



November 2016

Research Success Story



HOW YOU WILL HEAT YOUR HOME IN 2021

The EU's building stock is old, is mainly heated by fossil fuels and accounts for 40% of EU energy consumption and 36% of CO₂ emissions. No surprise then that the EU has set itself a target of 20% final energy consumption from renewable sources by 2020. Working towards that goal is the Horizon 2020 consortium "MPC-GT" (Model Predictive Control and Innovative System Integration of GEOTABS in Hybrid Low Grade Thermal Energy Systems – Hybrid MPC GEOTABS.

GEOTABS is an acronym for geothermal heat pumps (GEO) combined with thermally activated building systems (TABS). The latter includes technology such as pipes embedded in concrete floors through which warm/cold water is pumped to regulate thermal mass. When optimised, GEOTABS will be the perfect marriage of technology for heating and cooling buildings, and promise tremendous energy savings over conventional systems.

So far, however, the technologies are only 'engaged', explains Anne Caminade, project manager at Lemon Consult AG, a member of the MPC-GT consortium. "GEOTABS are not yet commercially viable and there is still an information gap among architects and developers. We think that robust model predictive control (MPC) strategies, already used in

the chemical, aerospace and automotive industries, could ensure smooth, efficient operation. We also plan to simplify the design process to identify the heating/cooling base load, apply a systematic sizing approach to components early in the design, and let a fast reacting secondary system take care of peak disturbances, like unusual cold spells."

"Our consortium aims to improve the system efficiencies and real market uptake of hybrid MPC GEOTAB technologies"

Clear guidelines

"Our consortium intends to exploit the results of previous projects and take them a lot further," Caminade adds. "The challenge is to lower costs, streamline design and provide a step-by-step

'sizing' handbook that engineers and architects can use from the feasibility stage."

Renovations

For older buildings, where recasting foundations would be prohibitively expensive if not impossible, the consortium is also working on an alternative approach using radiant ceiling panels with phase-change materials (PCM). "Materials with a higher thermal mass can help to thermally activate the building structure and recreate the self-regulating effect inherent in TABS," she says. Coordinated by Ghent University, the consortium includes research institutes, large industry and SMEs like Lemon Consult. "SMEs are in touch with clients and installers," Caminade says. "We can validate the concept, control models and look at benefits from a business point of view. We're doing the reality check."

About MPC-GT



“An MPC system predicts a building’s thermal behaviour so that it can correct itself and deliver the best performance”

Anne Caminade
Lemon Consult AG

CONTENT SUMMARY

MPC-GT (Model Predictive Control and Innovative System Integration of GEOTABS in Hybrid Low Grade Thermal Energy Systems – Hybrid MPC GEOTABS) is a consortium coordinated by Ghent University. The project aims to optimise the combination of geothermal heat pumps (GEO) with thermally activated building systems (TABS) to reduce the technical and operational barriers of GEOTABS. It will also design an innovative control solution for geothermally activated building structures.

FACTS AND FIGURES

Project Name
MPC-GT Model Predictive Control and Innovative System Integration of GEOTABS in Hybrid Low Grade Thermal Energy Systems – Hybrid MPC GEOTABS

Research Area
New heating and cooling solutions using low grade sources of thermal energy; Model predictive control

Organisations
Ghent University, Belgium (Coordinator) and 11 partners

Start Date – End Date
01.09.2016 – 31.08.2020

Duration
48 months

Project Cost
€4.26 million

Project Funding
€4.26 million

Programme
H2020 Societal Challenges: Secure, Clean and Efficient Energy

More Information
<http://cordis.europa.eu>

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