



DISTRHEAT

Digital Intelligent and Scalable conTrol for Renewables in HEating neTworks

” *With smart control we enable flexibility and resilience, fostering renewable energy exploitation and sector integration*

District Heating and Cooling networks (DHC) recently showed their potential in reducing CO₂ emissions, enhancing energy efficiency and integrating renewable energy resources. These systems introduced issues such as load allocation and control and management, especially in presence of highly variable climate conditions which are likely to occur more often in the near future. Innovative measures are required to efficiently operate and optimize DHC to reduce energy consumption and human impact on the planet. The need for advanced controllers that are able to face the challenges imposed by the growing share of renewable energy sources and climate variable conditions is highlighted. Unlike traditional control methods, Model Predictive Control (MPC) allows control and optimization of the system accounting for the prediction of its behavior in a future time horizon. The potential of MPC will be demonstrated on two different test sites: (i) the “Nuovo Sant’Anna” Town and University Hospital in Ferrara (Italy), i.e. a medium-size DHC for the fulfillment of thermal demand in the service sector and (ii) the district heating network of Västerås (Sweden). i.e. a large-size DHC for the fulfillment of thermal demand in the residential sector. The project will not only deal with technology topics, it will also analyze the social and economic impact of the proposed technology and address the potential barriers and opportunities to its diffusion.



Project Duration

01.11.2019 - 31.10.2023

Project Budget

Total Budget: € 1,287,400.-
Funding: € 736,740.-

Project Coordinator

University of Parma (Italy)

Project Partners

- Siram Veolia (Italy)
- Mälardalen University (Sweden)
- MälarEnergi (Sweden)
- First Control (Sweden)

Project Website

www.distrheat.eu

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ERA-Net Smart Energy Systems Joint Call 2018

This project has been awarded funding within the ERA-Net SES Joint Call 2018 for transnational research, development and demonstration projects. EUR 33.4 Mio of funding have been granted to 23 projects from 16 regions and countries.

Main Objectives

The overall objective of the DISTRHEAT project is to drive the district heating and cooling sector towards digitalization. This objective is pursued by developing two prototypes of smart controllers, one for small heating networks and one for large districts, based on the concept of Model Predictive Control for the optimal management and real-time control of the entire systems. This kind of control will enable system flexibility, by allowing buildings heat capacity to be exploited as energy storage, and system resilience, by allowing the network to face abrupt changes in climate conditions or demand (e.g. as is happening with the COVID-19 pandemic) and to accept high share of discontinuous renewable energy production (also in the light of sector integration).

Expected Main Results

Technology

A Model Predictive Control prototype applied to a small scale district heating network

A Model Predictive Control prototype applied to a large scale district heating network

A scale-free approach for Model Predictive Control development and application to district heating networks

Market

Assessment of a business model for building heat capacity market

Adoption

Assessment of customer response and acceptability

**Joint Programming for Flourishing
Innovation from Local and Re-
gional Trials towards a Transna-
tional Knowledge Community**

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