Optimization of District Heating System for Future Smart Thermal Grid

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Key Facts and Research gap

- Heating results in around one third of CO_2 emission in UK
- Heat loss of district heating systems can be as high as 20% percent
- Near zero emission from building by 2050 in UK

Research Approach (Methodology)

- Simulink simulation of a district heating system to minimize the heat loss through the piping system
- Optimization algorithm to make the most use of renewables from the aspect of thermal energy storage

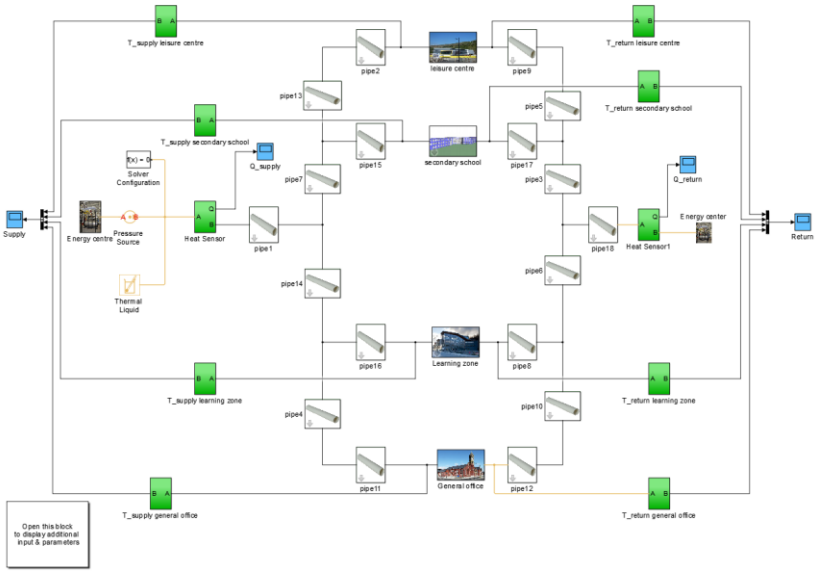
Overarching Research Questions

- How to make the system cost-effective in order to compete with conventional heating?
- How to build a zero emission community with renewables as the only energy sources?
- How to overcome the intermittence and flexibility of renewable energy?

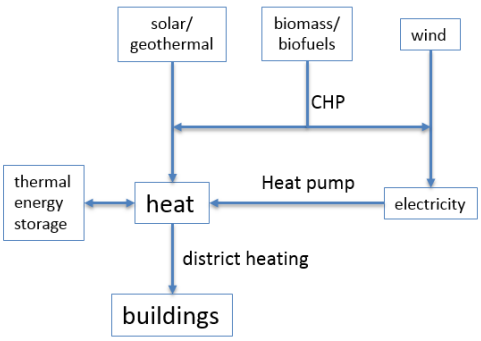
Research Aim

- Heat supply network with high energy efficiency and low emission
- Integration of renewable energy as heat source to build a sustainable community with reliable and affordable heating
- Intelligent control of the heat supply to buildings

District heating system optimization



Zero emission smart thermal grid



Research outputs

- Clean community with 100% renewable energy and near zero emission for heating
- Sustainable heat supply for 24 hours a day with lower price
- Smart thermal grid with intelligent control