PhD project:
Geographical representations of renewable energy systems

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group

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Associate professor, Department
of Development and Planning,
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4th Generation District Heating Technologies and Systems

Energi 2020
Ringkøbing-Skjern – 100 % vedvarende

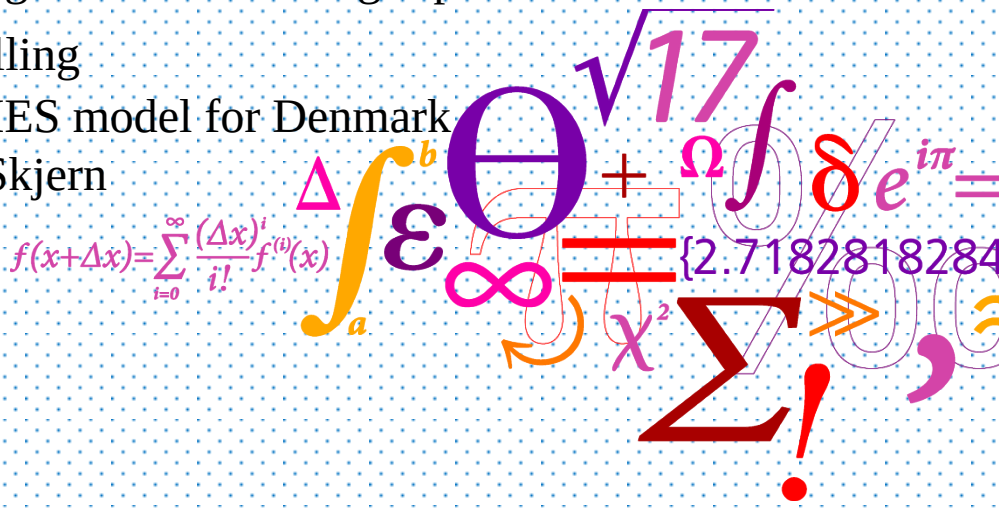
DTU Management Engineering
Department of Management Engineering

Ringkøbing-Skjern Energy Atlas

- What is it?

  Highly detailed collection of geographically referenced energy data

- Who is involved?
  - Stefan Petrovic and Ringkøbing-Skjern municipality (on-field)
  - Kenneth Karlsson and Bernd Möller (supervisors)
- What can it be used for?
  - Municipality for doing simple analysis
    - Heat savings in building stock
    - Expansion of district heating networks
    - Finding optimal position for placing windmills or biogas plants
  - Researchers for energy system modelling
    - Include Ringkøbing-Skjern in TIMES model for Denmark
    - STREAM model for Ringkøbing-Skjern



Ringkøbing-Skjern Energy Atlas – layers

1. Energy demand and supply
   - wind farms, CHPs and HO plants – capacities and historical productions
   - households, public and business buildings
   - industries can be both supply and the demand

2. Energy resources
   - wind, solar, biomass, geothermal, waste heat, manure

3. Energy transmission and distribution
   - district heating networks
   - gas pipelines
   - electricity lines, cables and transformers

4. Other energy data
   - roads, railways, waste storages, recycling facilities, parcels

5. Social data
   - population density, number of inhabitants, property values

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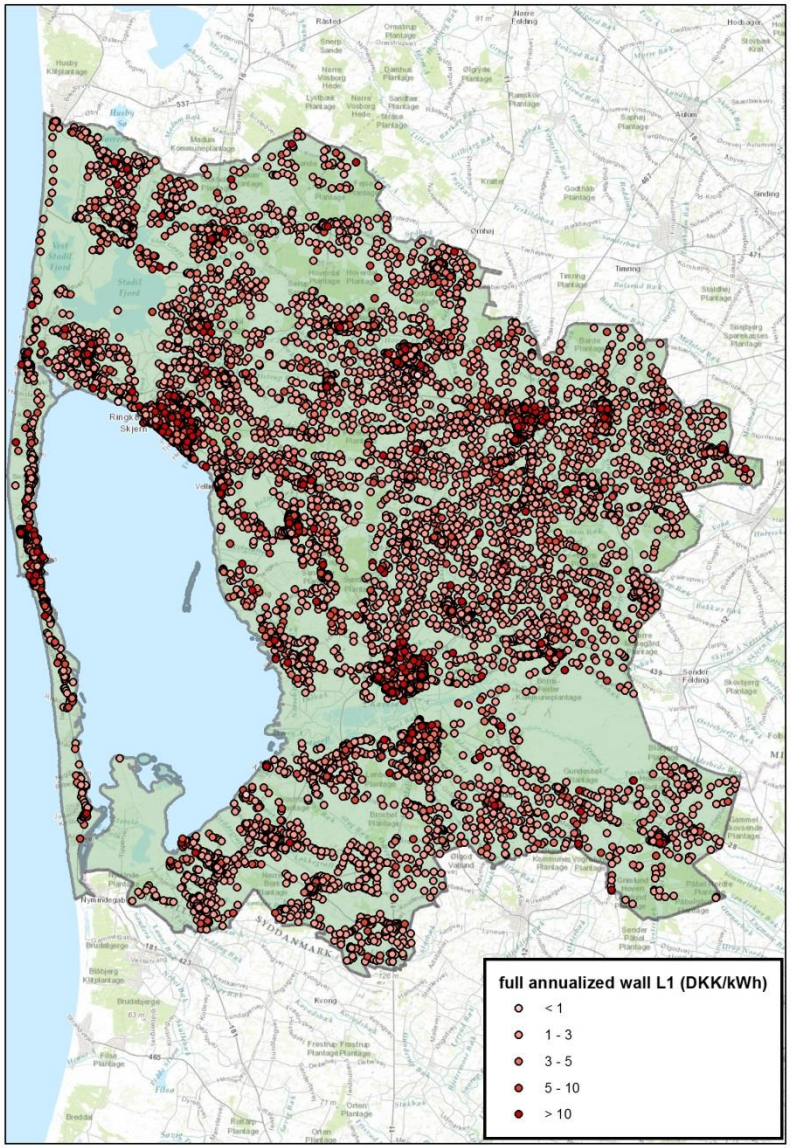
Ringkøbing-Skjern Energy Atlas – heat savings in building stock



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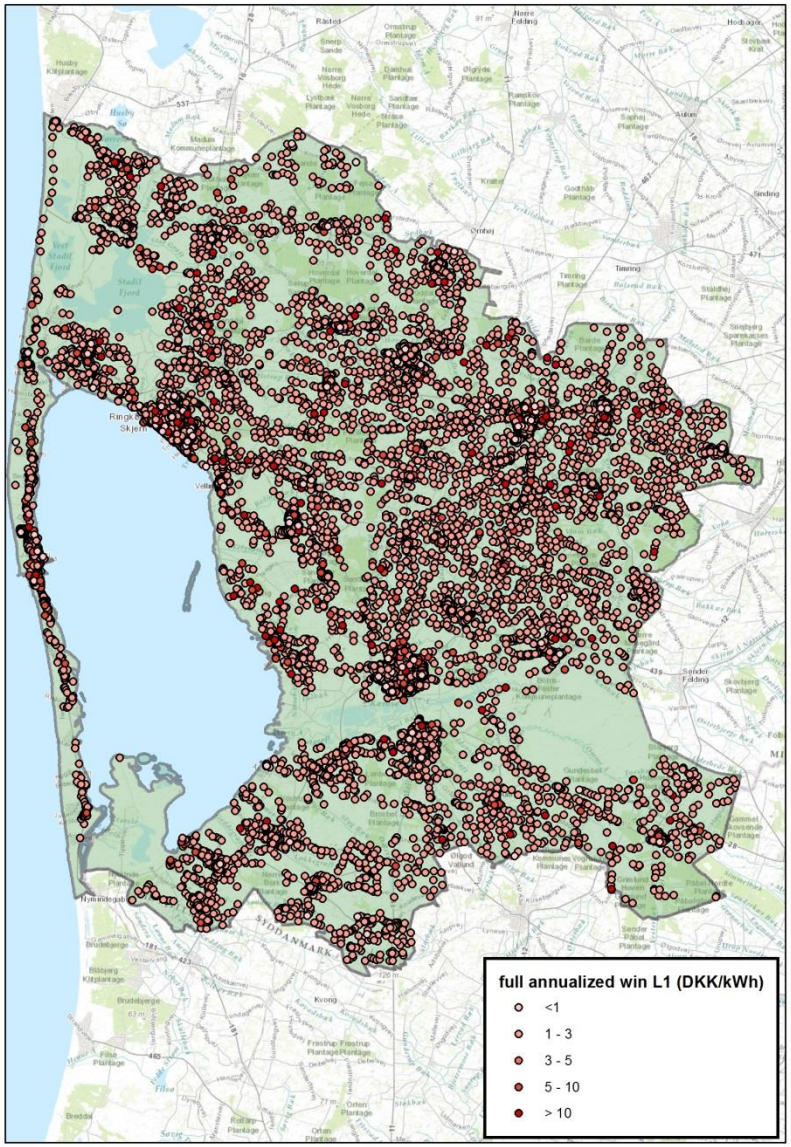

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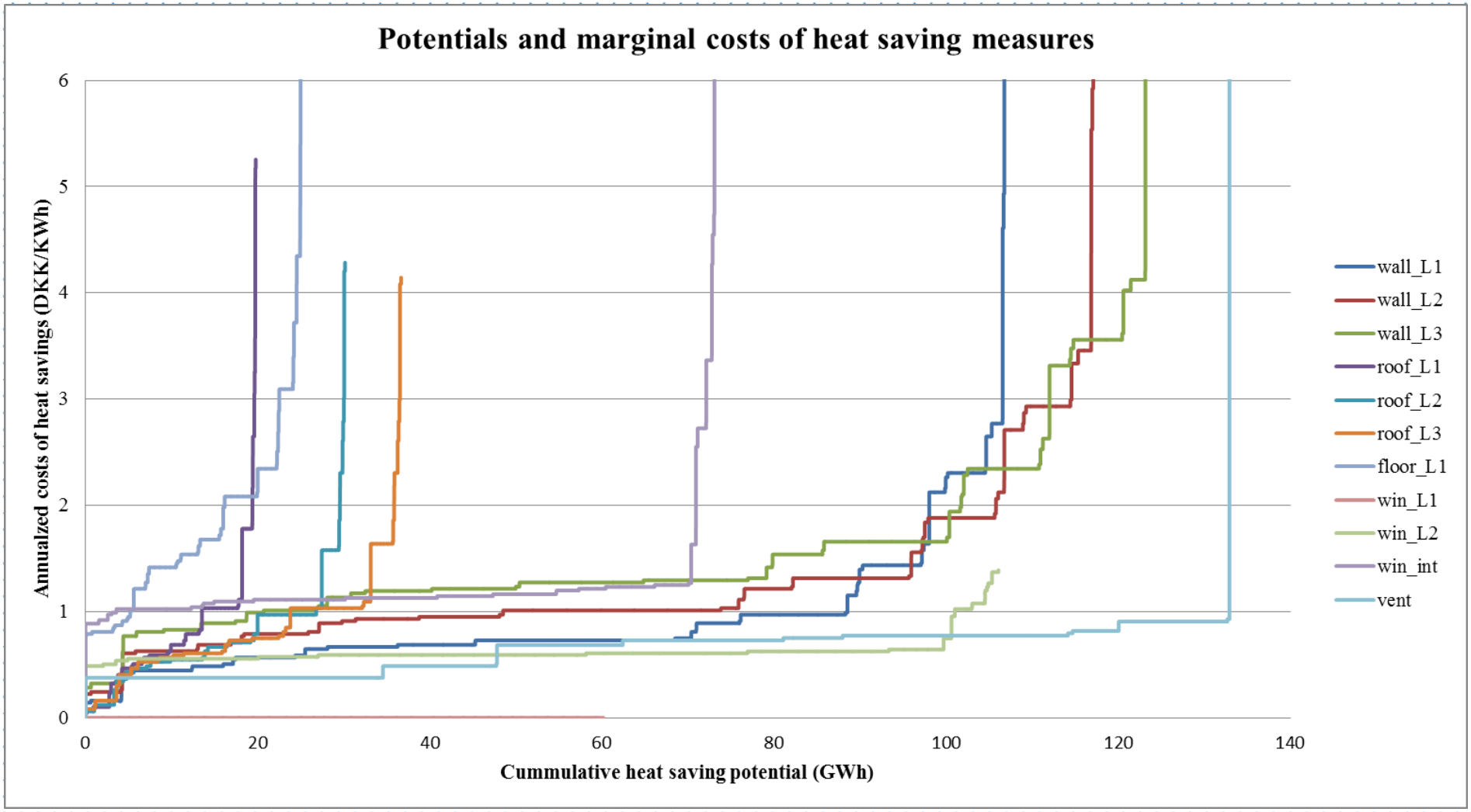

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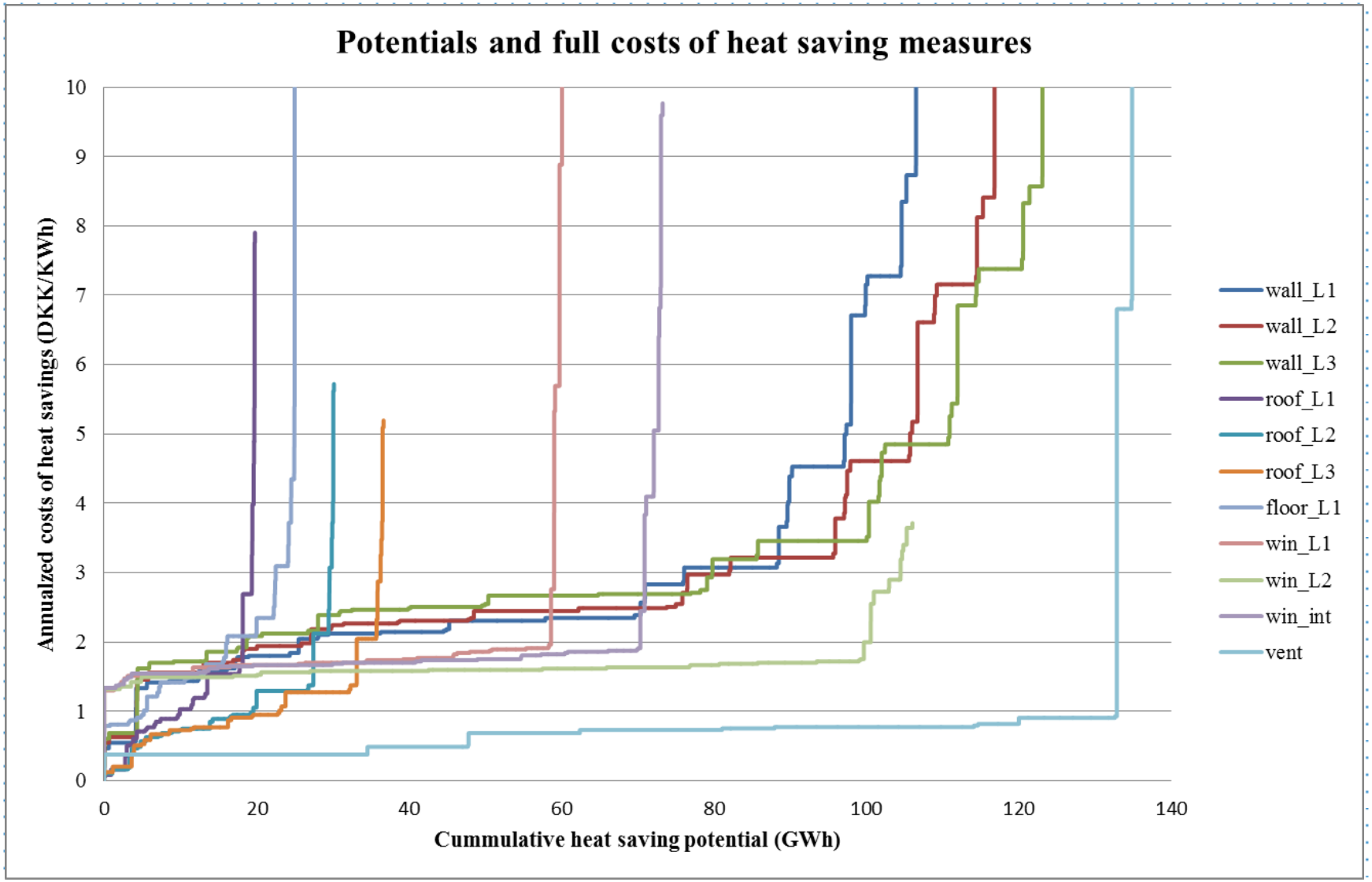

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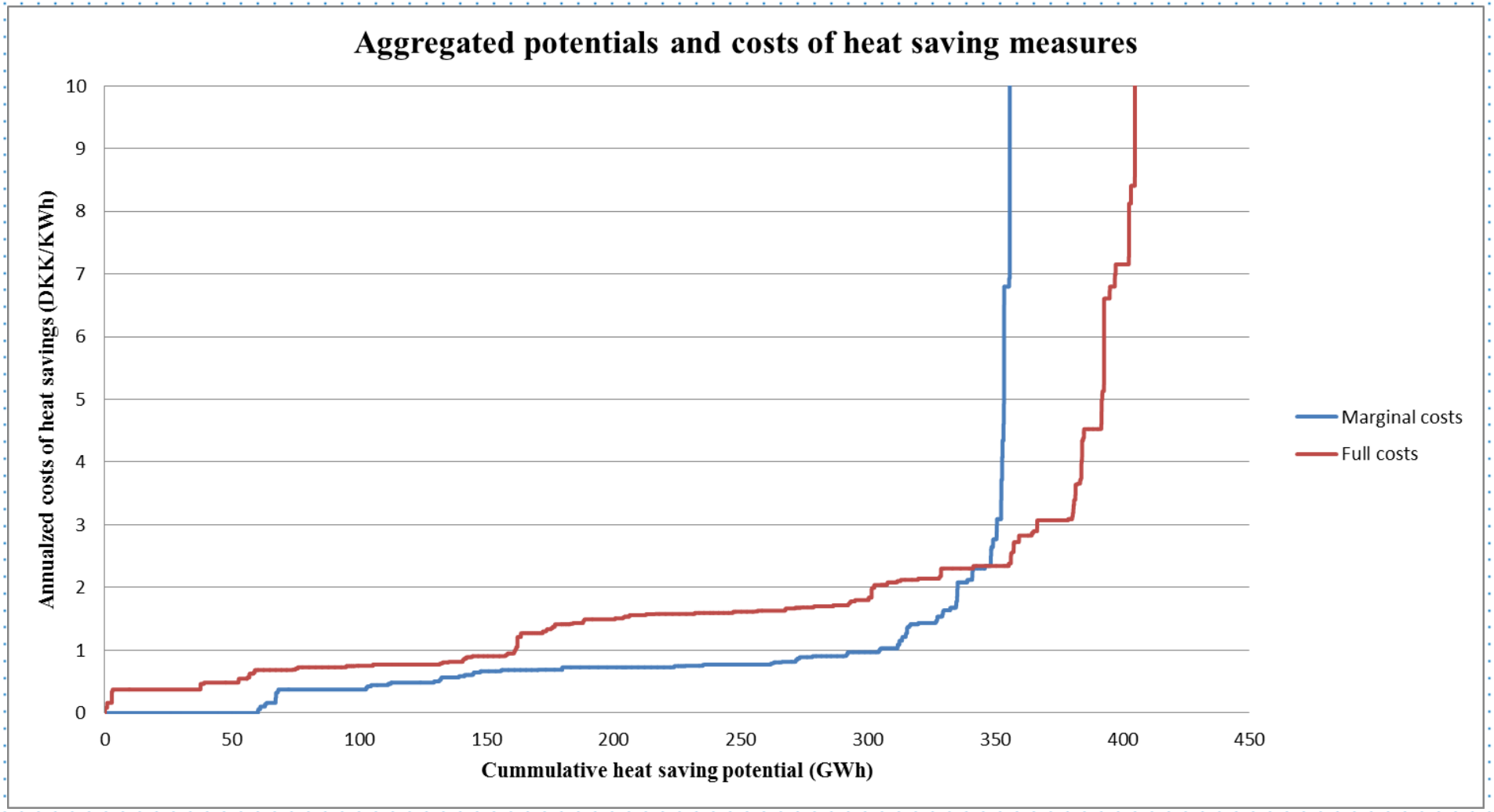

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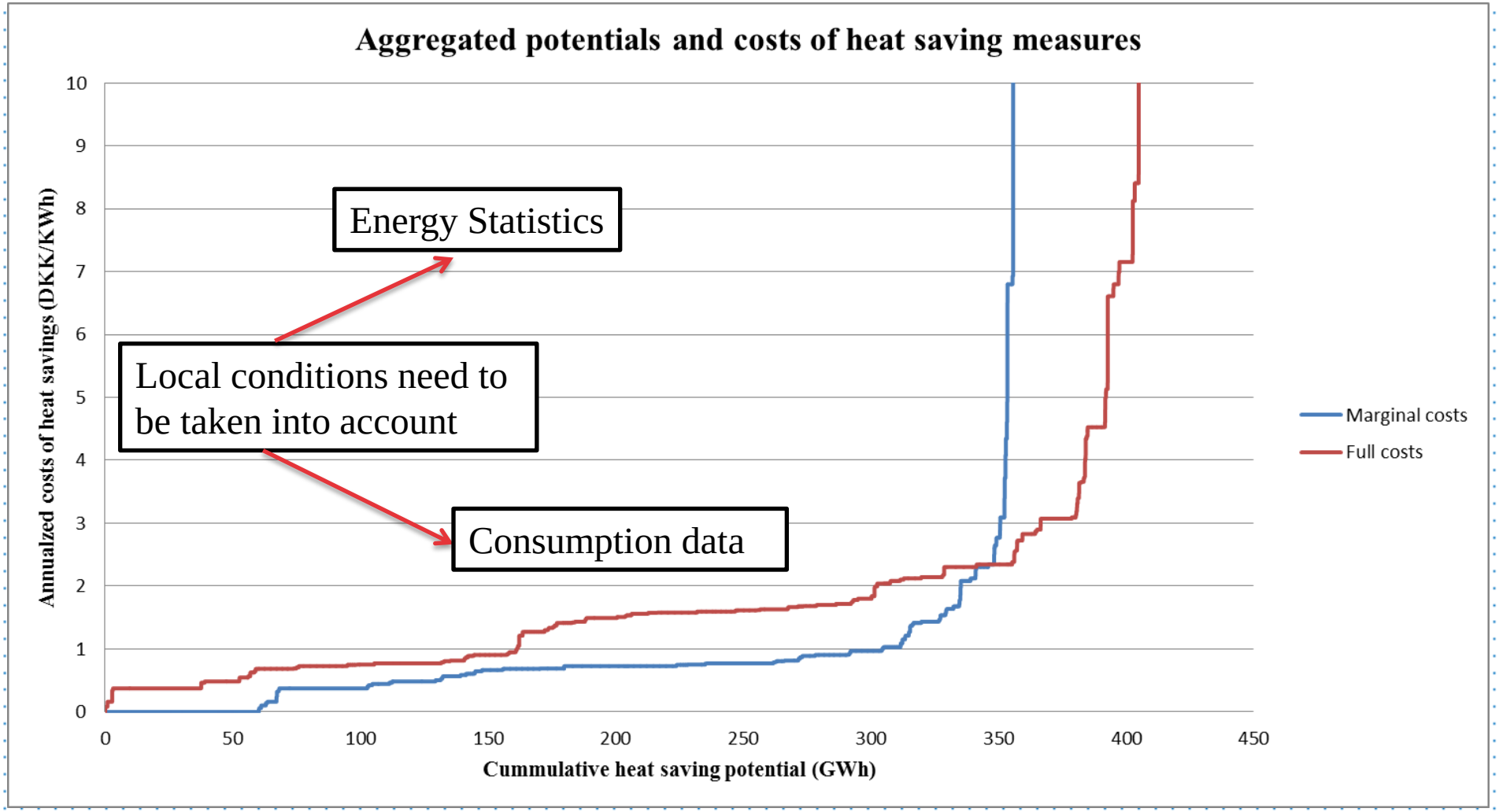
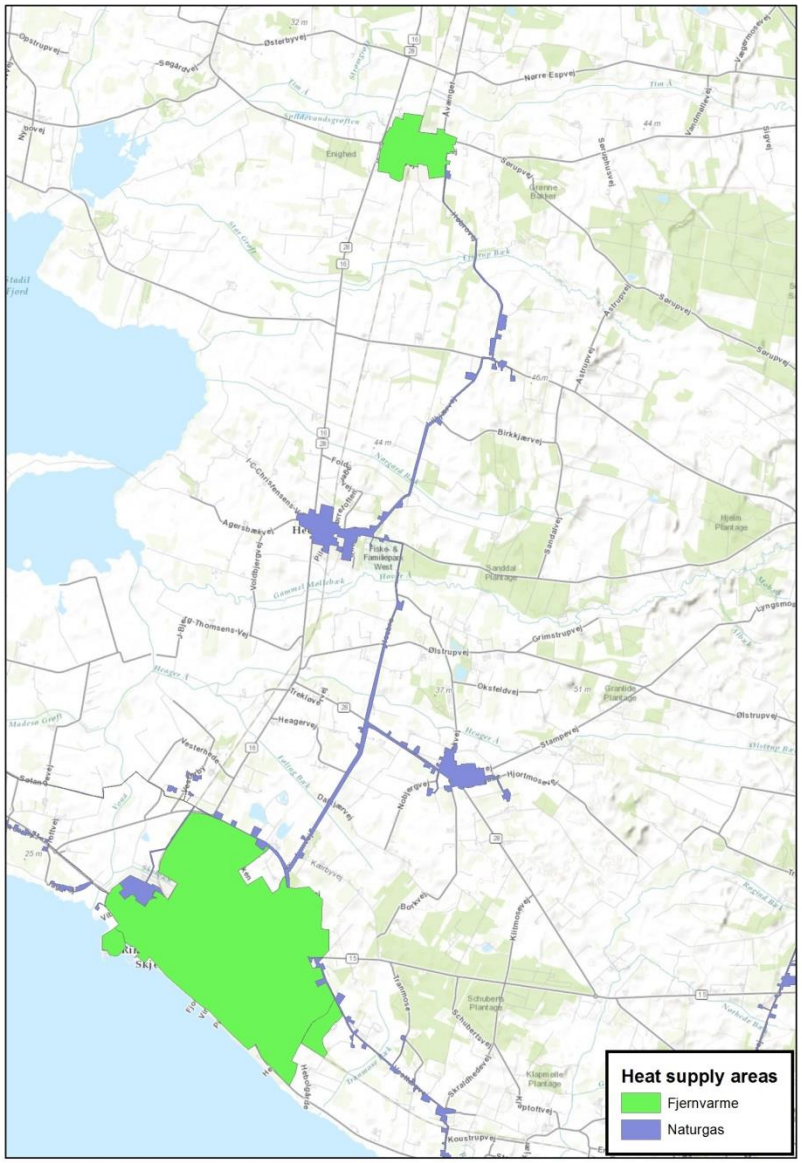


Ringkøbing-Skjern Energy Atlas – expansion of DH networks



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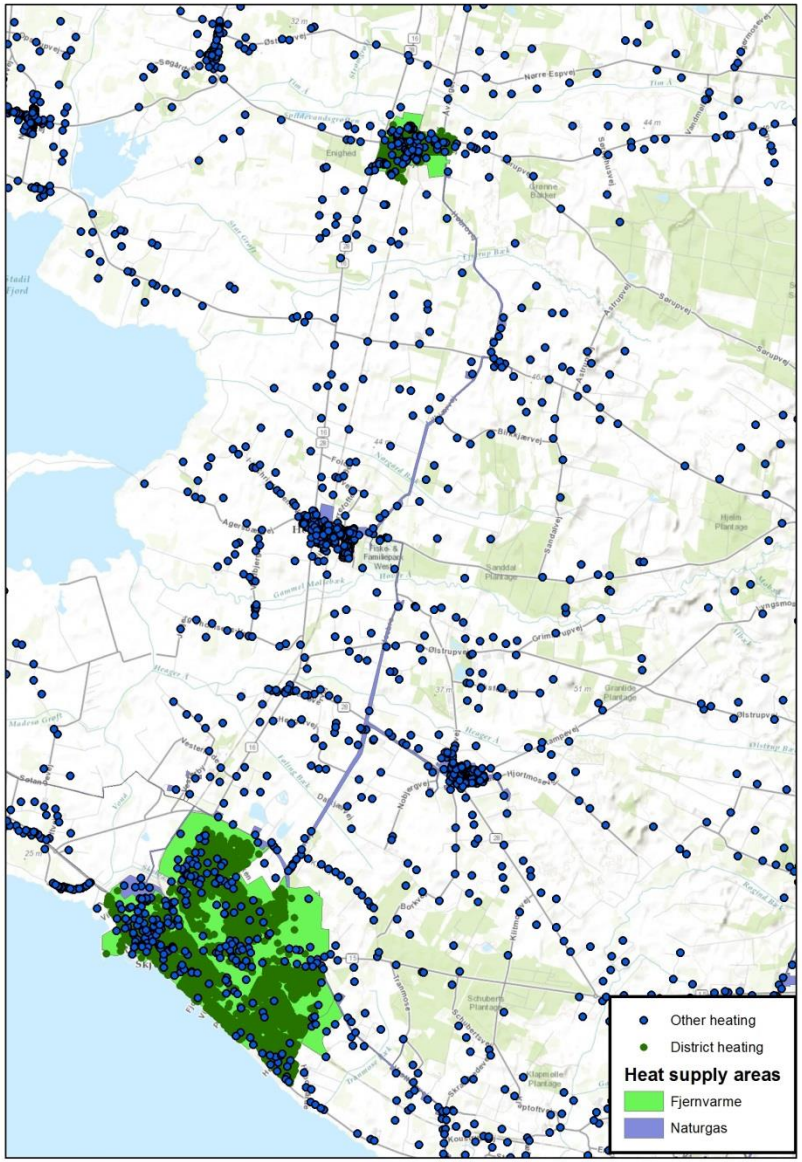

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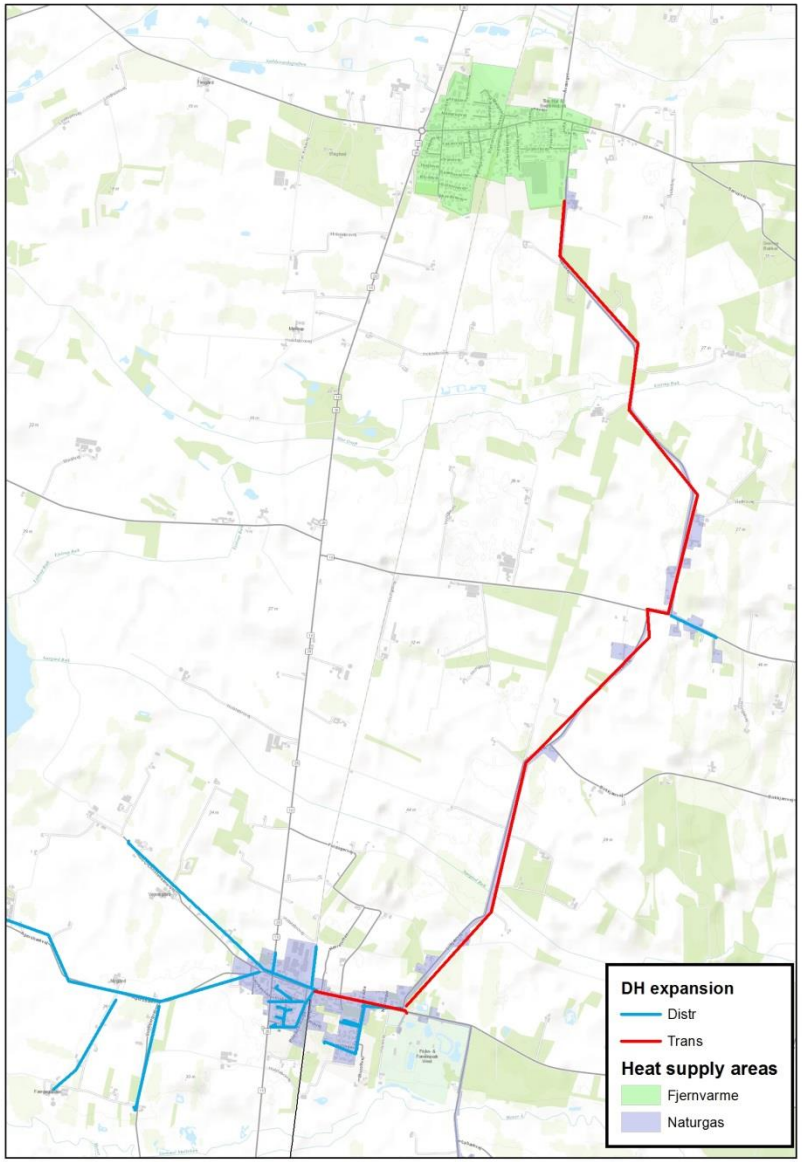
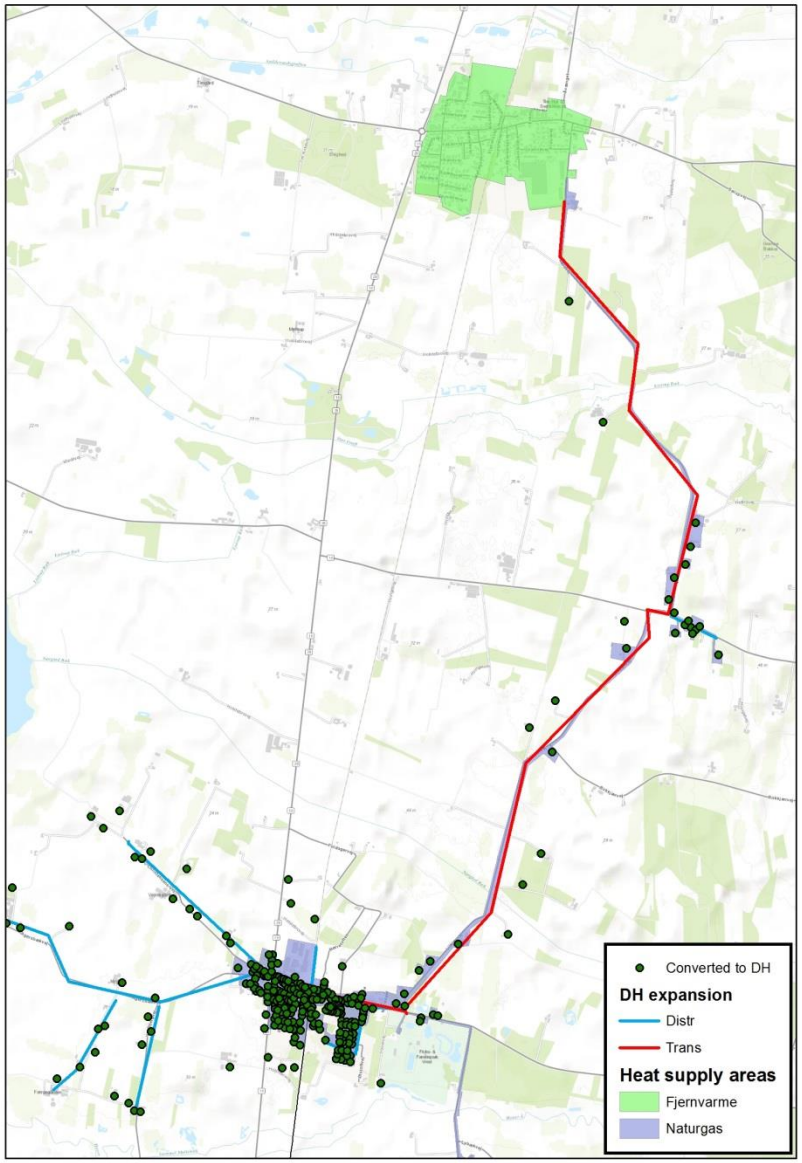


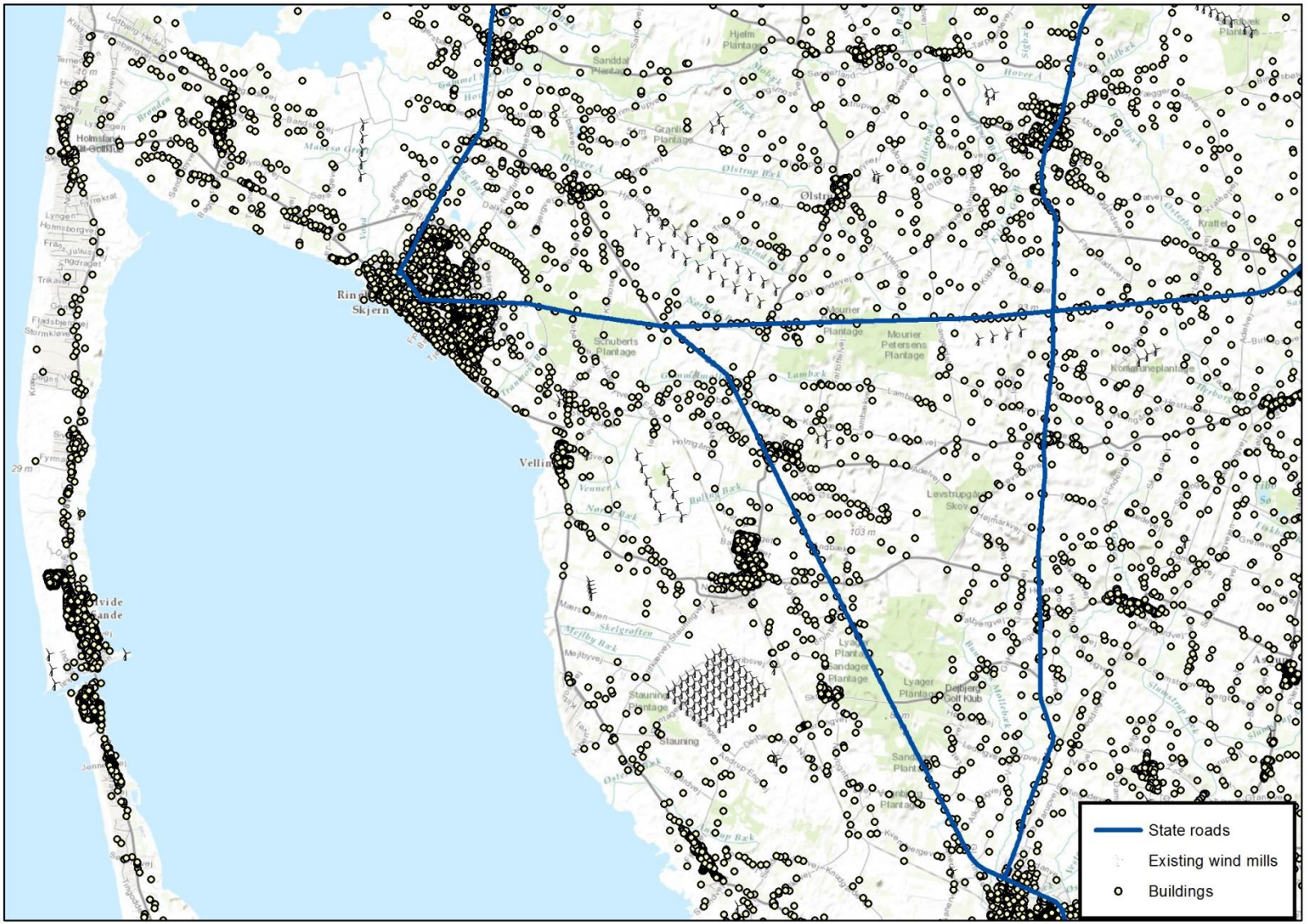
Ringkøbing-Skjern Energy Atlas – expansion of DH networks

$$C = C_{TR} + C_{DIST} + C_{CONN} = c_{TR} \cdot l_{TR} + c_{DIST} \cdot lD_{IST} + n_{CONN} \cdot c_{CONN}$$



Total buildings: 315
Total demand: 6 TWh
Total heated area: 55000 m²
Transmission lines: 7.16 km
Distribution lines: 6.56 km

Ringkøbing-Skjern Energy Atlas – site location for wind mills



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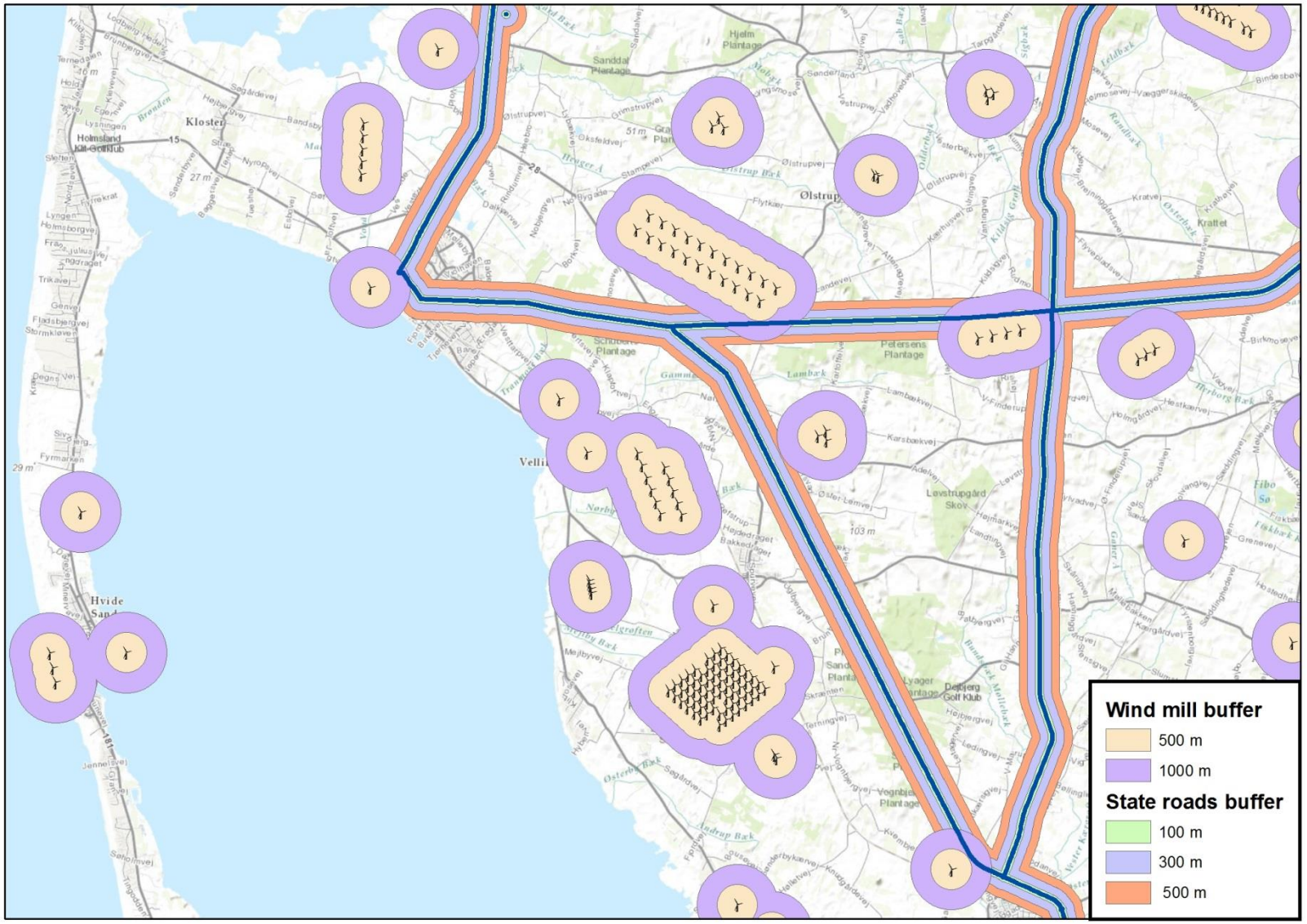

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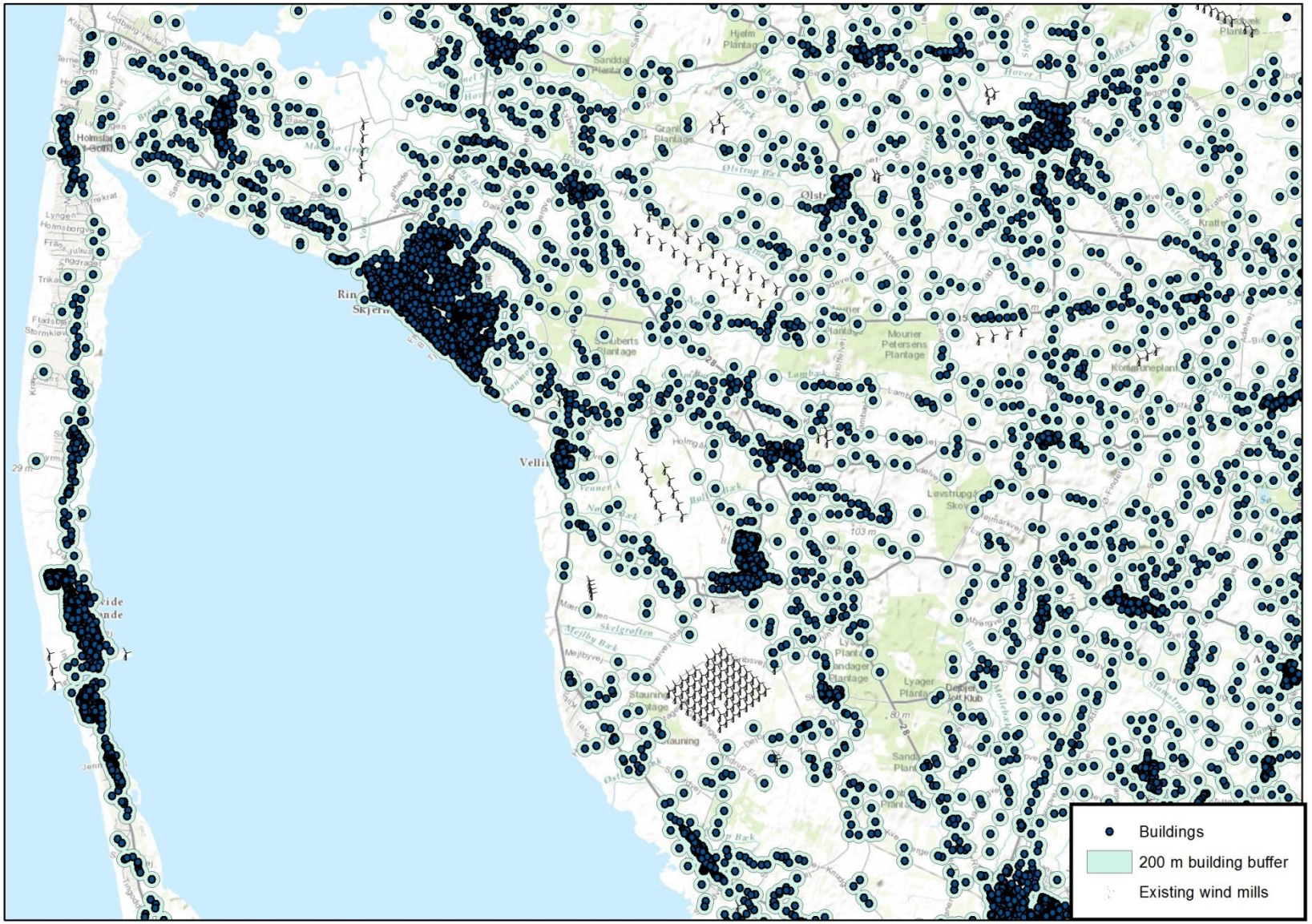

Thank you for your attention

Questions and answers

Contact:

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mobile: 2465 5732