

DEVELOPMENT AND APPLICATION OF THE DANISH HEAT ATLAS

LARS GRUNDAHL



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DENMARK

Project data

- Started September 1st 2014
- Finish August 31 2017

- Supervisor: Bernd Möller
- Co-supervisors: Henrik Lund and Steffen Nielsen



Project data

- PhD-courses
 - 27.25 ECTS completed at the end of this week
- Teaching obligation
 - Approximately 500 hours of teaching completed at the end of the semester
- Plan to not do teaching/courses in the spring semester due to stay in Belgium



Collaboration

- Small projects:
 - Region Midtjylland and Region Nordjylland
 - SmartReFlex (Spain and Ireland)
- Stay abroad
 - VITO, Belgium
 - Independent research and technology organization
 - Located in Mol and Genk, Belgium
 - Plan for stay: spring-summer 2016



Plan of research

- Research with FIE data (with Steffen Nielsen) – further development of the Heat Atlas
 - Adjusting the heat demands in the residential sector based on actual measurements
 - Writing on an article about heat demands and heat atlases in residential buildings
 - Investigating the accuracy of a heat atlas based on real-world measurements
- Applications of the Heat Atlas - specific topic is not decided yet
- Work in Belgium with VITO
 - Work with generating/using/comparing atlases
 - Study of the application of atlases (boundaries, data ownership, etc. in both Belgium and Denmark)



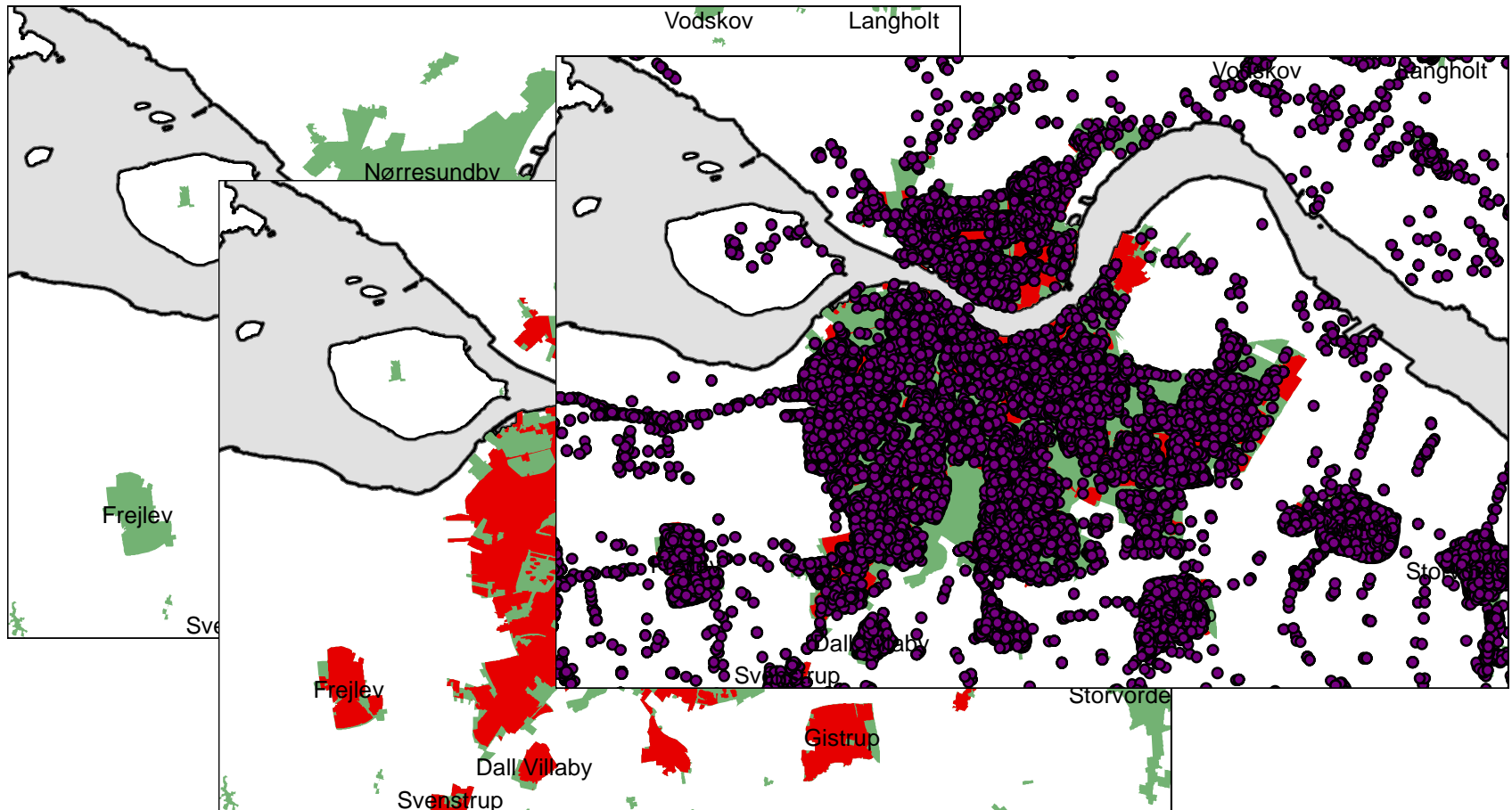
Comparison of district heating expansion potential based on consumer-economy or socio-economy



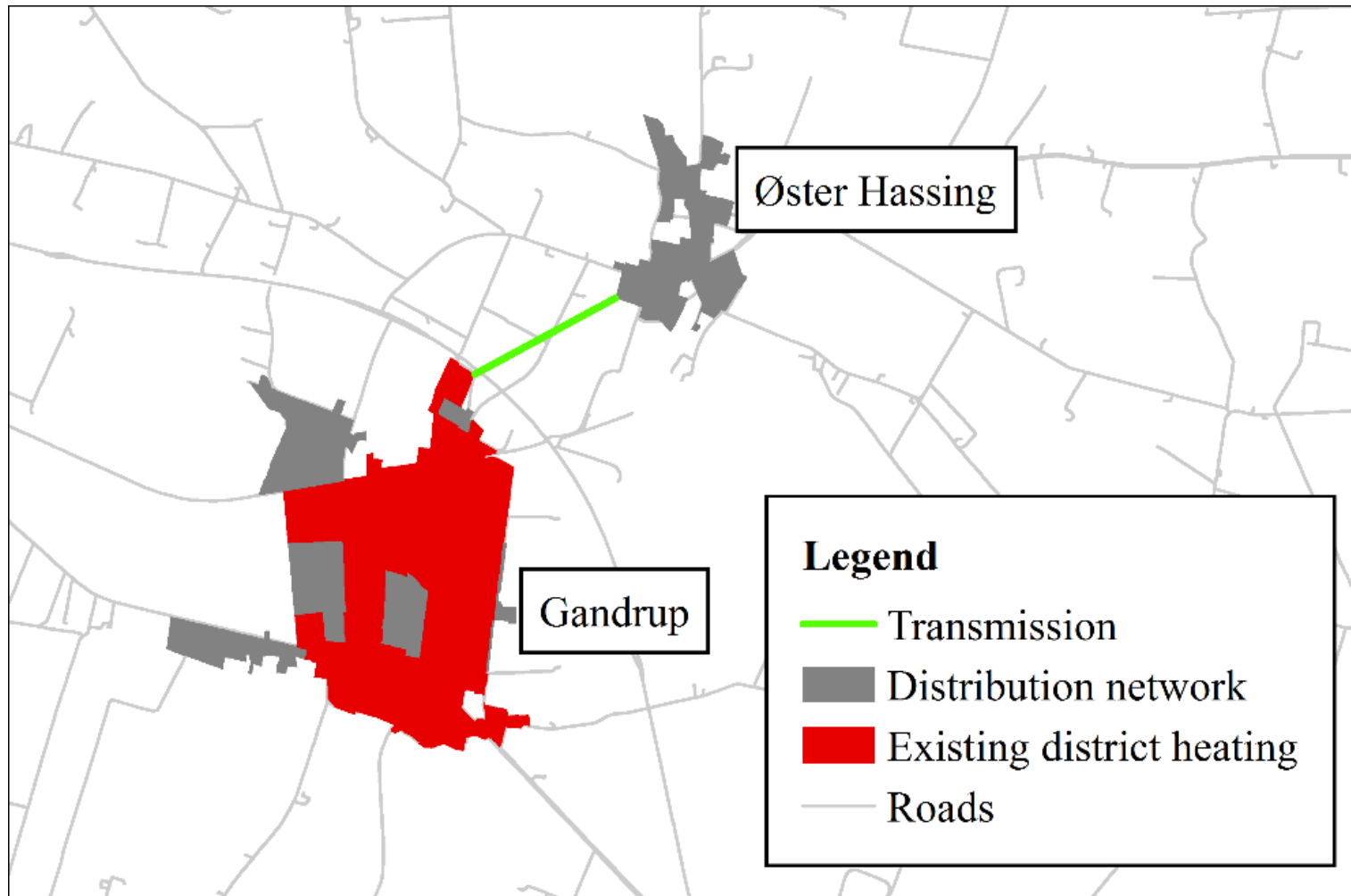
Methods

- Spatial analysis
 - Purpose: to prepare for the economic analysis by identifying zones currently supplied by district heating and the zones to investigate for a potential of supplying with district heating
- Economic analysis
 - Purpose: to calculate the economic potential of expanding the existing district heating zones
 - To compare the potential found using a consumer-economic approach and a socio-economic approach

Spatial Analysis



Economic Analysis



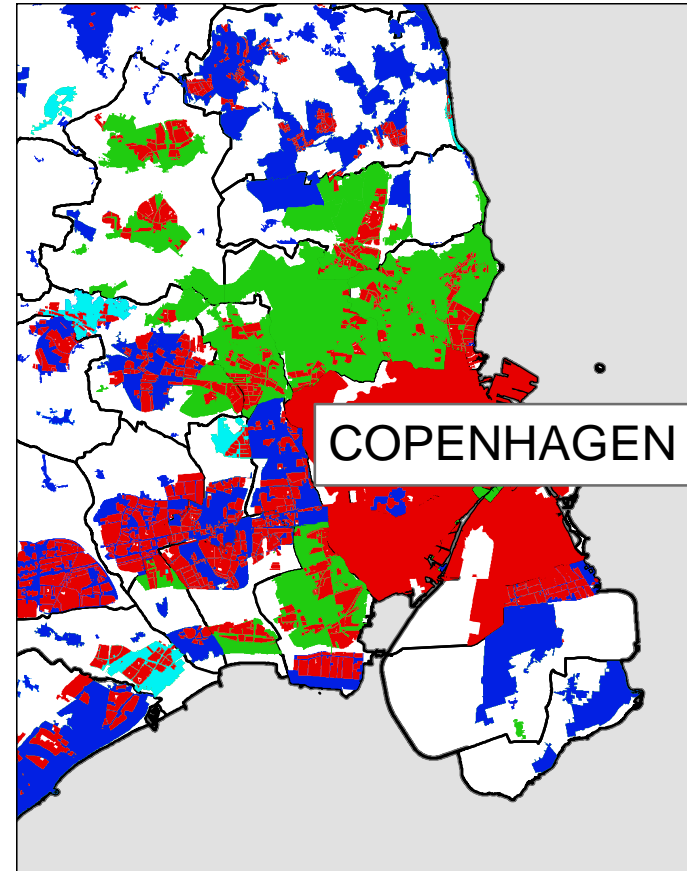
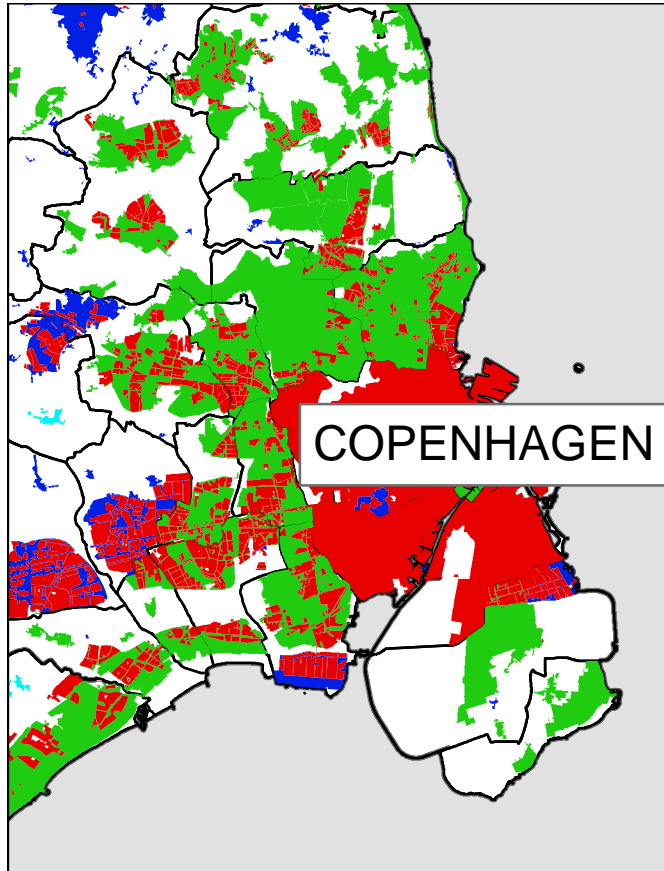
Economic calculations

- Socio-economy
 - Cost for the society
 - Not including taxes
- Consumer-economy
 - The expenses the consumer will face in the real-world
- Comparison
 - Expansion with district heating
 - Alternative with individual heating

Results

Socio-economic

Consumer-economic



Results

- Socio-economy: DH cheapest in areas covering 13 % of the Danish heat demand
- Consumer-economy: DH cheapest in areas covering 10 % of the Danish heat demand
- Together: DH cheapest for both the society and the consumers in areas only covering 6 % of the Danish heat demand
- The main reason is a taxation scheme not promoting the socio-economic best solutions to the consumers
- The consequence can be, that the socio-economic best solutions are not implemented at the consumers and thereby e.g. blocking the expansion of DH



Abstract for the conference next year

- Results or preliminary results of the studies carried out during the stay in Belgium
- Focus on the application of heat atlases and barriers for the use of heat atlases

