CONVERSION OF EXISTING DISTRICT HEATING TO LOW TEMPERATURE OPERATION AND EXTENSION OF NEW AREAS OF BUILDINGS

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My PhD research plan

Done so far:

- Developing an open source tool for thermal-dynamic modelling of district heating networks

  Validating the developed tool for two DHN against other similar tools
- A thermo-economic analysis of alternate pipe insulation series for an existing DHN
- Developing a tool for techno-economic analysis of introducing solar heating into existing DHN in collaborating with VTT

My PhD research plan

To do list:

- Adding a user interface tool to the developed tool in Matlab + User manual
- Further development of Matlab tool by including consumer substations model

  (However always there is space for further development of the model!)
- Make PhD dissertation
- Completing the paper with VTT

Results

- Conference Paper
  - A modeling approach for district heating systems with focus on transient heat transfer in pipe networks – A case study in Studstrup, Denmark – ECOS 2015
- Tow papers in review process
  - Choice of insulation standard for pipe networks in 4th generation district heating systems - “Applied thermal Engineering” Journal
  - Determination of optimal supply temperature in existing district heating networks by applying new insulation series in pipes – A Thermo-economic analysis – Special Issue “Energy” Journal
- Under progress:
  - Techno-economic analysis for integrating solar heating into existing DHN in collaborating with VTT (The title has not been confirmed yet)

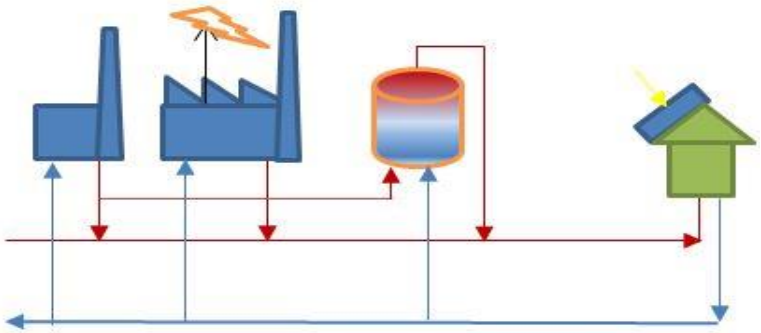
Collaboration with other PhD fellows or organizations

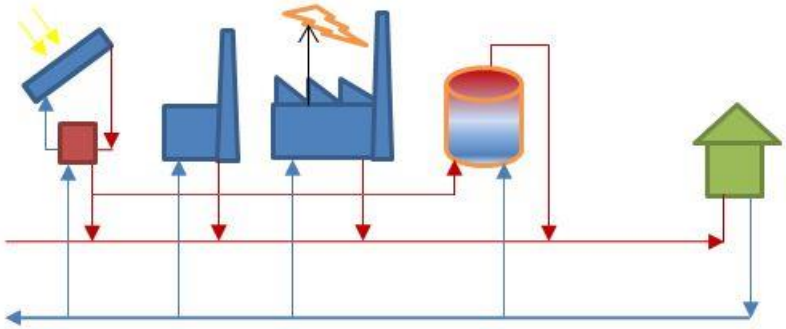
- Aarhus District Heating Company - 3 Months:
  - Building the main model for tree network topology
  - Add bypass application to the model
  - Apply model for a DHN – Studstrup base
  - Validate the model against Termis and real life measurements
- Finland Technical Research Center VTT - 3 Months:
  - Developing the new versions of the model(e.g., Improving the heat transfer calculation, improving the network topology simulation)
  - Applying model for a DHN in Finland - Hyvinkaa (50% DH Connection and 100% DH Connection) and validation
  - Developing a tool for techno-economic analysis of introducing solar heating into existing DHN
- Shared paper:
  - Choice of insulation standard for pipe networks in 4th generation district heating systems - Rasmus Lund, Soma Mohammad - Submitted to “Applied thermal Engineering” Journal

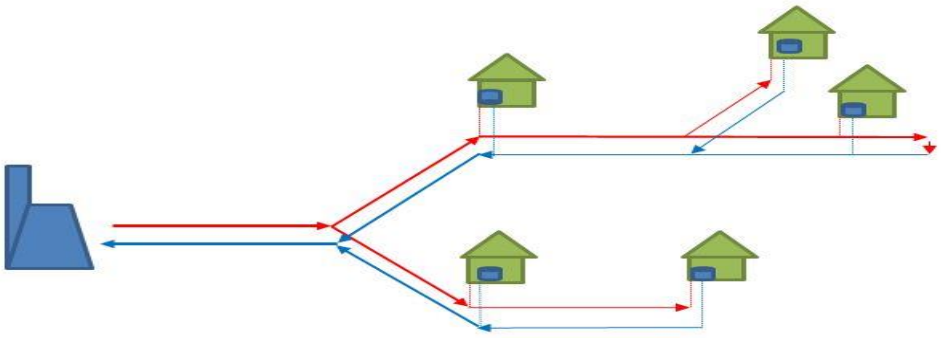
Ideas for the abstract

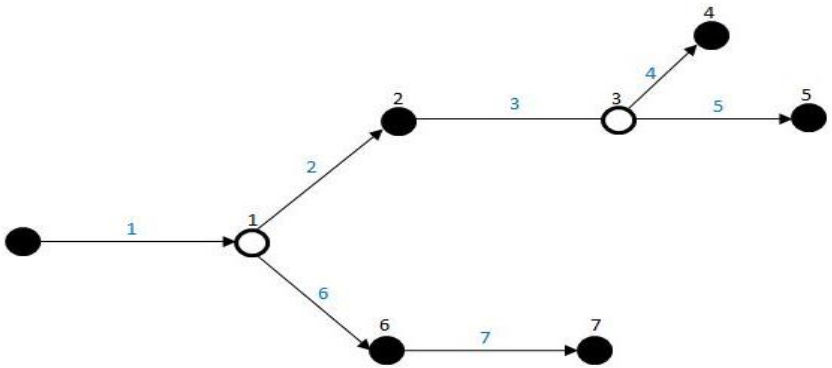
Strategic assessment for existing district heating networks in terms of techno-economic implications of different solutions to improve network thermal efficiency, considering alternative parameters:

- Network heat density
- Temperature level
- Building types (Traditional and low-energy)









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