

BUILDING A LOW-CARBON ISLAND ECONOMY CONFERENCE 2022

A SMALL NATIONS' GUIDE TO THE ENERGY TRANSITION

BENEFITS AND PRACTICAL IMPLEMENTATION OF DISTRICT HEATING

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Agenda

- The three Cs of benefits for the consumer/resident
- Framework for developing district heating systems
- Practical experience with implementation and operation of district heating systems

Benefits of district heating as seen from the consumer - Convenience

- Residents do not have their own waste incinerator or rubbish dump for that matter
- Residents do not have their own electricity production system (could have... but don't)
- Urban residents do not have their own TV antenna or satellite receiver (could have... but don't)
- Urban residents do not have their own water well
- Urban residents do not have their own sewage treatment works
- Urban residents do not need have their own gas/coal/wood/.. boiler to provide space heating and to provide hot water
- For most residents there is a strong element of convenience

Benefits of district heating as seen from the consumer – Space heating



+



or



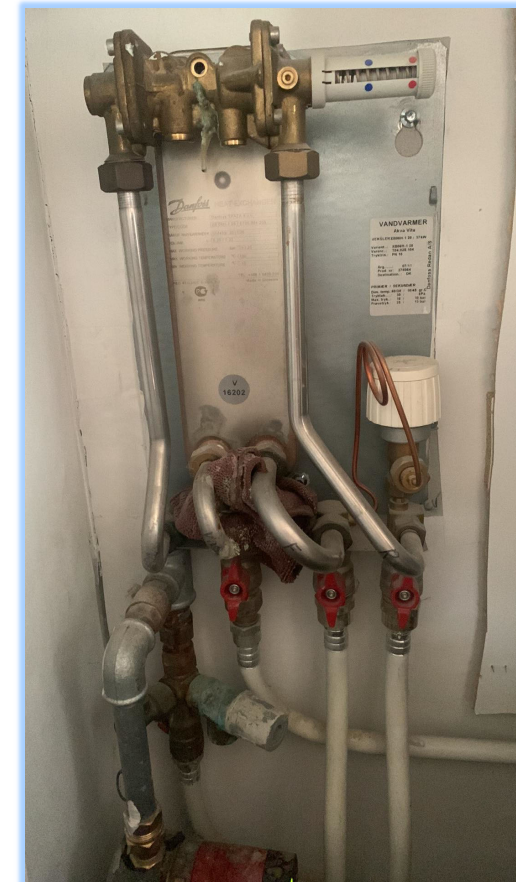
Benefits of district heating as seen from the consumer – Hot water preparation



1960s

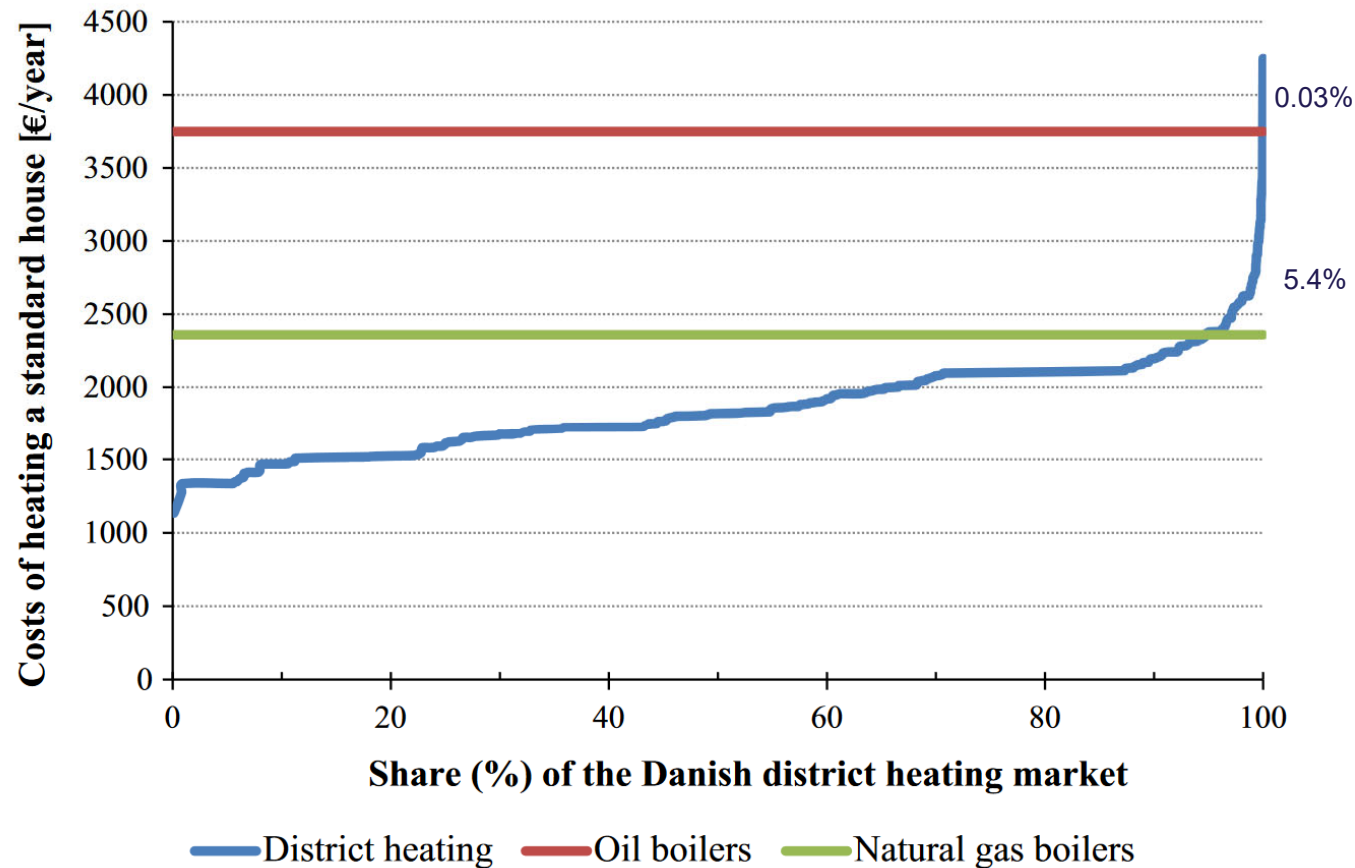


1980s

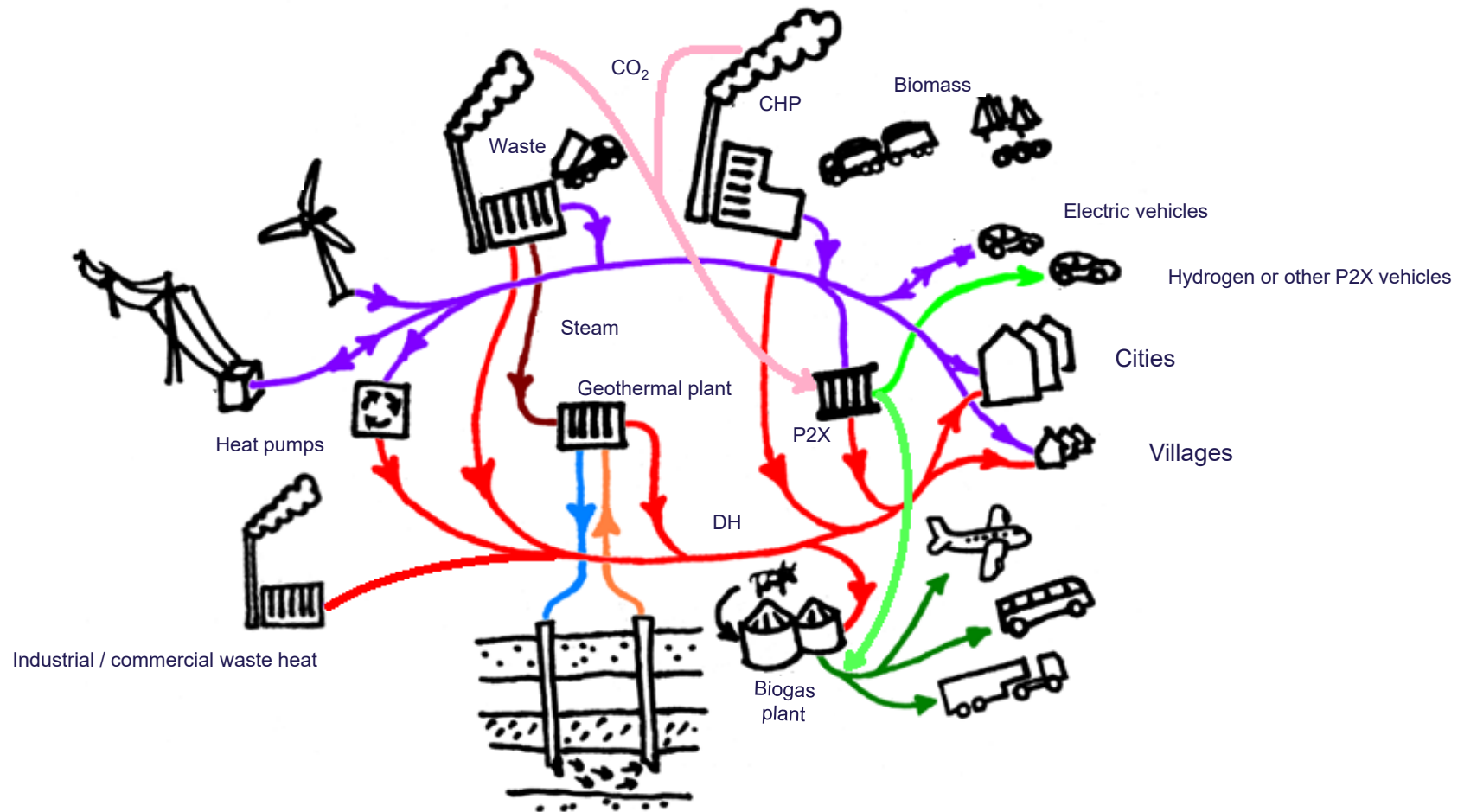


Benefits of district heating as seen from the consumer - Cost

- District heating is cheaper for most Danish residents
- Chart made before recent increases in oil and natural gas prices – making the advantage higher
- Economically robust systems potentially operating with a wide range of options
- Note: A few systems should not have been made (too small, too spatially dispersed, wrong projections on electricity and fuel prices)



Benefits of district heating as seen from the consumer – Conversion



Some highlights of heat planning and implementation in Denmark

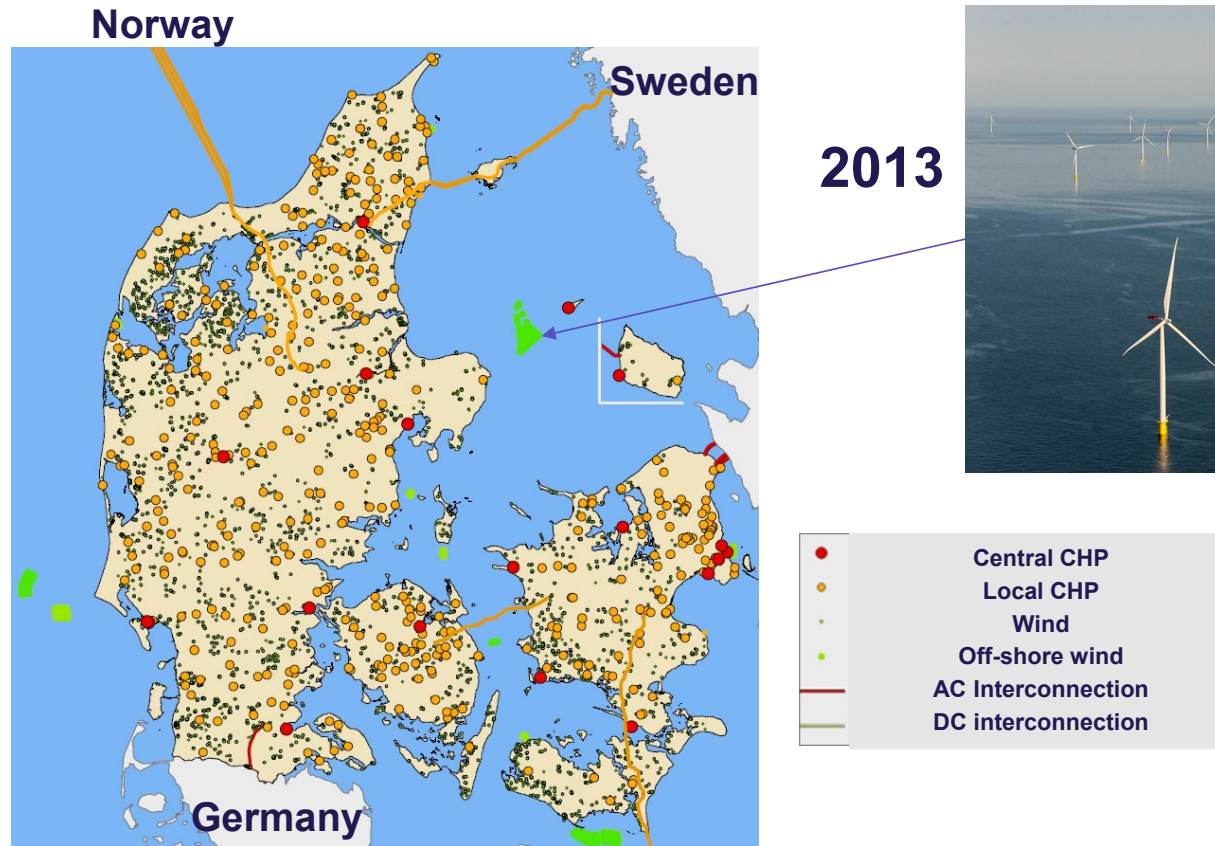
- Danish district heating has cost-effectively reduced the country's emissions.
- Danish heat planning has been critical to the district heating sector's success.
- Danish heat planning confers substantial power to municipalities.
- Empowering cities offers significant benefits to cities and consumers.
- Danish planning practices can be implemented today in the U.S.^K and other locations.



A Danish framework that enables the development of district heating

- A history of co-operatives (like the UK)
- Thus an appropriate “company” type that residents could relate to – and which existed in legislation
- Permission for municipalities to establish energy supply companies (electricity, gas, district heating)
- Municipal or co-operative stakeholders driving the introduction/expansion
- One of many infrastructure types – with, e.g., permission to place pipes in public soil
- Public guaranteed loans (though the guarantee has never been called upon)
- DH association with exchange of ideas, costs, experience and more
- A legislation that requires municipalities to engage in heat planning – and where municipalities to designate areas for specific types of heating – e.g., district heating
- Today:
 - Standard technologies/components/solutions
 - Technology catalogue with standard set of prices and technical characteristics for investment analysis and planning purposes
 - Experience within consultancy

From a central to a distributed energy system



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Maps: Danish Energy Agency

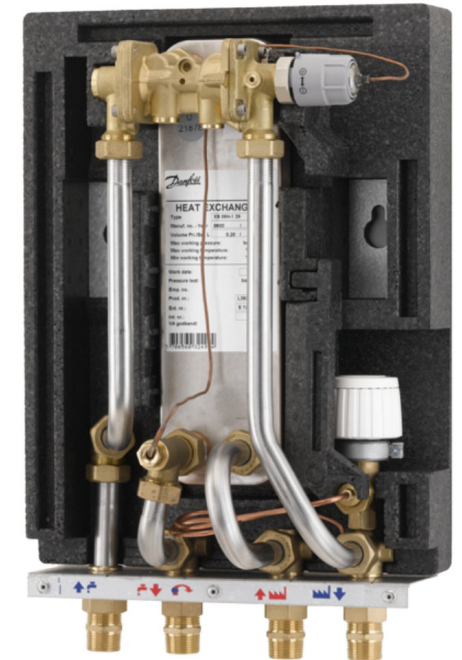
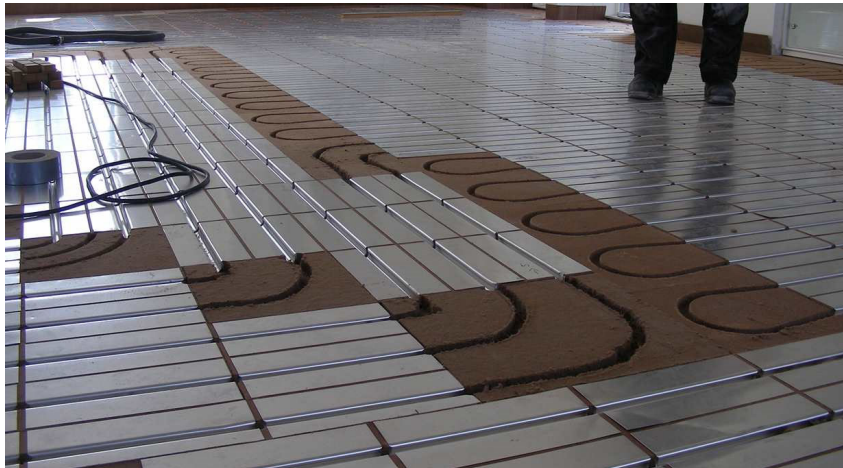
Photo: Rambøll

Practical implementation of district heating systems



Photos: HL, Logstor, PAØ

Practical implementation of district heating systems – Waterborne systems needed



Akva Lux II

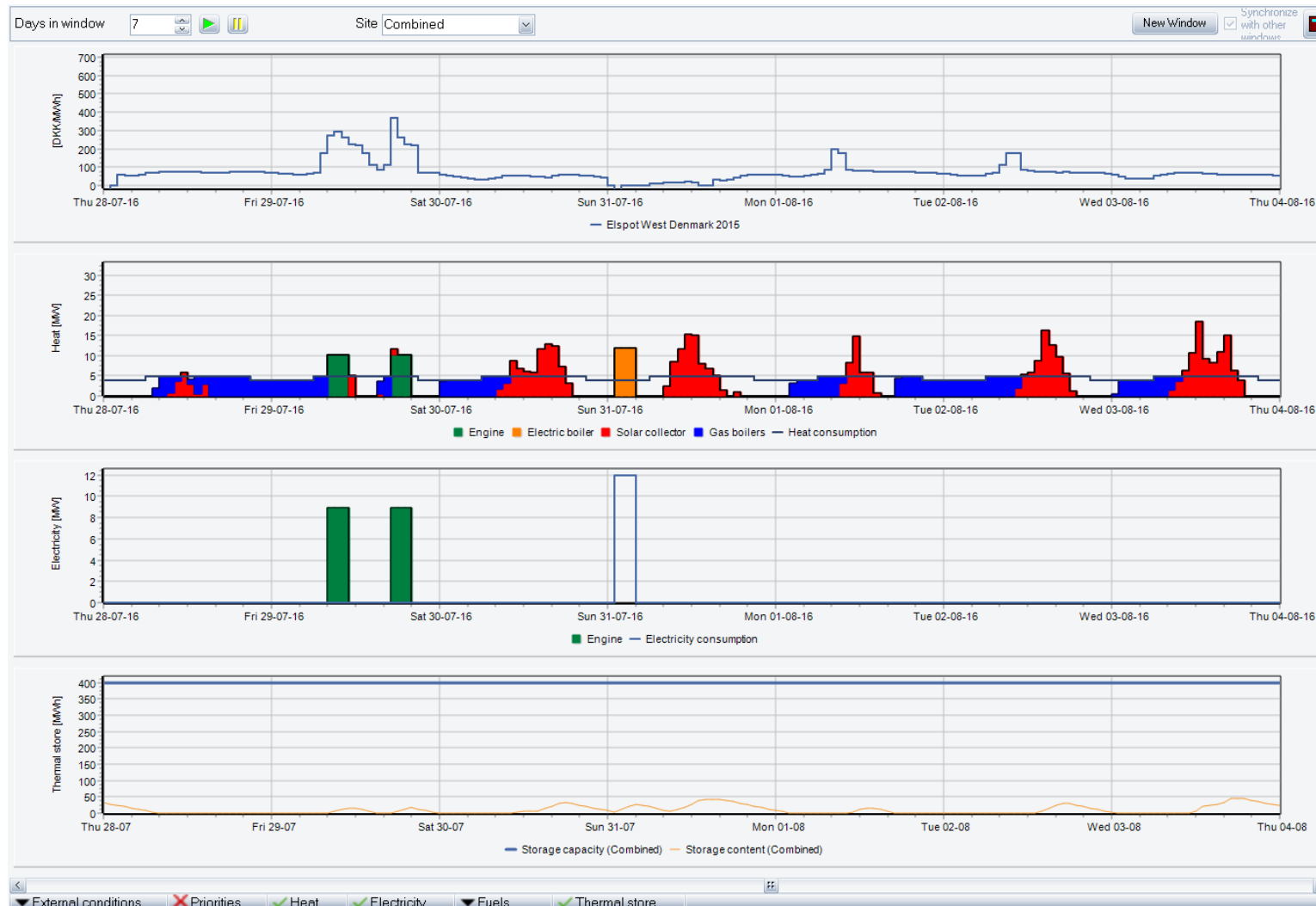
Floor heating can reduce temperature requirements compared to radiators – improving performance of DH systems



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Photos: Wickes, Danish Technological Institute, Danfoss

Flexible operation of district heating plants for renewable energy integration



Screenshot from energyPRO
(See emd.dk)

“Watts” - One of the most popular apps during the current energy crisis



Hourly (left) and daily (right) heat profile using measured nearly on-line data.

Similar data for electricity and water consumption

People are getting engaged and are controlling/optimising their demands (or just temporal profile) based on measurements



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