

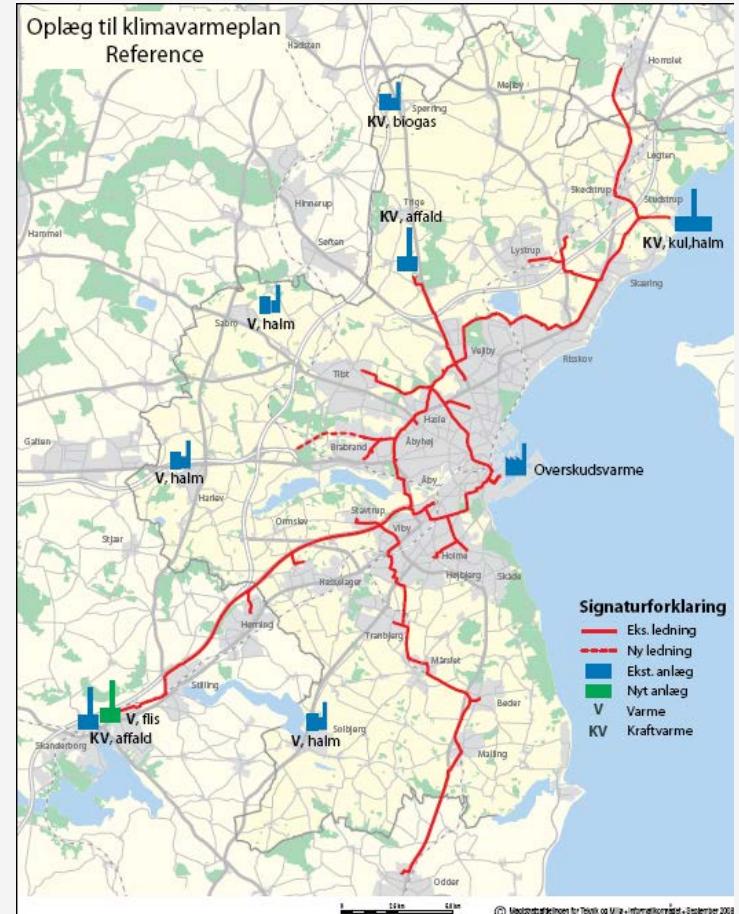
AffaldVarme Aarhus

Department of Waste and Heating

Teknik og Miljø
Technical Services and Environment
Adam Brun – Ph.D, Civ. Eng
Head of operation - Transmission

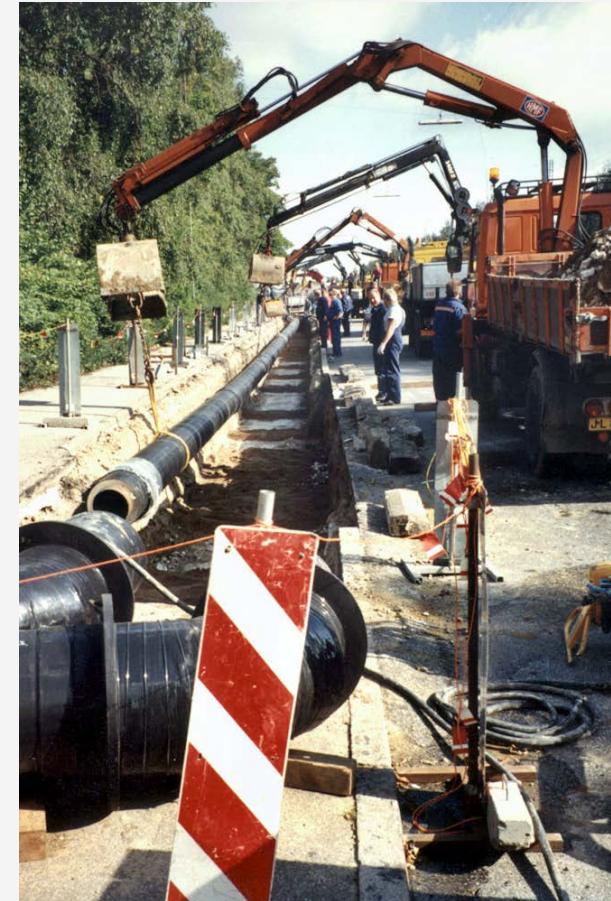
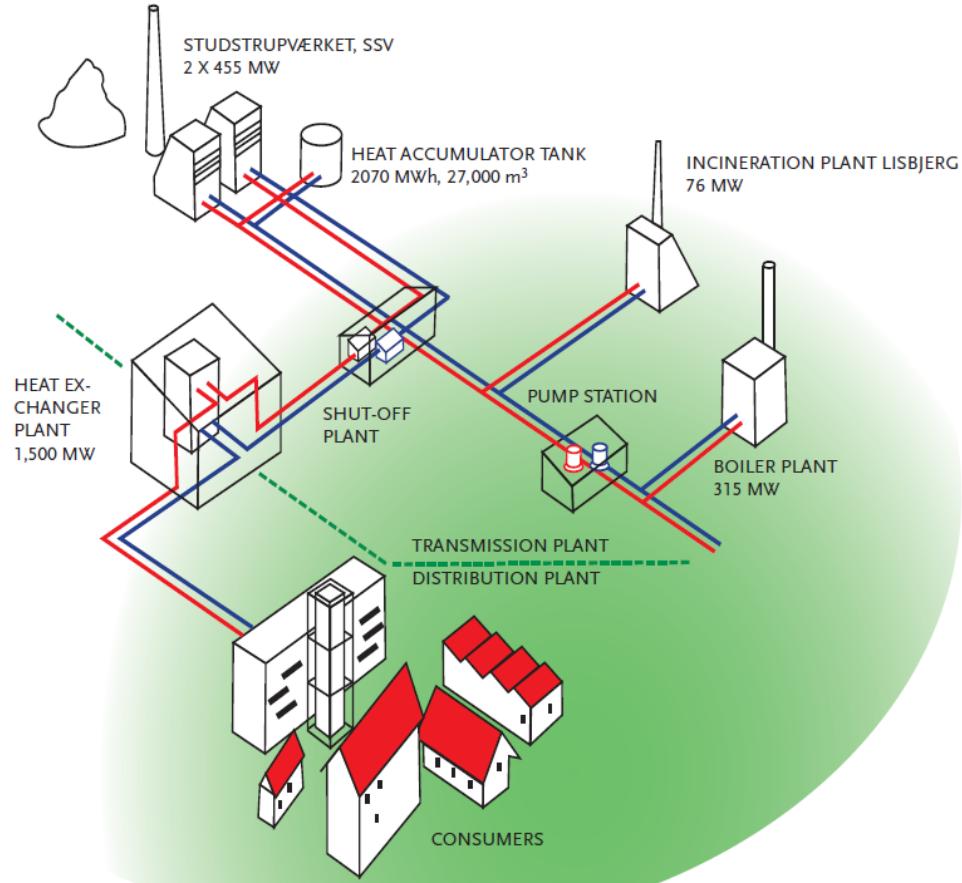
District heating

- 3,500 mio. kWh district heating based on burning of waste, coal wood chips and straw
- A transmissions system of 130 km which also covers 3 neighbouring cities
- 95% of the 300,000 inhabitants in the municipality of Aarhus are supplied with district
- 50,000 customers on a distribution system of 2000 km



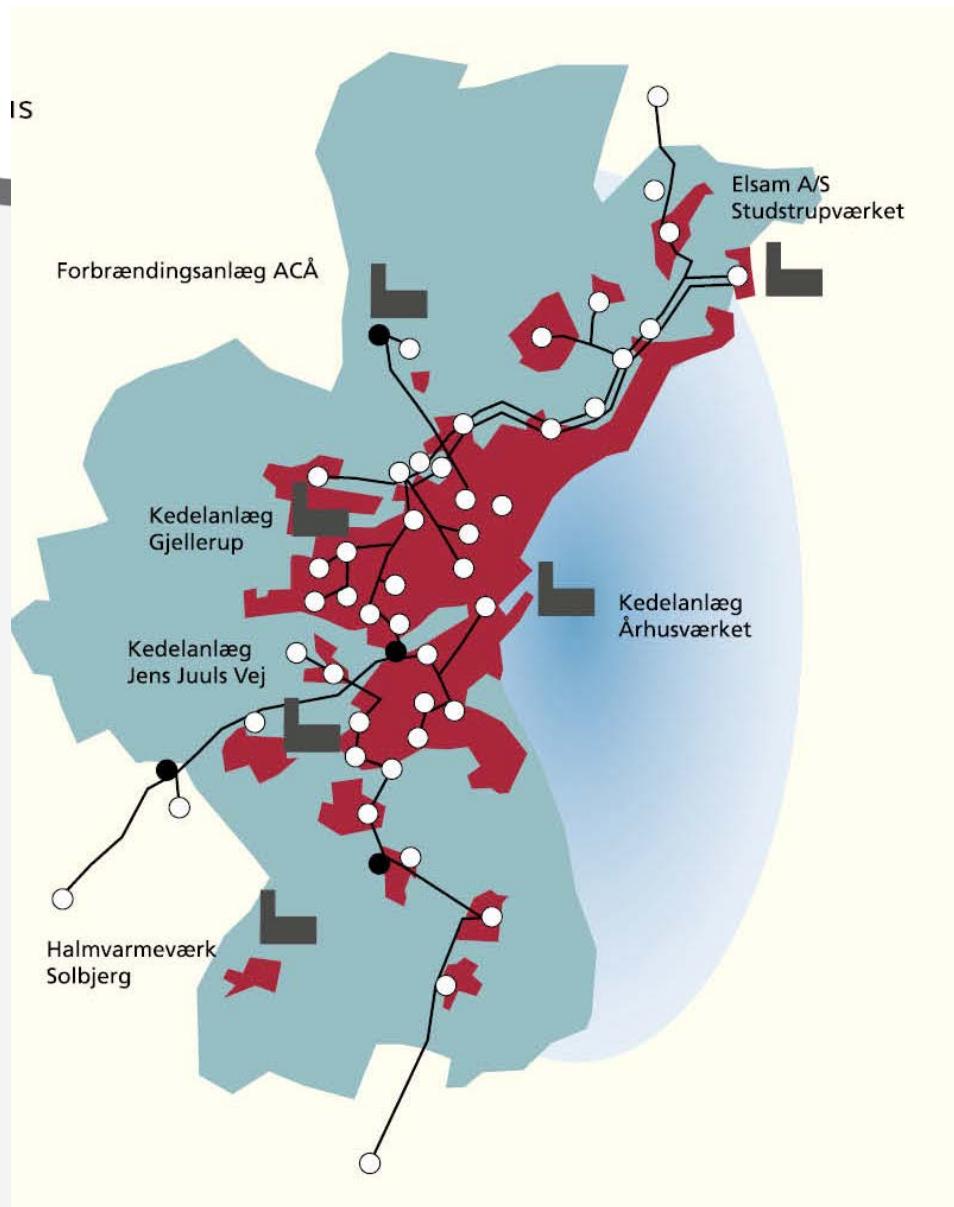
District heating systems – CHP born

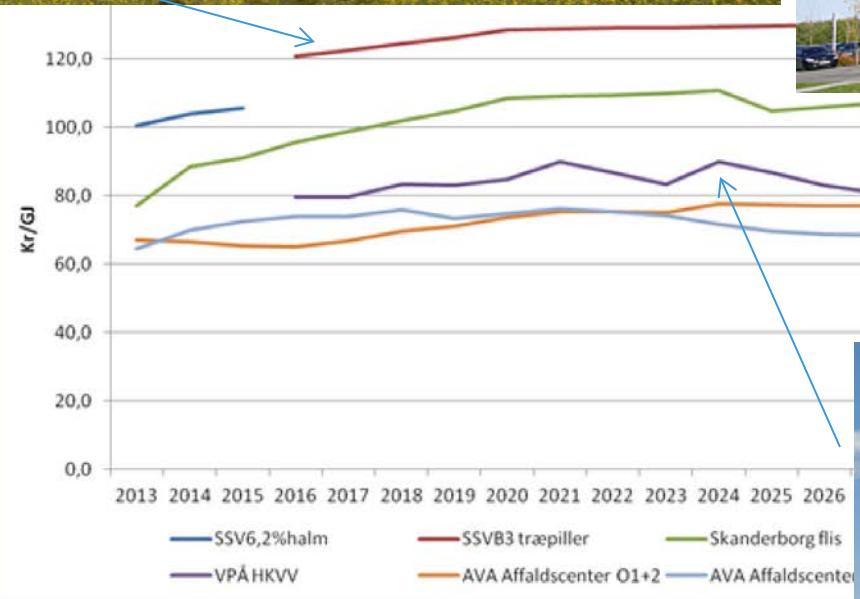
1985





1985





Transmissions system and heat exchangers

Heat exchangers

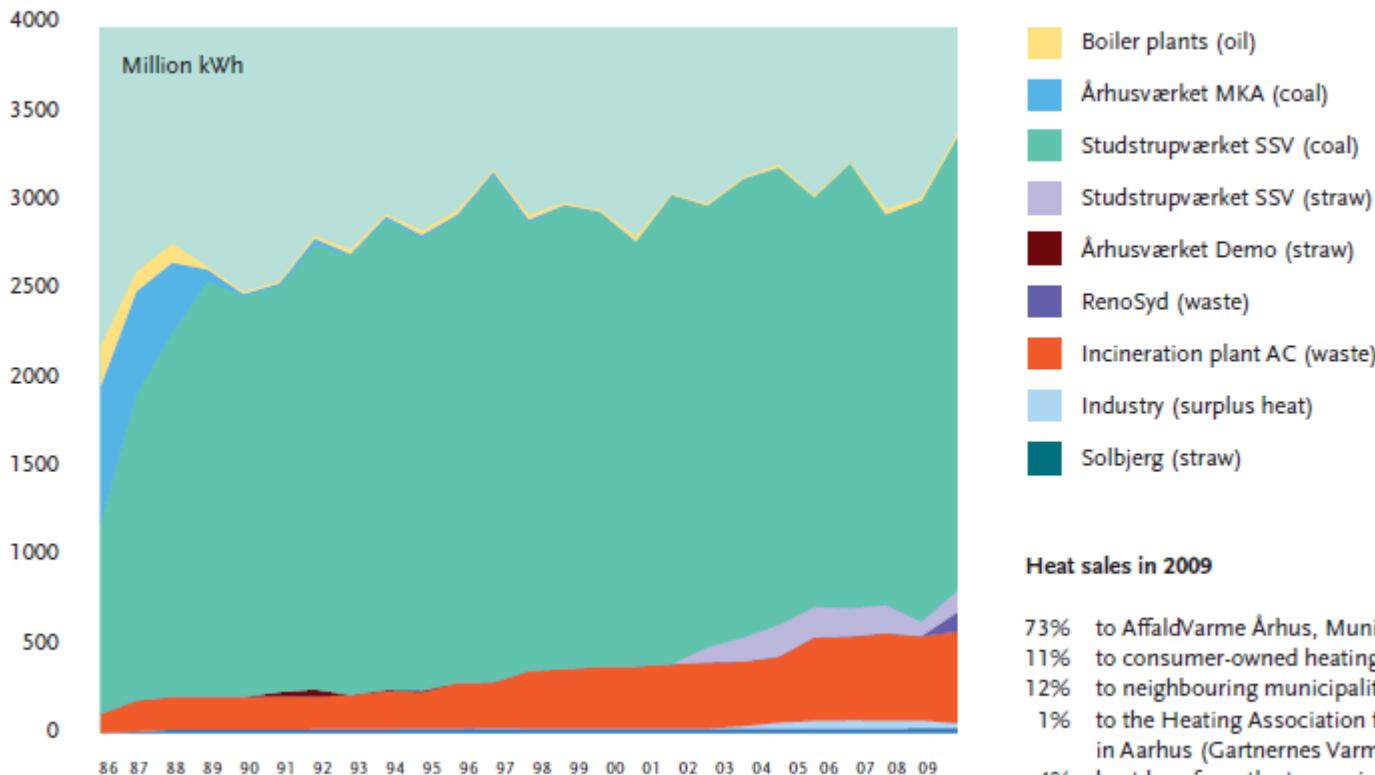


Transmissions pipes
Temperature 100 – 140 °C
Pressure 10 – 25 bar



Heat production since 1985

Overview of heat production in million kWh per year since 1985

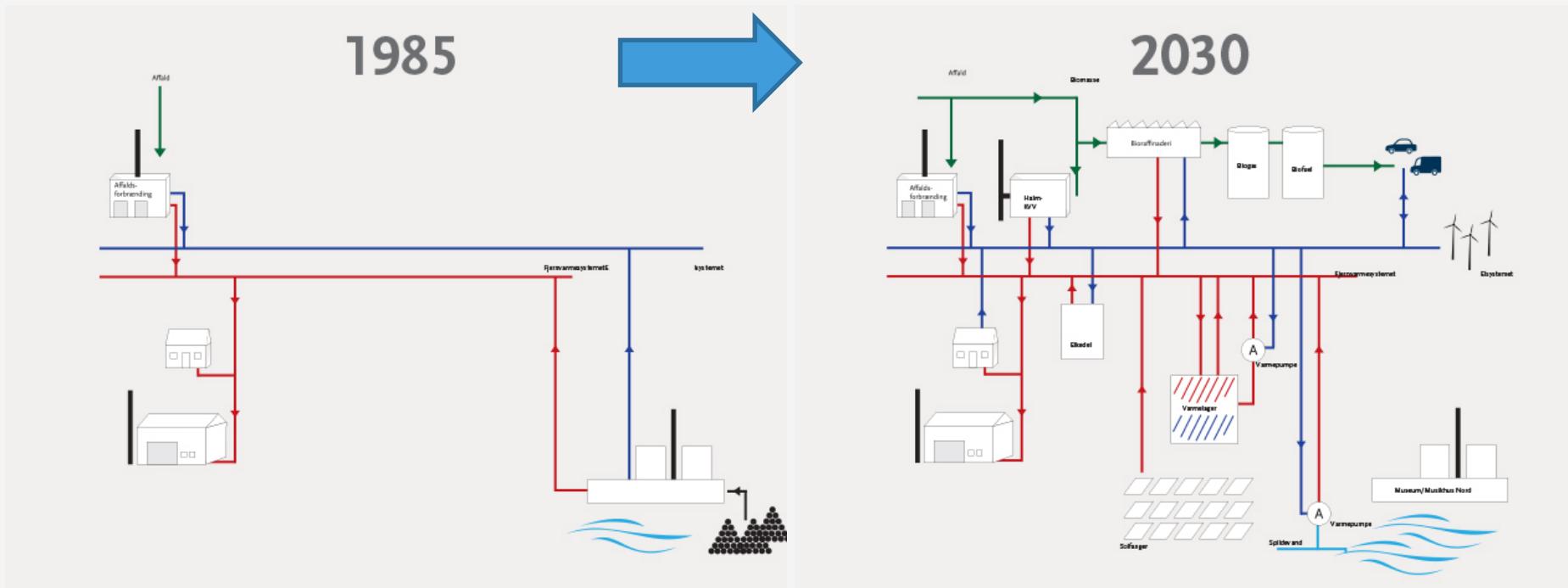


2014 -> 2020

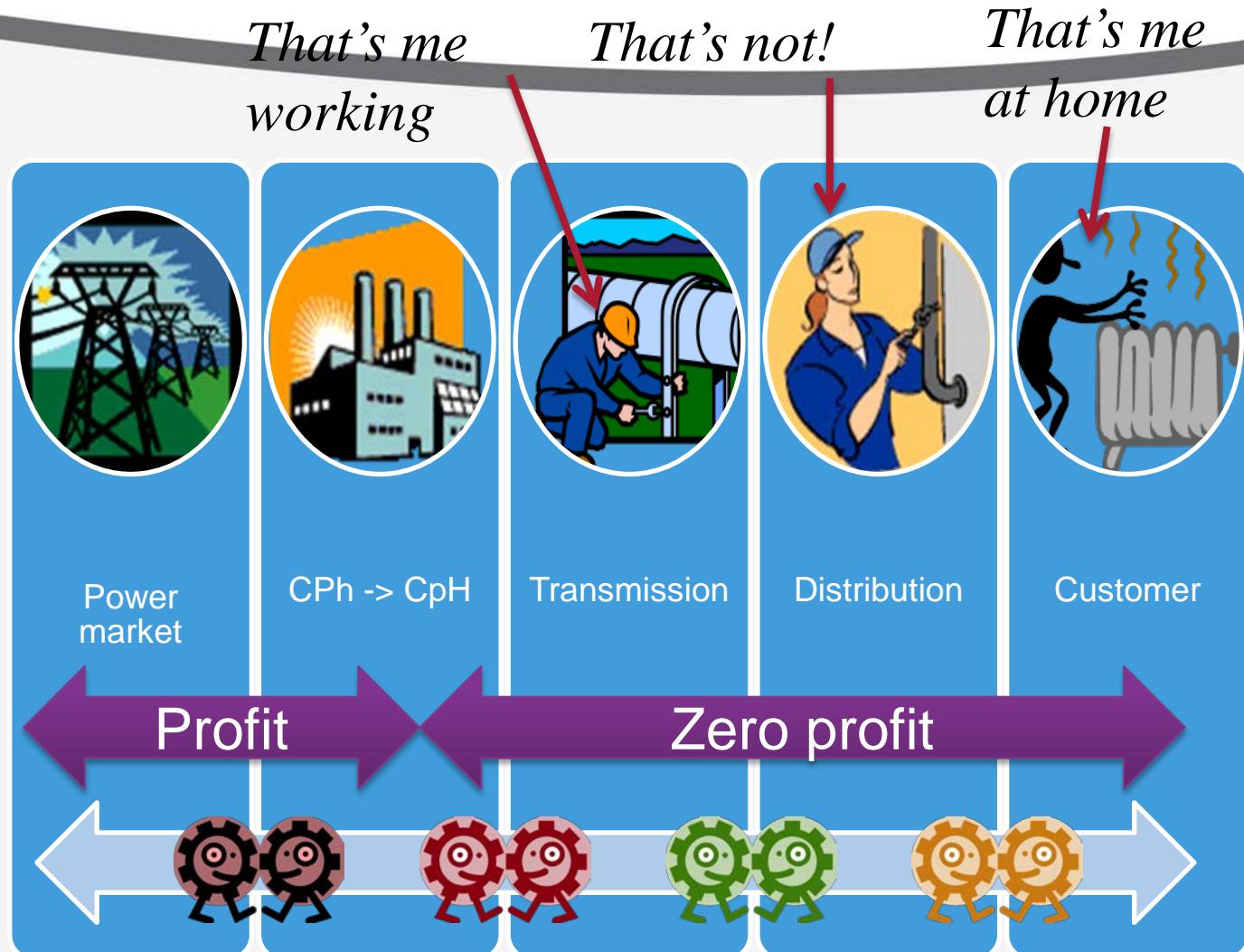
Technological challenge

- Large heatpumps +10 MW sea water/waste water
- Sun & wind
- Large heat reservoirs
- Industrial excess heat
- Heat from exergy lifts e.g. bioconversion
- Geothermal energy
- District cooling synergy

Towards 2030



Commercial challenges



Major strategy and tools

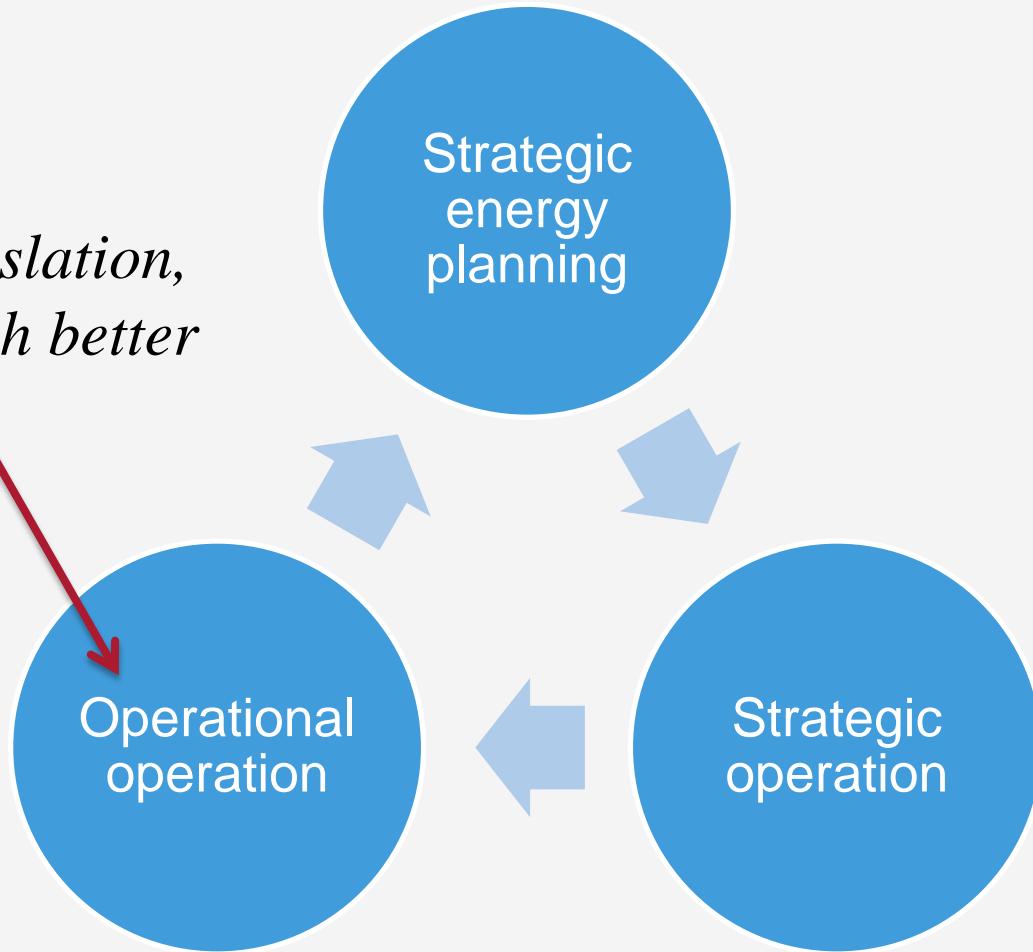
- Continuously adjusting towards changes in
 - Power market
 - Demand
 - Heat price
 - H2H trading
 - No free ride buffer from chp
- Models
- Prognosis
 - Power market
 - Weather
 - Demand
 - Hydraulics
 - Economics
 - Price & Robustness

Solution needed

- In the case of a specific sudden event, a specific solution does not exist – i.e. the current market, production and hydraulic situation must always be taken in consideration

24/7!

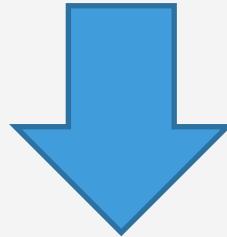
*Lost in translation,
sounds much better
in Danish*



Strategy: BI&BA



Make an open market for solution providers
and let experts on the individual
knowledge areas in as easy as possible



Anyone with a bright head, computer,
calculation programme and an internet
access can be a potential solution supplier

Solution

- Expose data and operational costs models
- SQL on AZURE
 - Data
 - Models
 - Quality of existing solution e.g. prognosis quality and data used for prognosis
- Supply your own online automatization tools for suppliers i.e. sharepoint and web services – no need for each supplier to run these services

E.g. Time varying prices

- <http://77.66.45.131/SitePages/Home.aspx>