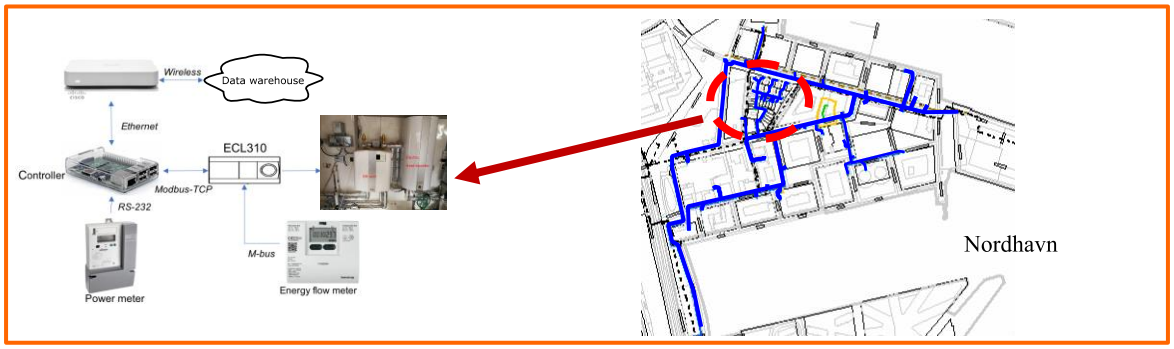
Optimal design of fuel-shift solutions in integrated heat and power systems

Programme: MSs thesis project/special courses **Time to start:** Negotiable

Background

"Fuel-shift" is recognized as one of the most promising technical solutions enabling integrated low carbon heat and power systems. Our previous research has shown fuel-shift could reduce district heating network losses by 35%, and it could reduce the peak boiler usage by as much as 48%. The figure below provides an overview of the system and our experimental setup.

The current fuel-shift design is strongly influenced by the industry standard. For example, Danish standard provides suggestion of tank size design according the number of inhabitants. Current standard clearly does not take into account of the different flexibility level coming with a different design. You will help us to understand this from a techno-economic perspective.



Your role:

- Understanding the system operation and fuel-shift concept proposed in our research
- Optimal sizing/sensitivity analysis for heat booster w.r.t. power rating, water storage tank size, inlet temperature of DH, and heat demand
- Document your suggestion for the industry in view of the increasing need of flexibility with increasing wind penetration in the energy system.

Collaborator:

Within the project of "EnergyLab Nordhavn", you will work with industrial partners: **HOFOR A/S, MetroTherm A/S**. Your research results will improve industry's understanding of storage size and its relevance to flexible energy system operation.

Prerequisites

Modeling and programming skills using Matlab, Python or other similar tools are necessary.

Principal instructor:	Instructor:
Dr. Shi You	Hanmin Cai
Tel.: 6139 6266	Tel.: 93 51 18 72
Email: sy@elektro.dtu.dk	Email: hacai@elektro.dtu.dk