

From simple heat production to intelligent energy plant

Company: JPH Energi A/S
- Consulting Engineers

Mr. Erik Povlsen, CEO



JPH Energi A/S

- Independent and privately owned consulting engineers.
- Based in Skanderborg, Denmark.
- The company has more than 40 years of experience in energy projects.
- We work with multifueled heating and power plants incl. the district heating grids.

Efficient production of district heating

We have two key focus areas:

Heat distribution and energy production.

1. Heat distribution :

- The best energy!- is the one that's not produced!
- Changing pipes to BAT (Best Available Technology)
 - Typical heat-loss-reduction: 37% -> 17%

- Benefits:

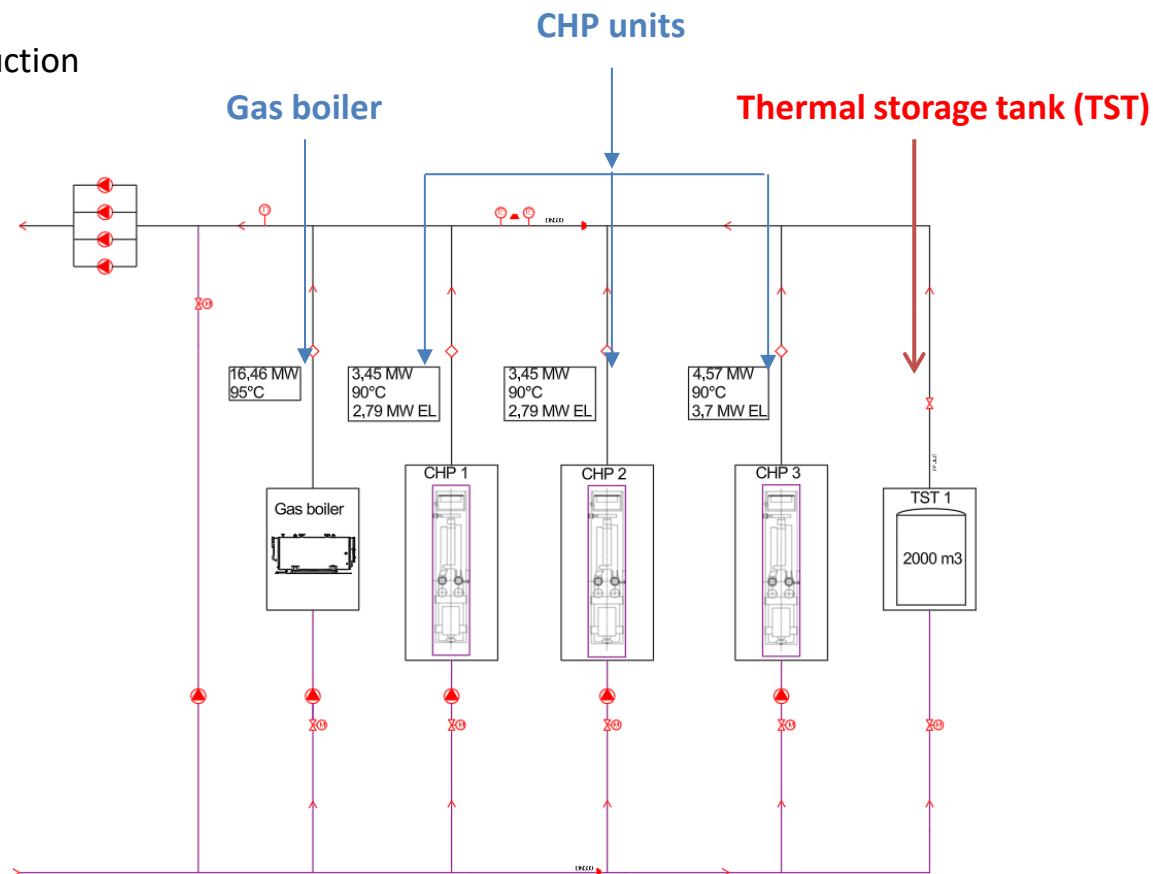
- Saving energy and reducing CO₂ emissions
- Saving water and cost for chemical
- Lower cost for unplanned repairs
- Low return temp.- > high efficiency in the heat production



Traditional CHP plants 1st and 2nd gen. district energy

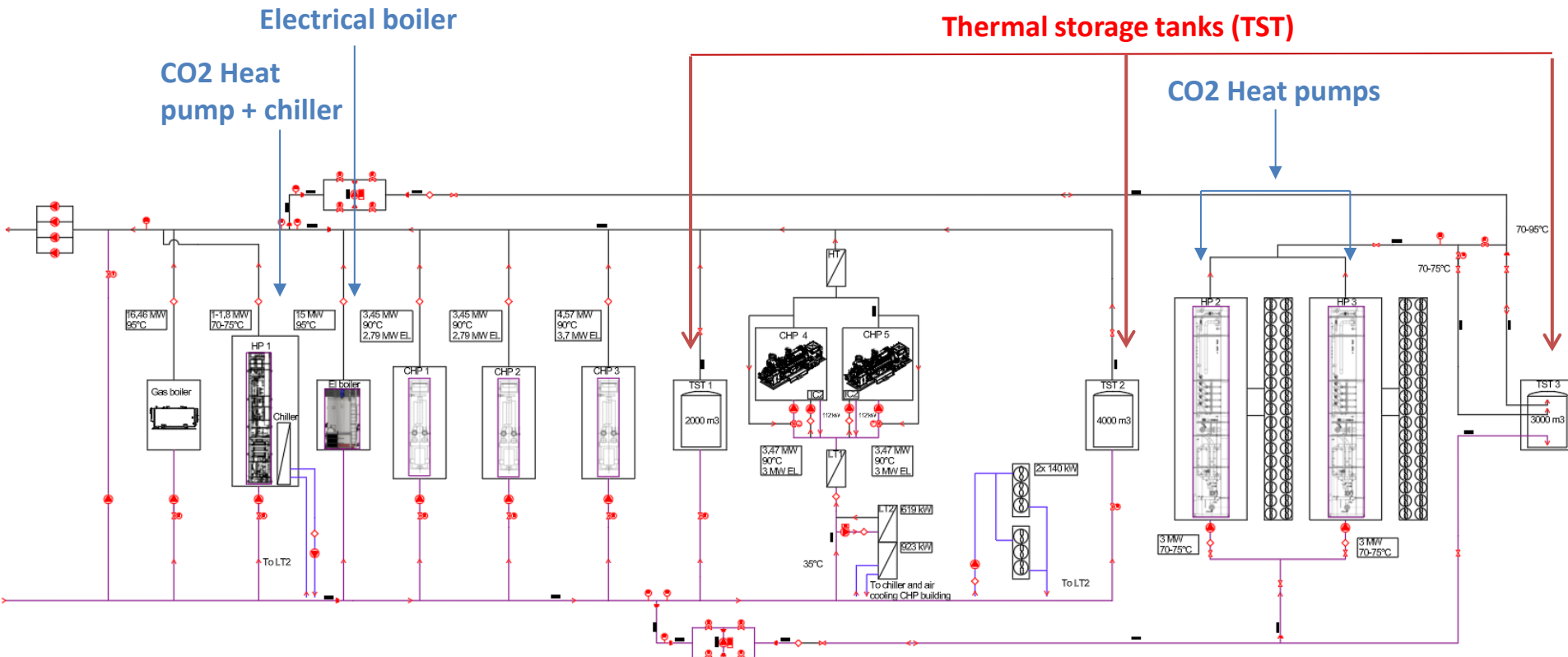
2. Energy production

- CHP units -> electricity and heat production
- Back-up oil or gas fired boiler
- A thermal storage tank



Multifueled plants 3rd and 4th gen. energy centers

- Heat pumps as base production and additional TST -> more cost-efficient production from CHP units.
- Electrical boiler produce heat when electricity price is low-> efficient with TST.
- Chiller module from LT2 connected to chiller

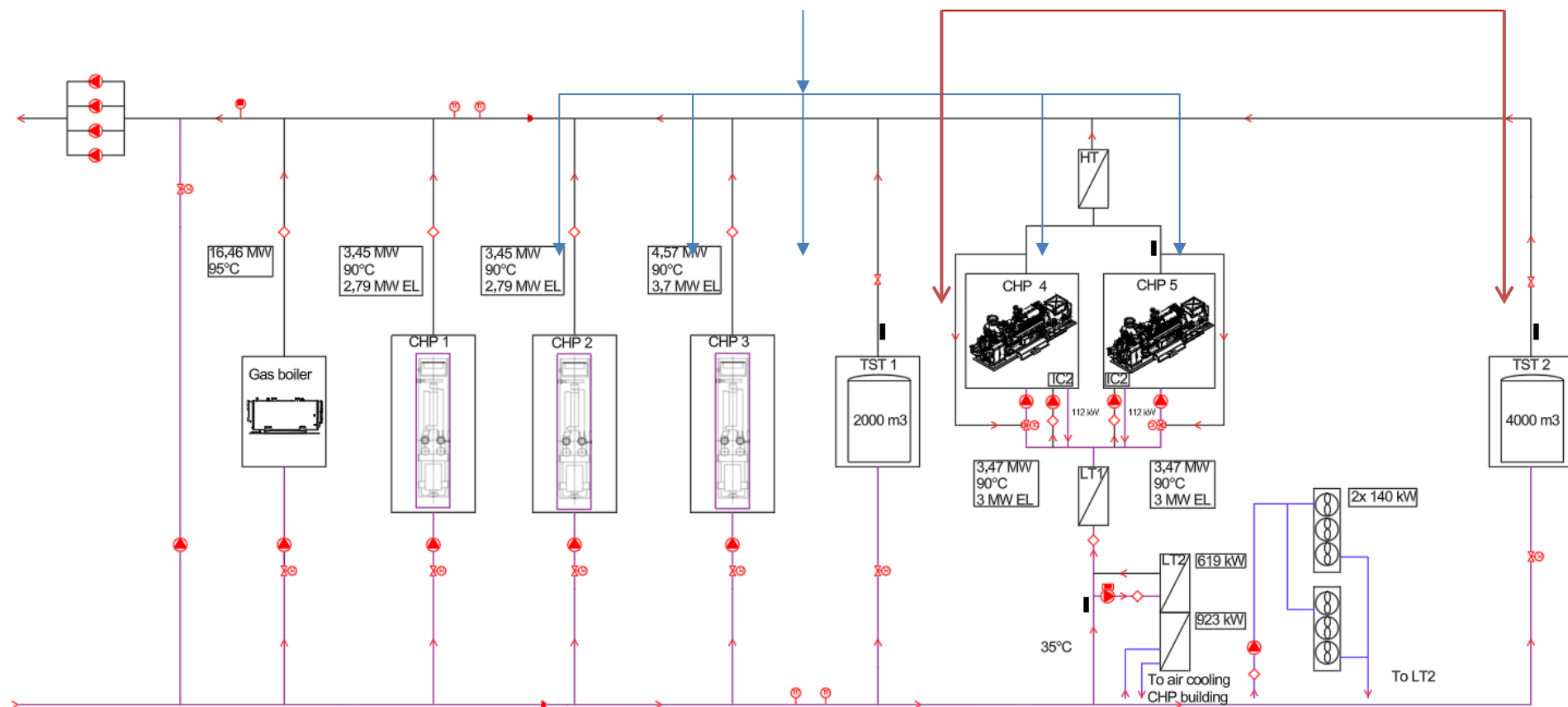


Extended version of Traditional CHP plants

- CHP units use heat exchangers efficiently
- Addition of two step heat exchanger (LT2)
- Additional TST

CHP units

Thermal storage tanks (TST)



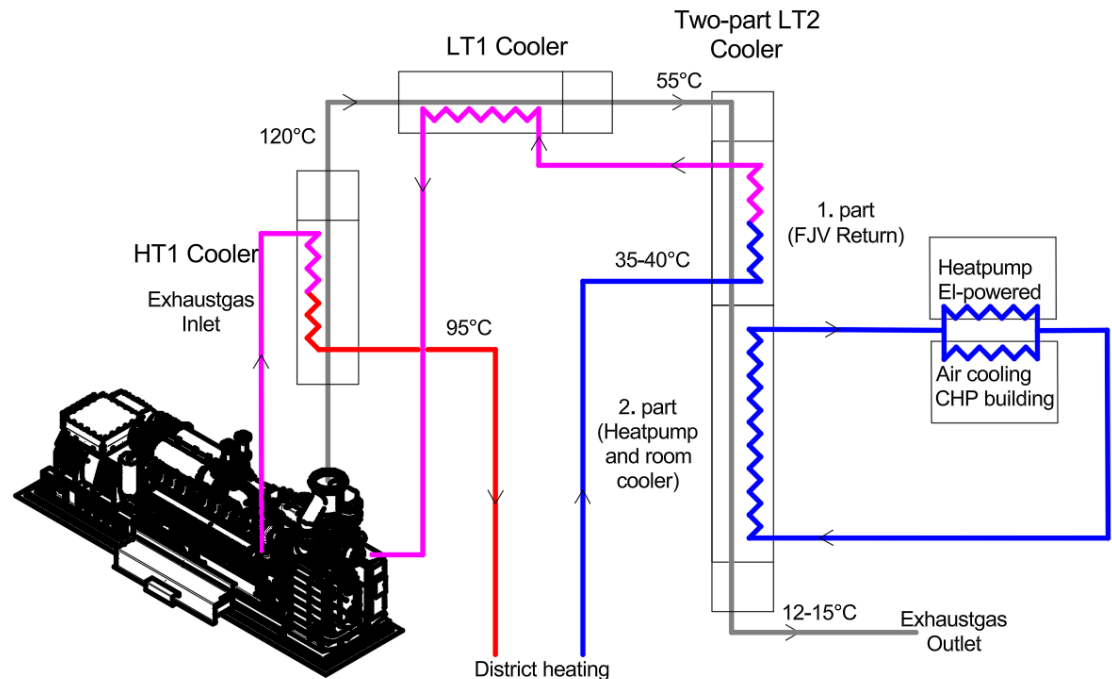
Efficient production of heat at CHP plant

Efficient optimization on existing gas fired plants

- Exhaust gas cooling in one step
(HT) → total : 80%
- LT1 cooler → total: 95%
- Two-part LT2 and Heat pump → 108%

Benefits

- Gas reduction.
- Reduction of service cost
- Lifetime extension
- Apply cooling to engine room and heat pump.



Benefits of multifueled plants

The fluctuating power grid:

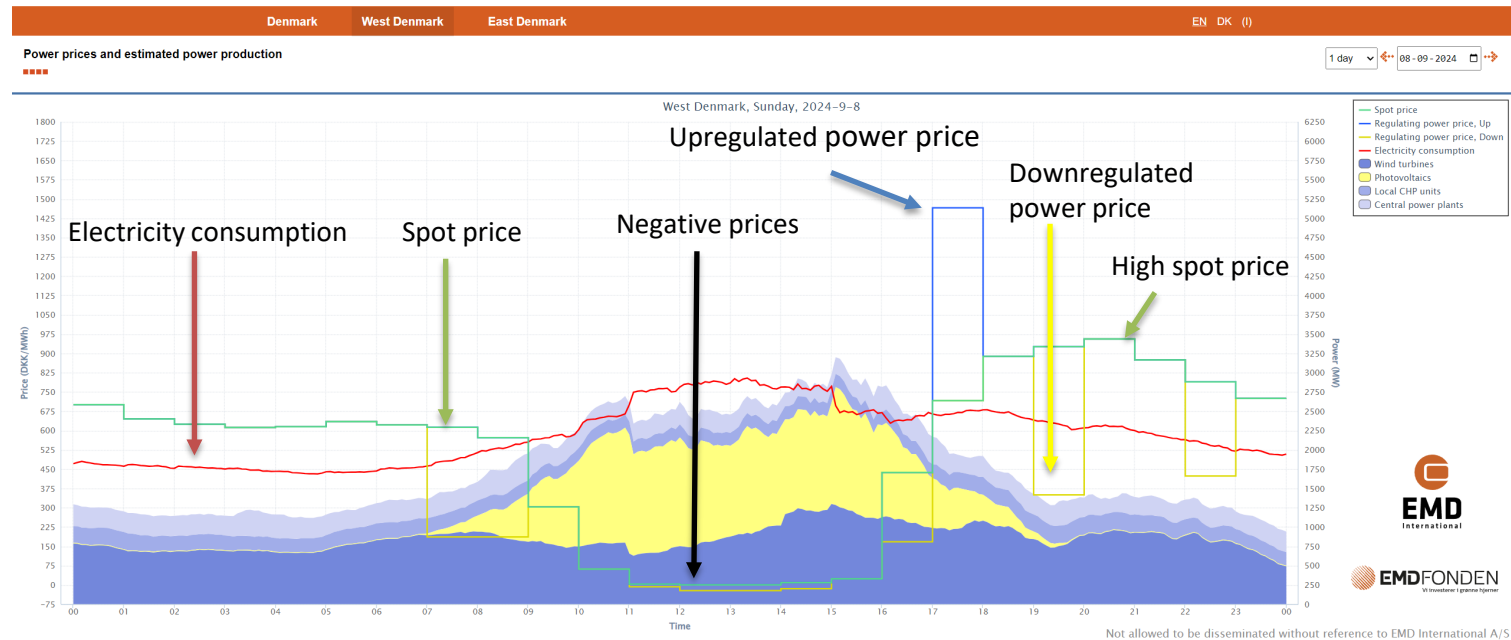
- Always able to produce cost efficient energy
- Takes advantage of the unstable electrical power grid and the lowest prices!

High spot prices and upregulated power prices:

- Typical CHP power and heat production.

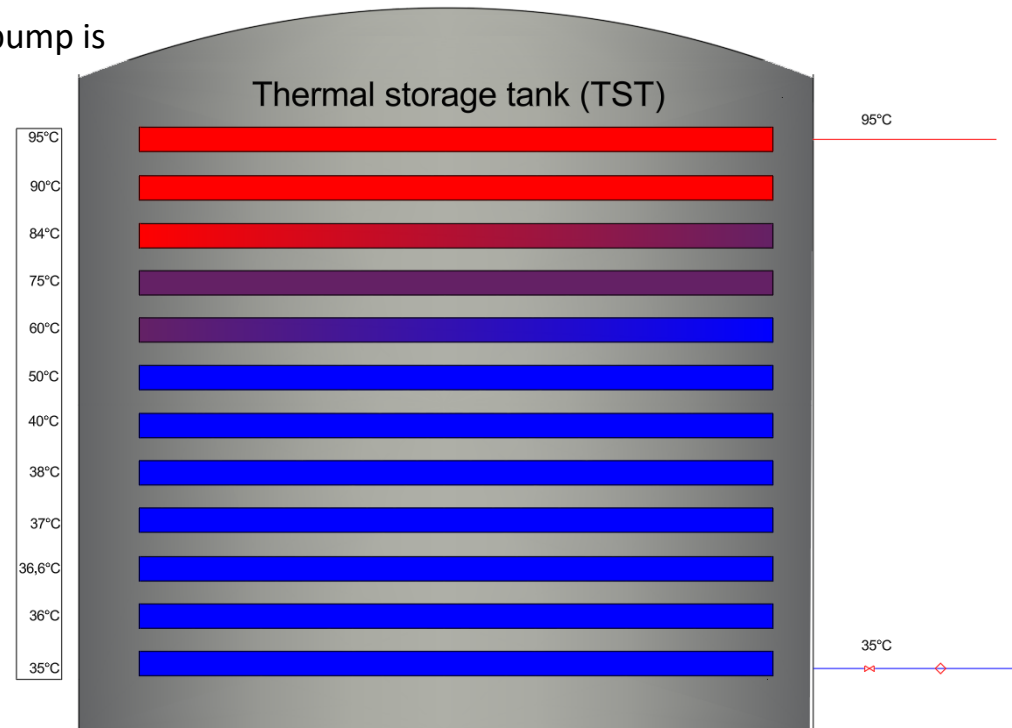
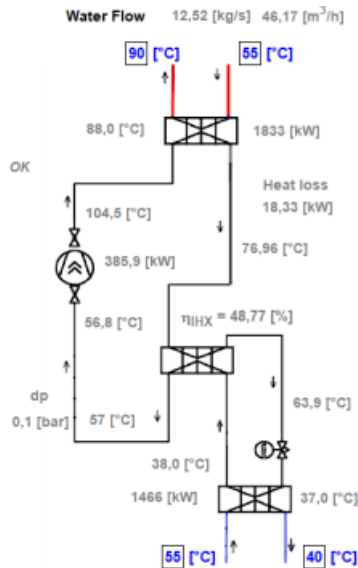
Low/negative prices and downregulated power prices:

- Typical electrical boiler and heat pump power and heat production.



Intelligent energy plant

- Temperature difference is key! -> Higher temperature difference (ΔT) between top and bottom = more stored energy
 - $\Delta T = 95 - 75^\circ\text{C}$. Stored energy = **136.768 MWh**
 - $\Delta T = 95 - 35^\circ\text{C}$. Stored energy = **410.306 MWh**
- If return temp is too high, installation of a heat pump is recommended



Questions?

Mr. Erik Povlsen