Booster Heat Pump

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Netherlands Enterprise Agency / Entry Technology Support BV

Schematic
Drivers Booster Heat Pump

Drivers:
1. On the spot DHW preparation, reduction of distribution losses
2. 2nd law optimisation (dedicated heat pump operation, only for high (DHW) discharge temperatures)
3. Reduction of supply temperature, increased performance of source generator efficiency (e.g. Solar)
4. DHW preparation e.g. by space cooling

Reference: Alternatives Hot Water preparation

DANFOSS, LOW TEMPERATURE DISTRICT HEATING CONSUMER UNIT WITH MICRO HEAT PUMP FOR DOMESTIC HOT WATER PREPARATION, E.Zvingilaite et al.,
Decentralised Booster Heat Pumps

2 Configurations

- Heat source = district heating system
- Summer heat source = Building cooling system
Energy Performance Standard?

Key parameter: Equivalent Generation Efficiency for Hot Water, including district energy infrastructure (dei):

\[ \eta_{W; gen; equiv; tot} = \frac{\text{Total heat supplied @ Water heating system}}{\text{All primary energy needed (electricity + heat, incl loss)}} \]

\[ \eta_{W; gen; equiv} = \frac{\sum \sum Q_{W, dis, men}}{E_{W, el} \times f_{P, def, el} + E_{W, dh} \times f_{P, def, dh} + E_{W, aux} \times f_{P, def, el}} \]

Input:

1. Measured performance of Booster heat pump
2. Temperature level and generator efficiency of district heating system, including losses
3. Hot water demand
4. Optional: Cooling load of the building
Booster heat pump efficiency, with and without building cooling, depending on district heating generation efficiency, for $A_g=150$ m², COP=4.04 @14000 MJ.
Optional bonus (Free cooling):

Conclusions:

1) Calculation procedure Booster heat Pump established & effectively standardised
2) Effect on Energy Performance identified
3) Including summer cooling
4) Booster Heat Pumps now on the market
Closure

With acknowledgment to:

Thanks for your attention
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