Data-driven analysis of energy efficiency and optimization potentials in a local low temperature district heating and cooling system

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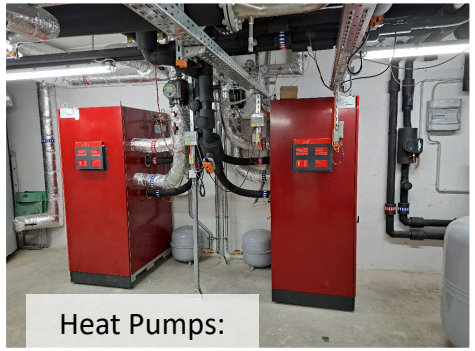


Image 1, New buildings A-F (left) and existing buildings (right): PlanungsgruppeDREI, Darmstadt

Images 2-5: M. Großklos / IWU

SUMMARY PROJECT „M-SWIVT“

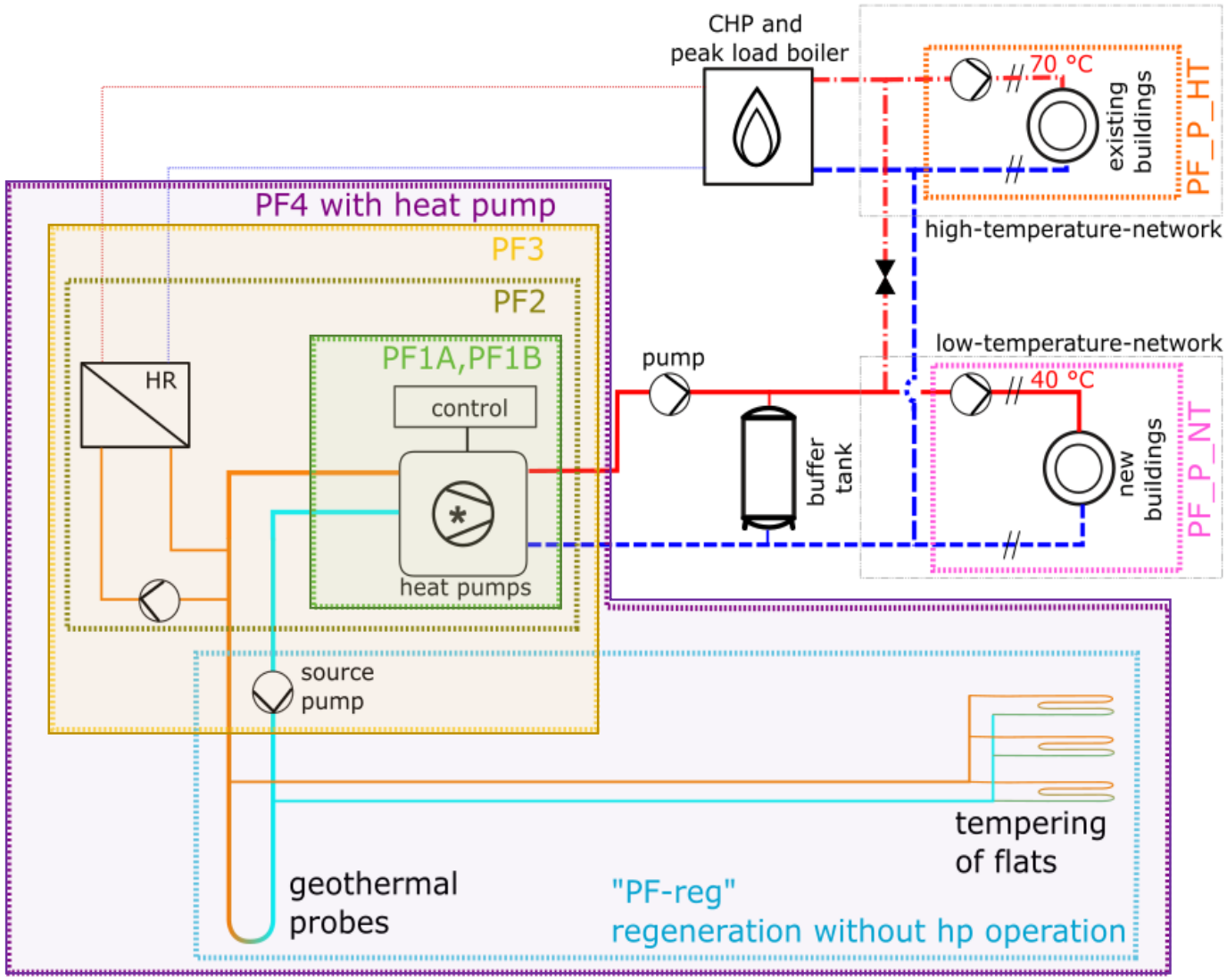
- Operational optimization in a district heating network using real monitoring data.
- Existing buildings achieved ~25% reduction in heating demand, New buildings meet expected heat demand.

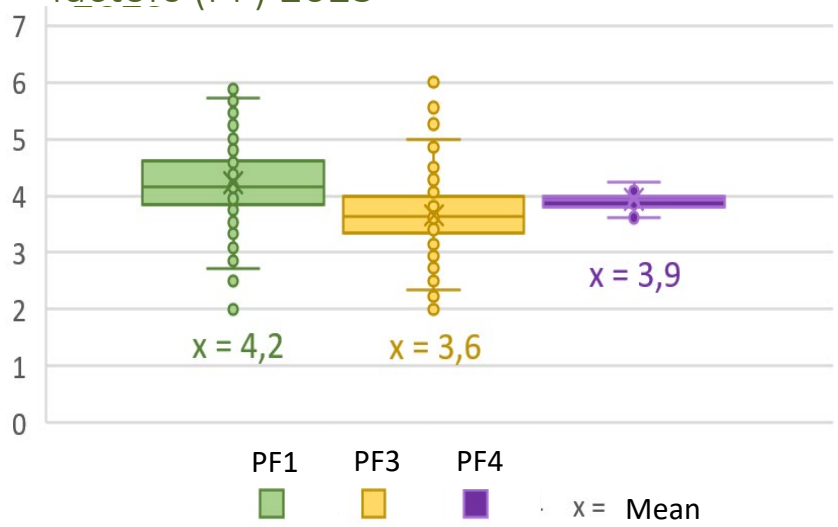
Optimization Potentials:
- Auxiliary electricity check
- Stategy Operation Heating/Cooling in transition periods

METHODOLOGY

- High-resolution monitoring data analysed at system level.
- Time-series analysis with interpolation of short data gaps; extended outages excluded.
- Assessment of performance indicators under different system boundary definitions.
- Evaluation of energy, flow and temperatures of system components.

EVALUATION





Starts per year at minimum runtime 30 min:

	Heat Pump 1	Heat Pump 2
2024	1747	1679
2025	1718	1719

RESULTS

- Performance assessment strongly depends on system boundary definition.
- Main potential for further optimization likely lies in the auxiliary pumps within the distribution system.
- PF 3.6-4.2 highlighting boundary sensitivity and aux. electricity consumption.
- Adapted hysteresis control stabilizes operation and improves efficiency during heating/cooling transitions.

CONCLUSIONS

- Integration of multiple heat sources significantly enhances district system performance.
- Efficiency gains through synergy between existing and new buildings.

- Auxiliary pumps offer optimization potential.
- Optimization potential lies in systematic adjustment of hydraulics, flow rates, and setpoints, particularly during transitional periods.

Thank you! For questions or further information, please contact us.

Project overview: **www.iwu.de/forschung/energie/m-swivt/**

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