
Project MoniGeoFluid

Fluid Monitoring in Low Temperature District Heating/Cooling Networks

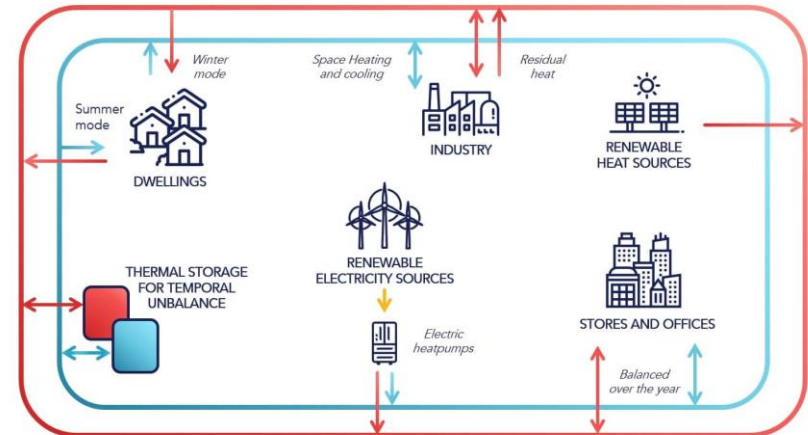
01

Introduction to Low Temperature District Heating and Cooling Networks

Low Temperature District Heating and Cooling Networks

- These networks carry a heat conveying liquid at a temperature not directly usable for heating.
 - Supply and return temperatures $\sim 10..25^{\circ}\text{C}$
 - Insulation of pipes is not necessary (cost reduction)
- Heat pumps connected to the network use it as energy source for heating, chillers as source for cooling
- Distributed thermal storage buffers fluctuations in supply and demand of heat and cold.

 Floating warm and cold water temperatures



Source: <https://5gdhc.eu/>

Goal:

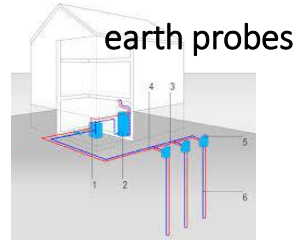
- Exchange of thermal energy between buildings with different needs.
- Maximizing the share of low-grade renewable and waste energy sources.

Heat Sources and Heat Sinks



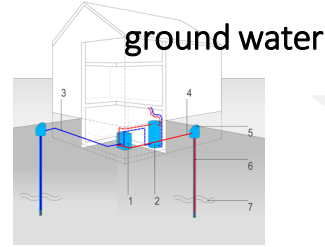
ground collectors

Source: Doppelacker



earth probes

Source: baukobox.de



ground water

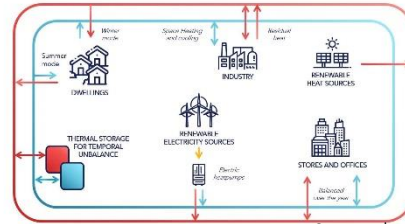
Source: baukobox.de



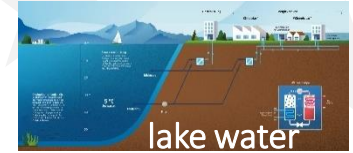
waste water

Copyright: Stadtwerke Bochum / source: waermpumpe-regional.de

Flüssigwasser und kaltes Regenwasser



Source: <https://5gdhc.eu/>



lake water

Source: Gersau Sewasser Energie



solar collectors (PVT)

Source: MEFA.de



facade absorbers

Source: MEFA.de



data centers

Source: Rittal



process waste heat

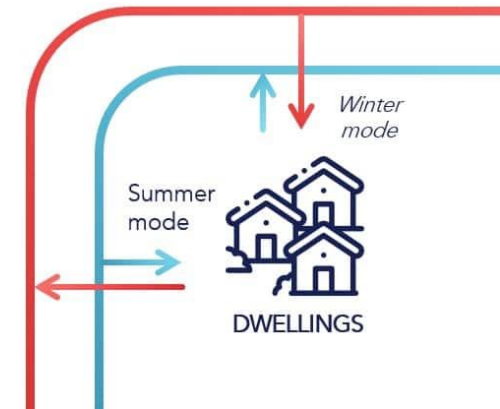
Source: Thermofin.de

Challenges for Energy Measurement

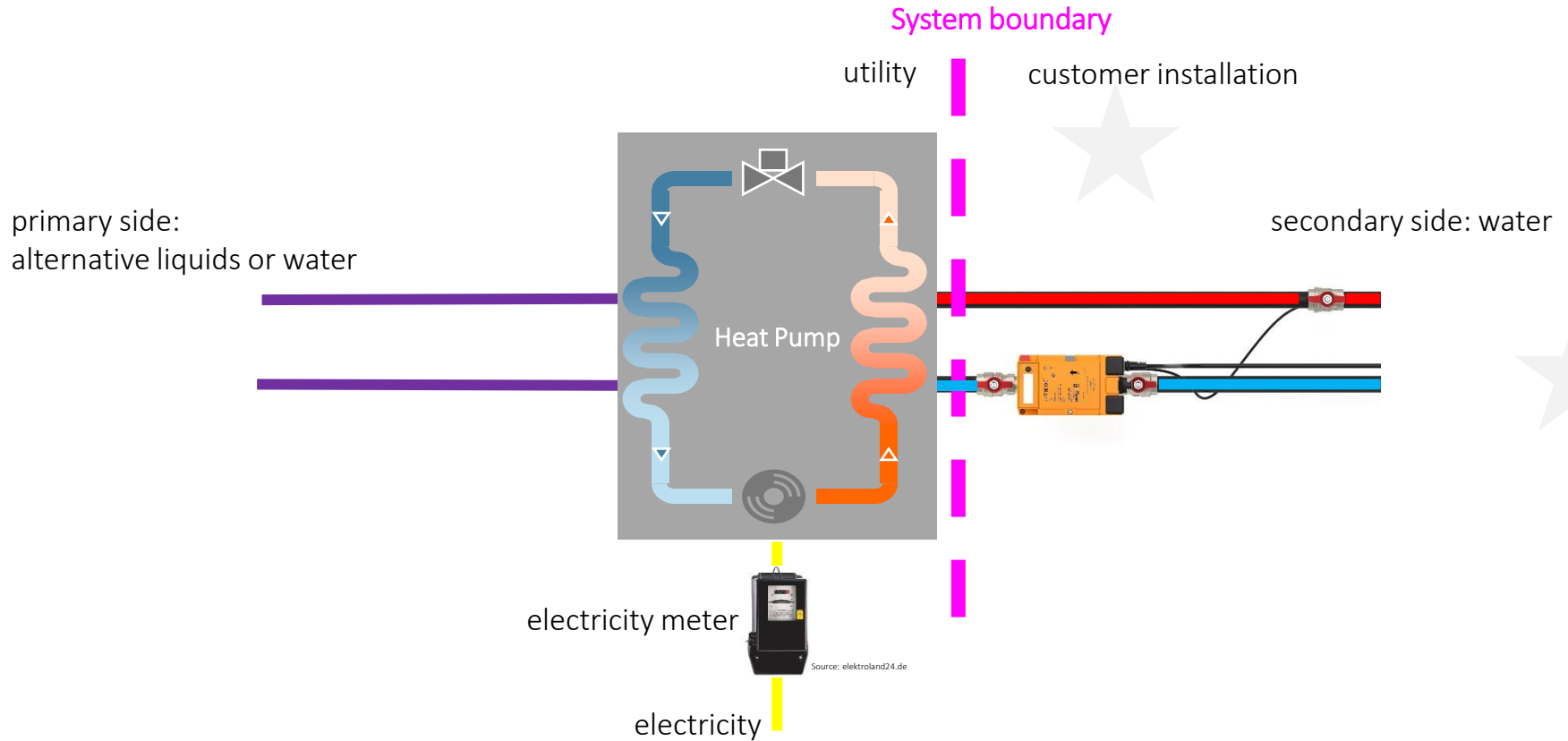
- Customers are connected via (reversible) heat pumps
 - Connected stations can be heat source or heat sink or both
 - Systems may run on water or other liquids
 - Currently no MID approved thermal energy meters available for billing with other liquids
- Energy measurement on secondary side in water loop



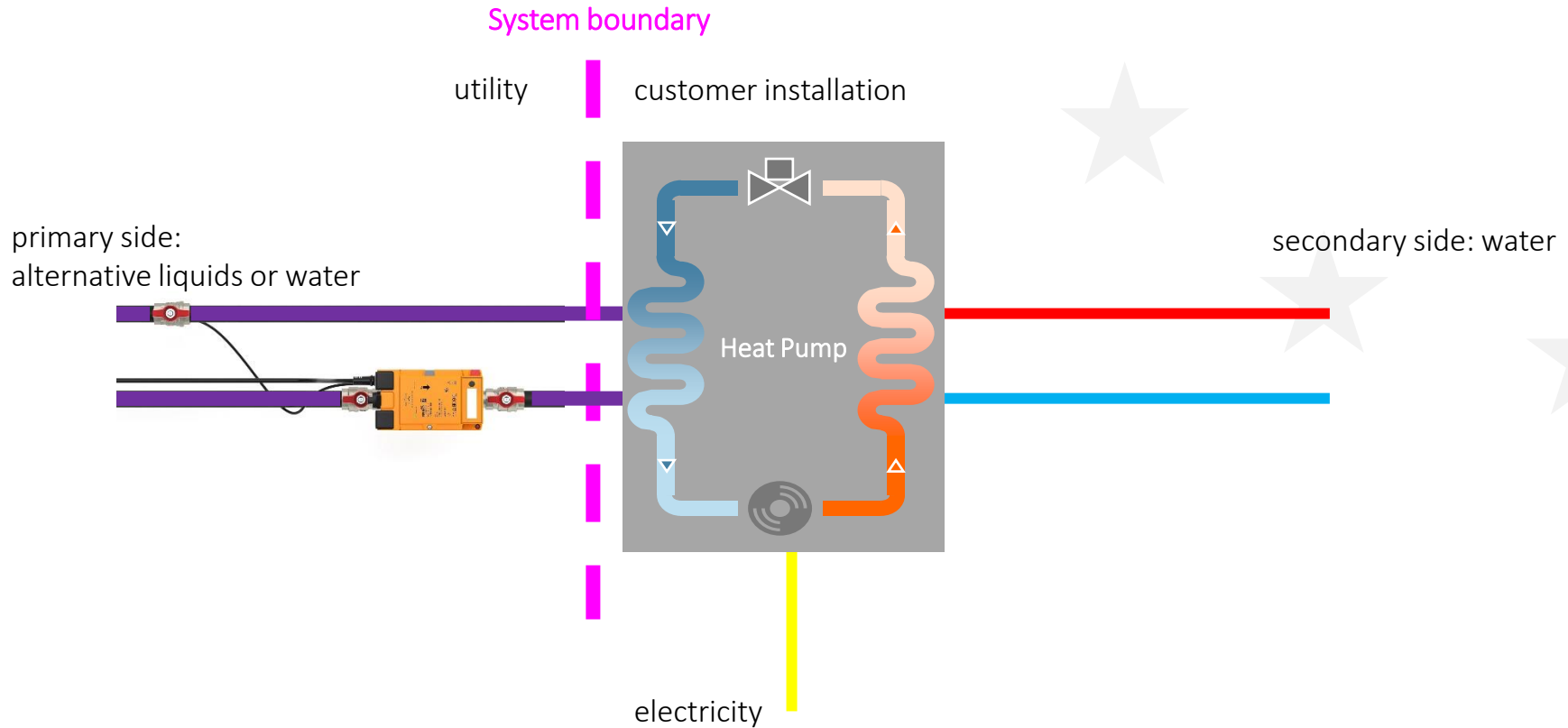
Floating warm and cold water temperatures



Energy Measurement (today)



Energy Measurement (wish)



Required Accuracy from Application View

- +/-10% are feasible, better is nice to have
- Cost for thermal energy metering should be reasonable
- Approval is important

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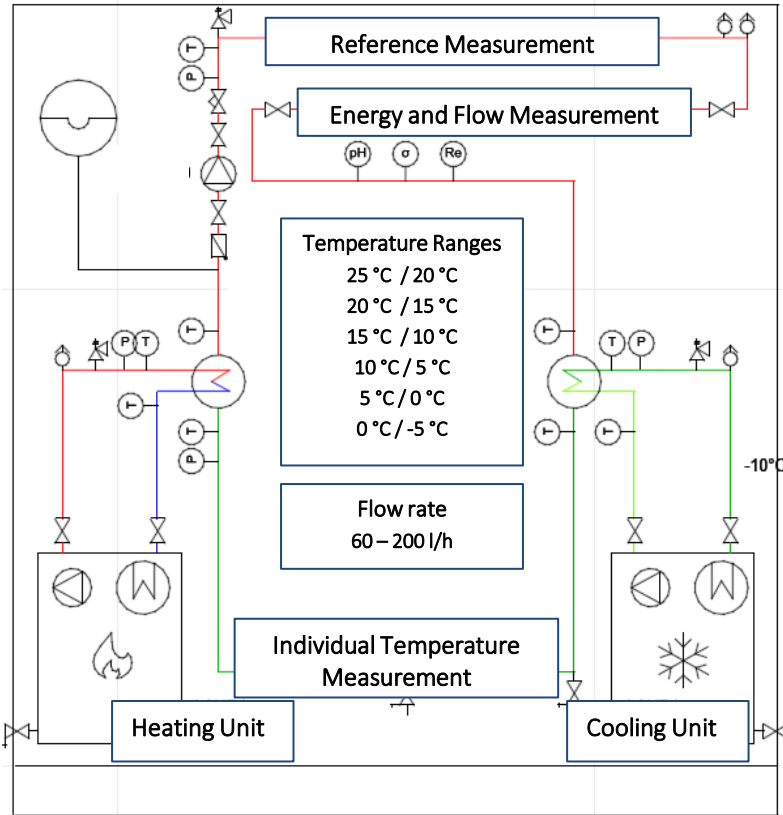
- submitted under the 29th call of the IraSME program, brings together a German-Austrian consortium to develop and implement advanced monitoring systems for geothermal installations
- collect data, verify system performance with different heat transfer fluids, and integrate a wireless early warning system, ultimately assessing scalability for broader applications in cold local heating networks
- Construction of a test bench to evaluate various heat meters for analyzing the recorded heat quantities with different heat transfer fluids
- Prototype installation in real-world environments



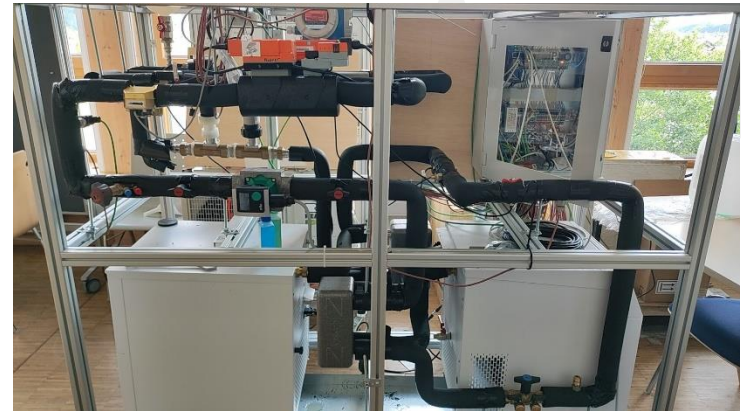
Wasserbehandlung nach Maß



Test bench for heat meters with different heat transfer fluids



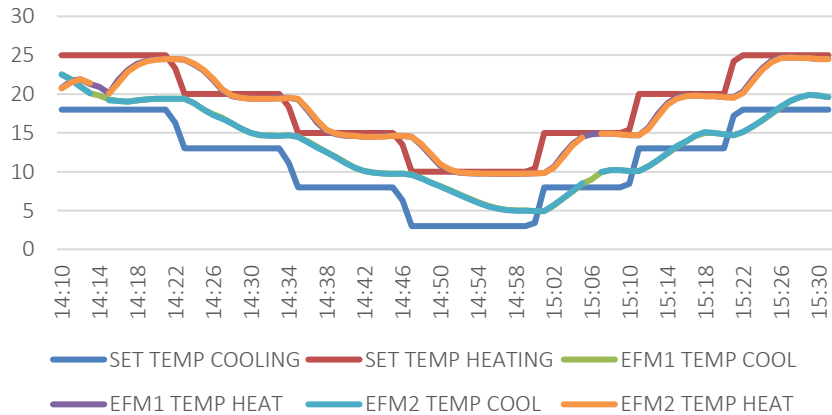
- 4 different heat meters
- 12 different heat transfer fluids
- Reference measurement with Coriolis meter



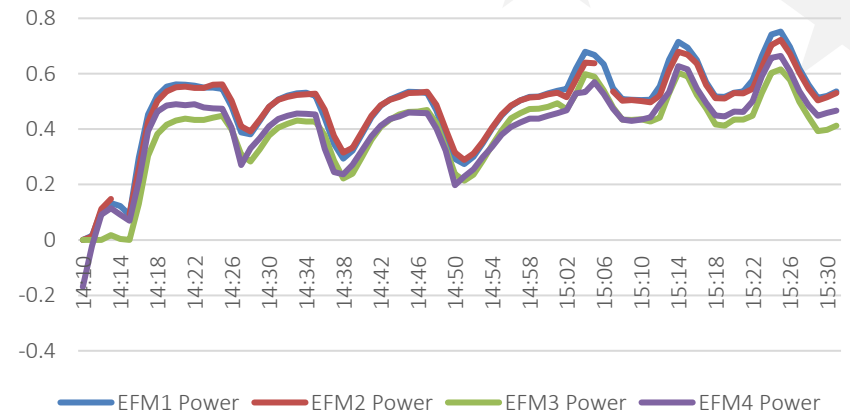
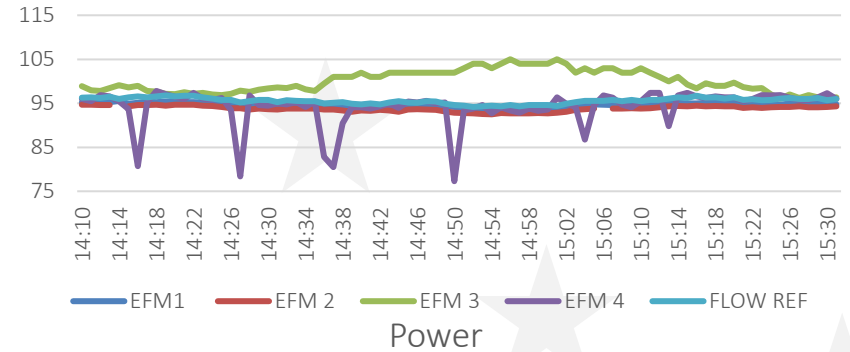
Test bench for heat meters with different heat transfer fluids

- Fluid: Water
- SETPOINT Flow: 100 l/h
- Time period : 10 min

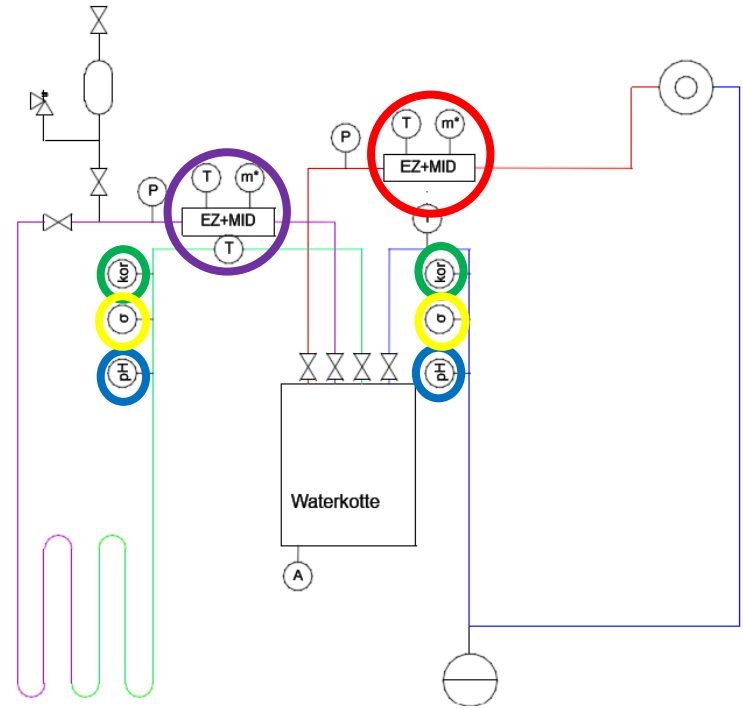
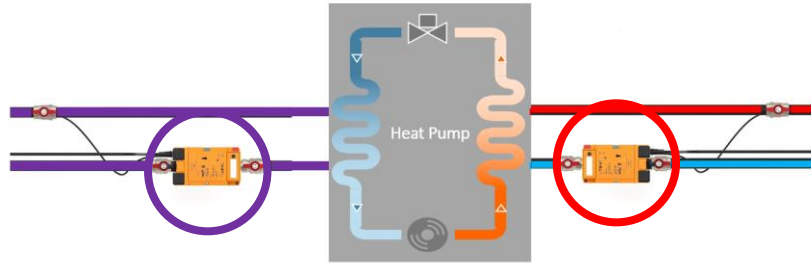
TEMPERTURE



FLOWMETER



Implementation in apartment building and single-family house



Further Steps and Outlook



- Carrying out the remaining tests on the test bench
- Verifying the glycol compensation of the energy meters
- Determination of the measuring accuracy via the heat period between the source and consumer circuit
- Description and testing of sensors for a possible early warning system
- End of project 05/2025



Wasserbehandlung nach Maß





EMATEM

European Metrology Association
for Thermal Energy Measurement