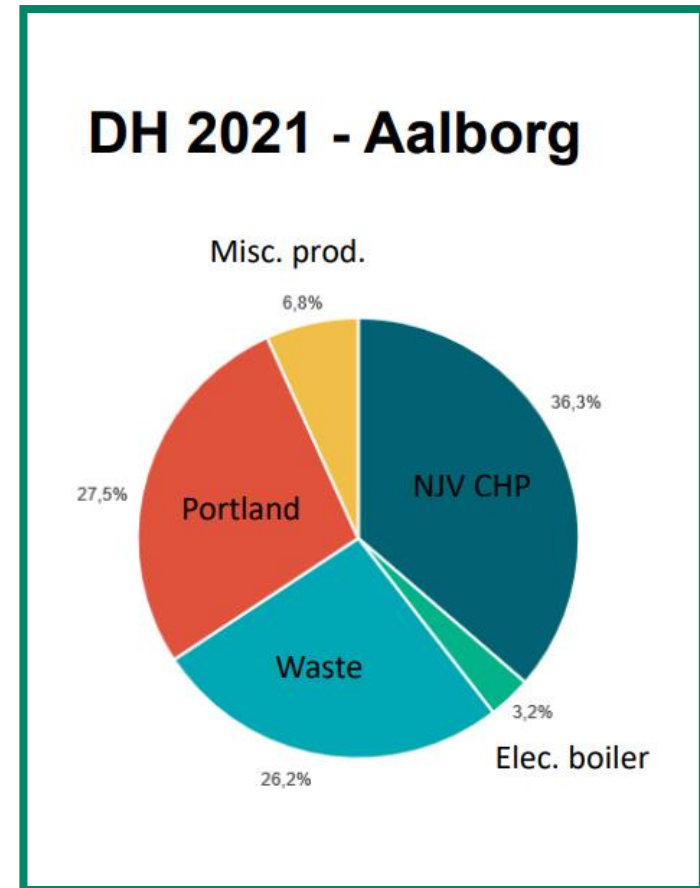


Sustainability and green transition in Aalborg Forsyning

About Aalborg Forsyning

- Aalborg is the fourth largest city in Denmark
- Aalborg Forsyning is owned by the municipality of Aalborg and provides customers with district heating, district cooling, gas, and water.
- Coal-based CHP until 2028
- DH in numbers (2021)
 - 100.000+ households
 - 14 mio.+ m2
 - Approx. 1650 km pipes



Green growth through Green transition

In Aalborg, close collaboration between local industry, consumers, scientists, district heating, and authorities improves the green transition and creates the foundation for green growth.

- **Win-win for DH and local community** to collaborate on green heating and green transition.
- **System integration** is at the center of replacing coal-based DH.
- **Sustainability approach**
 - Make it easier to develop and integrate new solutions

A variety of heat solutions will replace coal-based heat by 2028

Close
collaboration
with industry
and
suppliers of
DH solutions

- Integration of even more surplus heat. Beyond 60% of total heat consumption
 - From one very large cement producer and a growing number of smaller suppliers of surplus heat
- Heat pumps with sea water (100 MW) and cleaned sewage water (6 MW)
- Electric boiler (150 MW)
- Surplus heat from Power-to-X (130 GWh)
- 200.000 m³ heat storage (four tanks)

Increase energy efficiency

Close
collaboration
with
customers

- Expanding district cooling system
- Smart energy meters at all 46.000 customers
 - Better system improvements and control
 - Proactive communications with end-users
- Reducing temperatures in the district heating system

Developing and integrating new solutions



Cluster
collaboration

and

willingness to
include new
solutions

- New, green test center at central DH site.
 - To test and demonstrate new green solutions
- Power-to-X
 - Plans to combine green hydrogen from electrolysis with carbon from Waste-to-Energy plant to produce 130.000 tons of green methanol and 130 GWh surplus heat for DH.
 - The heat will be equivalent to 7% of the heat consumption at Aalborg Forsyning.
- Sustainable materials
 - Preinsulated pipes based on recycled plastic materials.
- Thermal battery
 - Electricity from wind to be stored in molten salt (525°C). The stored energy can be extracted to heat water for DH.

Sustainability also means sustainable materials

Preinsulated pipes based on recycled plastic materials

30 km pipes to include the villages of Storvorde and Sejlflod in the DH system.

Materials: 60 ton HDPE, ca. 100 tons CO₂ saved.

Next up at Aalborg Forsyning:

4,5 km Ø114-114/400 to connect surplus heat in two cases.

Legal issues and documentation

- EN253, allowing only recycled material from own production
- + Successful test at IMA in Germany

Political support

Both the municipality and Aalborg Forsyning have clear green ambitions. The pipes are a good example of this, and there was good publicity.

Operational experiences

- Not willing to compromise with quality, reliability, and longevity
- This is the first pilot project on larger scale. A few initial problems, but fixed right away.
- It works! We see no difference to conventional pipes.