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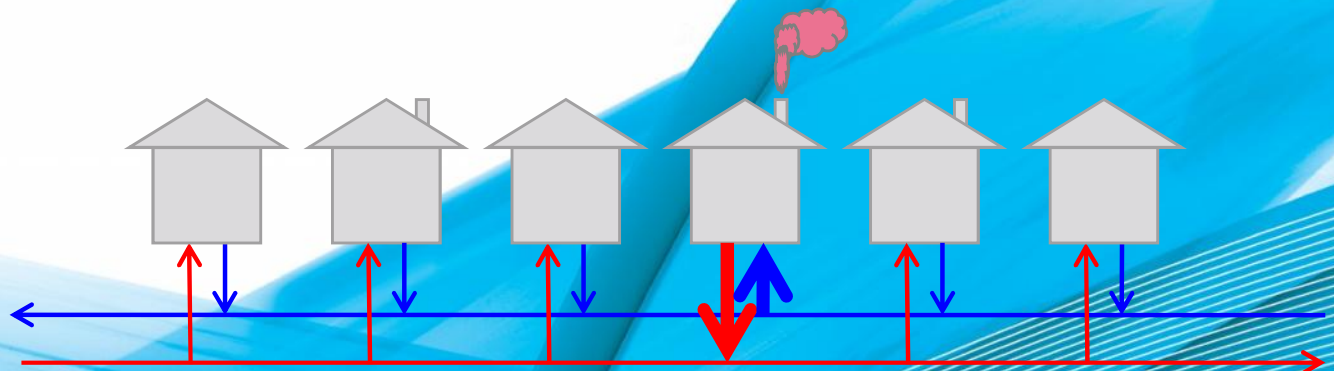
Department of Material Sciences and Process Engineering

Decentralized Bi-directional integration of Heat Grid customers:

Implementation concept in the heating network of the community Großschönau

Andreas Leitner



Overview

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- **State of the art - local heat grid**
- **Grid analysis**
- **Potential Prosumers** (**Pro**ducer/ Con**sumer**)
- **Implementation concept**
- **Examples of Prosumer implementation**
  - Solar plant by using a heat pump
  - Commercial waste heat by using a heat pump
- **Summary**

State of the art - local heat grid

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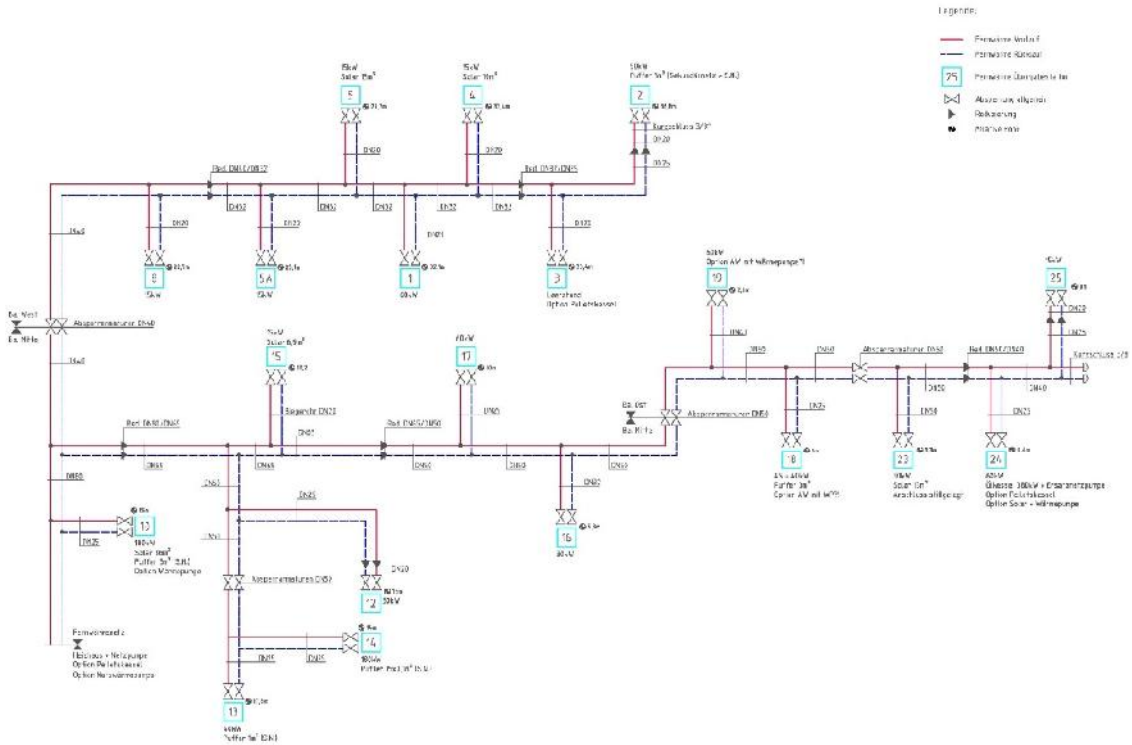
- **Main wood chip boiler 500kW**
- **Oil top load tank (backup) 320 kW**
- **Flow 70/90 °C; Return 40/50 °C**
- **20 consumer heat transfer stations**
- **2 (3) main supply lines**
- **Optical waveguide →**

  Calculation heat consumption



Grid analysis

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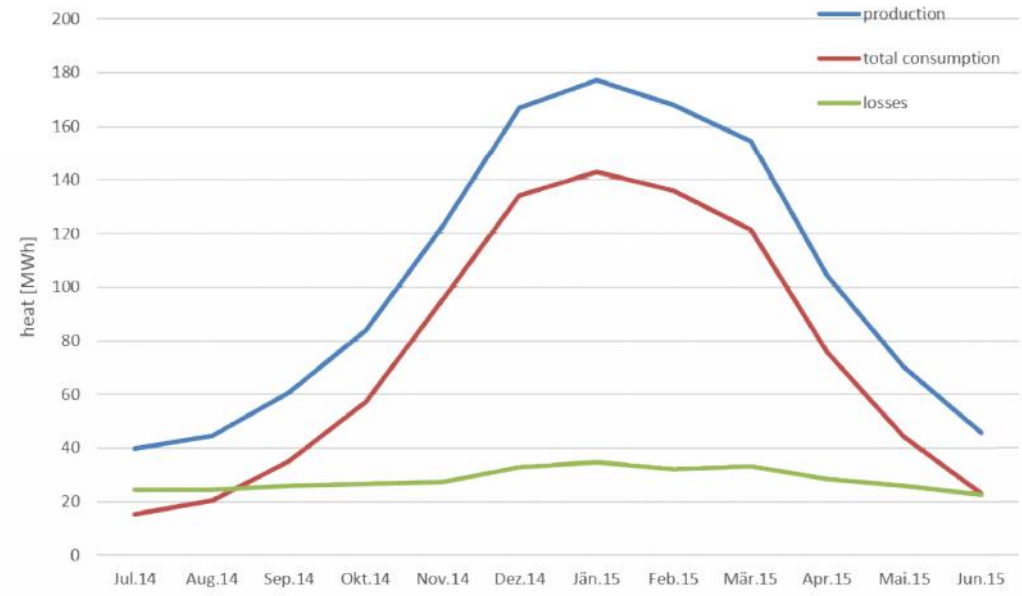
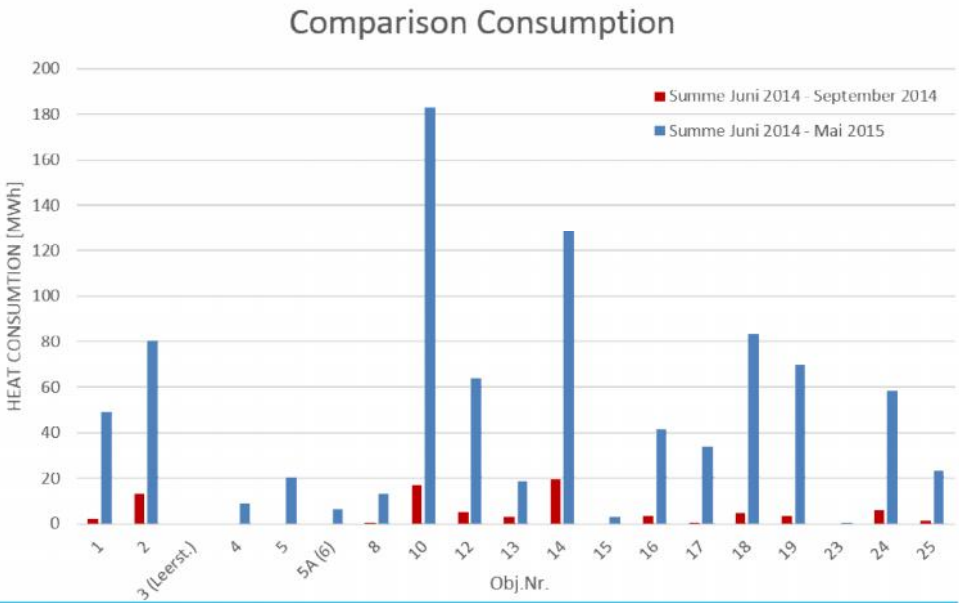


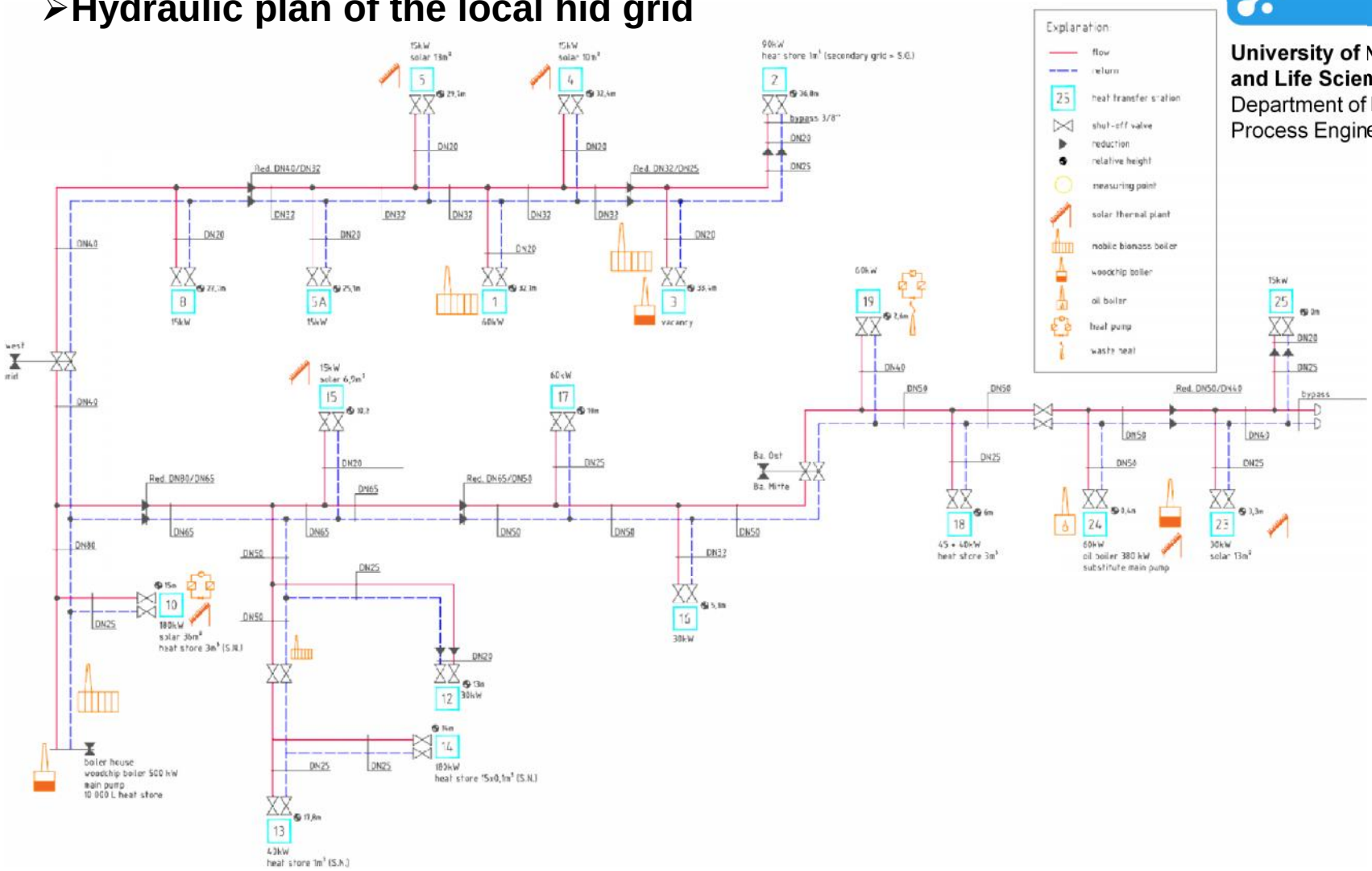
- **Low boiler load in summer → bad boiler operating conditions**
- **High energy losses**



- **5 consumer 75% consumption in summer → field monitoring**
- **peak load: 30 - 70kW**
- **Average heat coverage: 5 - 10kW**

Potential Prosumers

➢**Hydraulic plan of the local hid grid**



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Implementation concept BiNe2+

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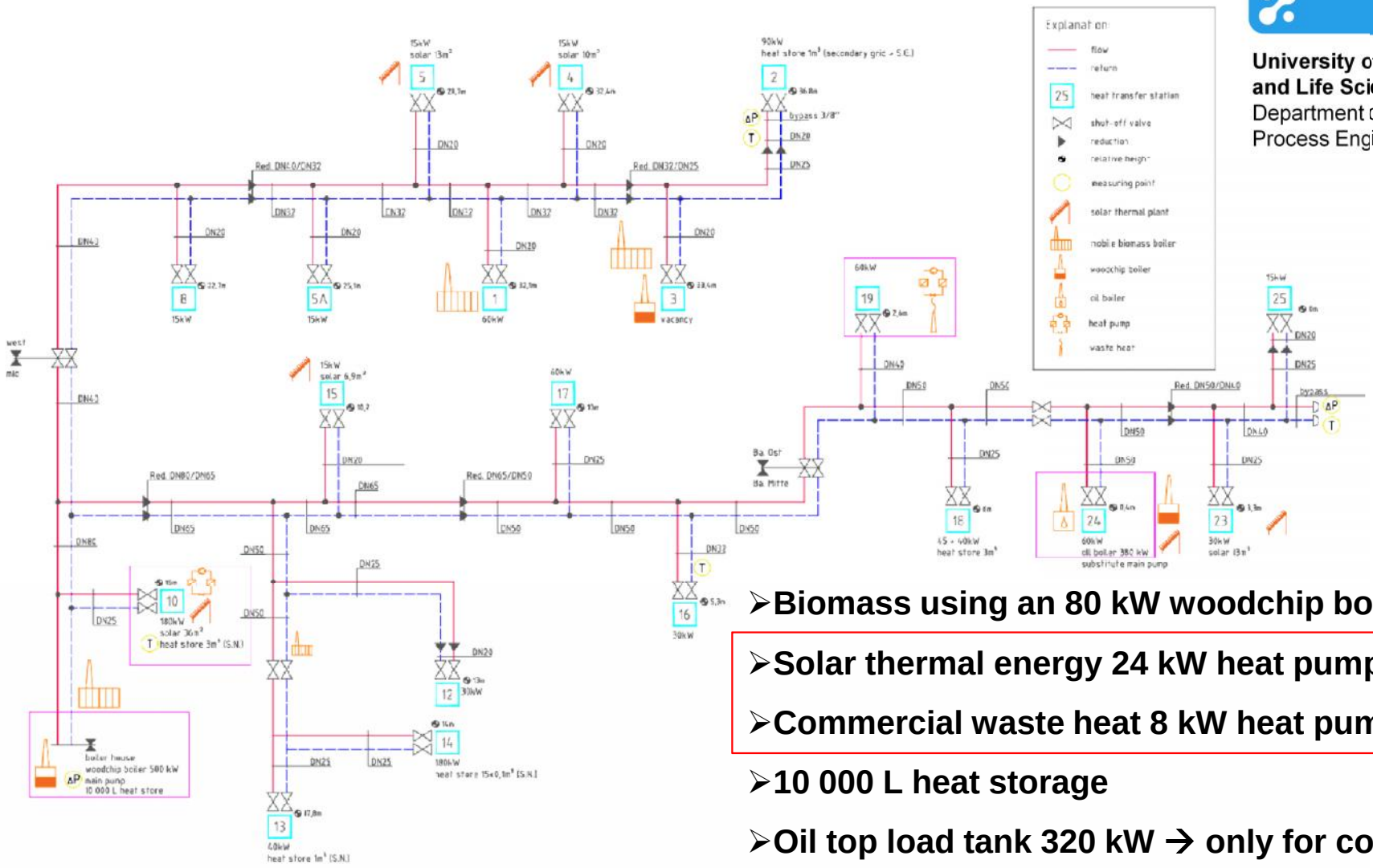

- **Biomass using an 80 kW woodchip boiler**
- **Solar thermal energy 24 kW heat pump**
- **Commercial waste heat 8 kW heat pump**
- **10 000 L heat storage**
- **Oil top load tank 320 kW → only for cold snaps**

Solar plant

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- **36 m² solar thermal plant**
- **Community building → school and event center**
- **3000 L heat storage**
- **Solar output used for hot water and heating in the transition period**
- **Heat can only be used partly → field Monitoring**

- **Integration by using a 24 kW heat pump**
- **Feed temperature 70-90 °C**
- **Use the existing heat storage**

Solar plant

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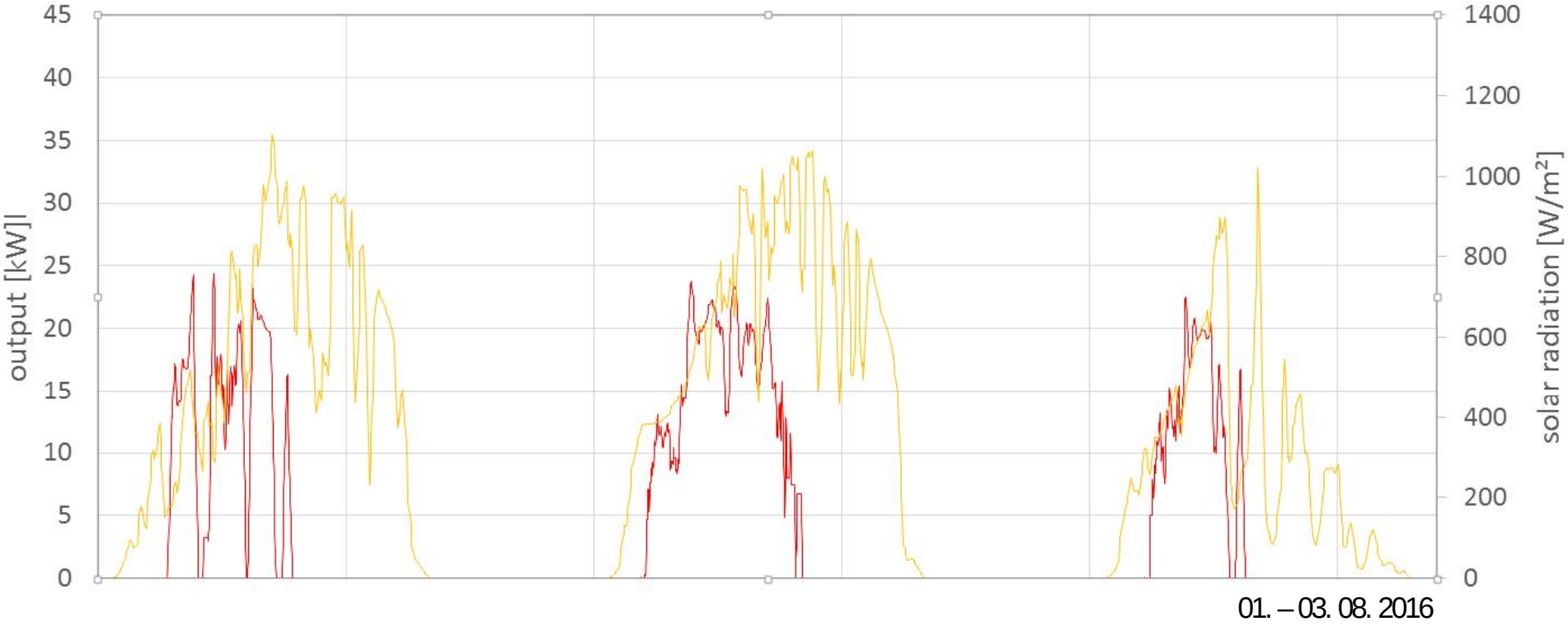
- **Comparison solar radiation / solar plant energy output**



Solar plant

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- **Why implement the solar plant by using a heatpump?**

	direct feed in		feed in by using a heatpump		
radiation [W/m²]	avr.Coll.T. [°C]	heat output [kW/m²]	avr.Coll.T. [°C]	heat output [kW/m²]	output increase [%]*
600	75	0,23	40	0,41	78
900	75	0,45	40	0,63	40
1200	75	0,68	40	0,88	29
600	90	0,12	50	0,35	191

* without el. HP Power

Solar plant

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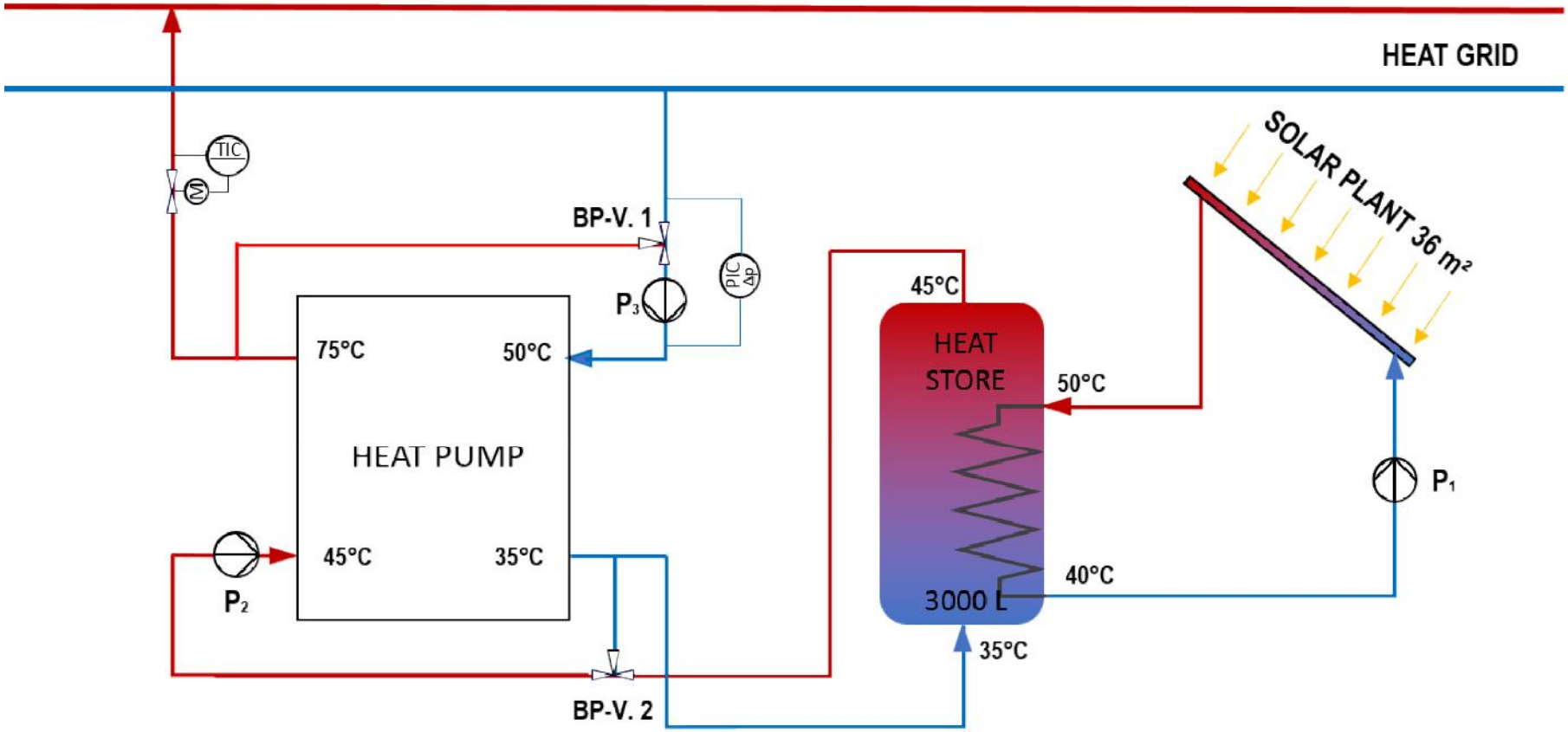
- **Implementation concept**



Commercial waste heat

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- **Unused waste heat from two refrigerating plants of a company**
- **Waste heat is now discharged via table cooler**
- **Cooling capacity of the refrigerating plants**
  → 3 kW + 10 kW

- **Integration by using a 8 kW heat pump**
- **District heating feed temperature 70 - 90 °C**
- **Heat store to damp the fluctuating waste heat**
- **Field monitoring**

Commercial waste heat

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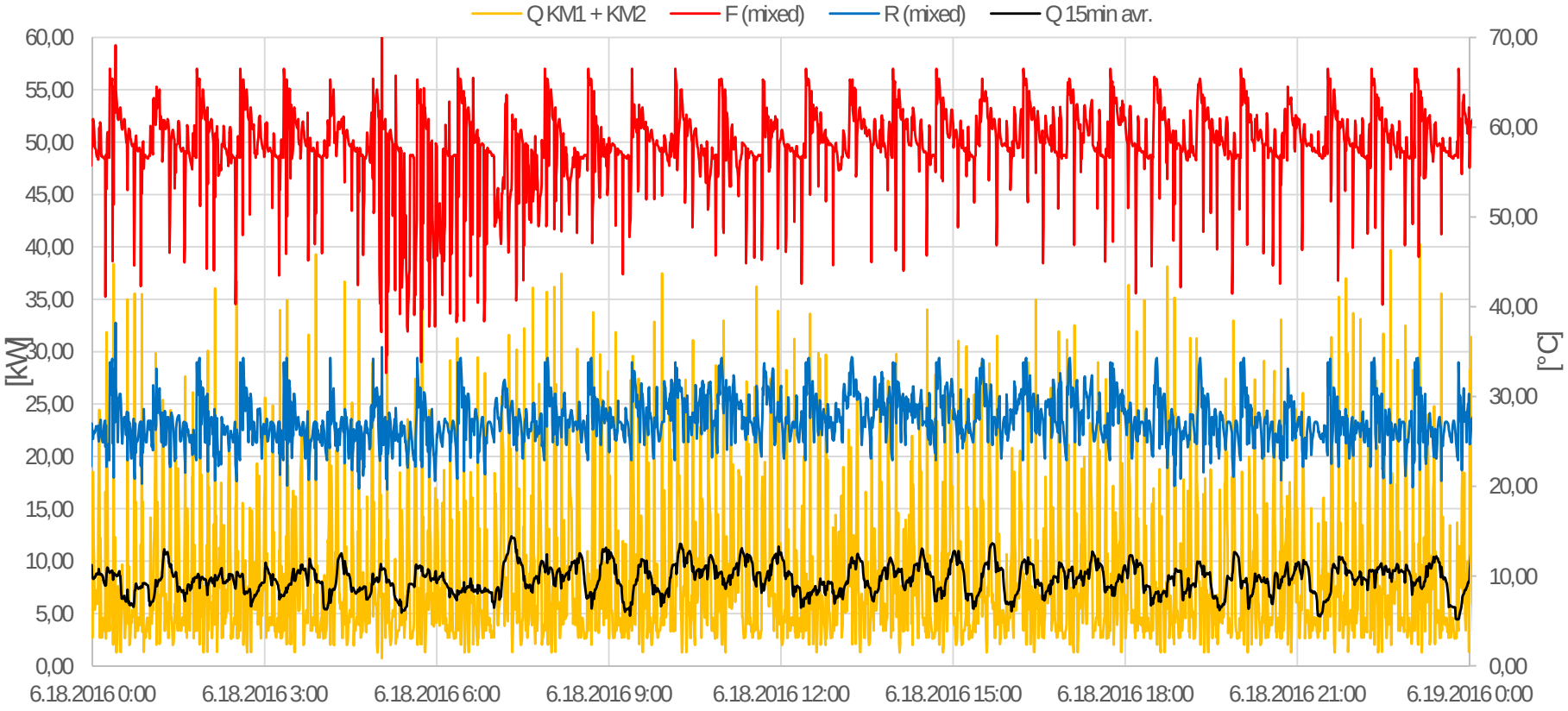
➢ Analysis field monitoring



Commercial waste heat

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- **Simulation heat store charge condition**

Commercial waste heat

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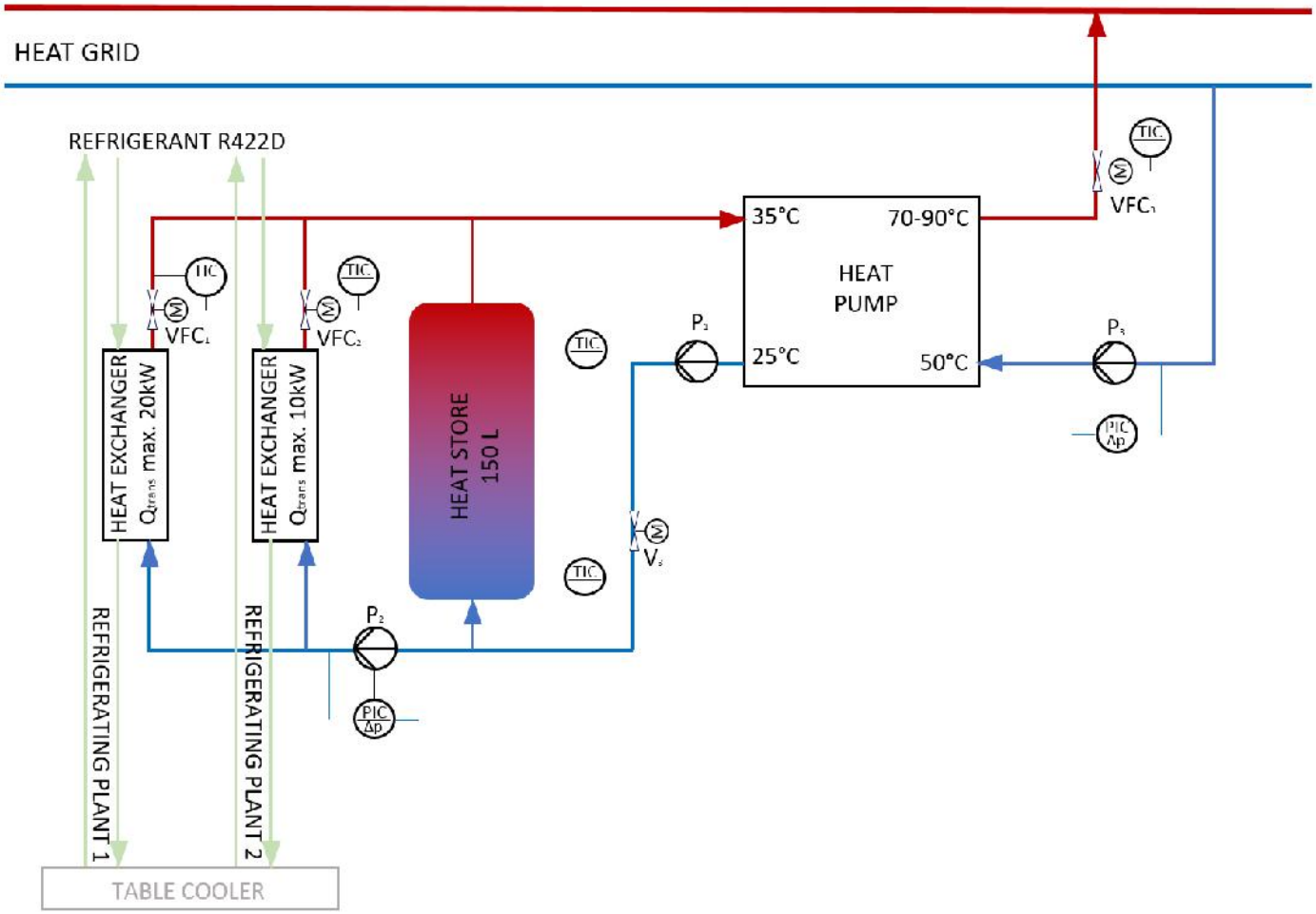
➢ Implementation concept



Summary

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- **To integrate decentralized heat location independent: return line → flow line**
- **Individual implementation concepts necessary → standardization possible**
- **Field monitoring and simulations essential step**
- **Unused heat can be found even in a small district heating network**
- **Potential to increase energy efficiency, reduce emissions and reduce overall costs and fuel consumption**

- **High requirements and complexity on the control concepts of the decentralized heat producers: hydraulic balancing, monitoring of supply and demand, business models**

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Further Partners: