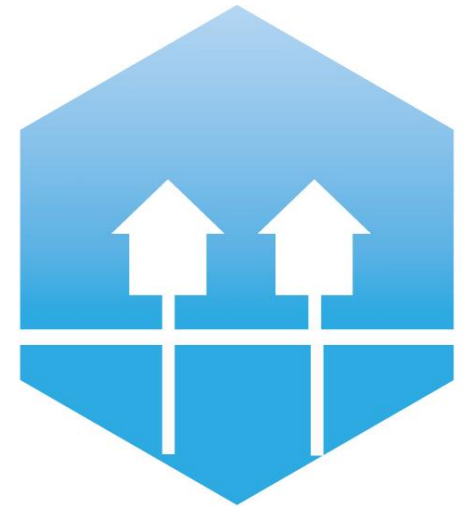
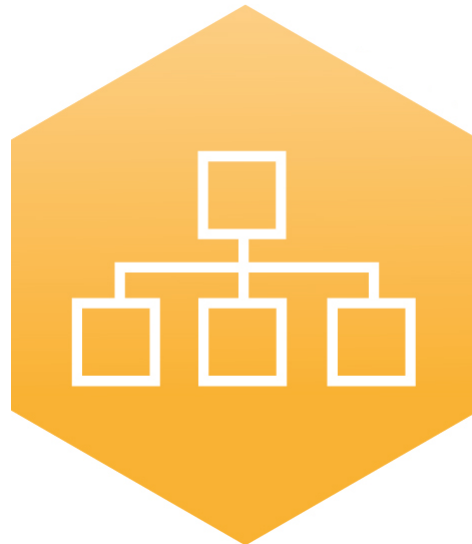


Optimal Heat Pump Use in European Cities

Susana Paardekooper



AALBORG UNIVERSITY
DENMARK

4DH

4th Generation District Heating
Technologies and Systems



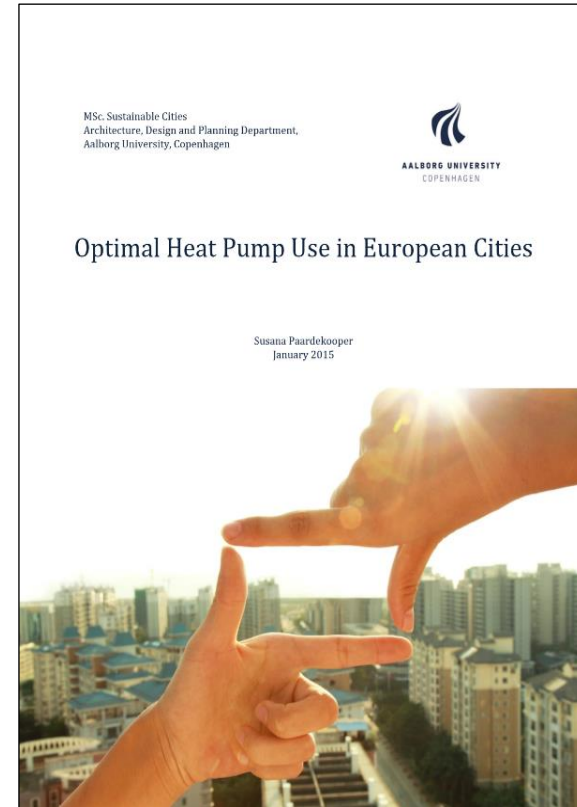
International Conference on Smart Energy Systems and 4th Generation District Heating,
Copenhagen, 25-26 August 2015



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Project

MSc. Eng. Sustainable Cities Semester Project



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Methodology

Demand in 2050

- City size
- Service and HH
- Energy efficiency

Supply in 2050

- Gas boiler scenario
- Individual heat pumps
- Large scale HPs and DH



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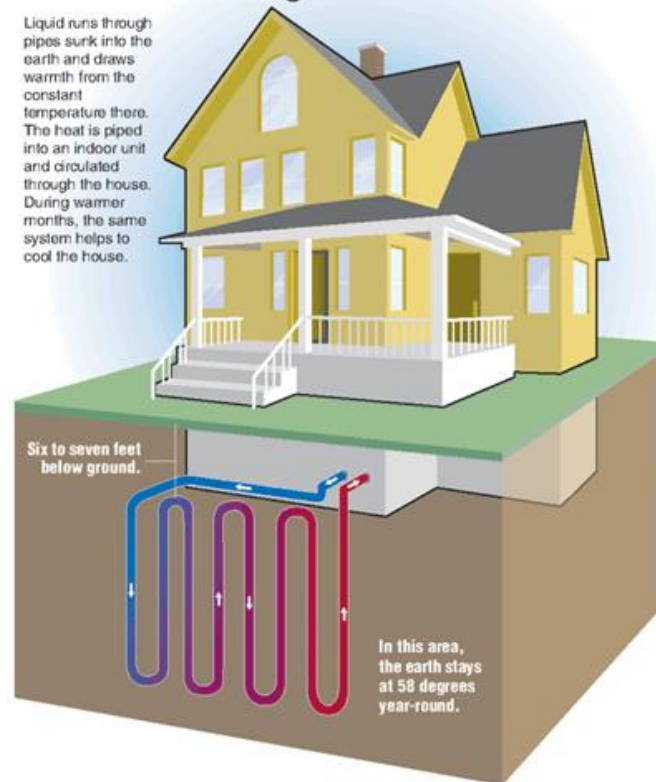


Knowledge gaps

- Urban specific data
- Heat pumps and density
- Cooling

Geothermal heating

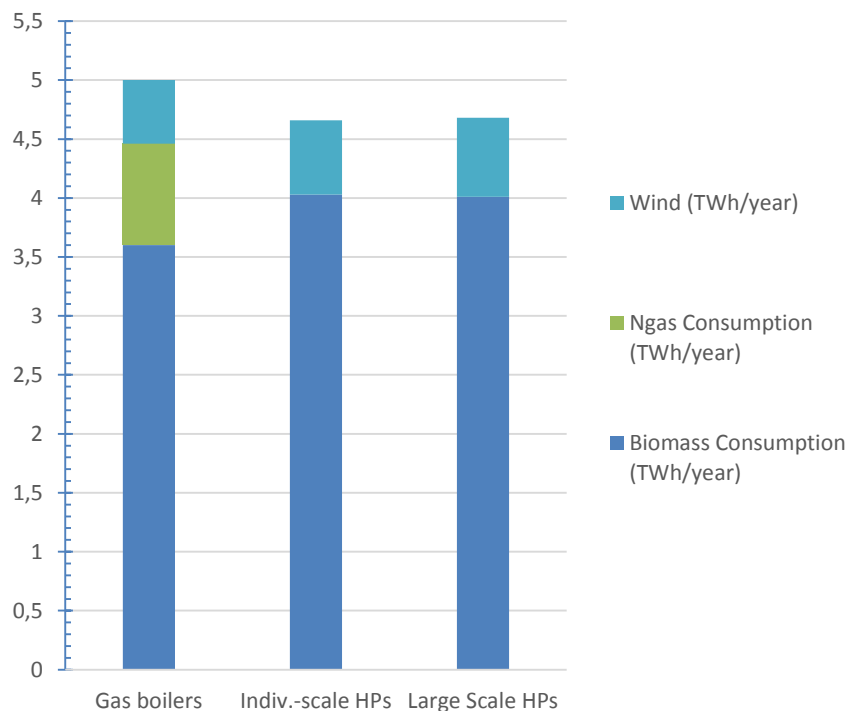
Liquid runs through pipes sunk into the earth and draws warmth from the constant temperature there. The heat is piped into an indoor unit and circulated through the house. During warmer months, the same system helps to cool the house.



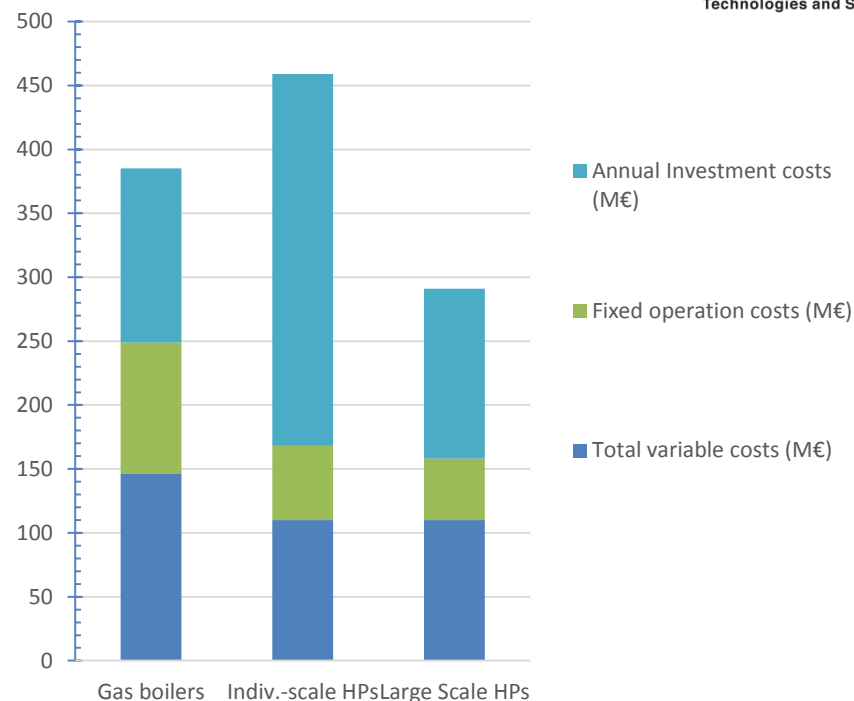


Results

Total fuels types



Total costs

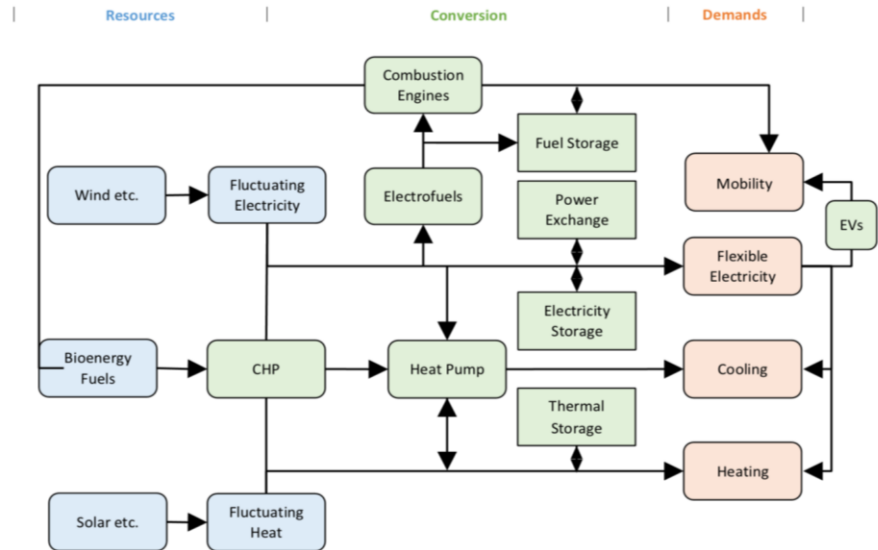




Conclusions

- Heat pumps in urban areas
- District heating is a good use of HP technology
- Heat pumps to create energy system synergies

Smart Energy System



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Questions?

susanapaardekooper@gmail.com

[Linkedin](#)



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