
Cooling with Compact Absorption Chillers

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Decentralize compact absorption and business opportunities

Vattenfall operates centralized cooling networks in

- Amsterdam
- Berlin
- Hamburg
- Uppsala



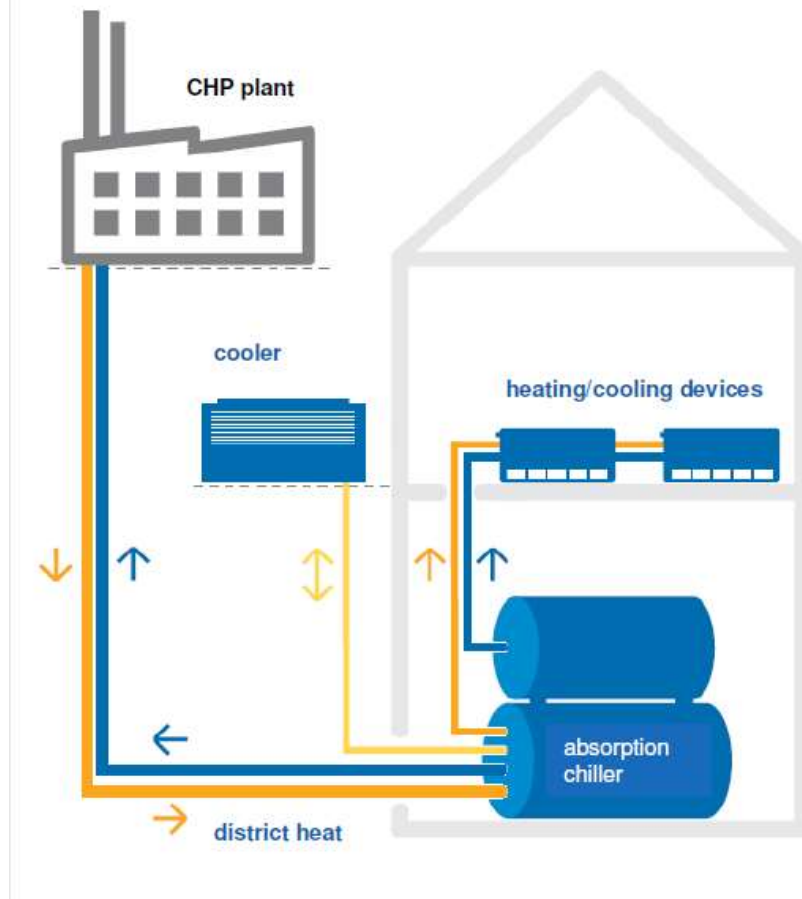
170 MW
in total

Why is Vattenfall starting to “think” decentralize?

- Because we would restrict ourselves otherwise very locally.
- Because we could not offer sustainable cooling solutions to our district heating customers outside the reaching area of centralized cooling networks.

Decentralize solutions are the ancilla for
a cooling business of relevant volumes

Overall technical concept for district heating based cooling



the concept:

Use of **environmentally friendly** district heat based on **CHP**.

Much of the **existing infrastructure in a house** can be used to distribute cooling services.

ecological benefit:

District heating for absorption chilling permits a higher degree of CHP utilization and avoids additional electricity usage for air conditioning.

conclusion:

District heating-based cooling is the environmental-friendly alternative to conventional air conditioning using electrically driven room air conditioners.

Compact absorption chiller and modular structure

modular structure of the absorption chiller



- two separate cylinders
- modulating cooling capacities
(50, 100, 160, 210 and 320 kW)

manufacturer:

BS Nova

BS Nova Apparatebau GmbH
Eiserfelder Straße 70
D-57072 Siegen

160 kW absorption chiller

length: 1,95 m
width: 0,86 m
height: 2,05 m

50 kW absorption chiller

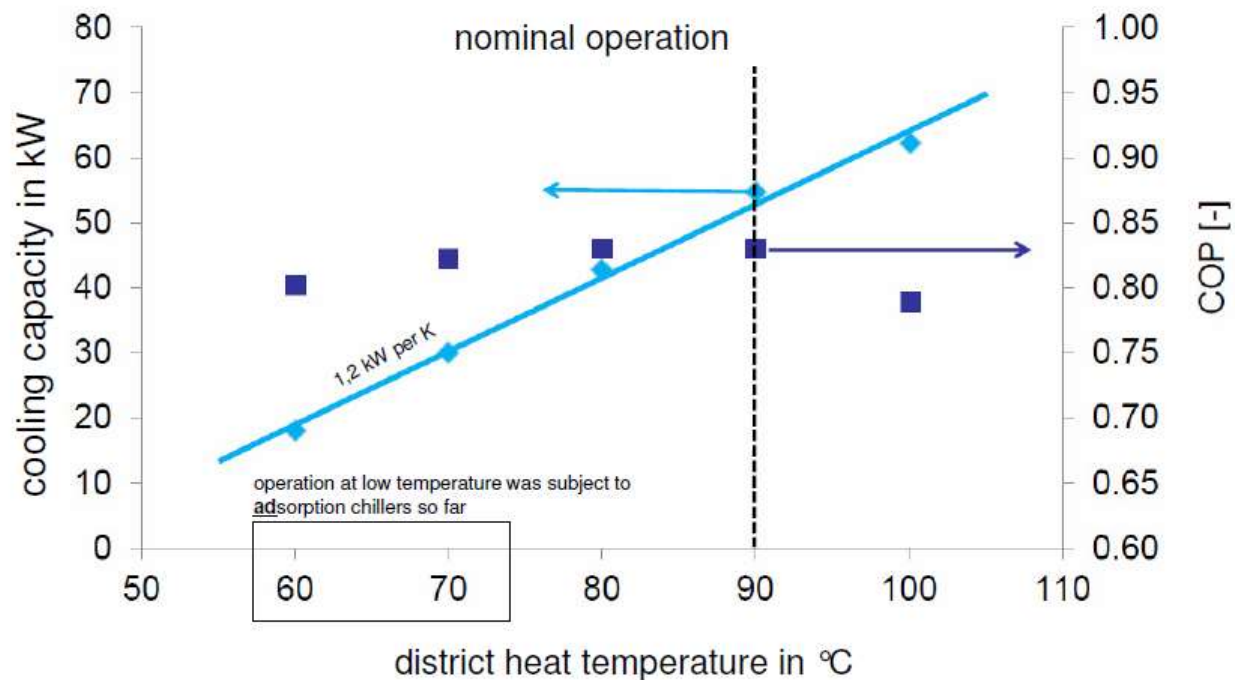
length: 1,75 m
width: 0,68 m
height: 1,59 m

Capacity range of the compact 50kW- absorption chiller

design, operational behavior, efficiency

cooling water $t_{in} = 30^{\circ}\text{C}$ $\dot{V} = 3,8 \text{ l/s}$

cold water $t_{in} = 21^{\circ}\text{C}$ $\dot{V} = 2,4 \text{ l/s}$



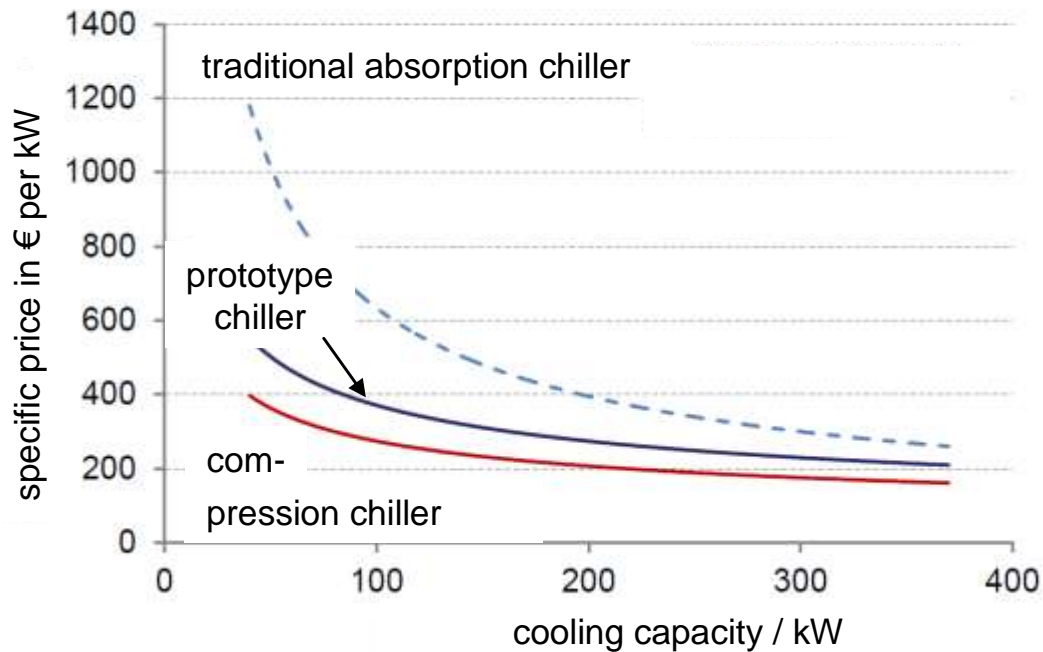
source: Technische Universität Berlin • Institut für Energietechnik

Innovative elements of the compact absorption chiller

- Low temperature operation possible minimum 60°C
- High temperature spread in district heating (designed for 90/74°C)
- High pressure design PN10(16)
- Compact unit, low-weight design
- High efficiency (COP 0,8)
- Dry re-cooling concept (up to 45°C re-cooling temp.)
- Cold water temperatures between 5°C and 50°C possible
- Integrated vacuum system
- Control design for total cooling asset (incl. re-cooler)
- Minimum auxiliary energy demand

Cost characteristics of the compact absorption chiller

investment costs in comparison



source: Technische Universität Berlin • Institut für Energietechnik

Indoor climate and customer perception

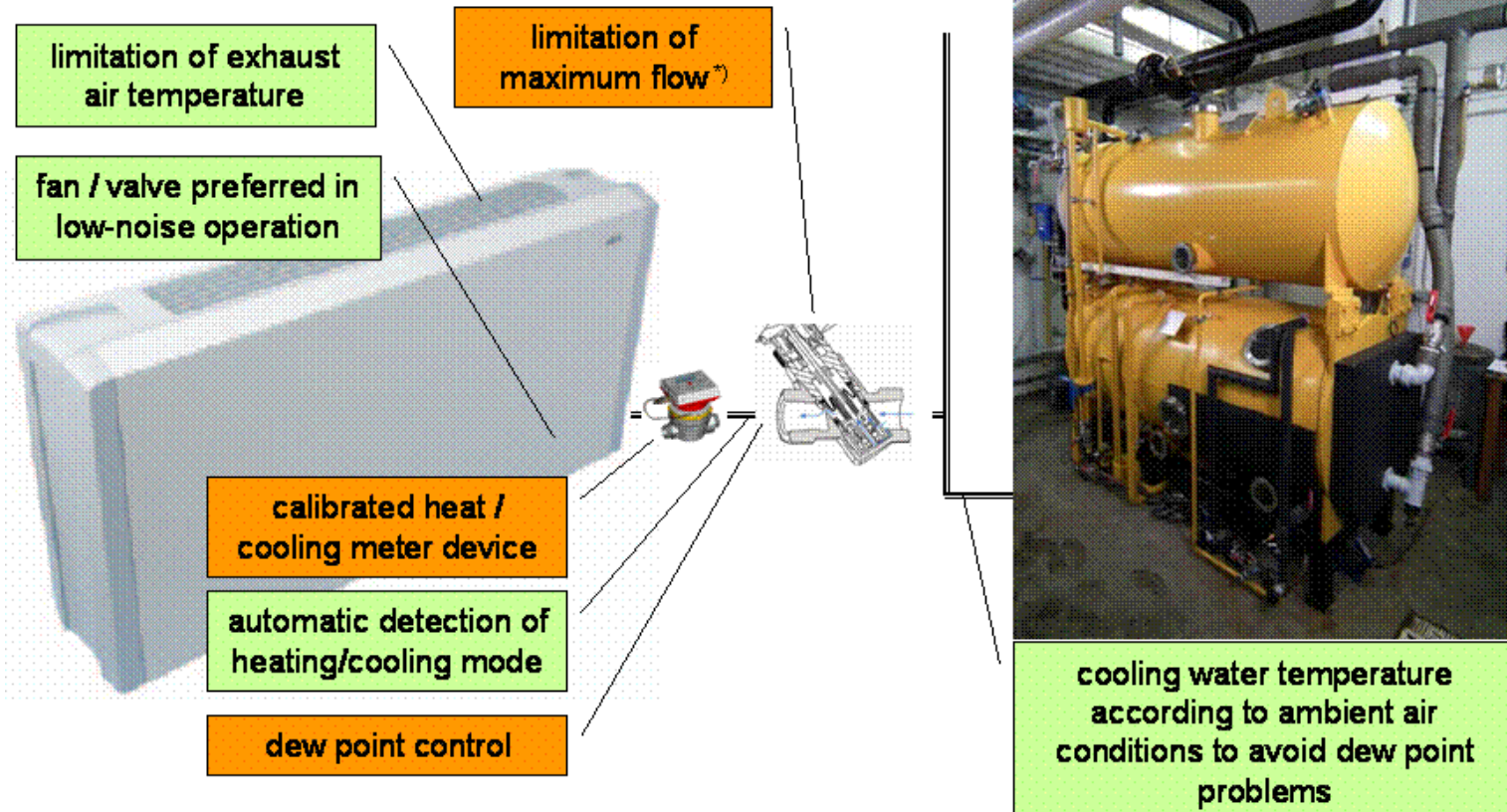
60 % of interviewed persons made already bad experience on ordinary air conditioning

- Inconvenient air conditioning with extreme difference of indoor temperature to ambient air temperature
- Drafty / dry / bad air
- “Air conditioning causes health problems”

Our approach

- Cooling, but no air conditioning
- Cold water supply $\sim 16^{\circ}\text{C}$

Fan coil technology for retrofit in existing buildings



^{*)} to avoid hydraulic trim

Fan coil realization at Vattenfall



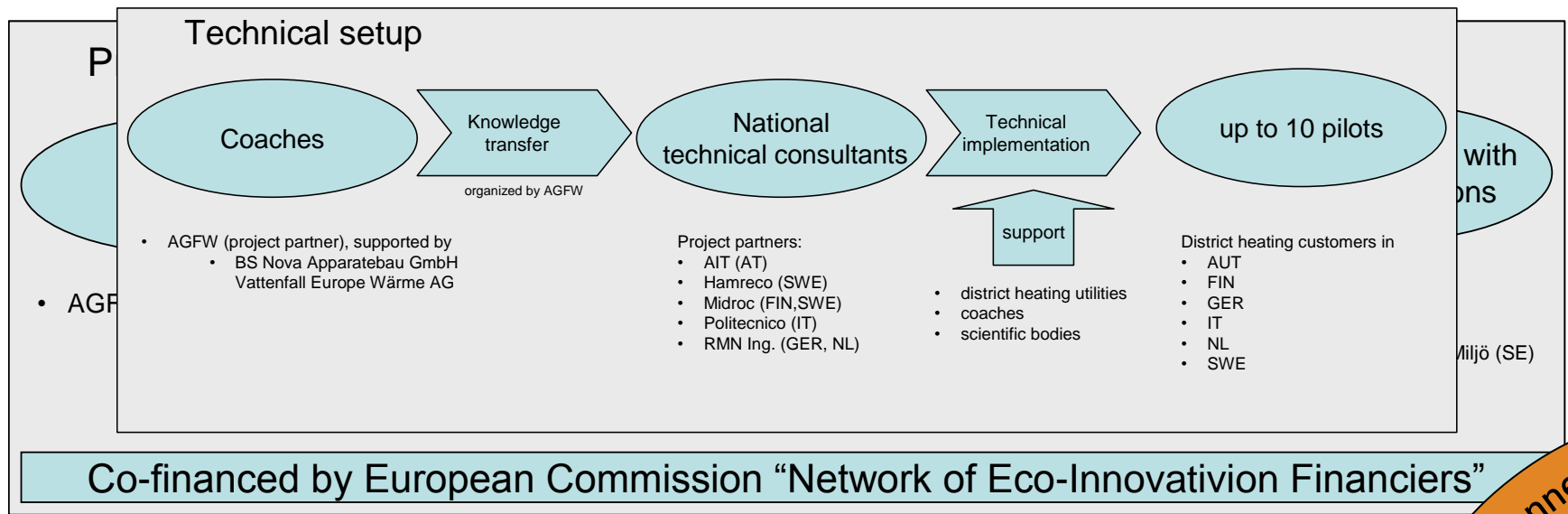
DC Compact: Compact absorption machines in pilot applications for warm District Cooling

Subject of the project

European wide roll out of different technical concepts by using compact absorption chillers (50 – 300 kW) for district heating based cooling. Development of individual business concepts for cooling. Utilities show in pilot applications the benefits of the compact absorption chiller and create their own business cases for cooling. National technical consultants are coached on the finding in pilots in Germany and Sweden to support the utilities in the technical setup of the pilot installations during the roll out phase

Pilots (examples):

- Cooling in existing buildings (up to 300 kW)
- Hybrid cooling in data centers
- 20°C distr. heat return temperature in winter
- ...



planned

DC Compact: Dissemination of information

