

FUTURE DISTRICT HEATING SETUP IN VIBORG WITH 95 % RENEWABLE ENERGY

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COO at Viborg District Heating



THE WORLD IS CHANGING



FUTURE ENERGY SOURCES

- Apples new Data Facility



- Situated 10 km outside Viborg
- 55 MW surplus energy at 30 degree is planned to be used in Viborg District heating.
- Electrical heat pumps to boost temperature at apple to 50 °C, and another boost placed by the current naturalgas boilers 4 places in town to 55° C and 60 °C

- Alternatively Large “Air to Water” Heatpump

- 55 MW electrical heat pumps to boost temperature to 50 °C at the current CHP plant, and another boost placed by the current naturalgas boilers 4 places in town to 55° C and 60 °C
- Lower investment cost, and investment close to city
- Less efficient because of the lower temperature in outside temperature

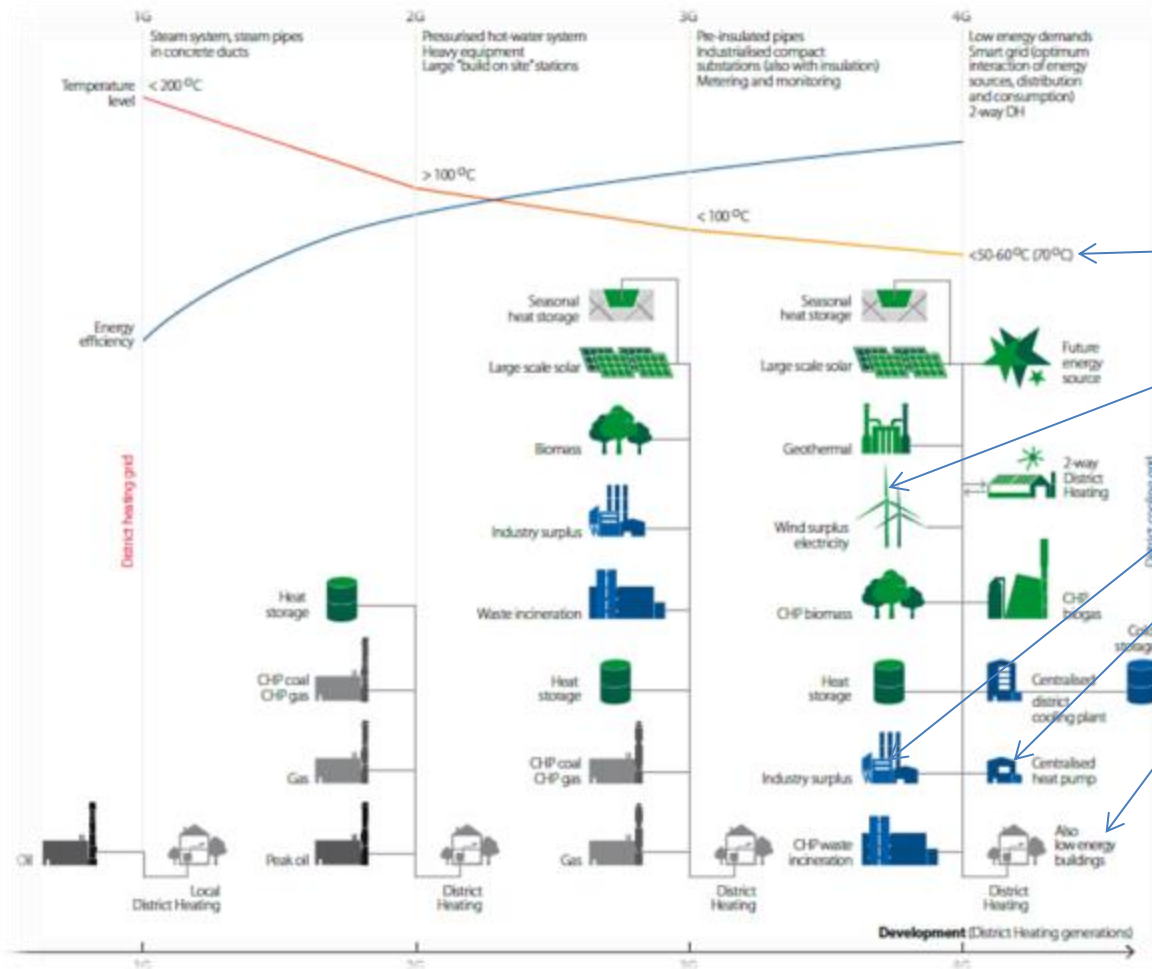
- Other surplus energy sources

- Hospital, supermarket, industrial process

- Existing Gasboilers

4. Generation District Heating

The Datacenter Project (Apple)



PRODUCTION

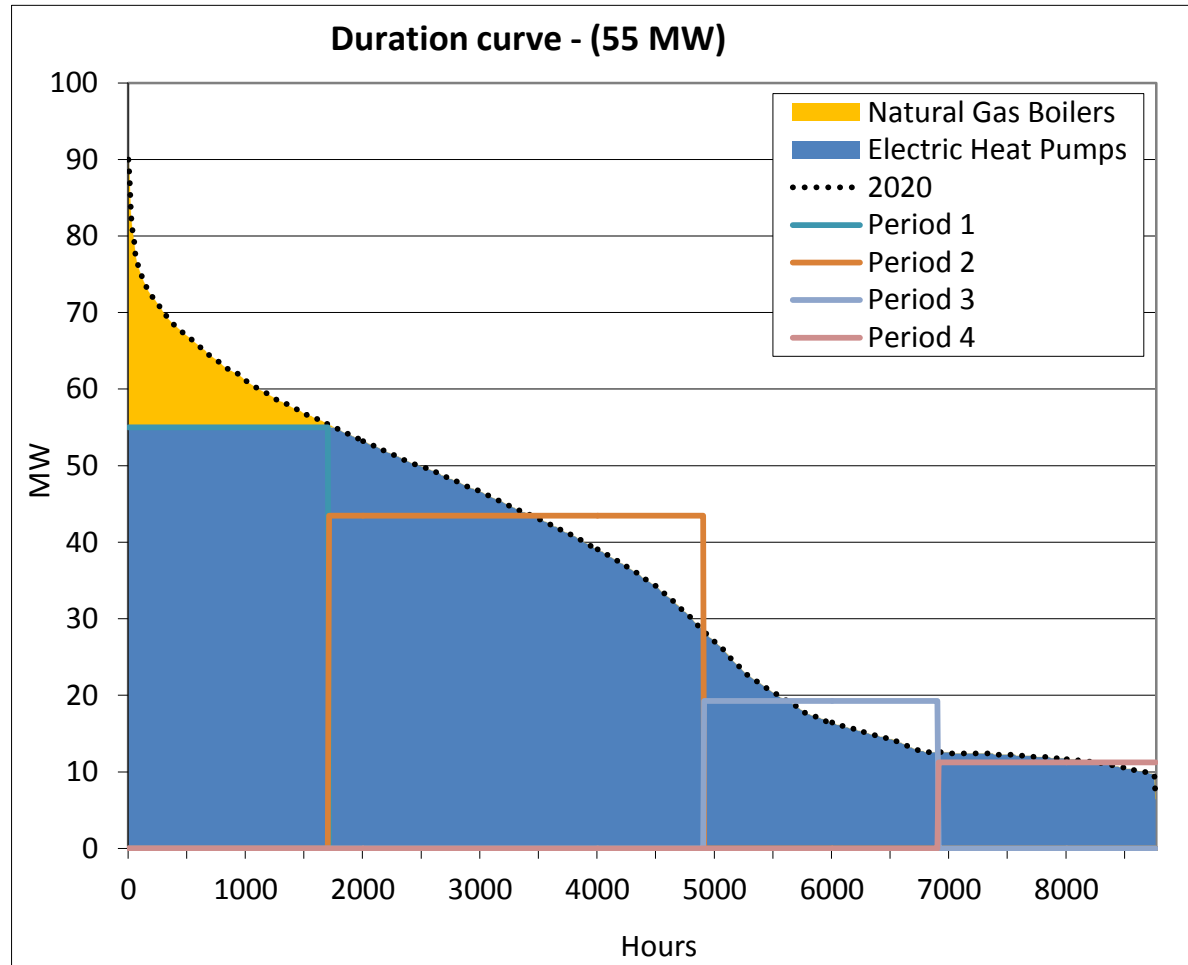
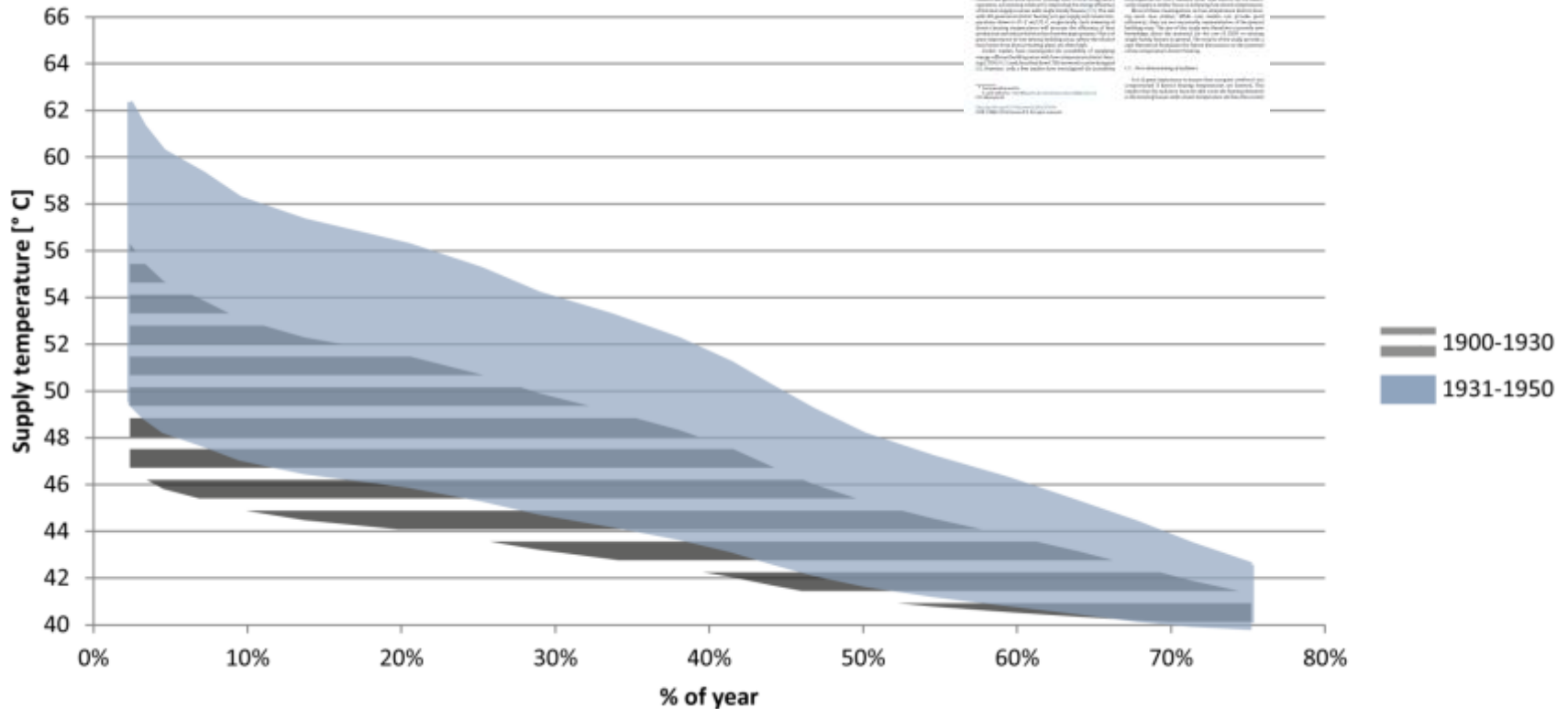


Figure 4-8 Duration curve 55 MW from Apple

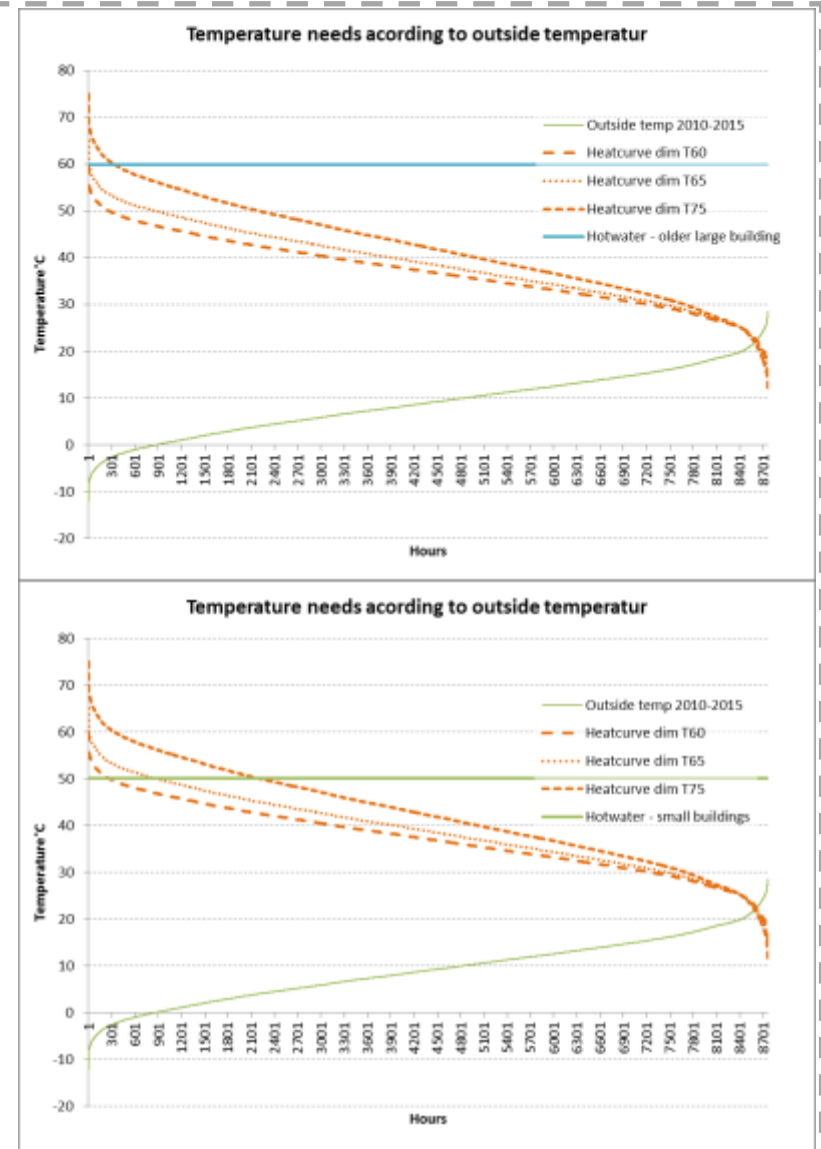
TEMPERATURE NEEDS

- DTU –report on temperature needs in typical danish houses



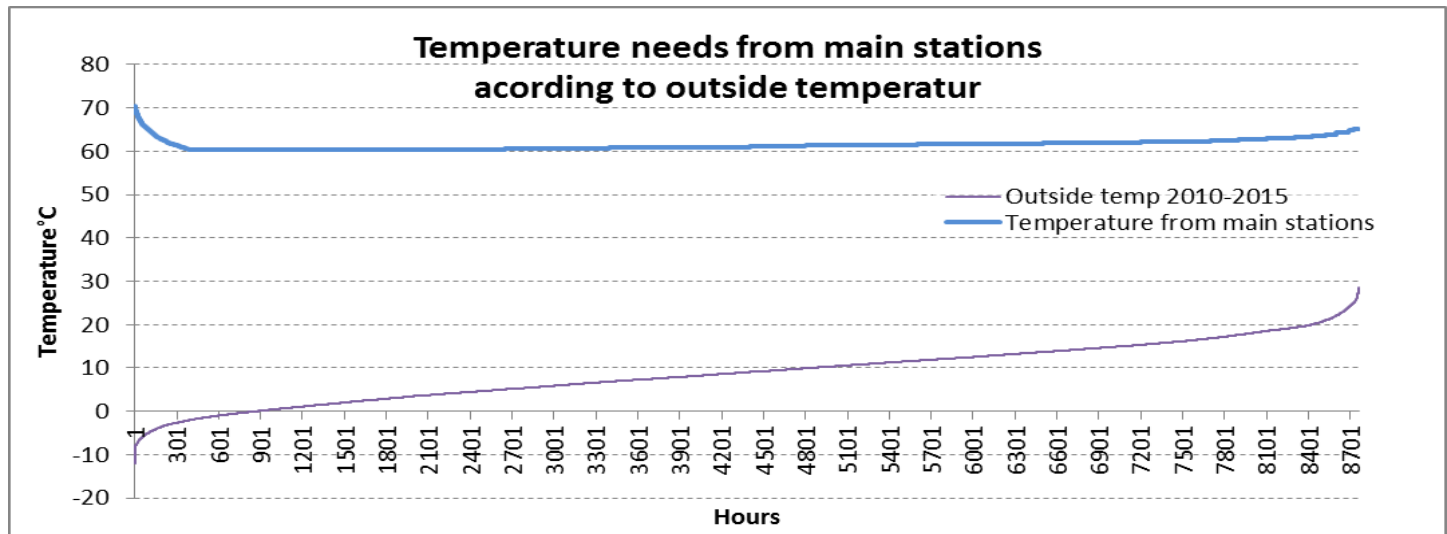
TEMPERATURE NEEDS

- Older larger buildings
 - Circulation systems on the hot water
 - According to age a heat demand for the radiator from 60 to 75 °C when ist -12 °C outside
- Small buildings
 - Heat exchanger on hot water and no circulation

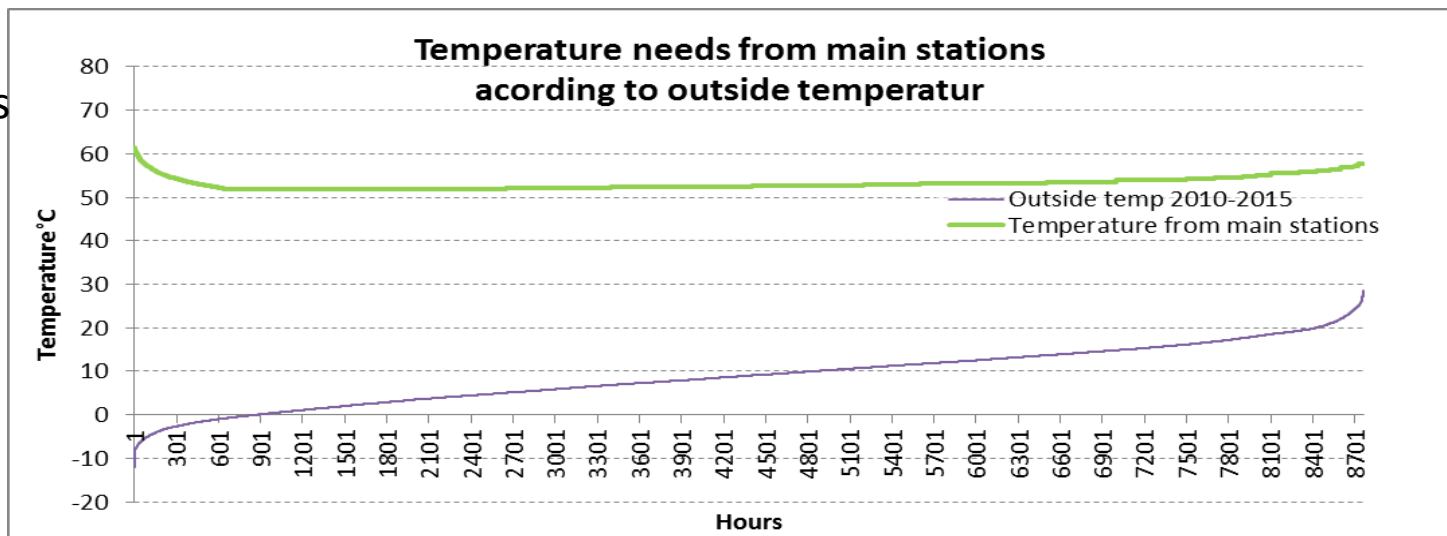


FREMLØBSTEMPERATUR AB CENTRAL

Blå areas is optimized for older multifamily houses (58-60 °C min)

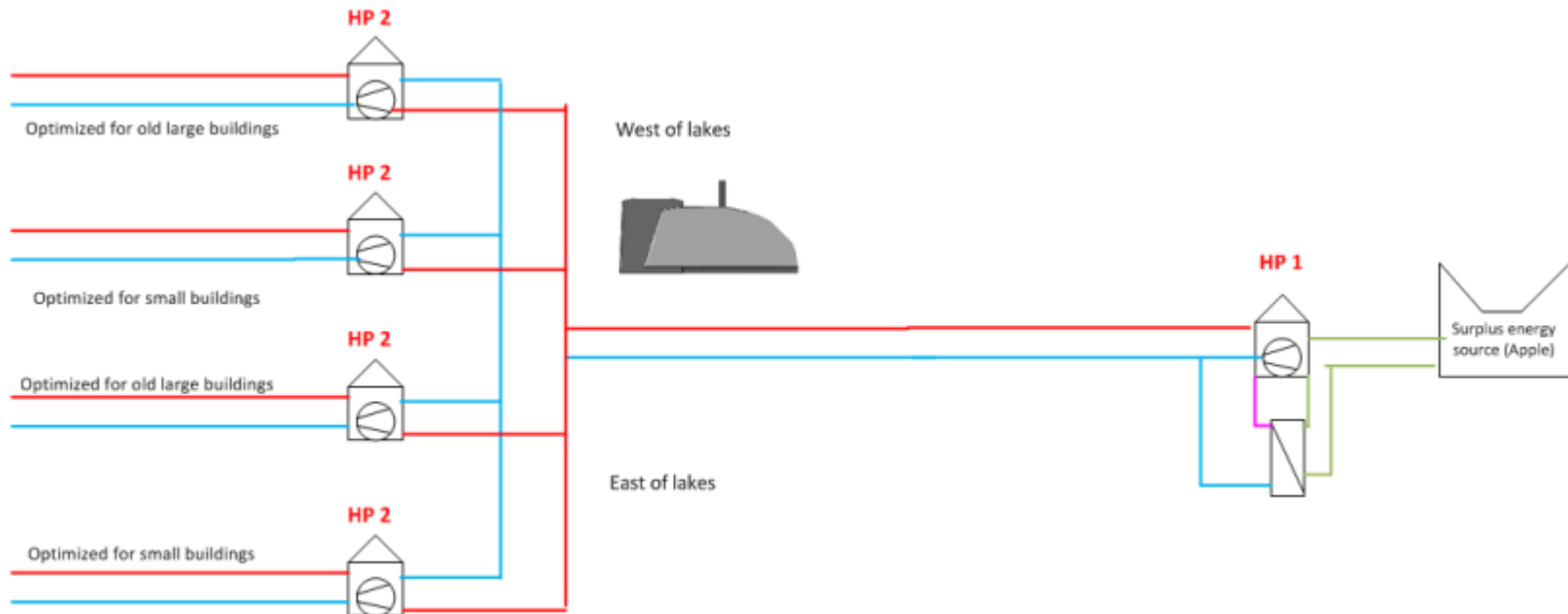


Grønne areas is optimized for 1-family houses (50 °C min)



HEAT PUMPS IN 2 PLACES

- Heat pumps both at the Datacenter and at the gasboilers in Viborg



- Reduces installations outside Viborg
- Makes it possible to use other surplus sources in Viborg
- Can differentiate the temperature in different sections

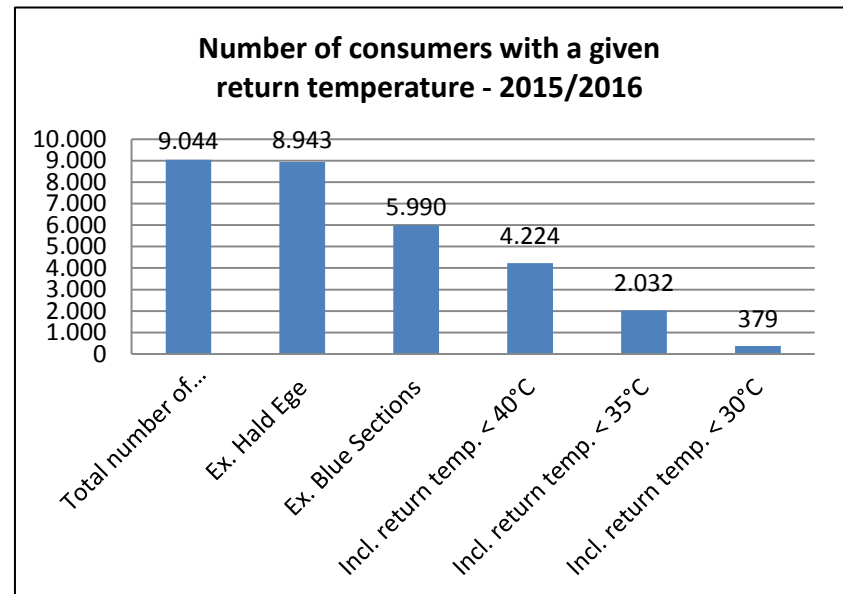
INVESTMENT IN DISTRIBUTION GRID

- To be able to section the distribution net, a few changes is needed:
 - 4 km distribution net needs to be upgraded
 - 2 new pump stations needs to be established

- Investments 14 mio. kr.
- Pipes from 1980-95
- Annual renovation budget in pipes 8 mio. kr.



- Most focus on consumers in the green zones
 - 5990 customers needs a rental unit
 - 90 customers is larger buildings with circulation systems
 - Danish Clean Water model to treat legionella by adding chlorine from kitchen salt seems to be the most effective way.
 - A Heat pump Is another solution



INVESTMENT AND PRODUCTION PRICES

Scenario	Temperature	Mio. kr.
Reference – Natural Gas CHP	80/40 °C	29
0 – Heatpump at Apple – Natural gas boost to transmissions temperature	80/40 °C	275
1.A – Heatpump at Apple	60/30 °C	318
2.D – Heatpump at Apple and at gasboilers	55/30 °C	371
3.D – Air to Water Heatpump	55/30 °C	208

Produktion prices	Ref.	Sc. 0	Sc. 1A	Sc. 2D	Sc. 3D
[kr./MWh]	642	307	274	243	298

- Production price is reduced by 64 Kr./MWh in average compared to running the transmission-network as usually
- Incl. payback of Investments, it generates (over 25 years) savings of 480 mio. kr.

CUSTOMER PRICES

- A standard home 18,1 MWh 130 m²

Produktion prices	Ref.	Sc. 0	Sc. 1A	Sc. 2D	Sc. 3D
[kr./year]	18925	11316	10603	9952	11201

- A customer saves 1.364 kr a year or 180 € a year if we do it smart

TIMING AND TAXES

Gennemsnitlig prod. pris (25 år) - Fuld kapacitet fra Apple VP 2022-2024 -

