

MSc project Optimised control of open ATES networks

Background

Most of efforts to move towards a sustainable energy mix are focusing on renewable electricity generation (solar and wind), but the largest final energy use in Europe (and many other countries) is for heating and cooling. Today's best sustainable energy technologie for heating and cooling of buildings is the seasonal storage of thermal energy in the underground. Aquifer Thermal Energy Storage (ATES) refers to the situation where an aquifer is used to store the thermal energy to provide heating in winter and cooling in summer. In densely populated areas the aquifers can be used more efficiently if the available ATES installations get interconnected in a network. Utrecht University (UU) operates such an ATES network and wants a systematic design of the control for the cooperation of building installations and the ATES system to reach minimal use of thermal energy for building climatization with maximum utilization of the ATES capacities. UU is also interested in the optimised operation of their ATES network by peak shaving design aspects and control strategies.

Goals

A general feature of sustainable heating cooling sources is that their capacity and temperature levels are restricted (compared to gas boilers and cooling machines). The main goal of this MSc project is to develop a generic coordination method between a building installation and an ATES network (or other CO₂ friendly distribution network), which enables maximum use of the sustainable sources and minimum use of peak load facilities.

In order to familiarise with the topic, historical data from the thermal sources of the ATES network at UU will be made available by Campus Real Estate UU. Numerical modelling tools for the thermo-hydraulic simulation of ATES networks and their control systems (WANDA and RTC Tools from Deltares) can be used to test different coordination methods and peak shaving control strategies.



We are looking for

A student from Process & Energy (3mE) or Building Technology (BK) with a background in systems and control or a MSc student Systems and Control with a background in applied thermodynamics. The successful applicant has an interest in sustainable thermal energy systems. We expect a pro-active attitude and clear communication skills in Dutch and English, which are deemed necessary for the execution of this challenging MSc project. Simulation of solutions for the UU system with their specific building demand profiles will be of great value.

More info:

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