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#SESAAU2020

EXPERIENCE WITH BOOSTER FOR DHW CIRCULATION IN MULTI APPARTMENT BUILDING

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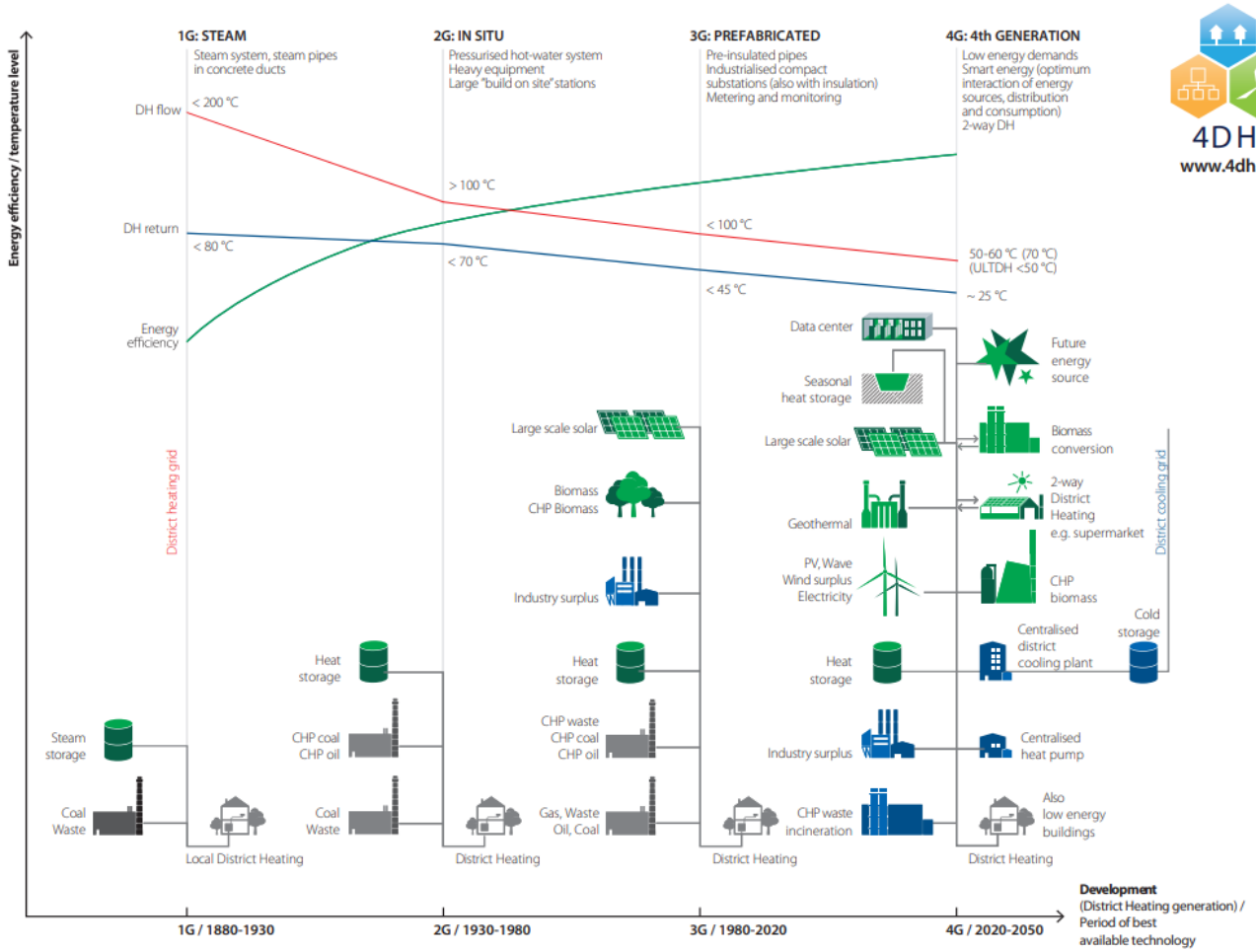
Part of project:
www.energylabnordhavn.dk

Funded by:

The aim is to reduce the District heating return temperature

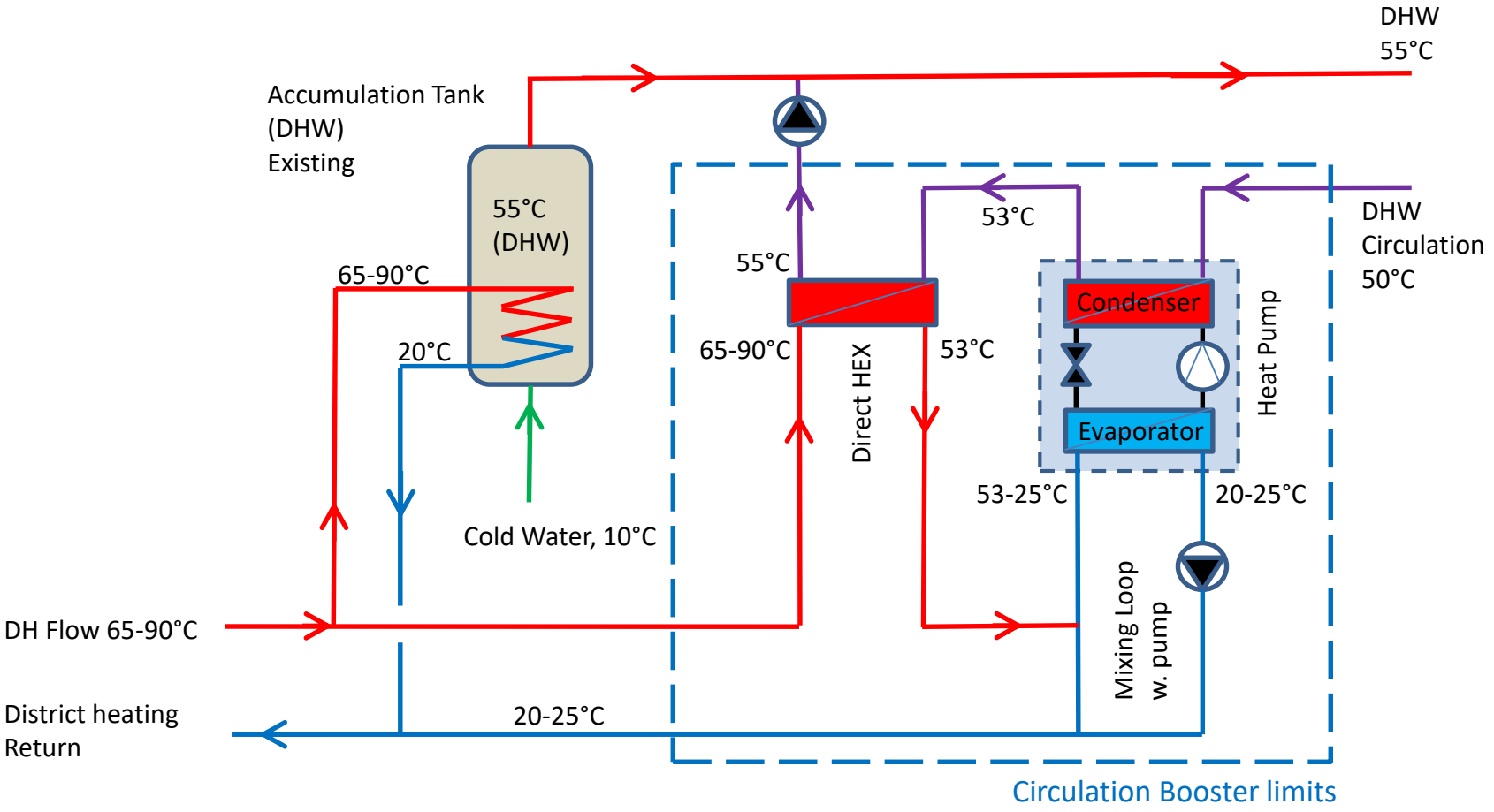


4DH
www.4dh.dk

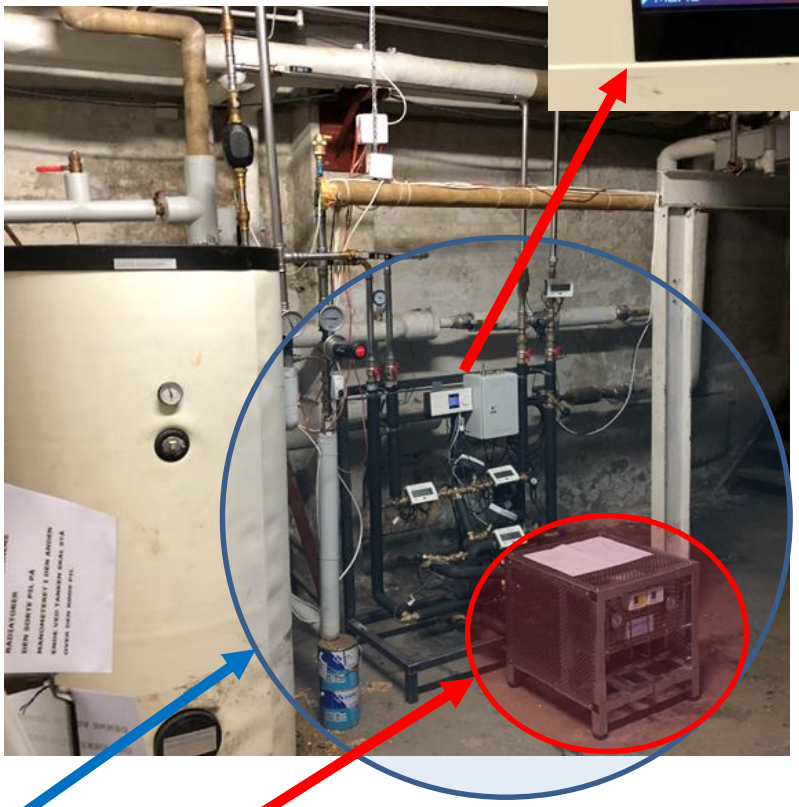
Focus is on:

Domestic Hot Water Circulation

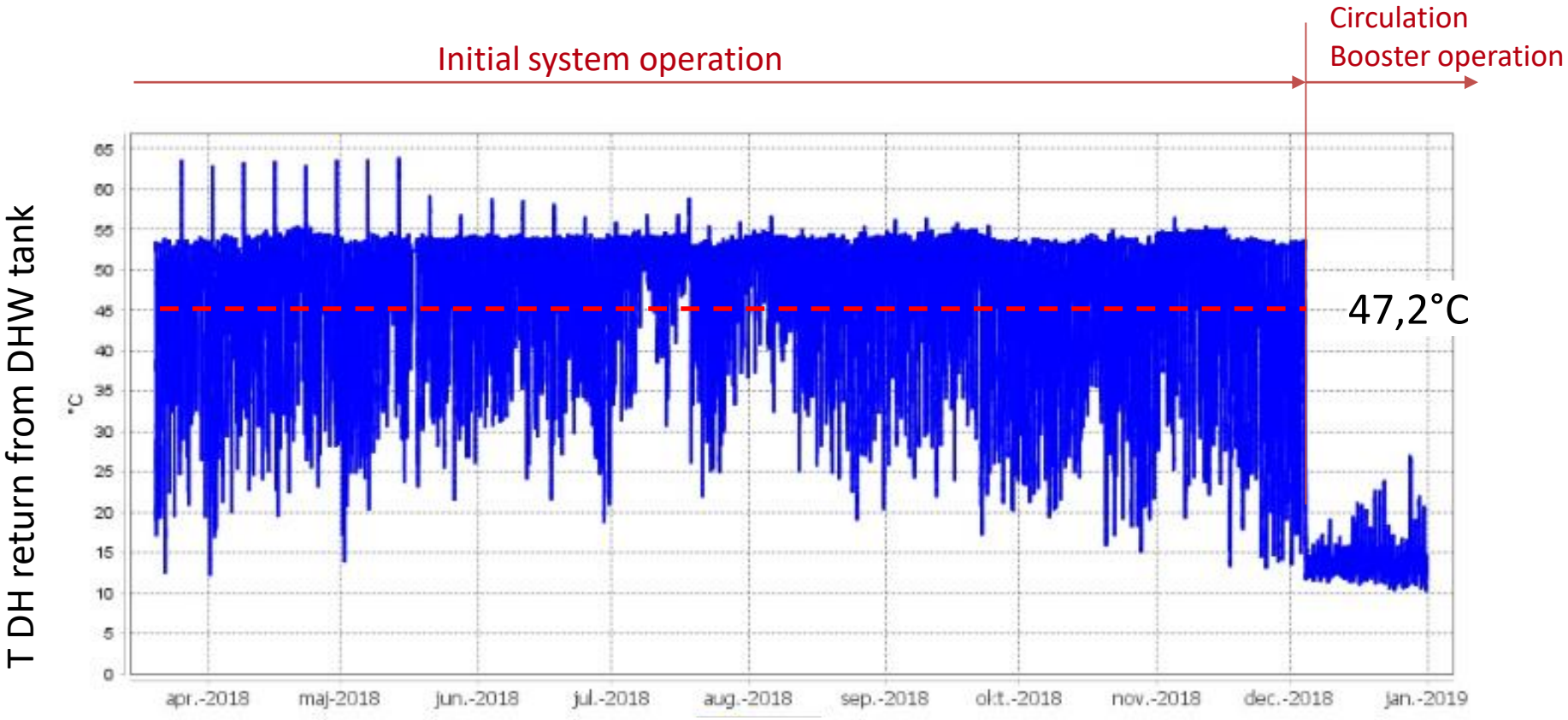
The Basic Concept of Circulation Booster:

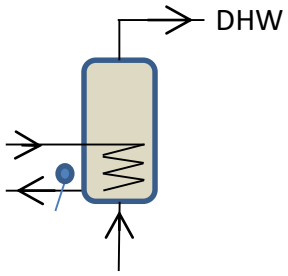


Field Location and Installation:



DHW system tank data

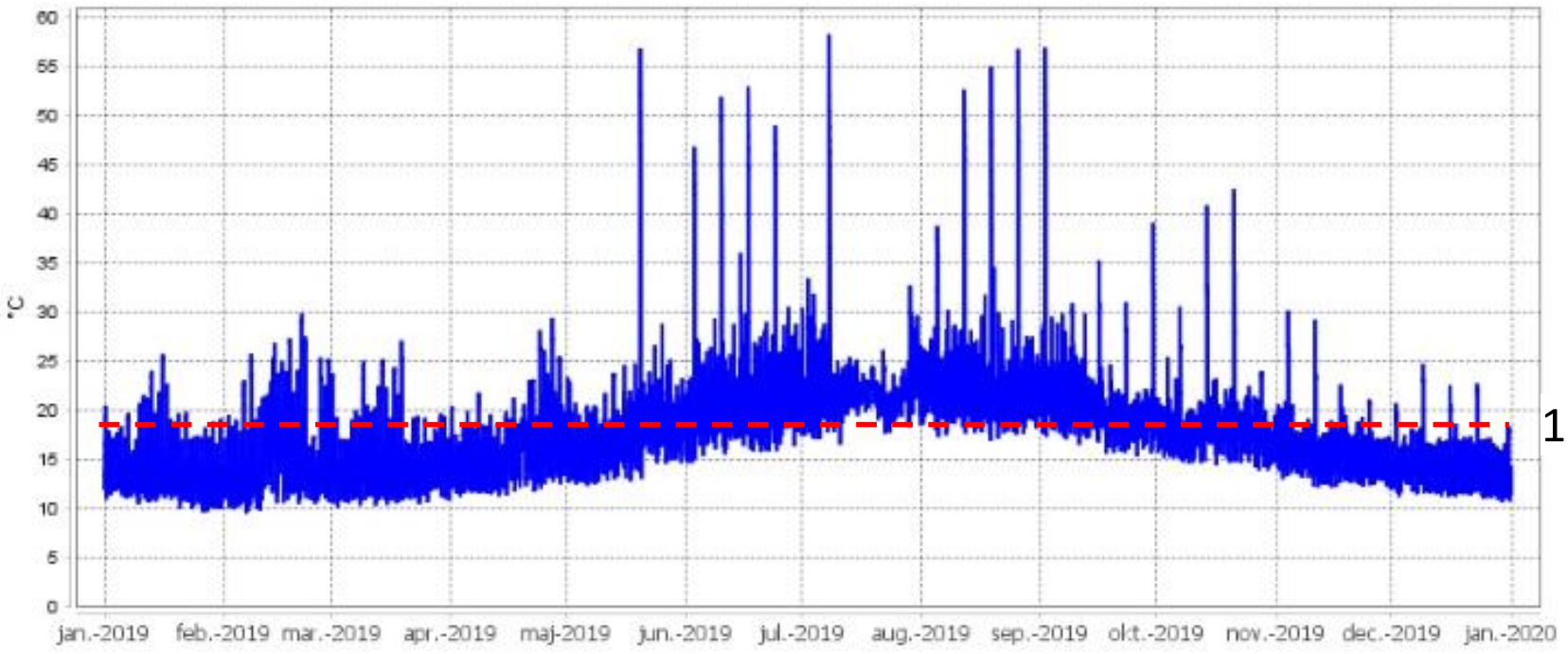




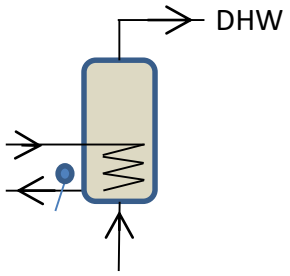
DHW system tank data

Circulation Booster operation

T DH return from DHW tank

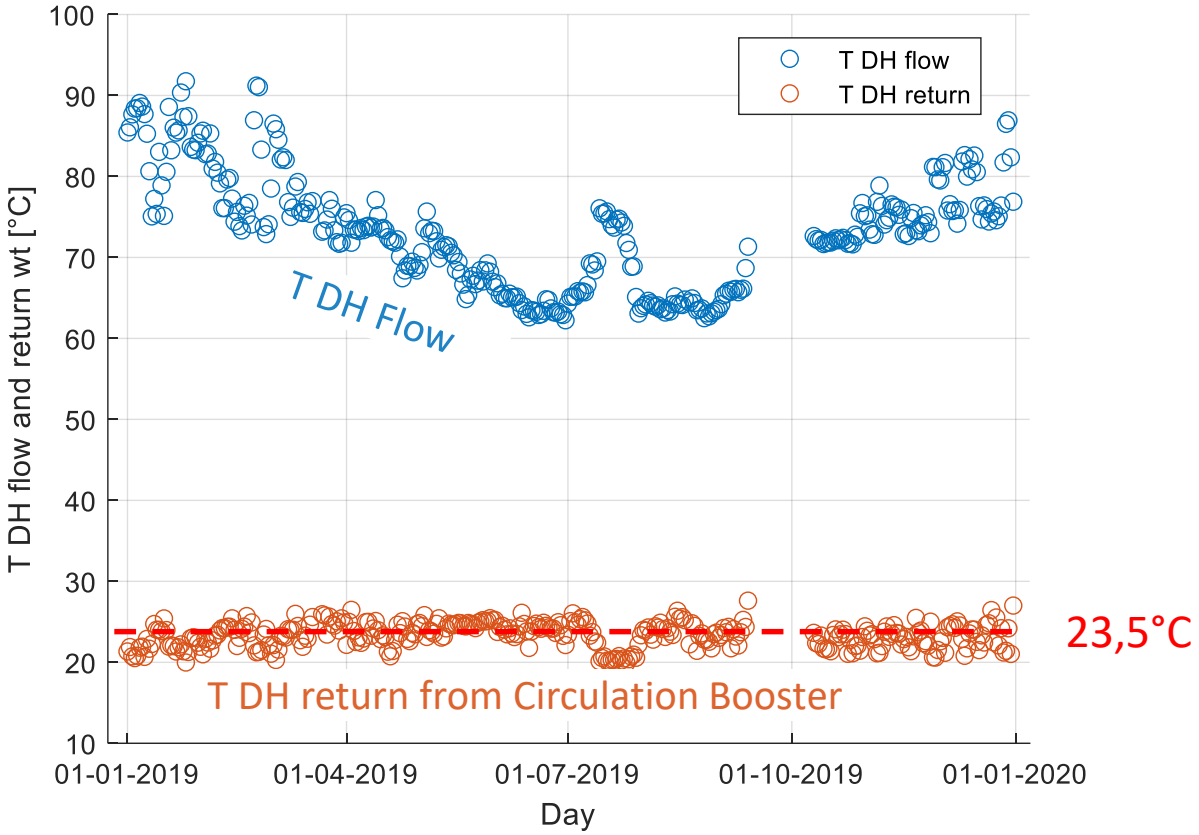


18,0°C



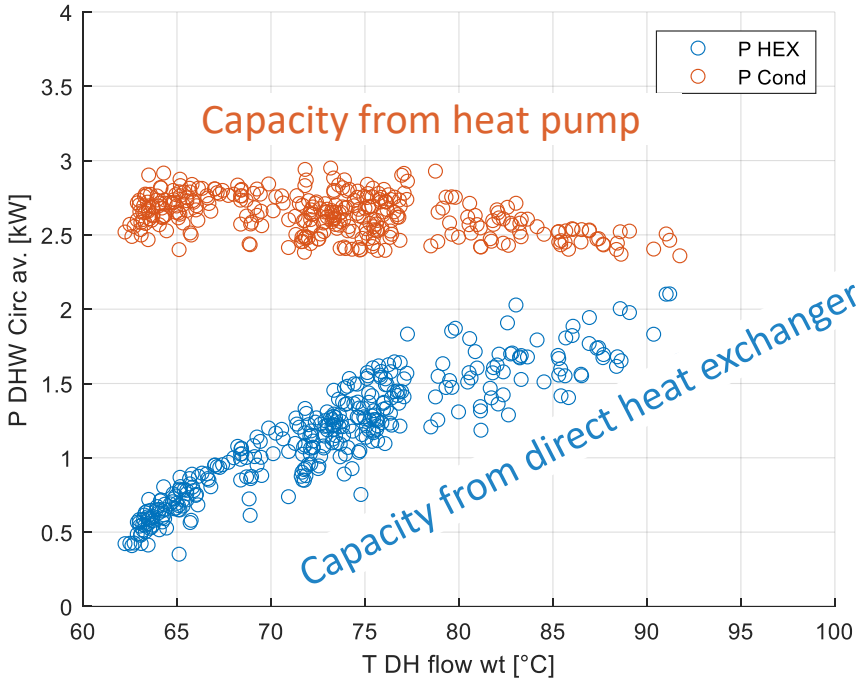
Average return temperature

Operational data Circulation Booster (daily average):



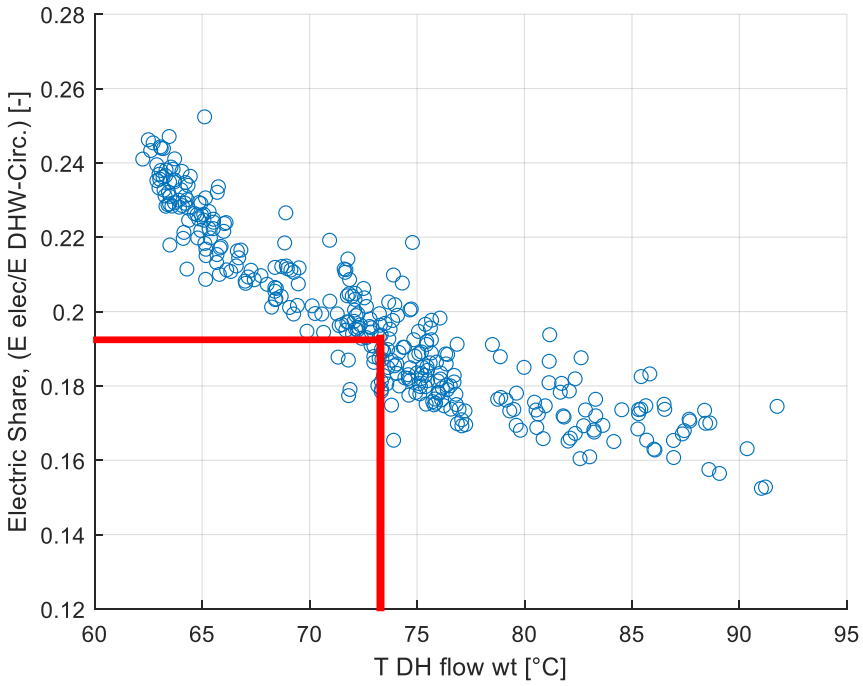
T DH flow and return from Circulation Booster
Flow weighted T DH return from CB 23,5°C

Operational data Circulation Booster (daily average):



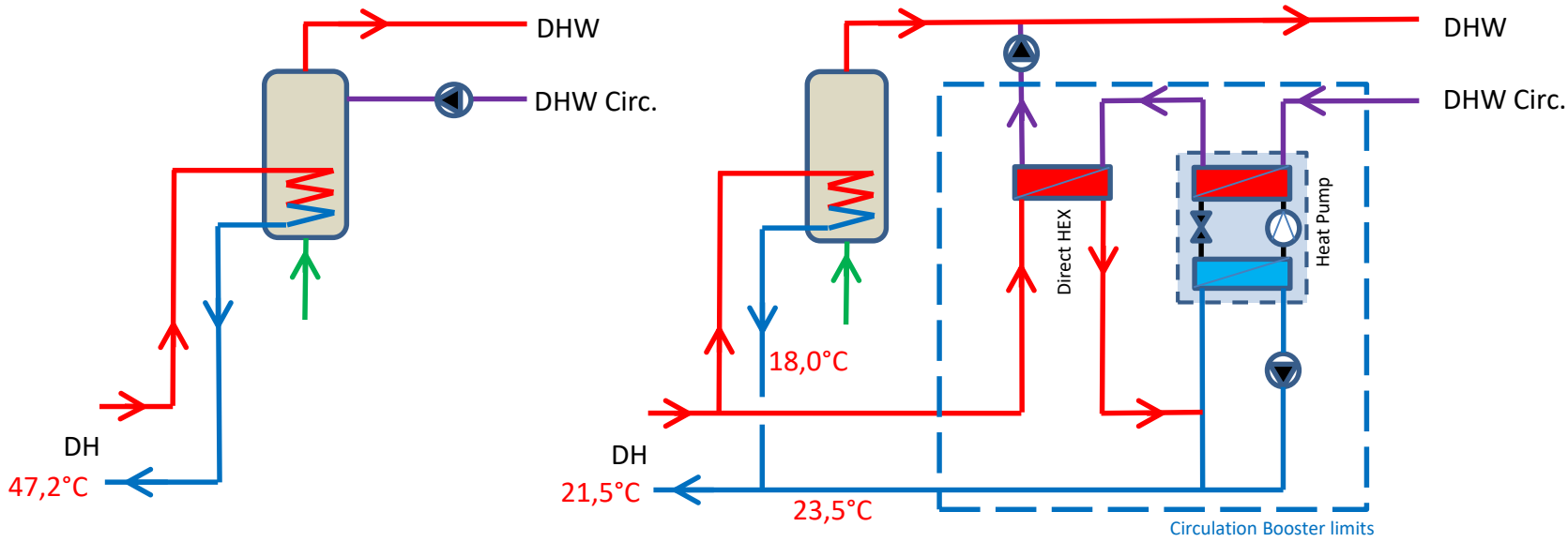
Heat Pump capacity more or less Constant, due to constant speed of HP and basically const. temperatures.
Yearly variations handled by direct heat exchanger

Electric share for heating up DHW circulation



Electric share of 19,3% representative for the year. Weighted by Circulation heat loss

Economic case of Circulation Booster:



Yearly DHW circ loss = 33,3 MWh/y (64%)
Yearly DHW production = 19,0 MWh/y (36%)

Typical DHW circulation loss for 5 pipe systems

For some installations share of DHW circulation loss even higher !

Income: Reduced DH return temperature, resulting in bonus from utility side

Expense: Investment & installation of Circ. Booster
Electric costs for running HP
Maintenance

Economic case of Circulation Booster:

Case 1:

Current tariffs:

T DH ret. bonus	7.110	DKK/y
Saved DH	4.252	DKK/y
Electric costs	12.018	DKK/y
Maintenance	500	DKK/y
Yearly Saving	-1.157	DKK/y
Inv. + Inst.	30.000	DKK
Simple pay back time	N.A.	years
Electricity	1.870	DKK/MWh
DH	662	DKK/MWh
T DH return bonus *	5,29	DKK/MWh/°C

*) 0,8% of DH price
**) 1,6% of DH price

Case 2:

Current tariffs + double T DH return bonus:

T DH ret. bonus	14.220	DKK/y
Saved DH	4.252	DKK/y
Electric costs	12.018	DKK/y
Maintenance	500	DKK/y
Yearly Saving	5.953	DKK/y
Inv. + Inst.	30.000	DKK
Simple pay back time	5,0	years
Electricity	1.870	DKK/MWh
DH	662	DKK/MWh
T DH return bonus **	10,58	DKK/MWh/°C

Case 3:

Current tariffs + reduced electricity tax

T DH ret. bonus	7.110	DKK/y
Saved DH	4.252	DKK/y
Electric costs	6.543	DKK/y
Maintenance	500	DKK/y
Yearly Saving	4.319	DKK/y
Inv. + Inst.	30.000	DKK
Simple pay back time	6,9	years
Electricity	1.018	DKK/MWh
DH	662	DKK/MWh
T DH return bonus *	5,29	DKK/MWh/°C

Conclusions

- The developed and tested Circulation Booster works as expected
- The DH return temperature is reduced from 47,2°C to 21,5°C
- Case 2 (double of DH return temperature bonus) results in a direct pay back time of 5,0 years
- Case 3 (low electric taxes) results in direct pay back time of 6,9 years
- A combination of case 2 and 3 results in a direct payback time of 2,6 years
- Further optimization potential of pay back time, due to optimization of system, e.g. COP and operation. This is in focus as next step

Thank You for the Attention…

Contact information
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Part of project:
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