



Business Case for Natural Refrigerants

19-21/11/2018 – Lago di Garda



Swedish district heating - world's largest heat pump utilising the power of natural refrigerants

40MW ammonia heat pump

Heat pumps are revolutionizing sustainable district heating in Malmö, Sweden

Organization: E.ON Energilösningar AB

Project name: SHP 40 MW heat pump installation

Start-up: November 2017



Malmö City to be 100% renewable by 2030

- By the year 2020 the internal organisation of the city of Malmö is to have achieved carbon neutrality and by 2030 the whole city will be provided with 100% renewable energy
- By the year 2025 E.ON will supply 100% recycled or renewable energy to its district heating customers in Malmö
- Old heat production plants needed to be replaced. First step in the renewal process was to investment in a new heat pump installation
- Ammonia safety can be handled by placing it in an industrial area and thorough robust design
- Alternative with R134a has a high global warming effect and will be phased out globally



Heat pump installation

- 4 Heat pumps
- 40 MW heat. COP 3,5.
- Location: VA Syd sewage water treatment plant Sjölunda, Malmö, Sweden
- Waste heat taken from cleaned sewage water, which is chilled 6 degrees
- Outgoing DH-water is further heated in a waste incineration plant
- Heat pumps can be shut down during electricity peak load, in order to use the electric grid in an efficient way. In this case heat will be produced in other heat plants instead.
- Full load production from October to April. Part load during summer months
- 200 GWh/year, 8% of Malmö's annual heating demand
- 50 000 ton less CO2 per year, renewable electricity will be used
- Quick start and stop.
- Investment ca 200 MSEK



Heat pump installation

Unique cooperation between 3 parties:

- **VA Syd** Waste Water Treatment Plant
- **SYSAV** Waste Incineration Plant
- **E.ON** Heat Pump Plant

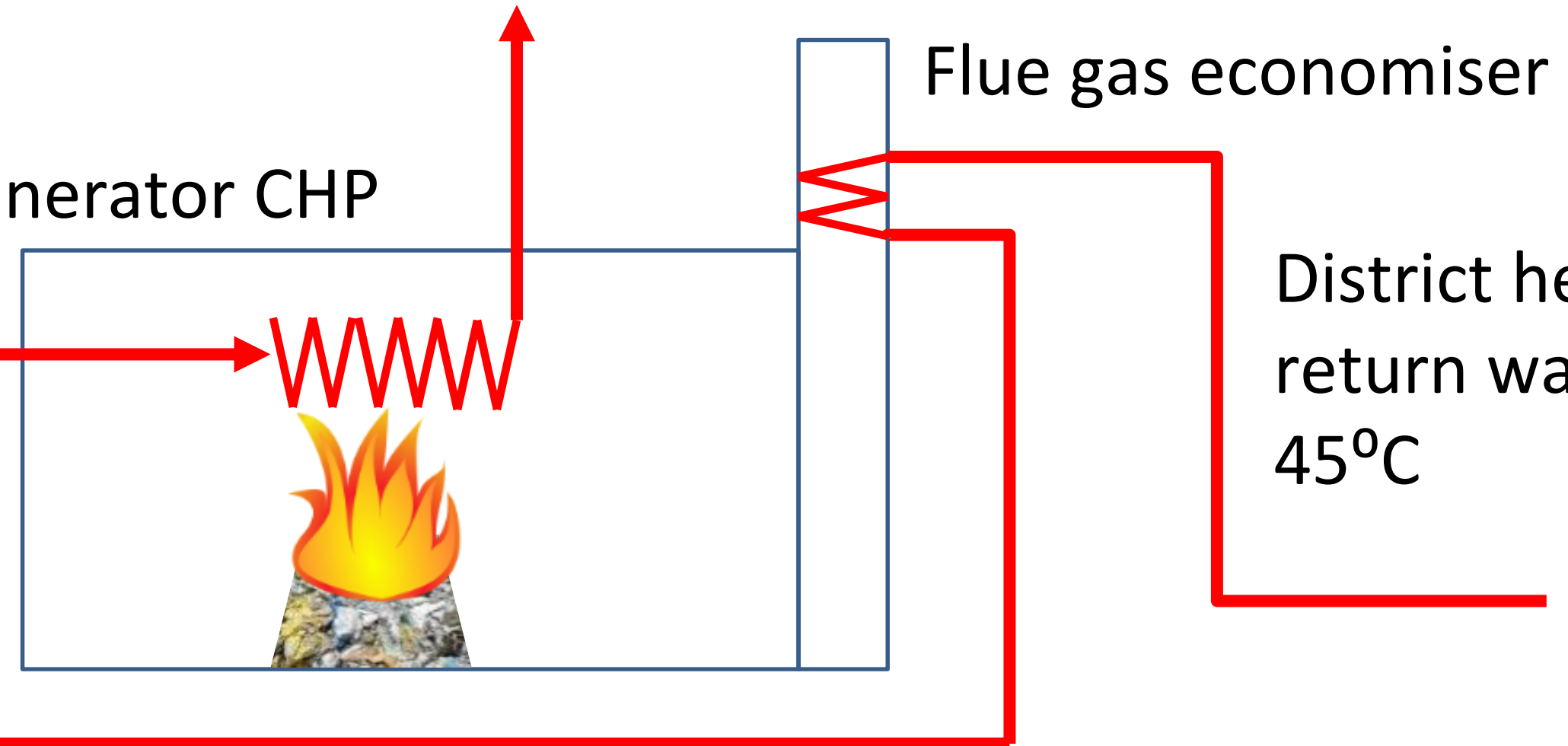
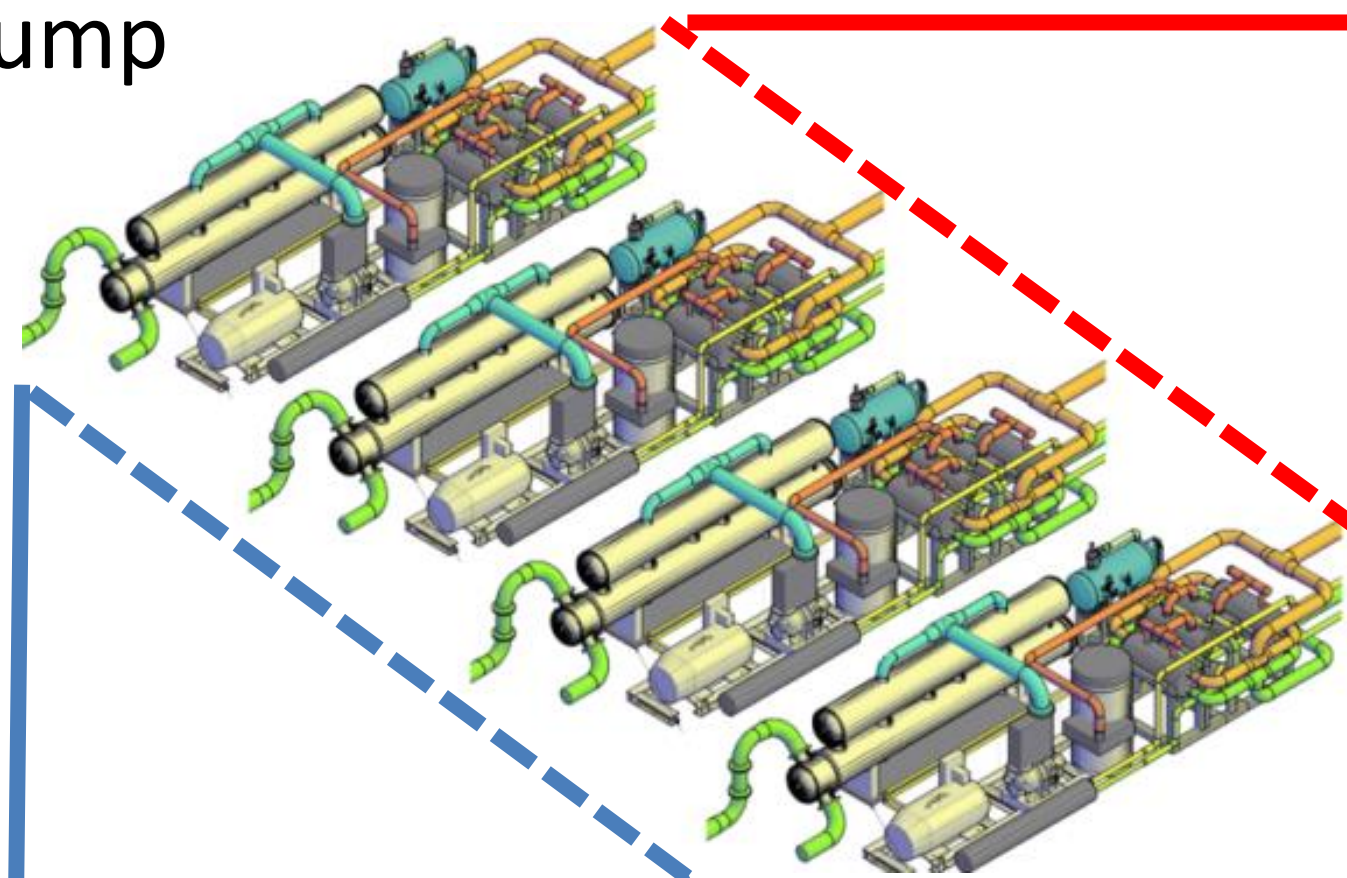
District heating
supply water:

Waste incinerator CHP

Flue gas economiser

District heating
return water:
45°C

40 MW heat pump



Oresund (Sea)



Waste water treatment plant



City's sewage water

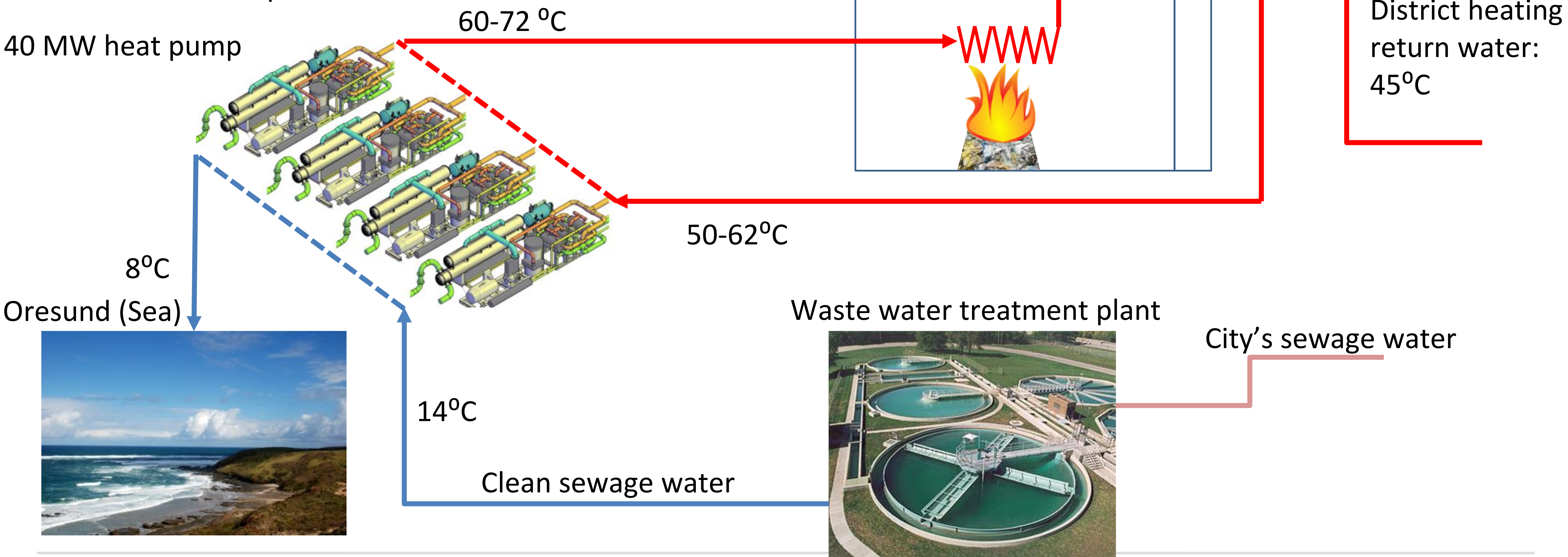
Clean sewage water

Heat pump installation

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40 MW heat pump



Multiplication potential

- With the European wide expansion of district heating network this project shows how zero carbon emission can be achieved for these networks
- A step on the way for EU's target for Carbon neutral heating by 2050 (in 22 years)
- By using natural refrigerant with 0 GWP the installation complies with the Kigali agreement from 2016 which sets out to globally phase out of all high GWP refrigerants.
- The heat pumps have proven to supply cheaper heat and gas heating, which can end fuel poverty across Europe.
- From all cities there is sewage water, which provides a good source for district heating heat pumps





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