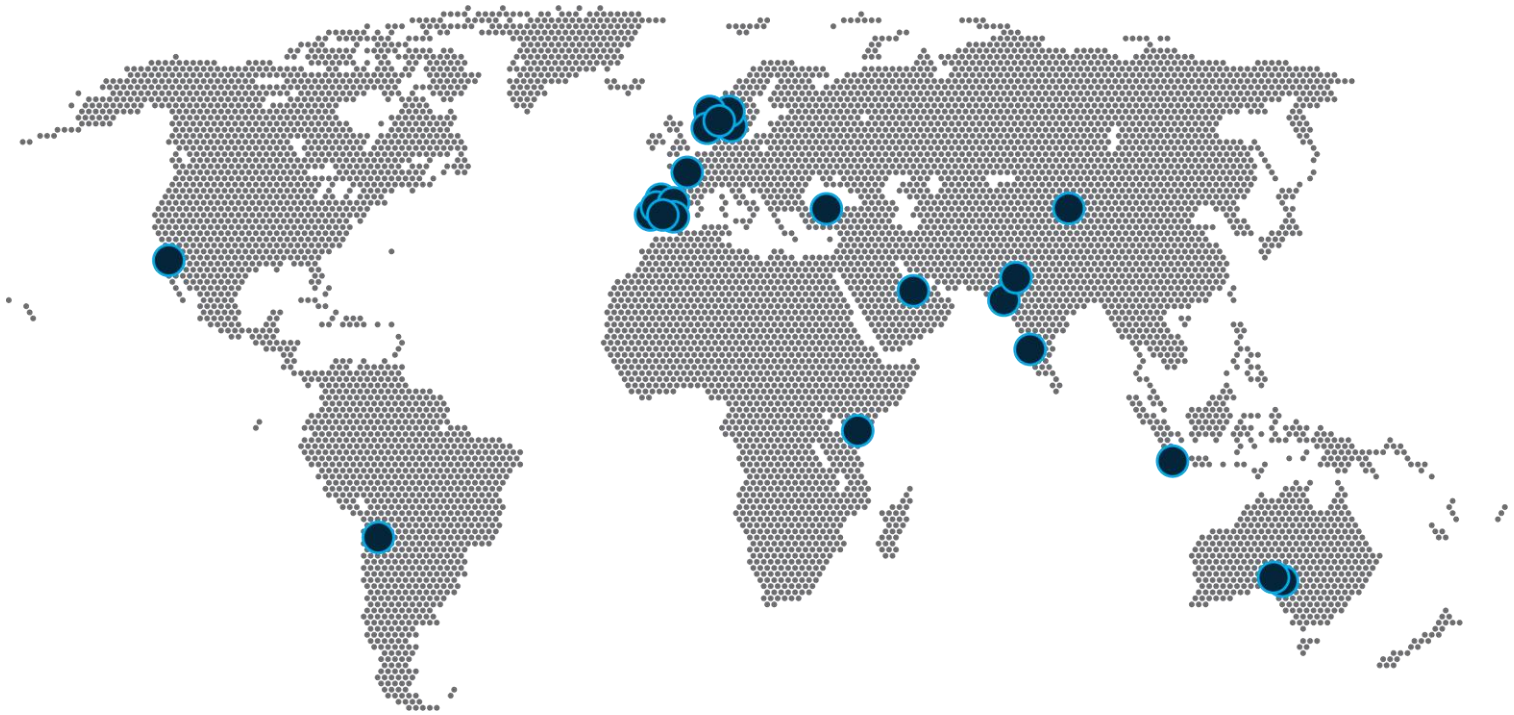
Integrating Green Technologies in the District Energy Mix - Boosting Green Transition

10th Bi-annual District Heating Meeting, April 2nd 2025, Aranđelovac, Serbia

Andreas Zourellis, VP Global Sales, District Heating

Changing Energy – around the world

Leading developer and supplier of innovative
RENEWABLE ENERGY TECHNOLOGIES
aiming to change the way energy is produced today.



1 headquarters in Aalborg, Denmark

5 sales & service locations worldwide

>1700 MWth solar installations globally

BUSINESS AREAS

Thermal Energy Storage (TES)

Solar district heating

Heat pumps

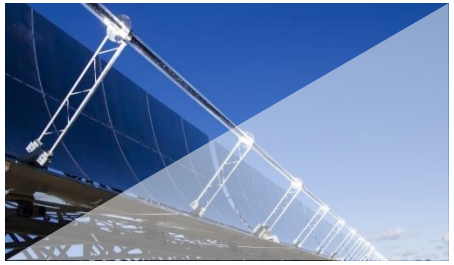
Integrated Energy Systems

Header-coil heat exchangers

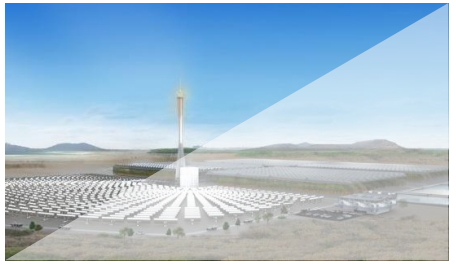
PTX technologies

After Sales & Service

CSP power plant technologies

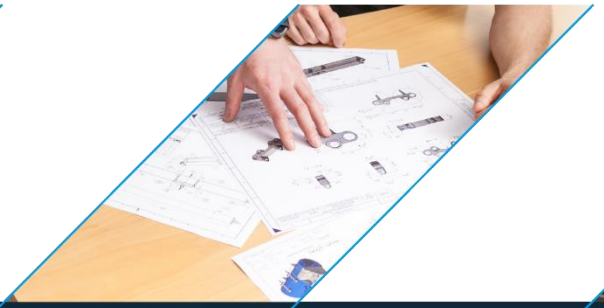


Industrial solar technologies

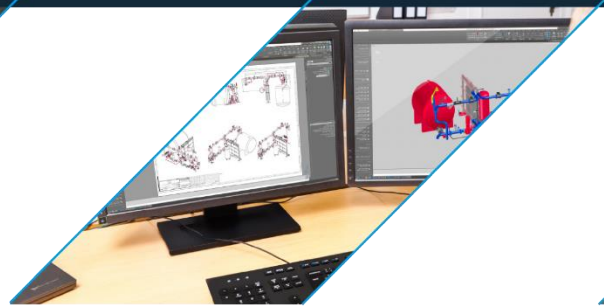


R&D activities

FROM IDEA TO REALITY



Research & Development | **Feasibility study** | **Pre-engineering** | **Detailed design** | **Procurement & Manufacturing** | **Delivery** | **Installation & Commissioning** | **Operation & Maintenance**



Efficient, cost-effective and flexible heat delivery

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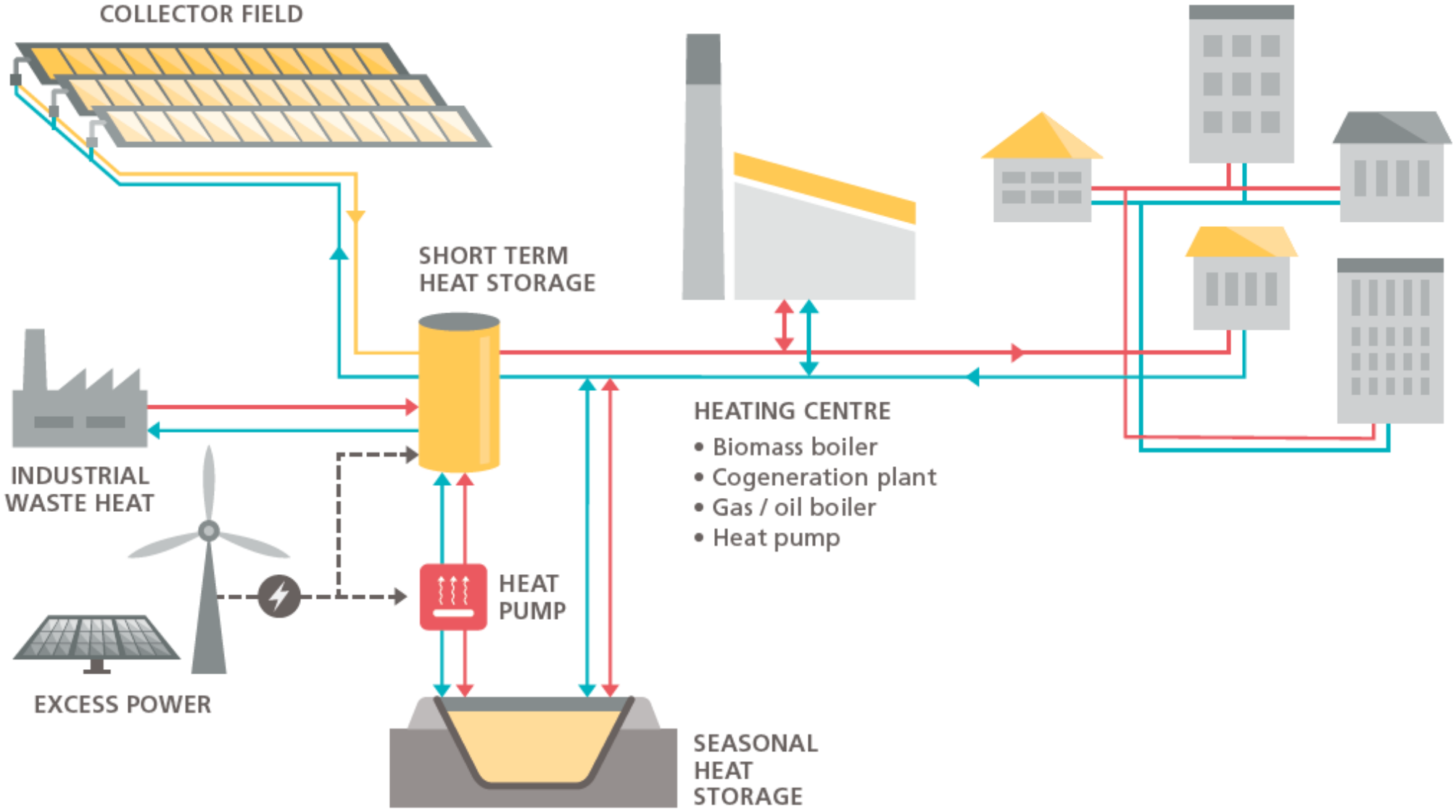

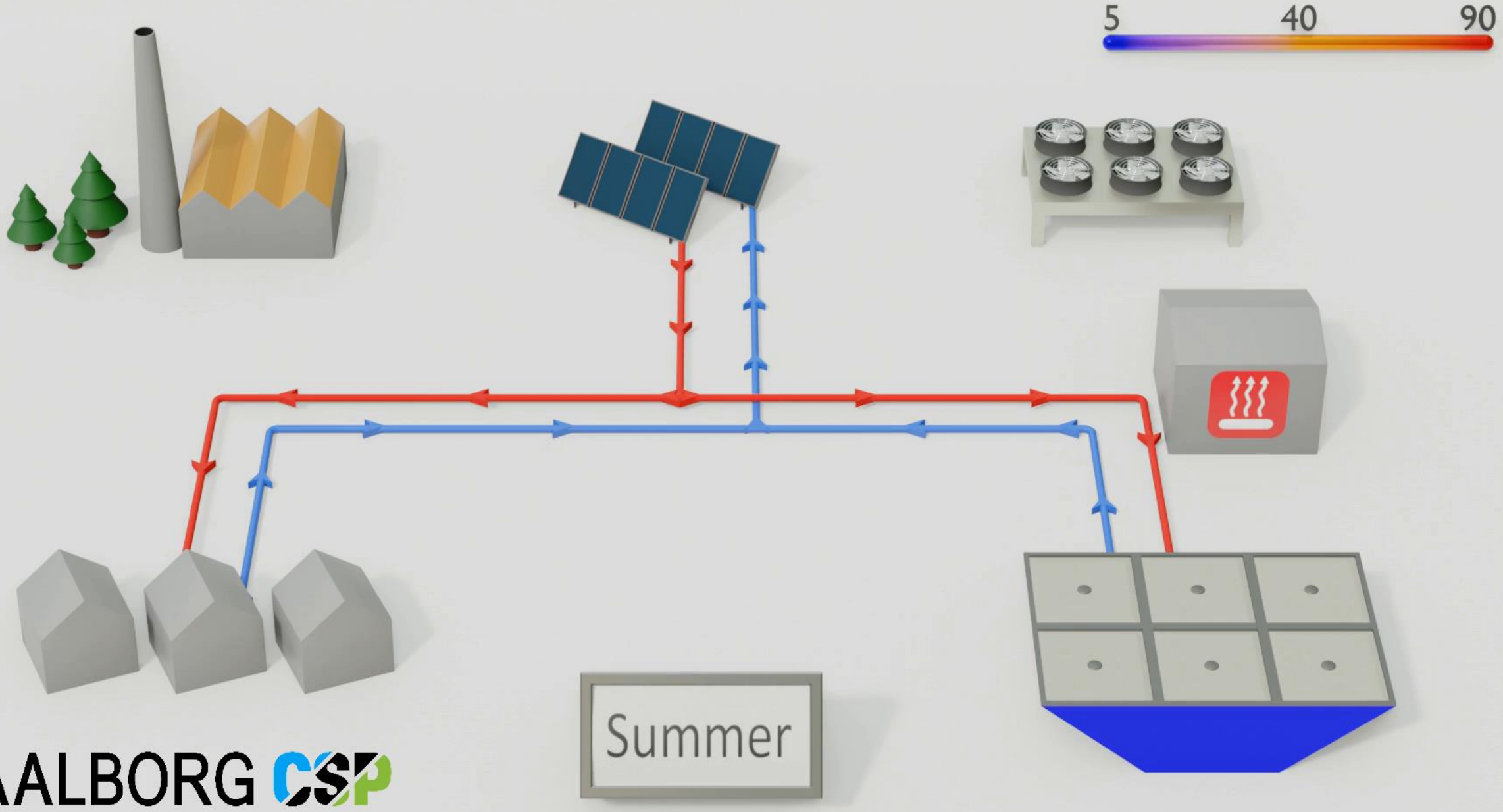
5
40
90
Summer
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HEAT PUMP SYSTEMS

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SOLAR DISTRICT HEATING

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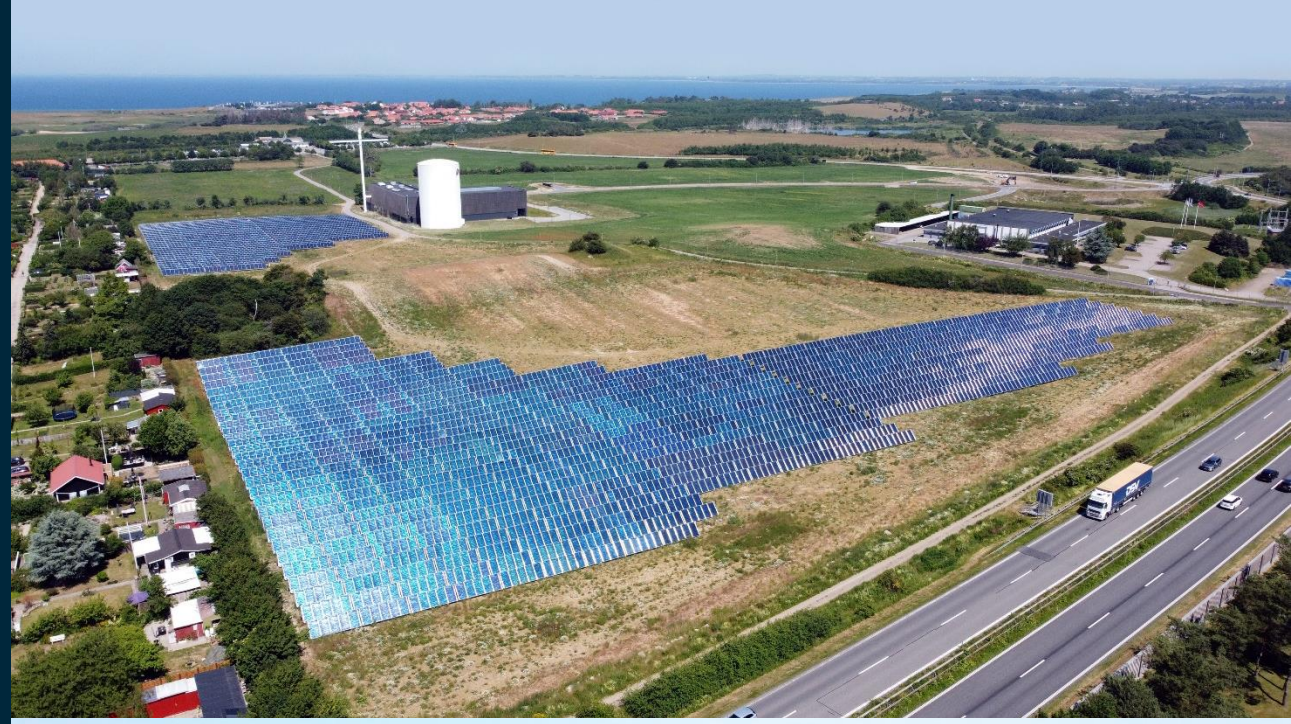

PIT THERMAL ENERGY STORAGES

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Construction - Lining of sides and bottom

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Construction - Sacrifical liner

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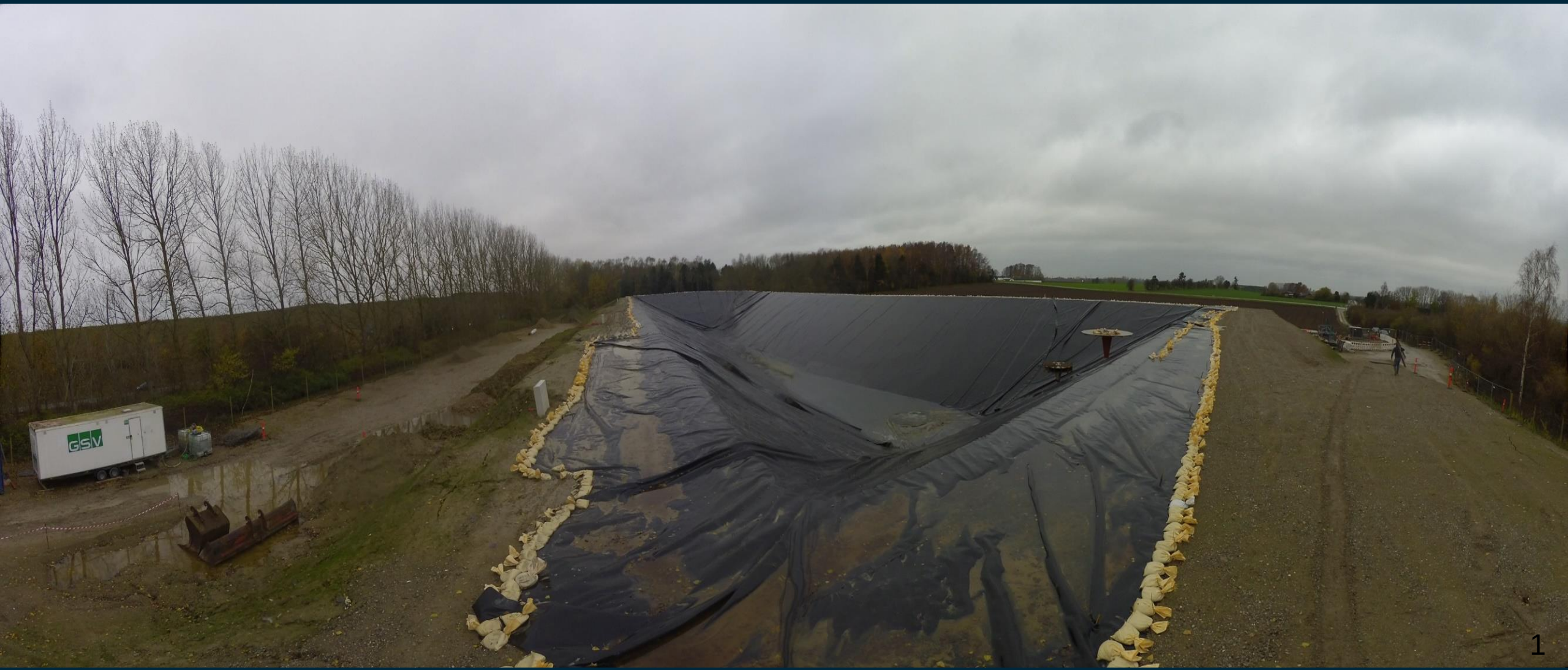
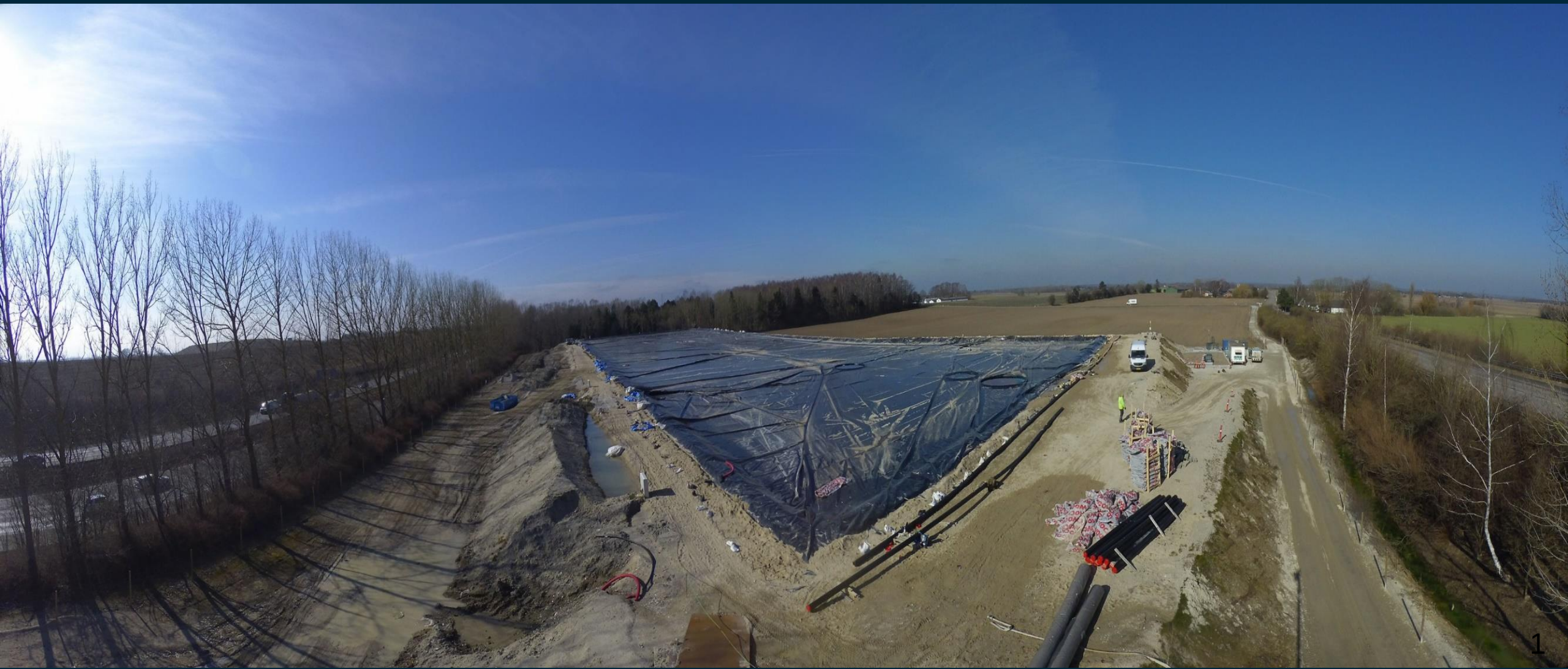


Construction - Filling storage with water



Construction - Installation of floating liner

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Construction - Installation of floating liner

Construction – Installation of insulation layers

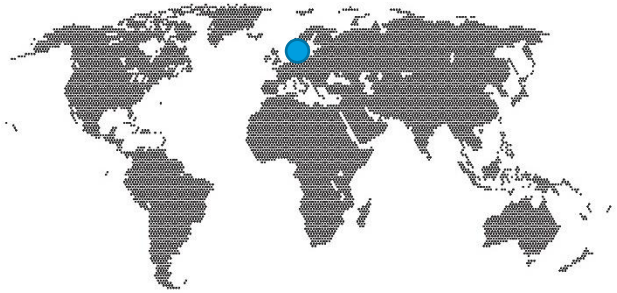
Construction – Ballast installed

INTEGRATED HEAT PUMP SYSTEM

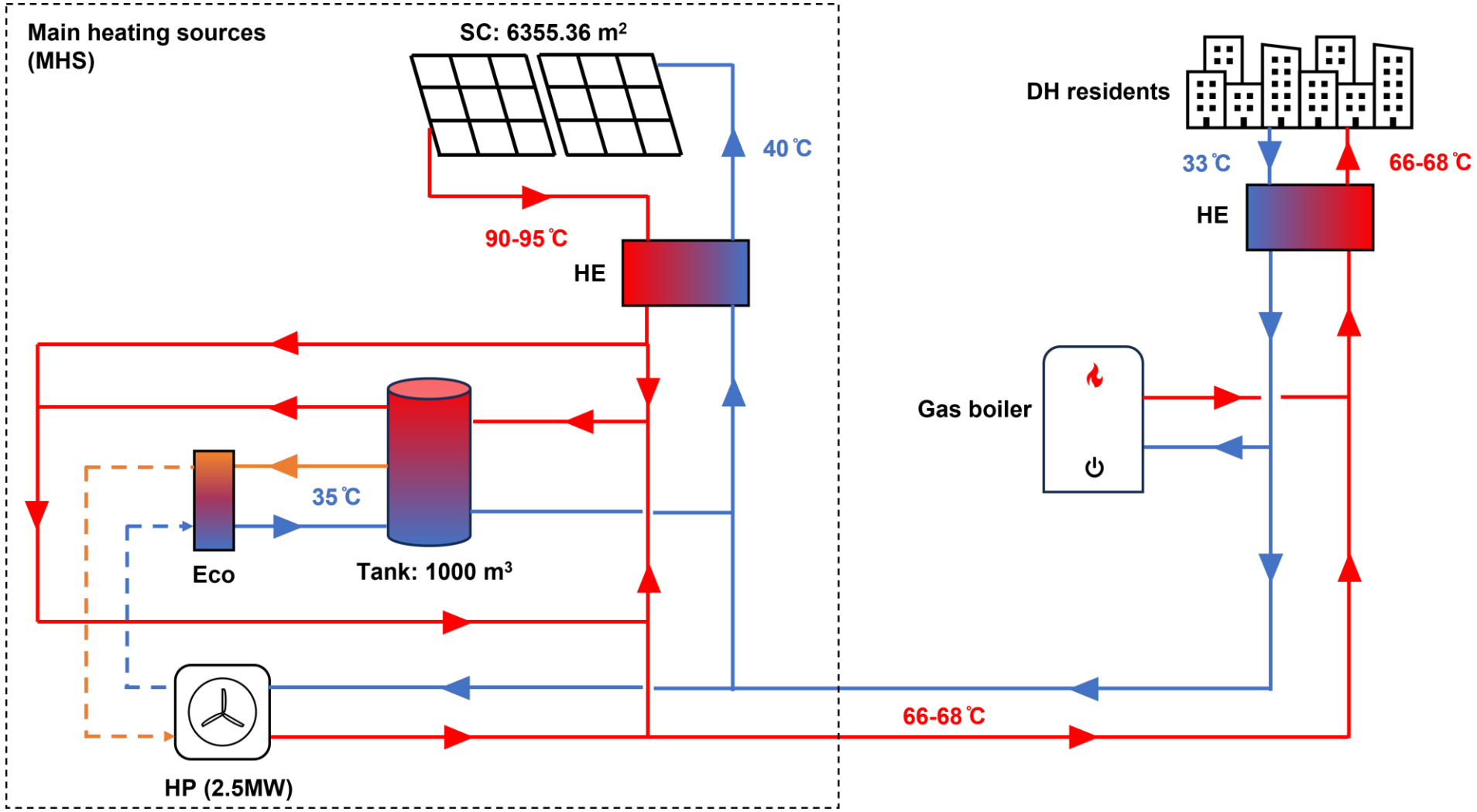
Aalborg CSP received the order for a turnkey delivery of a customized 2.5MW integrated heat pump system. The system will be integrated with an existing solar heating plant boosting its efficiency and enabling a higher level of renewable energy in the district heating plant's energy supply.

Location: Ørum, Jylland
Client: Ørum Varmeværk
Status: Operational
Heat Pump Capacity: 2.5 MWth
Annual heat production: 10,000 MWh
No. of customers: 696

Final energy output: Heat

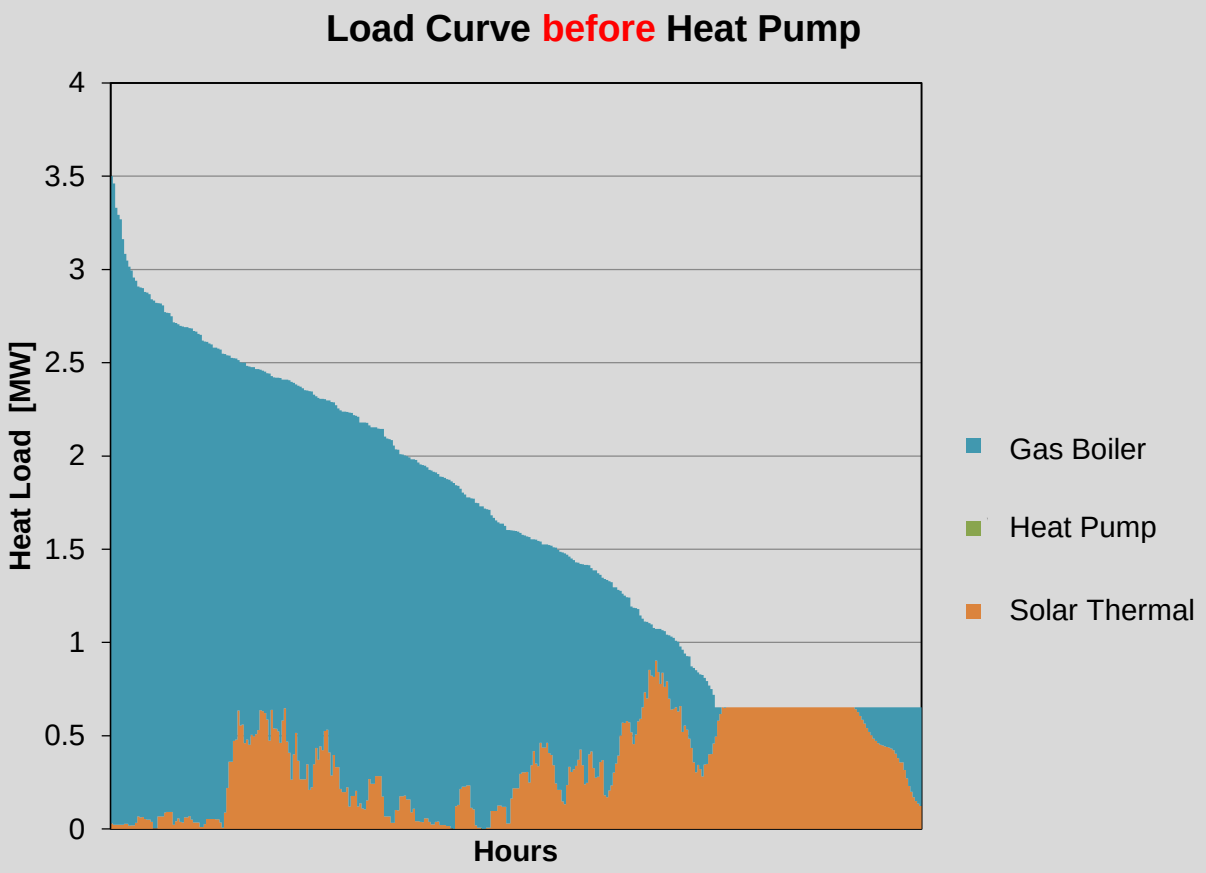


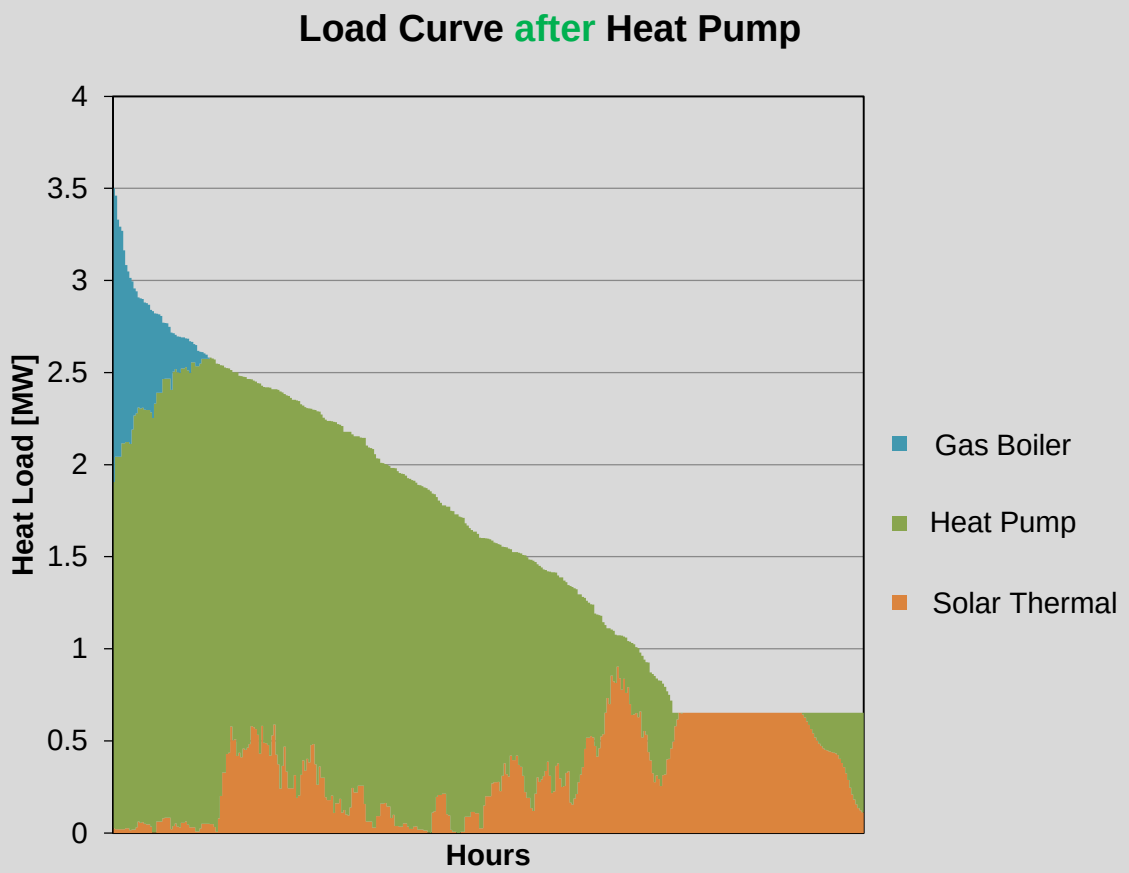
Flow diagram of the Ørum solar heating plant



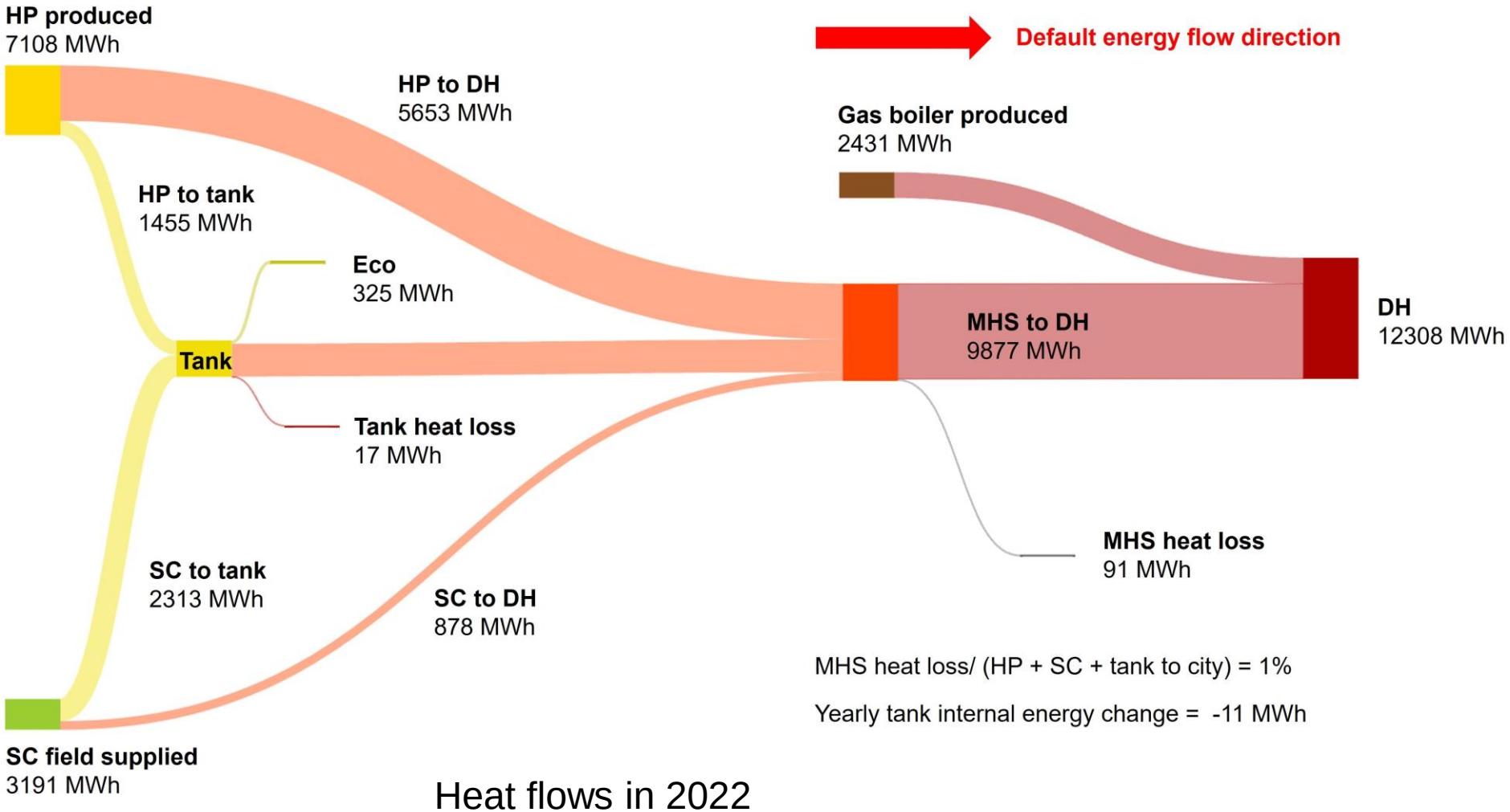
* Dashed lines mean heat transferred indirectly.

Heat Production in Ørum, DK



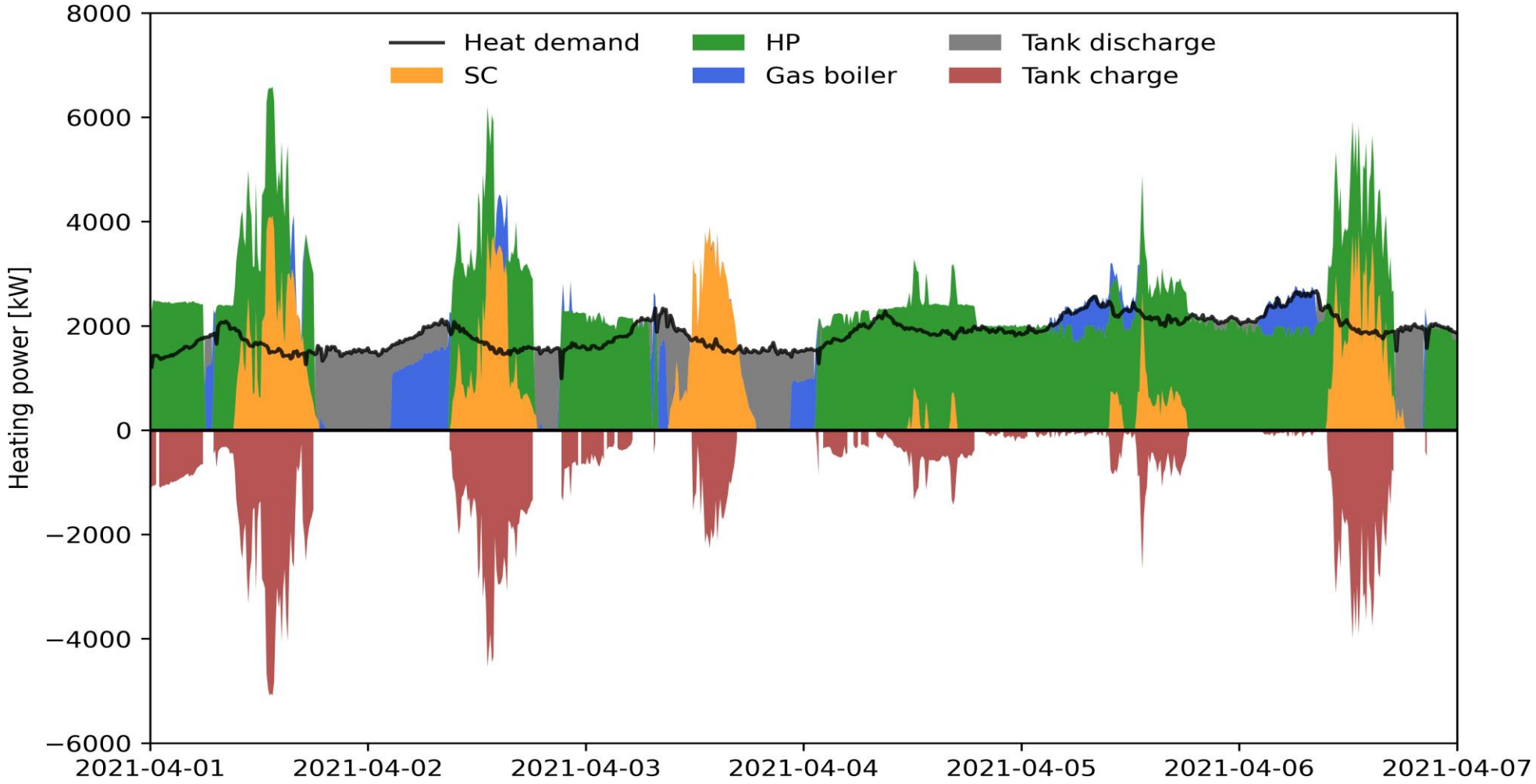


Heat flows



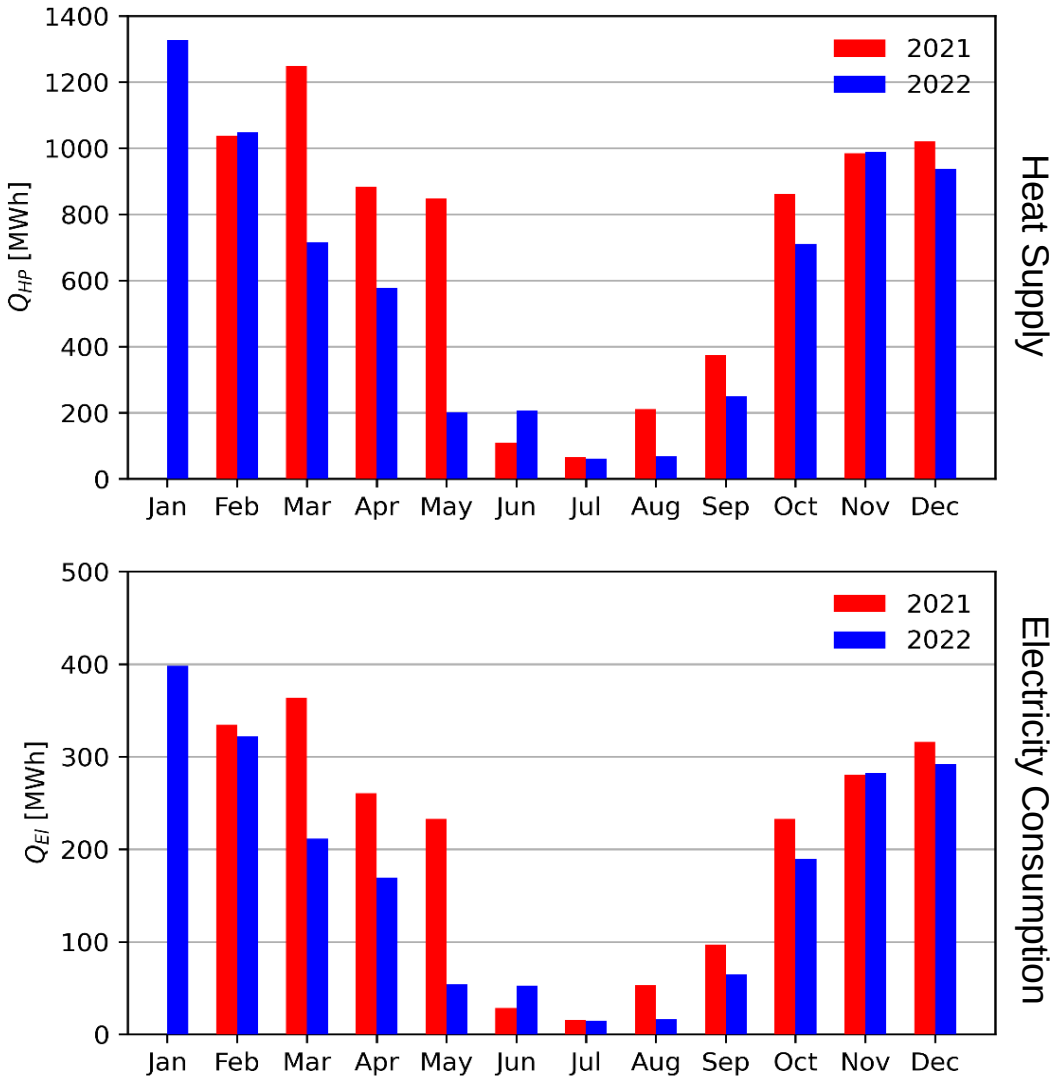
Heat flows in 2022

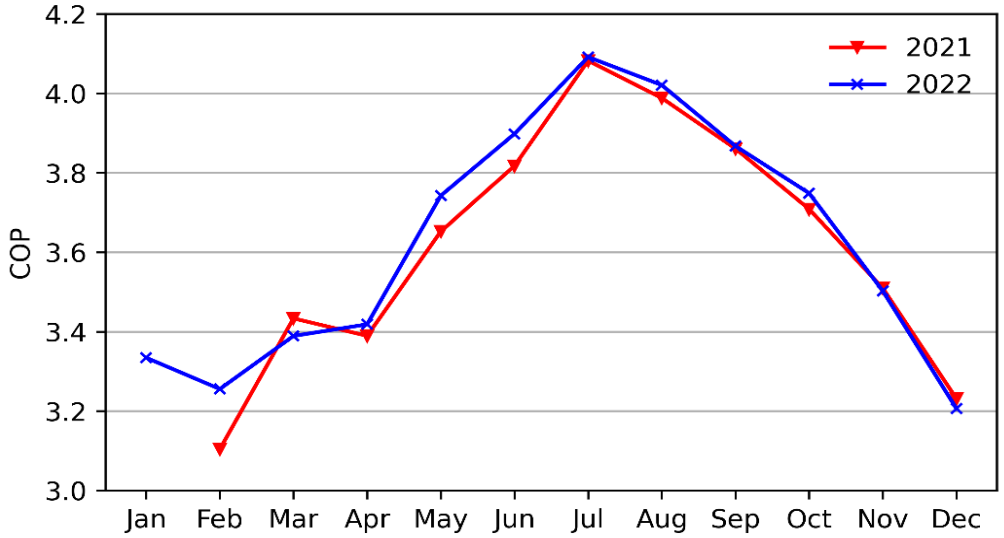
HP performance in a typical week (April 2021)



Heat flows in the solar heating plant during a week in April 2021

HP yearly performance





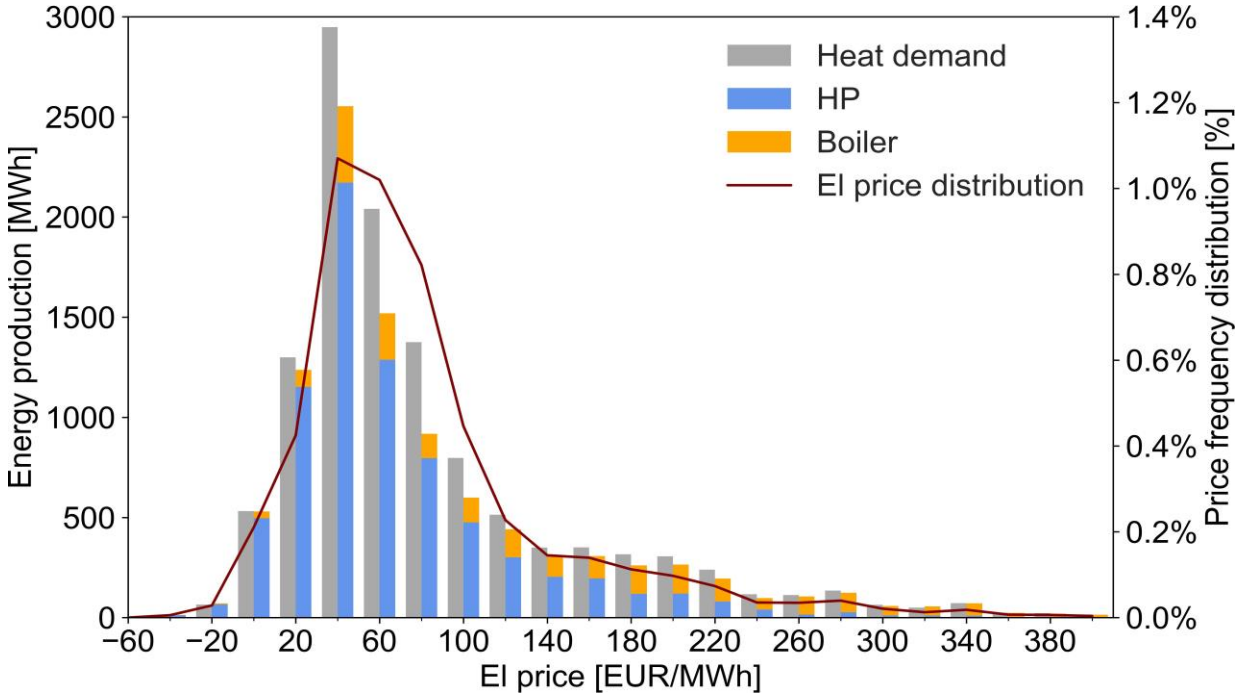
HP yearly COP performance

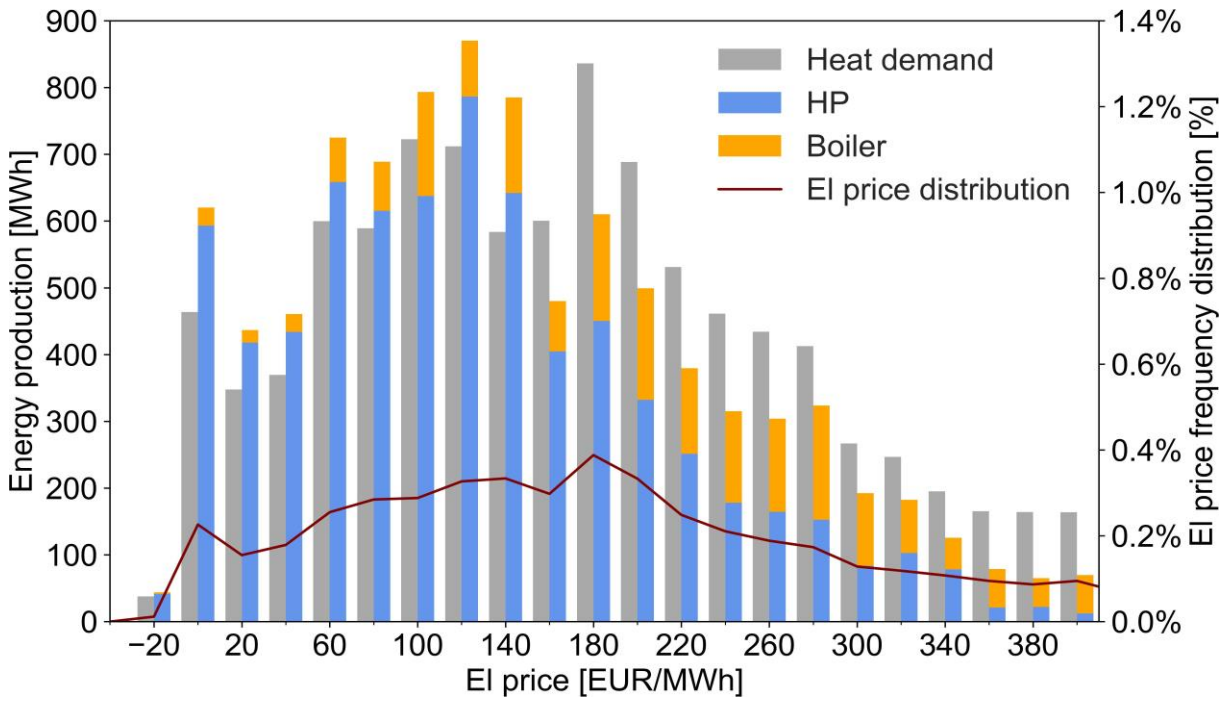
	Q_{HP}	T_{in}	T_{out}	COP	R	COP with Eco	COP without Eco
Unit	MWh	°C	°C		%		
2021	7572	33.6	67.3	3.54	53.4	3.60	3.36
2022	7108	33.4	66.8	3.44	40.9	3.59	3.43

2021 Average ambient temperature Ta = 8.6º

2022 Average ambient temperature Ta = 9.4ºC

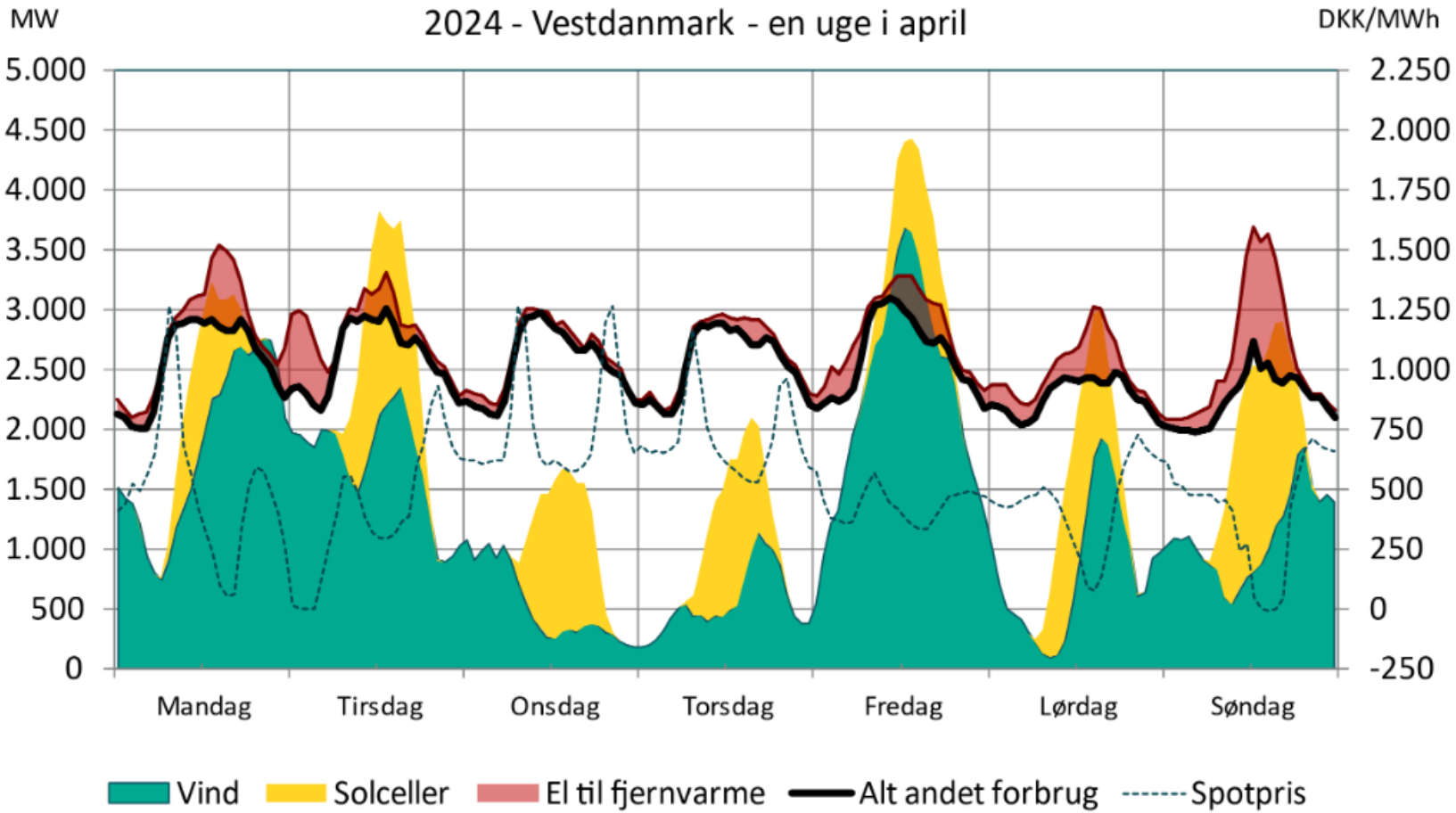
The influence of electricity price on HP operation





Histogram of the energy production in relation to hourly electricity price in 2021 and 2022

Green electricity contributes to green district heating



*The figure shows flexible consumption from district heating when the electricity price is low. At the same time, production from solar and wind is high. **Yellow** is production from solar cells, **green** is production from wind turbines and **red** is consumption from the district heating sector. The dotted line is the electricity price.*

- **Energinet**, Denmark's transmission operator, highlights district heating as a leading contributor to **grid flexibility**, alongside other emerging flexible consumers.
- **District heating plants** in Denmark use **cheap solar electricity** to produce **hot water**, stored in large tanks or pits for later use. Eventually , utilities get **additional revenue** while supporting the power infrastructure.
- By participating in **balancing markets**, these plants can reduce or increase electricity use, supporting grid stability.
- This flexibility is crucial as Denmark increases **solar and wind energy**, which causes **fluctuating electricity production**.

[Source: Link]

NOVI SAD SOLAR THERMAL PLANT

The EBRD is providing a €105 million sovereign loan to Serbia for the construction of a large-scale solar-thermal plant in Novi Sad.

The project includes 38,600 m² of solar collector fields, a seasonal heat storage system, a heat pump, and an electric boiler.

Co-financed by the EU through the Western Balkans Investment Framework, the project aims to enhance energy efficiency, reduce CO2 emissions, and decarbonize the city's district heating network.

It is part of Novi Sad's Green City Action Plan and introduces innovative renewable energy technologies to Serbia's district heating sector.

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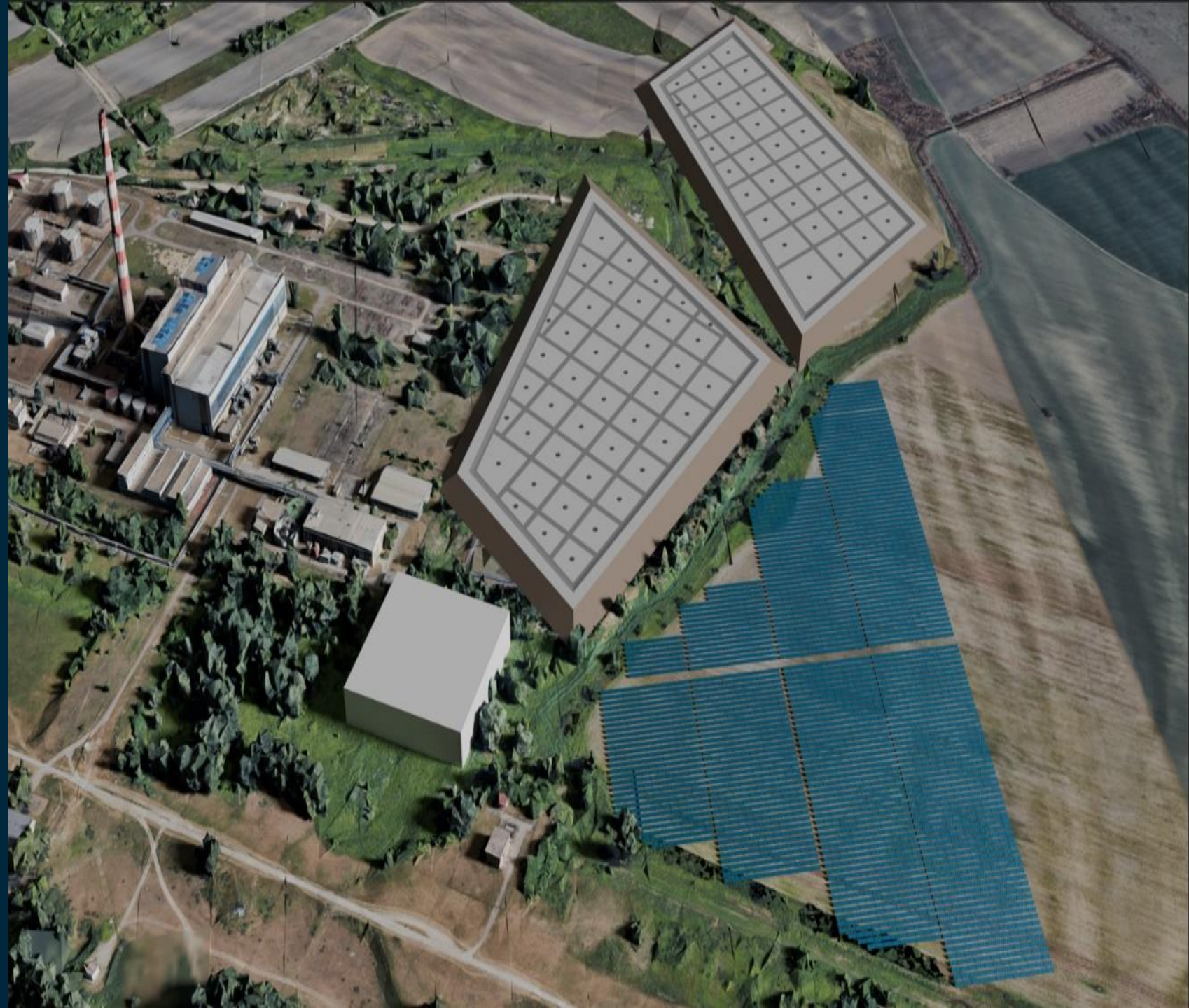
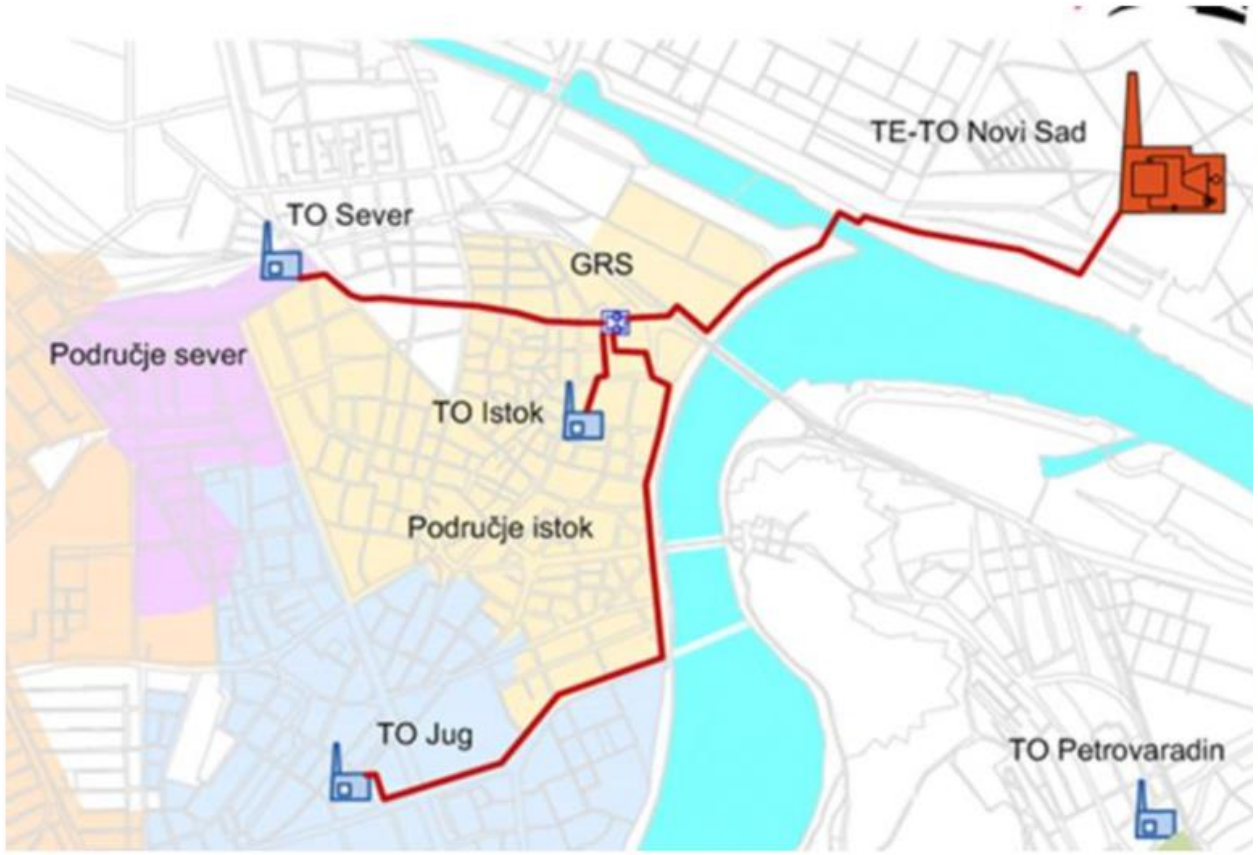
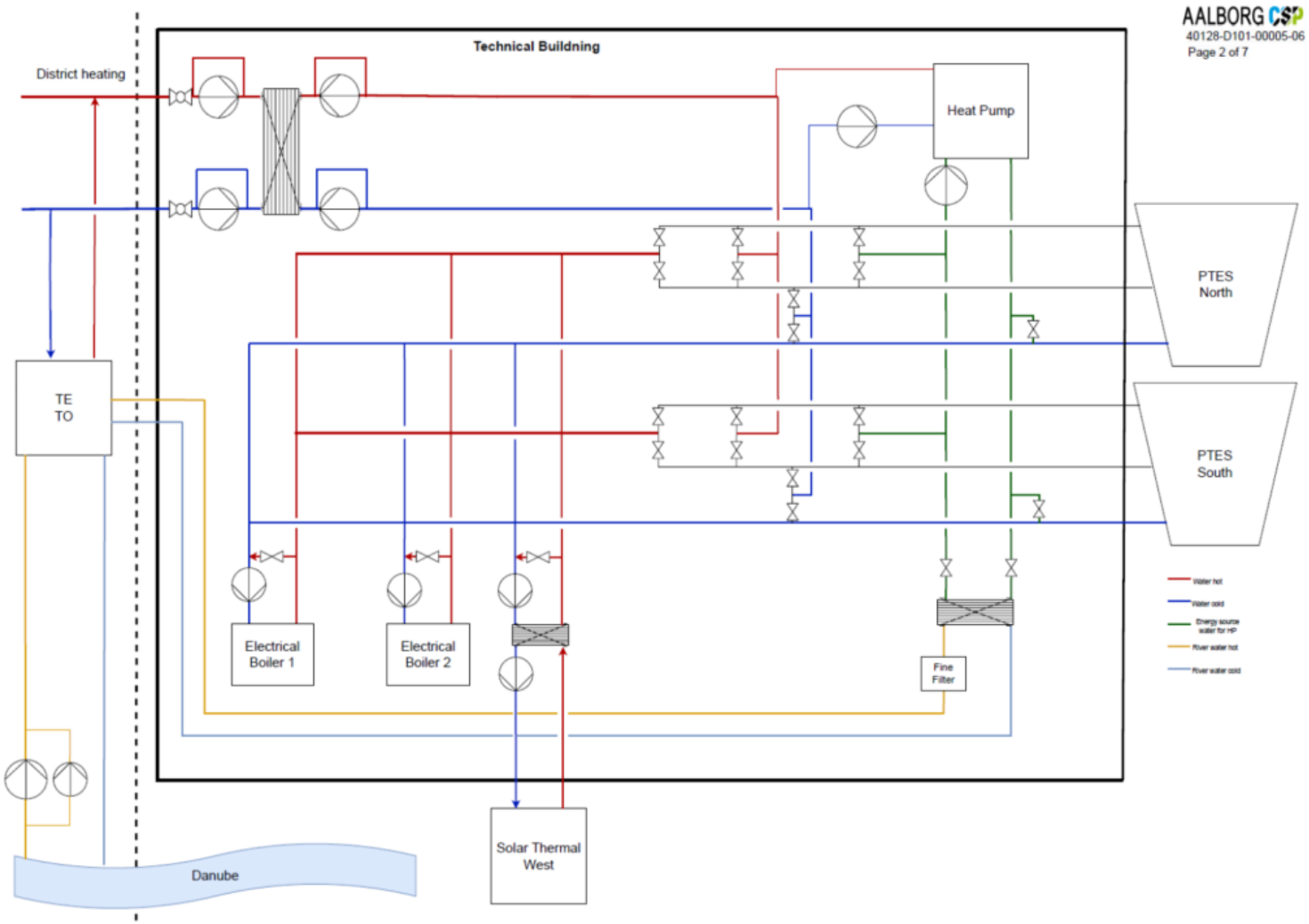
[Source: Link]

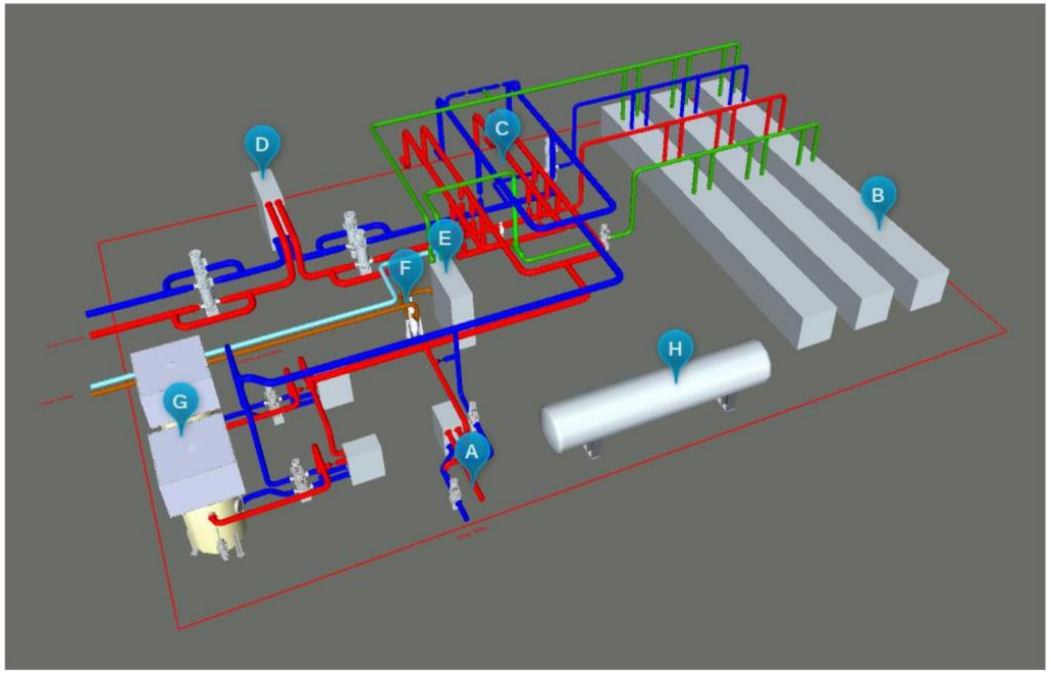


OVERVIEW OF SYSTEM

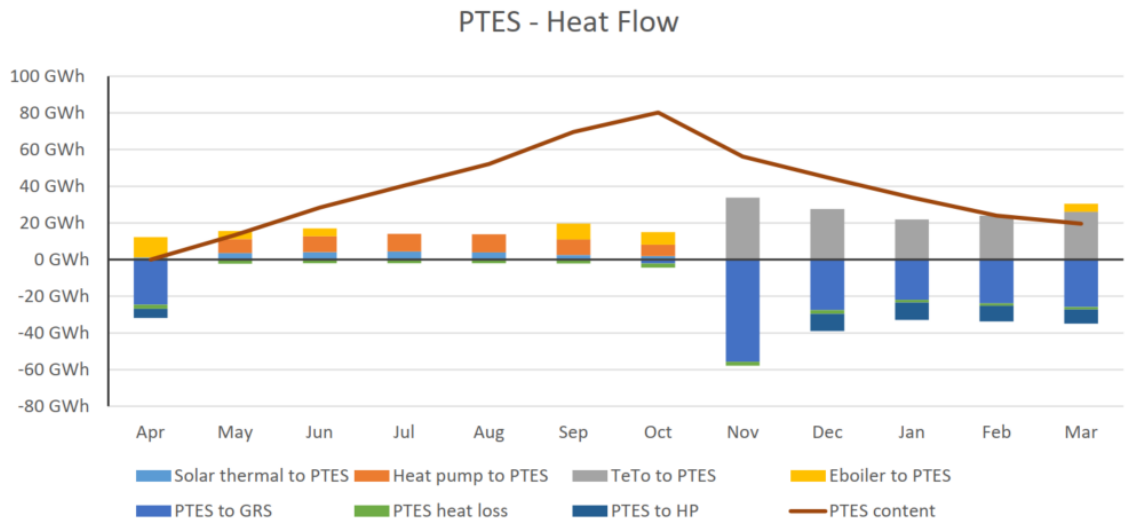


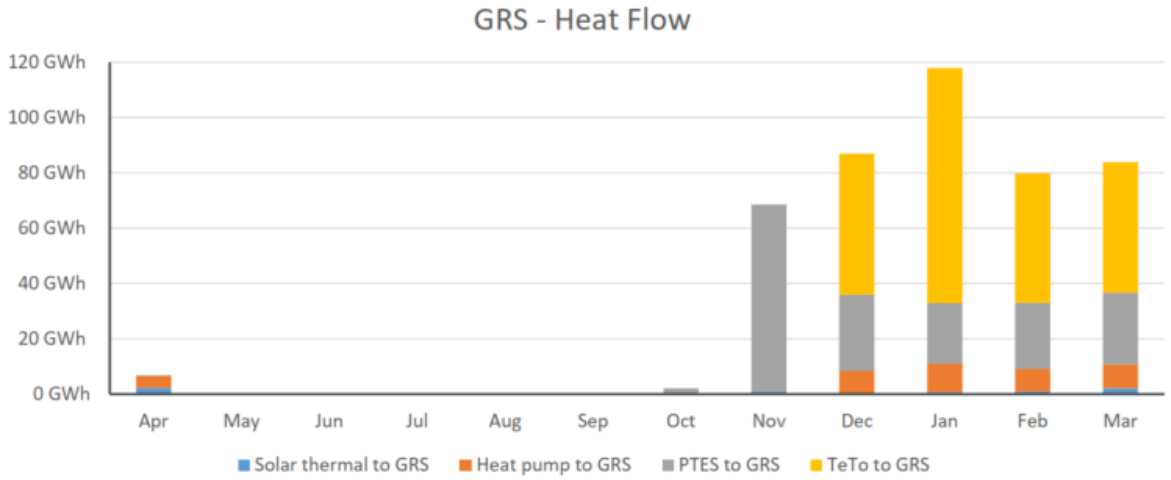
HOW DOES IT WORK?

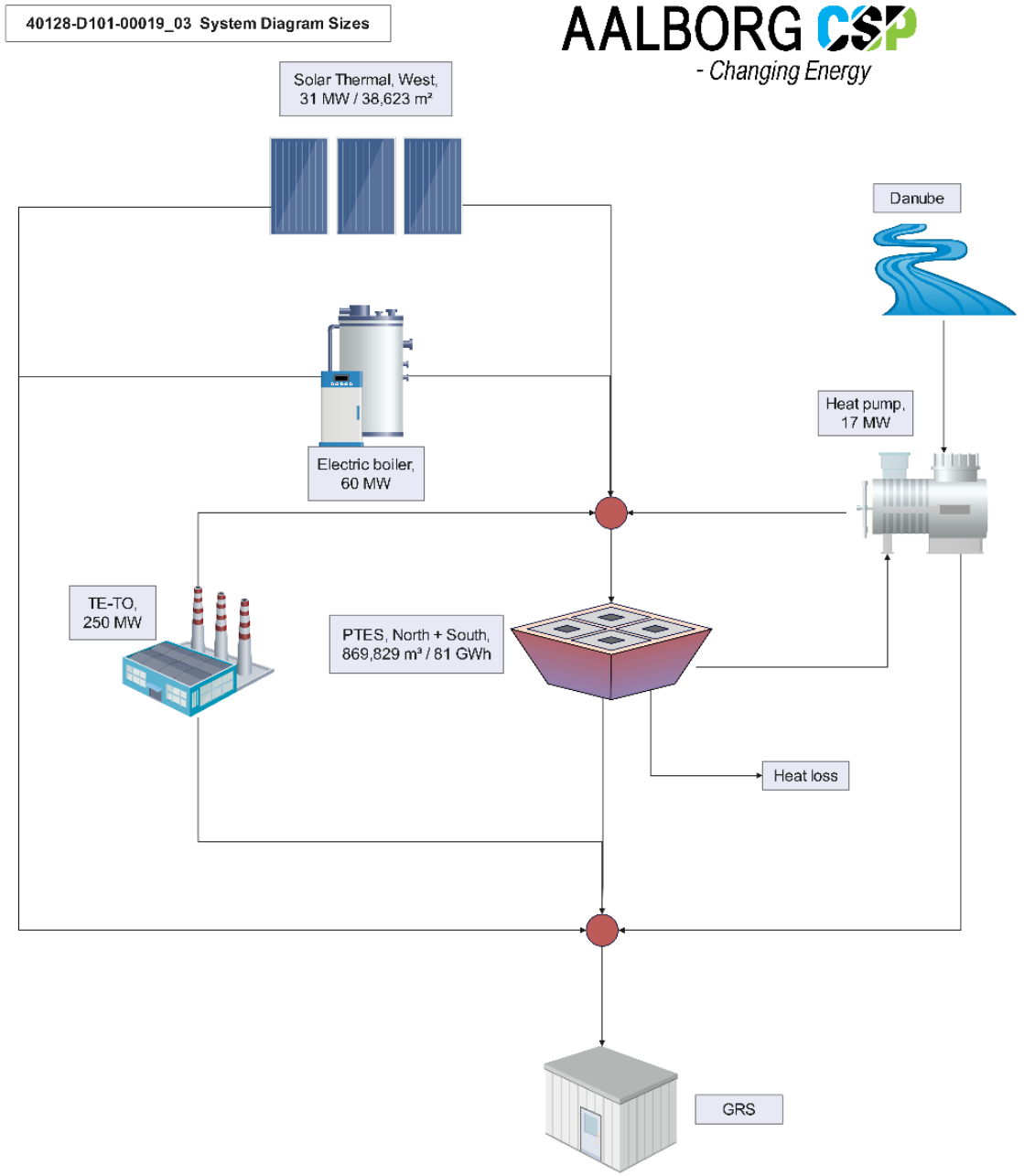




YEARLY HEAT FLOW







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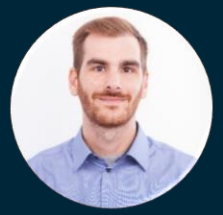
THANK YOU FOR YOUR ATTENTION



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