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# District Heating and Geothermal Energy in Denmark – Competition or Cooperation?

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# District Heating and Geothermal Energy in Denmark – Competition or Cooperation?

## Agenda:

- District Heating
- Fuels and carbon footprint
- A deadline and a challenge
- "Hard-to-supply" areas
- Competition or cooperation?



# District heating in Denmark

- 64 % of Danish households are heated by district heating
- 400 district heating companies
  - 50 are owned by municipalities
  - 350 are cooperatives owned by consumers
- Combined heat & power or heating only
- Non-profit organisations
- Governed by Consolidated Act on Heating Supply:
  - § 1: The purpose of the act is to promote the **most socio-economic** and **environmentally friendly** use of energy for heating of buildings and production of domestic hot water and within this framework reduce the utility's dependency on fossil fuels.

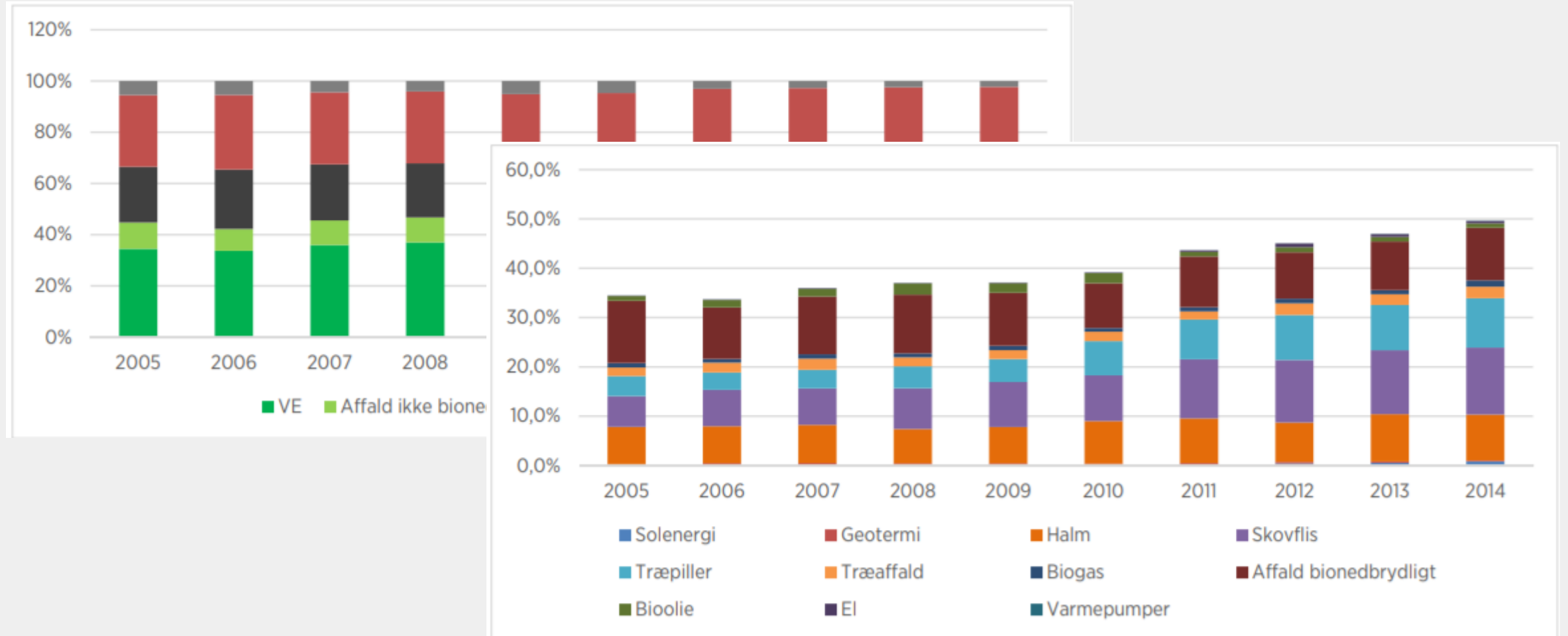


# District heating in Denmark

- All district heating utilities are run by a board
  - Elected by consumers or
  - Elected by consumers and municipality
- The municipality (used to) compile Heating Plans
  - Areas for district heating
  - Areas for natural gas
  - Areas for "individual solutions"
- In district heating areas:
  - Connection is mandatory, unless
  - it is a low-energy building or
  - the building is supplied by more than 50 % renewables



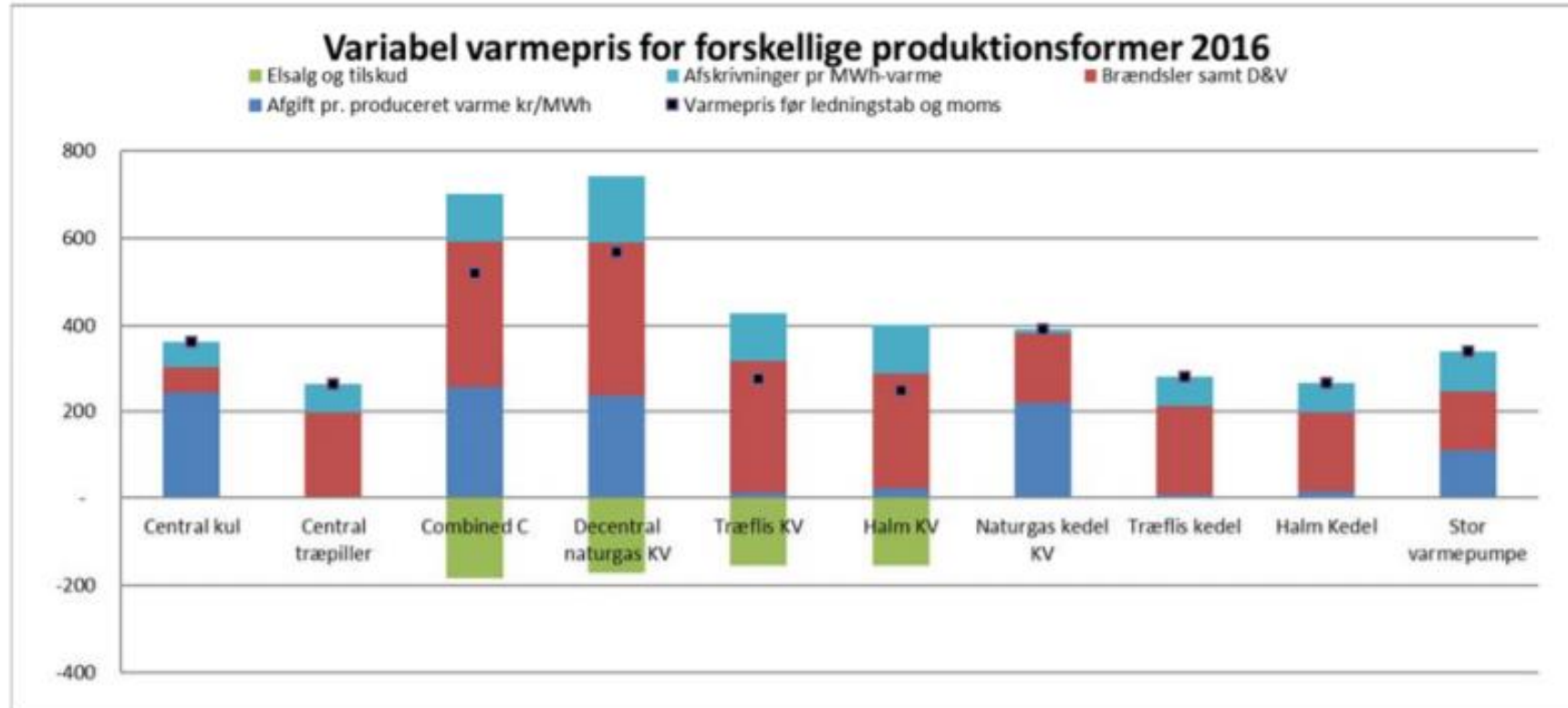
# Fuels and carbon footprint





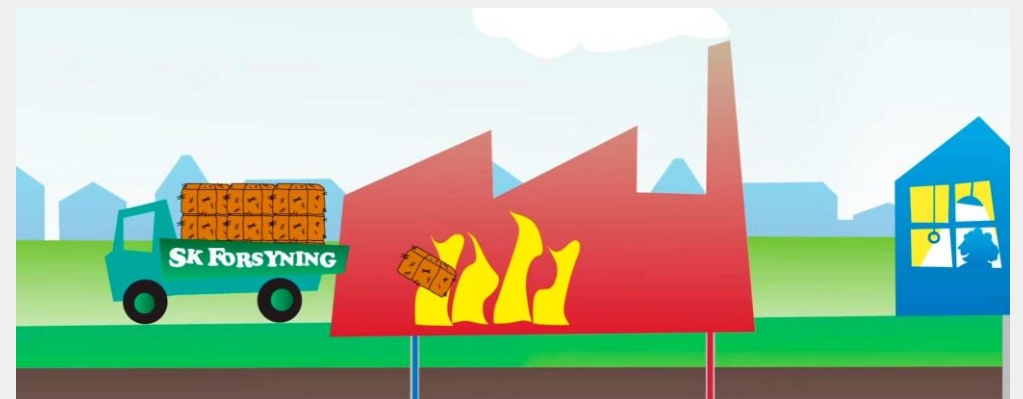
# Why biomass?

Figur 3:



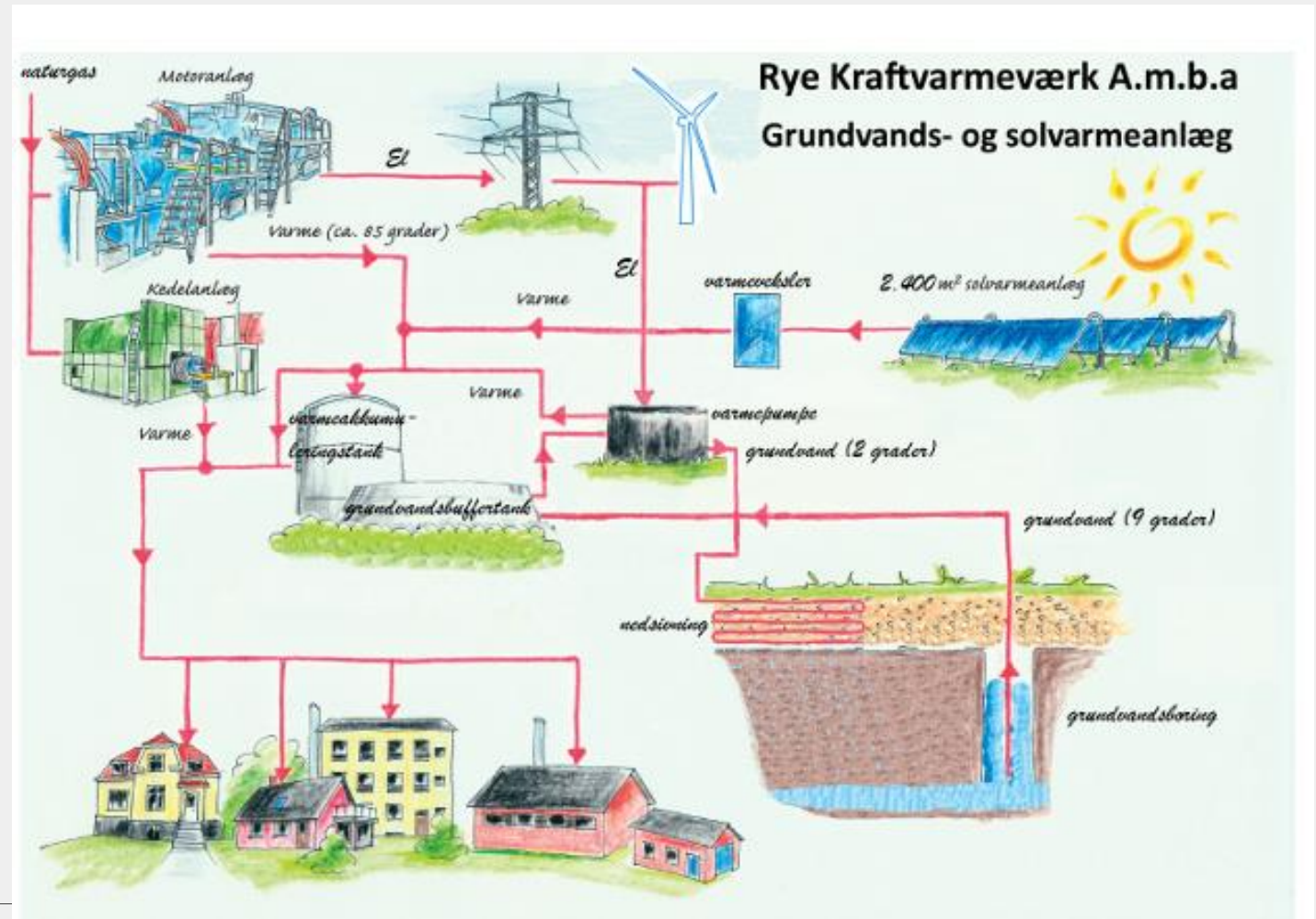
# A deadline and a challenge

- The deadline: 2050
- The challenge: No fossil fuels...
  
- Many district heating utilities aim for shorter terms 2035, 2030 or 2025
- But is burning things the solution?



# Rye Combined Heat and Power Plant

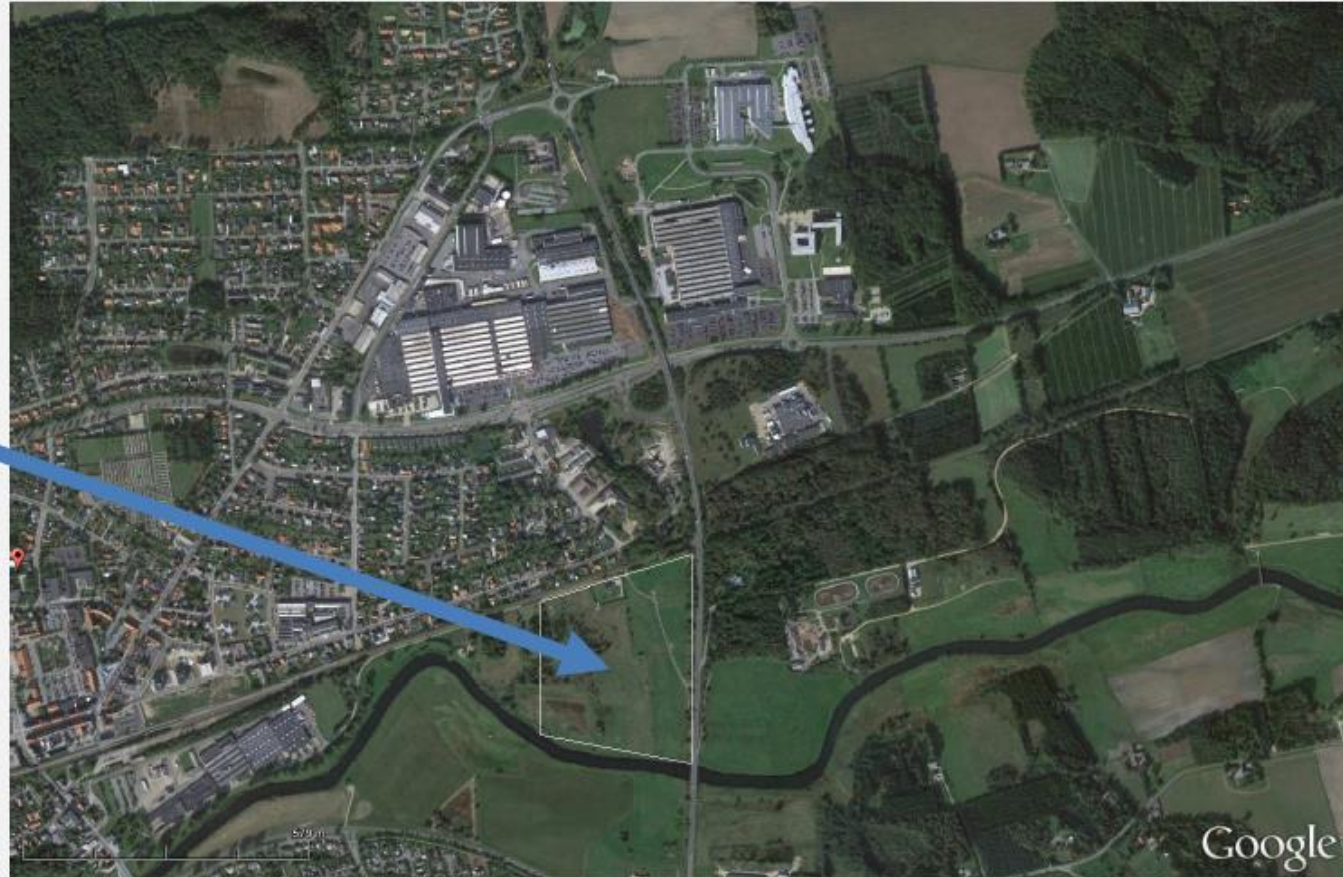
- 2.400 m<sup>2</sup> thermal solar
- 2 MW ground water sourced heat pump
- 200 m<sup>3</sup>/h
- COP 4.0
- 80 % renewable
- Savings: 400 €/household/y





# Industrial waste heat – ATEs – District Heating Bjerringbro

ATES



# ATES at Grundfos A/S Bjerringbro

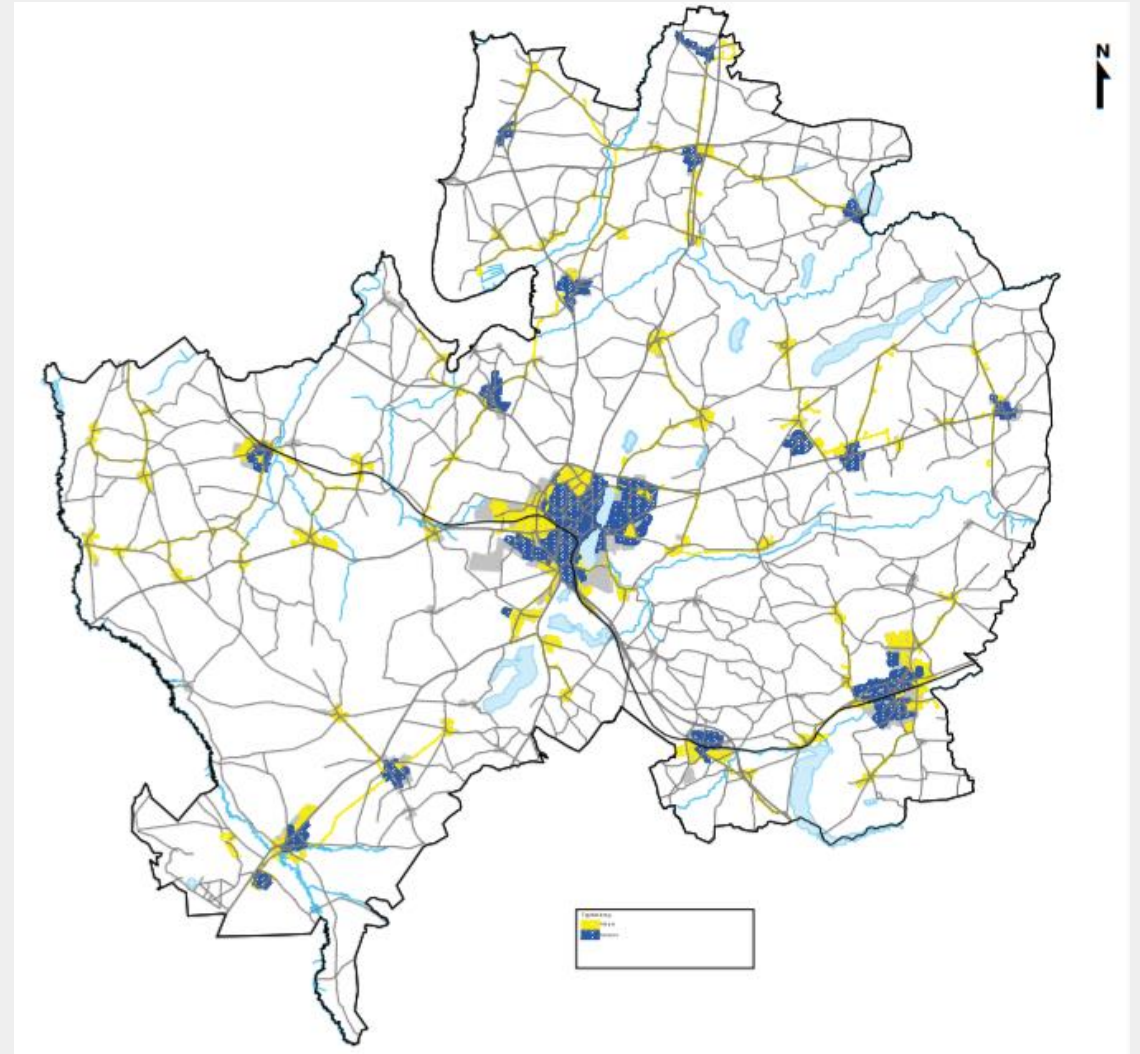
## ATES key figures

Storage capacity	5200 MWh/y
Cooling load	1.5- 2 MW
Groundwater total	1.4 mio. m <sup>3</sup> /y
Reservoir volume	4.6 mio. m <sup>3</sup>
Groundwater peak	160 m <sup>3</sup> /h
Electricity savings (cc)	1160 MWh/y
Electricity consumptions (hp)	1440 MWh
Ngas savings	470.000 m <sup>3</sup> n/y



# "Hard to supply" areas...

- The leftovers:
  - Villages
  - Rural areas
- Individual solutions
  - Oil
  - Wood chips or pellets
  - Heat pumps
    - Air source
    - Ground source





# Middelfart Municipality

- Urban development
- 19 plots
- 19 x 100 m deep BHE
- Individual heat pumps
- Heating and cooling



# Vester Nebel

- Urban development, 70 detached houses
- 8 km distance from traditional district heating
- 12 km horizontal ground source collector
- 2 x 120 kW HP
- 55 °C in grid
- Construction & operation: Trefor District Heating
- Heating cost identical to that of "traditional" DH





# Brenderup - Termonet

- 13 plots
- 8 boreholes
- Individual heat pumps (owned by Trefor)
- Common brine net (Termonet)
- Heating and cooling
- Expected opening May 2019
- Construction & operation: Trefor District Heating
- Heating cost identical to that of "traditional" DH



# Rosborgbyen

80 Ha

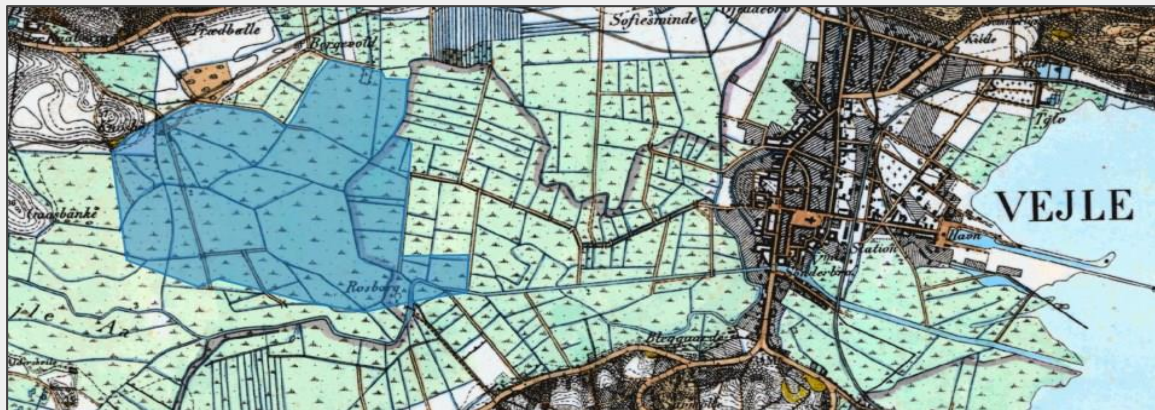
3.000 flats

5.000 residents

20.000 m<sup>2</sup> commercial



**Vejle 2050**  
Vejle oplever massiv tilflytning og kan vokse til op mod 100.000 indbyggere i 2050.  
Med Kommuneplan 2017-29, strategi Vejle 2050 og Fjordbyen samt Ny Rosborg vil Vejle være på forkant.



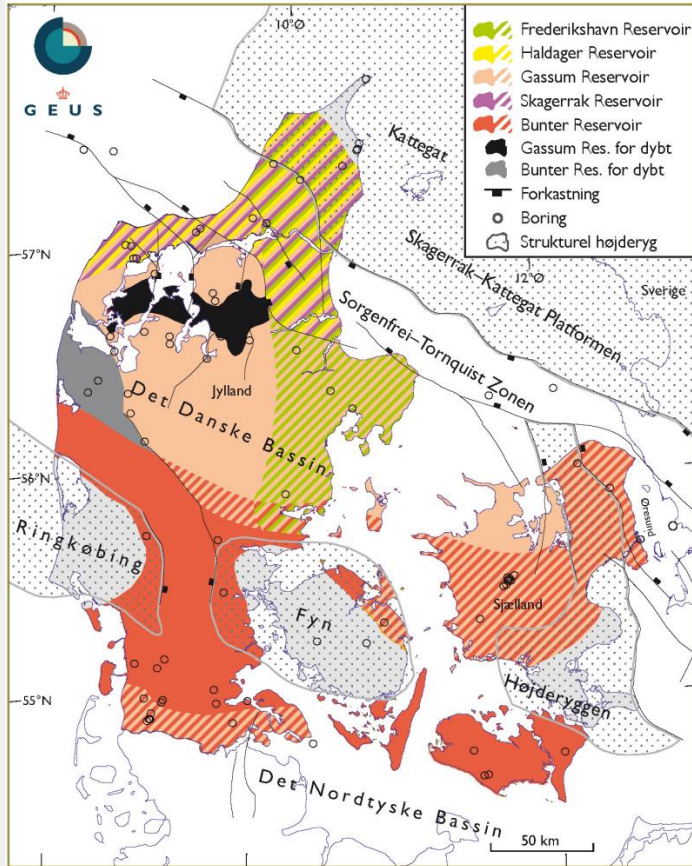


# Rosborgbyen

- The Resilient Rosborg
  - 25.000 energy piles ?
  - Central or local HP ?
  - Common brine net ?
- Pilot project
  - Vejle Municipality
  - Centrum Pæle
  - Vølund
  - Vejle District Heating
  - VIA University College



# Deep geothermal in Denmark



Map of potential geothermal areas between 800-3000 meters



Geothermal district heating plants

# Deep geothermal in Denmark - a new development

- AP Møller (Maersk)
  - Letter of intent signed with Aarhus Municipality
  - Aim: Energy cost competitive to biomass
- Geoop
  - Eon
  - Iceland Drilling
  - Ross Offshore





# Competition or Cooperation?

- Traditionally: Competition
- Recent development: New line of business
- The future: Cooperation





Thank you for your attention.