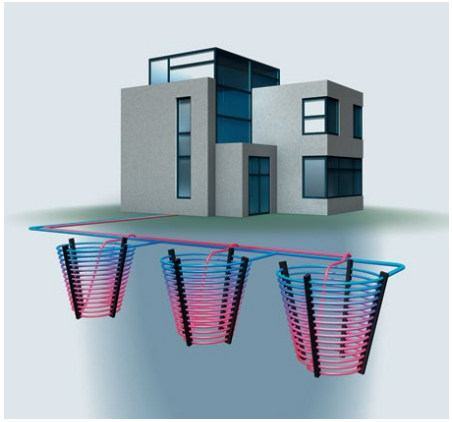
4 Countries, 5 Building Types, Different Soil Conditions, 3 Different Climates

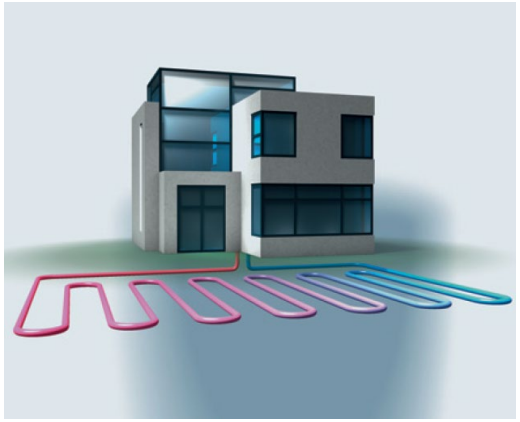
EDUCATIONAL BUILDING in Boreaux

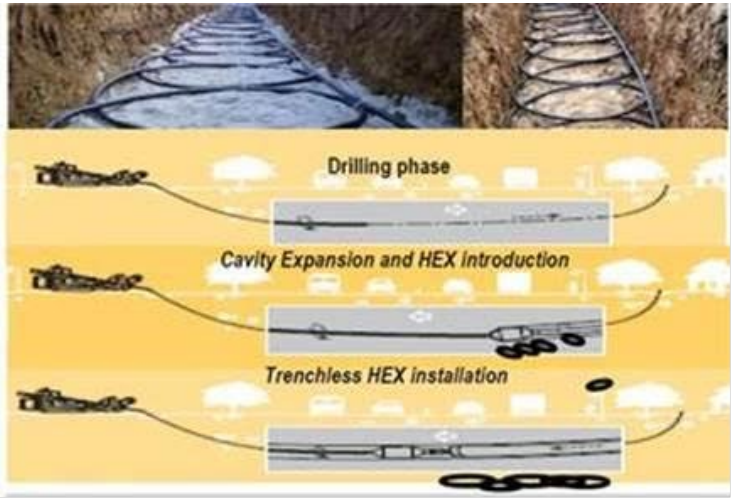
MAIN PROBLEMS IDENTIFIED AND SOLUTIONS FOUND

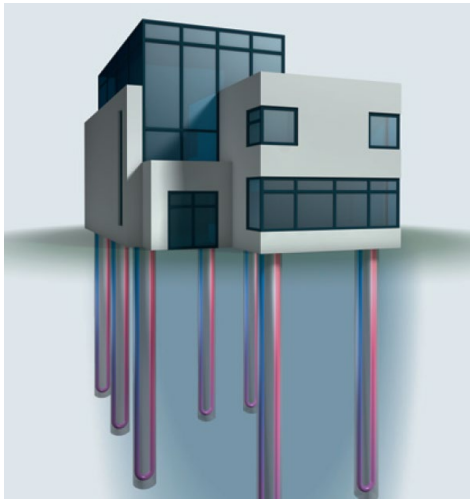
- Shallow Geothermal requires **many skills around the table**
  -> Integrated D&D Solutions and multidisciplinary approach, applicable standards
- One of the main problems encountered is **freezing of the ground** in the long run
  -> correct design is crucial! Heat Exchanger design framework
- Another big issue is **underground utilities** (e.g. Bordeaux pilot)
  -> GPR technology is quick and provides good results
- Heat pumps work best with **low return temperature**
  -> correct design crucial! Pilot deliverables and LTH/HTC deliverable
- **BIM components** for geothermal are not available
  -> BIM library developed
- Geothermal H/C is still **underdeveloped** in EU countries
  -> Market analysis

SHALLOW-EARTH HEAT EXCHANGER CONCEPTS COUPLED TO INNOVATIVE DRILLING TECHNIQUES



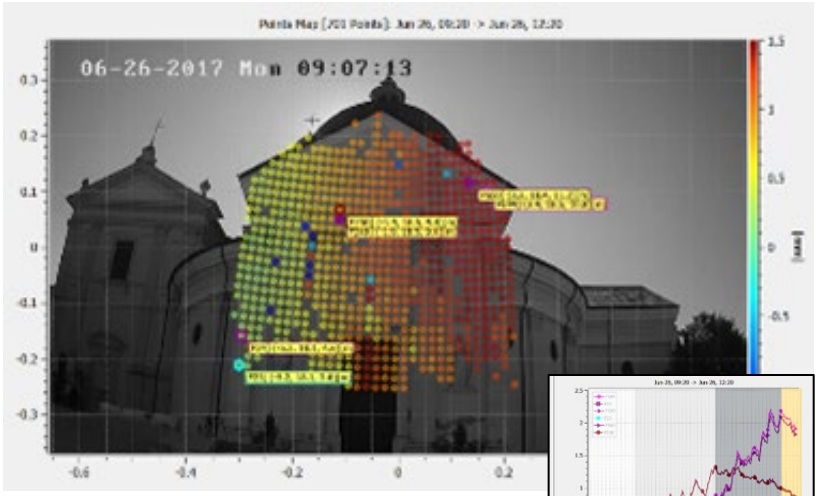






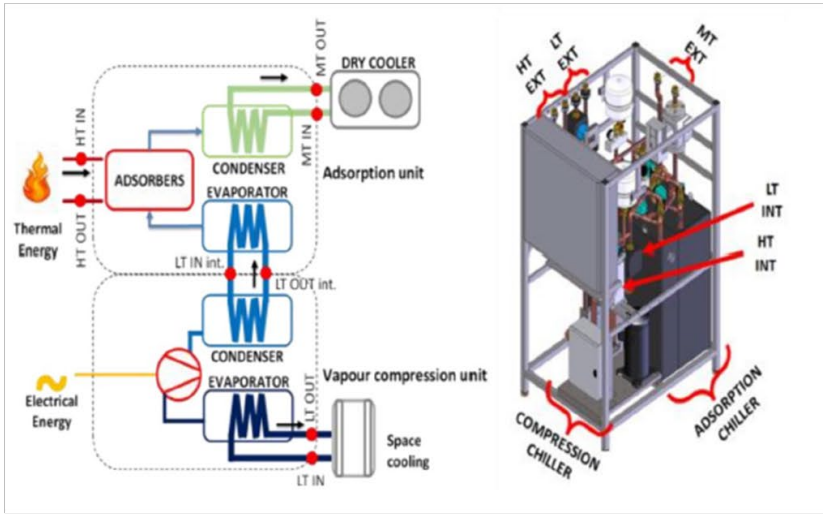
Images from partner Uponor and partner Catalana De Perforacions

GROUND PENETRATING RADAR, UAV SURVEYS, AND MONITORING TO REDUCE RISK



Images from partner IDS Georadar & R2M Solution

NOVEL TECHNOLOGIES AND INTEGRATED SYSTEM CONCEPTS DELIVERING ULTRA-EFFICIENT HEATING AND COOLING SOLUTIONS



Radiant heating and cooling

Thermally active slabs

Manifold stations

Geothermal energy stations

Controls

Images from partner Uponor, Fahrenheit, CNR, Ochsner

GEOTHERMAL SYSTEMS AS FLEXIBLE ASSETS, BIM AT THE BUILDING LEVEL

Passive consumers
(incl HPs, Evs, Batteries, etc)

i.Leco

creates the evolution towards

Better and more economic local value

Active part of the energy system

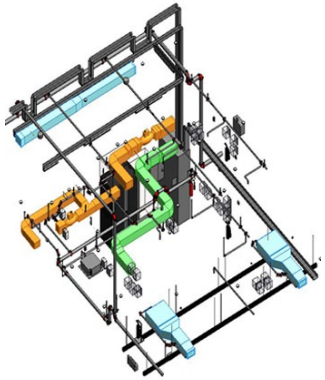
1. Gather data
2. Forecast (AI)
3. Control (AI)

i.EcoSCADA

- **i.a.E (advisor)**
- **i.b.E (building)**
- **i.l.E (local energy communities)**

Network congestion will occur in the future

Flexibility will be needed by the Electricity markets



RELEVANT REPORTS ON GEOFIT-PROJECT.EU

- *D.1.2 Detailed guidelines of the processes*
  Integrated Design and Delivery Solution applied to geothermal projects

- *D.2.1 Geothermal – IDM for Drilling Processes*
  Geothermal Information Delivery Manual (IDM) for drilling processes

- *D.2.6 Displacement Based Monitoring Methodology*
  Sensor-based structural health monitoring

- *D.3.1 Design methodologies strengths and weaknesses*
  Overview of the main heat transport processes in ground source heat exchangers, discuss the main analytical and numerical methods available

- *D.3.2 Ground Source Heat Exchanger design framework*
  Overall design process and procedures for data collection and evaluation

RELEVANT REPORTS ON GEOFIT-PROJECT.EU

- *D4.1 Options and selections of heating/cooling components for geothermal retrofitting*
- *D5.2 Report on improvement contributions of the LTH/HTC system*
  Effect of low-temperature heating and high-temperature cooling on thermal comfort
- *D.6.2 Geothermal Components BIM Libraries*
- *D.8.1 Standardization landscape and applicable standards*
  Standards applicable to geothermal projects
- *D9.2 Market Analysis*

Thank you for your attention

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Find out more at www.geofit-project.eu
Write us directly at info@geofit-project.eu