Sector coupling of electricity and heat through smart district heating networks

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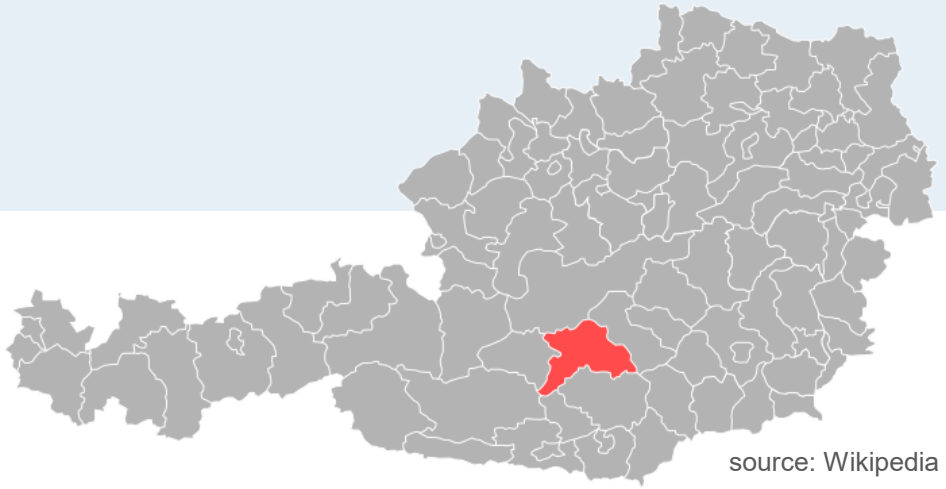
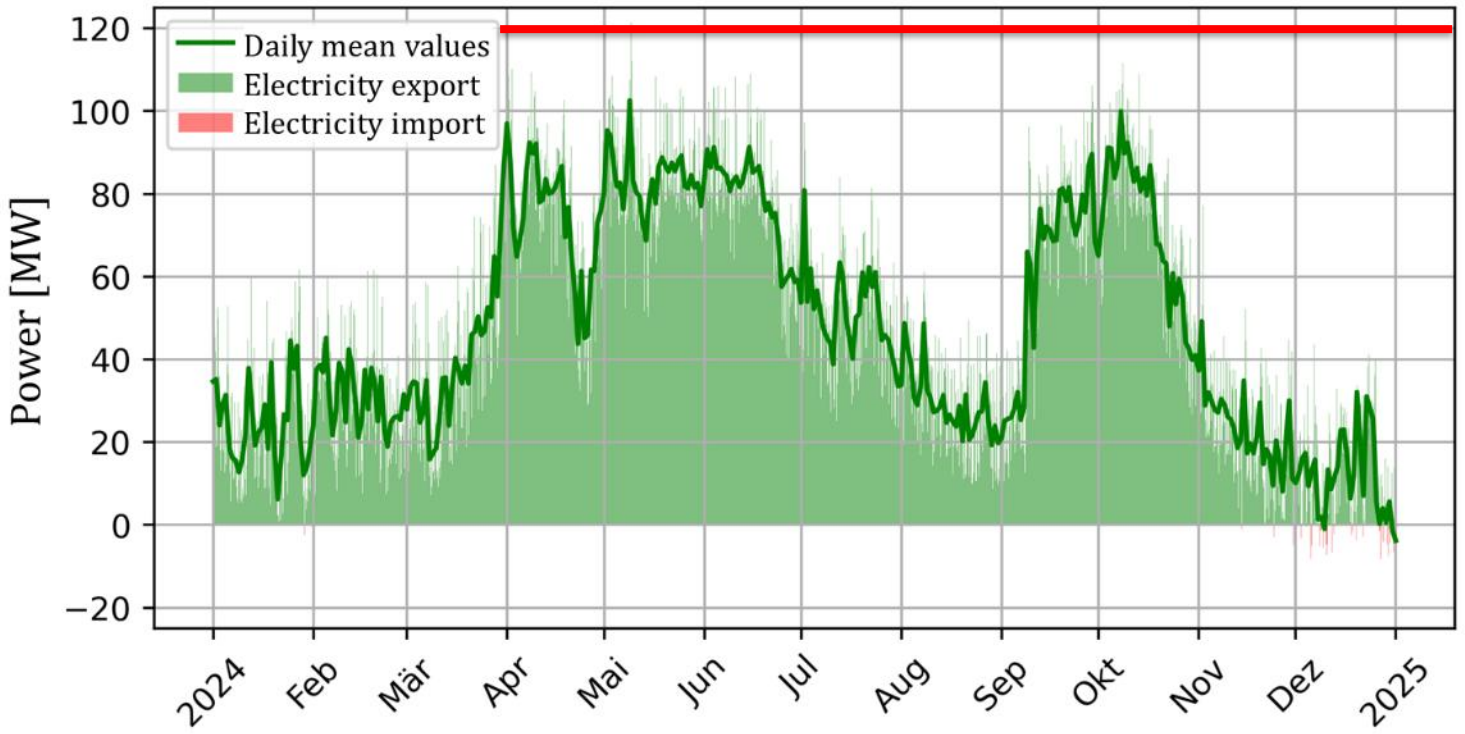
Electricity generation in Murau



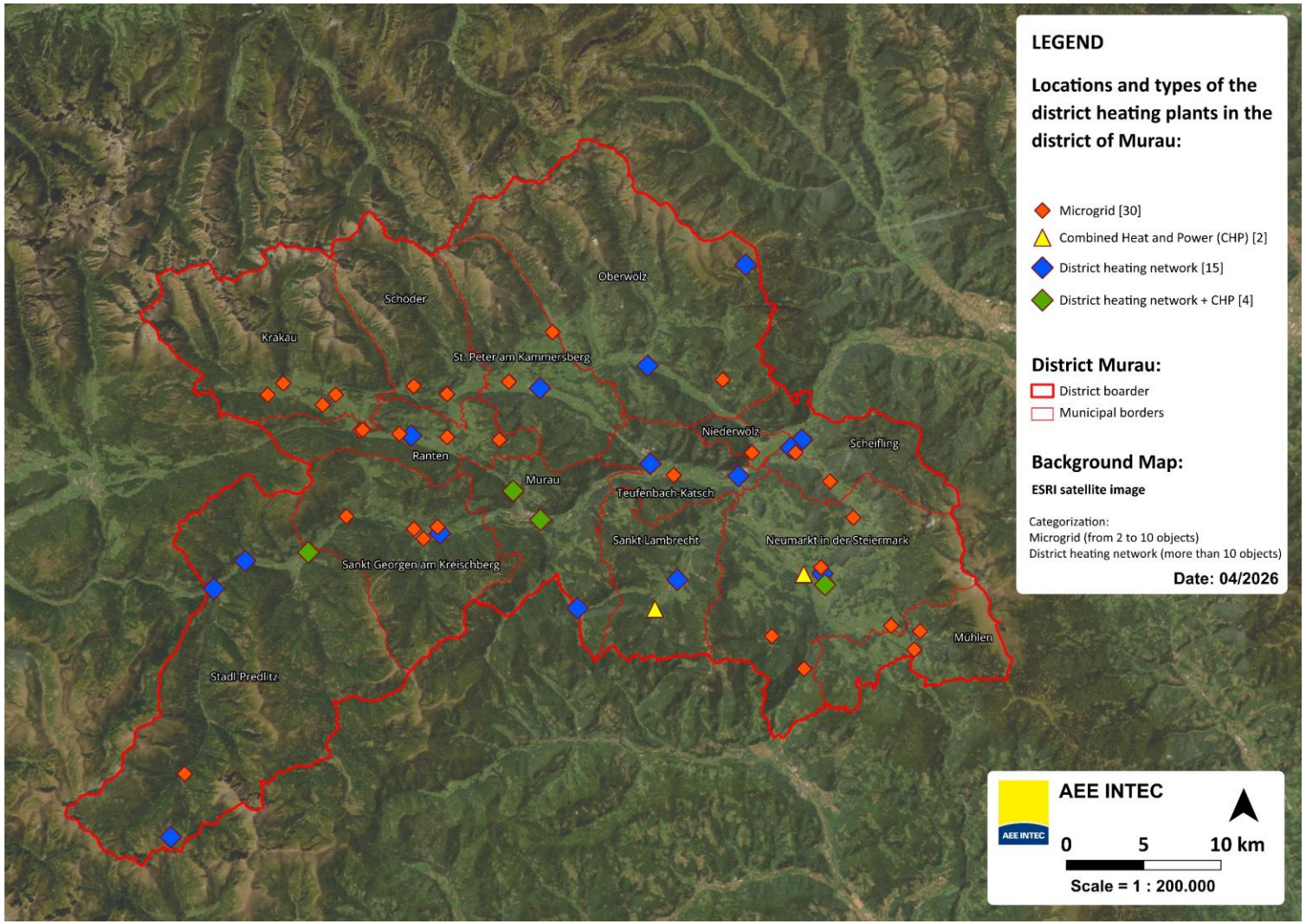
source: Wikipedia

- Production mix (2020)
  - 89 hydropower plants: 88,5 MW_{el}
  - 10 wind plants: 32 MW_{el}
  - ~1700 PV-plants: 22,5 MW_{el}
  - 7 biomass CHP plants: 3 MW_{el}
- Excess electricity – especially in summer

source: Montanuniversität Leoben



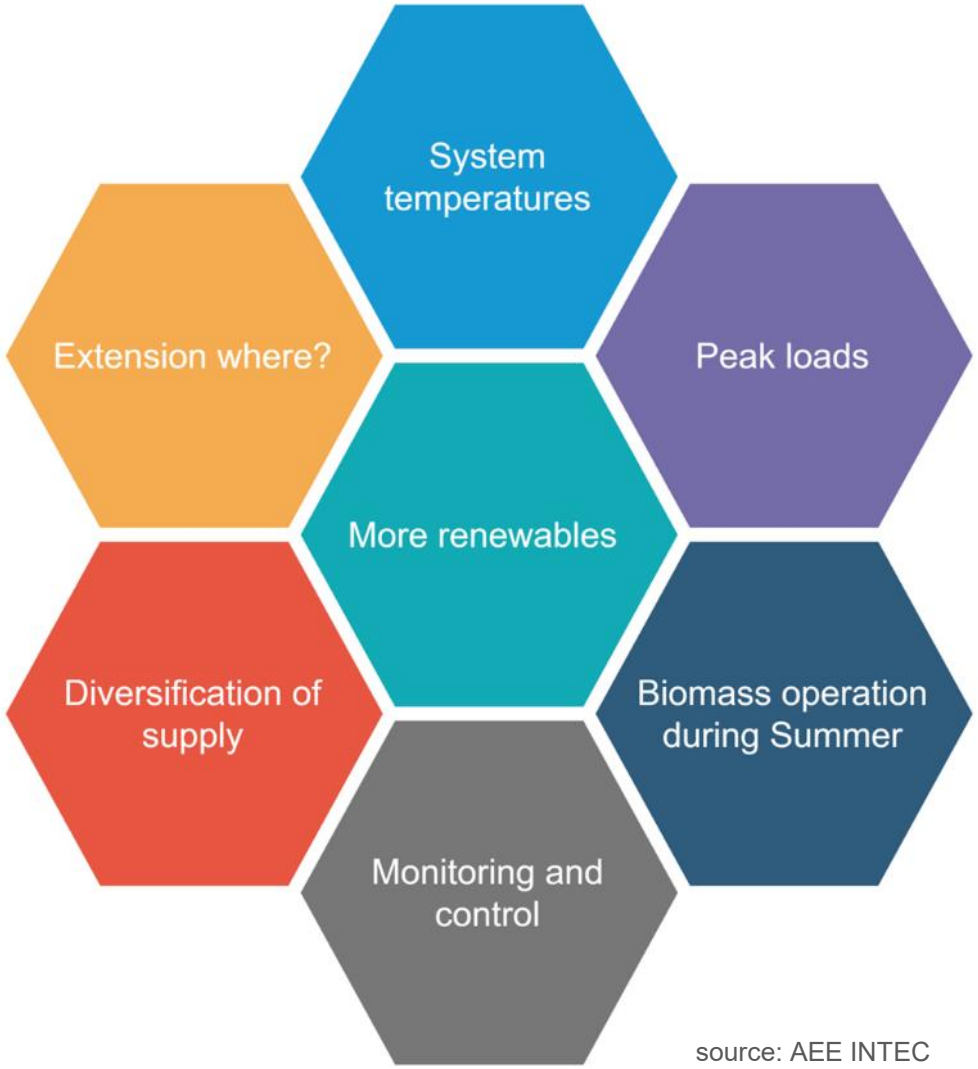
District heating plants in Murau



source: AEE INTEC

- 51 DH plants
- Main fuel: biomass
  - Thermal capacity: ~ 52 MW
  - Electric capacity: ~ 3 MW

District heating systems
Main challenges and future needs

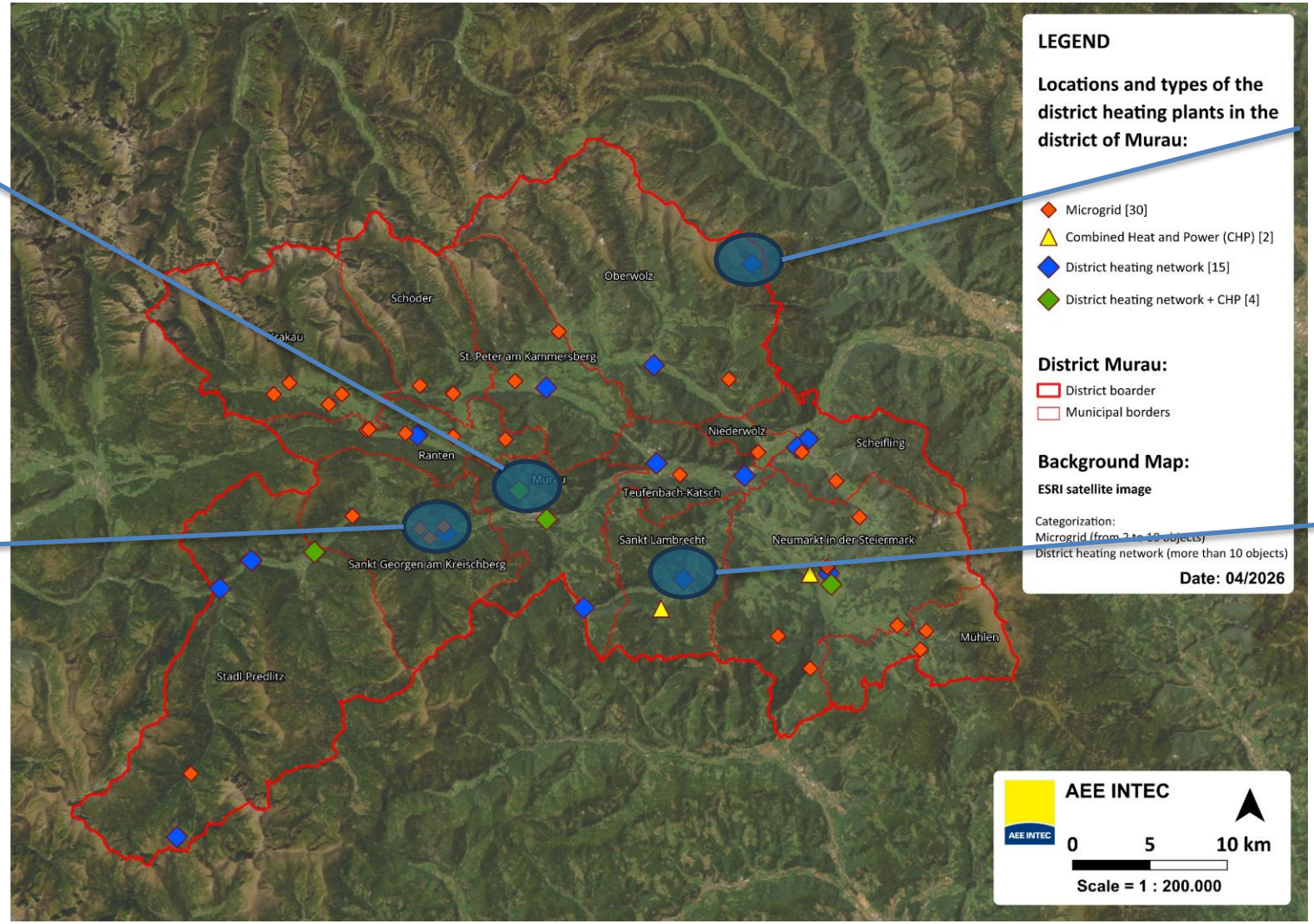


source: AEE INTEC

- Increased flexibility and system efficiency, via sector coupling technologies such as P2H, heat pumps, or CHPs
- Reduction of fossil energy share and integration of regional renewable energy sources and waste heat
- Increase system efficiency to conserve existing biomass resources

Demonstrators

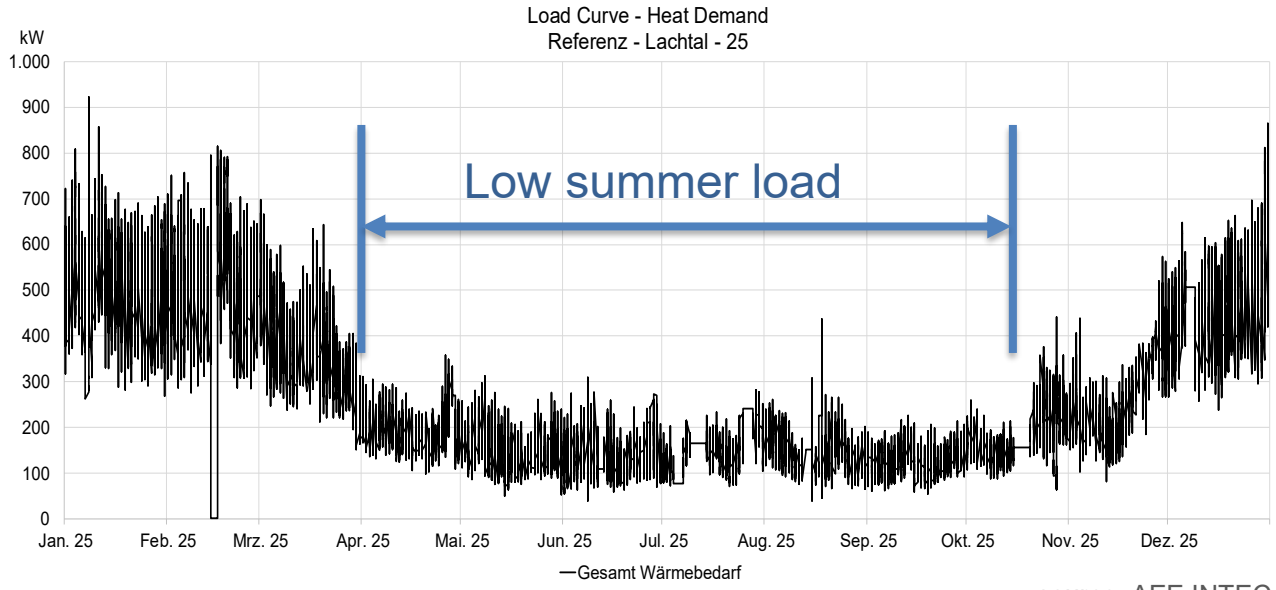
- **Murauer Stadtwerke**
- Biowärme St. Georgen ob Murau
- **Biowärme Lachtal**
- WLG St. Lambrecht



source: AEE INTEC

Lachtal

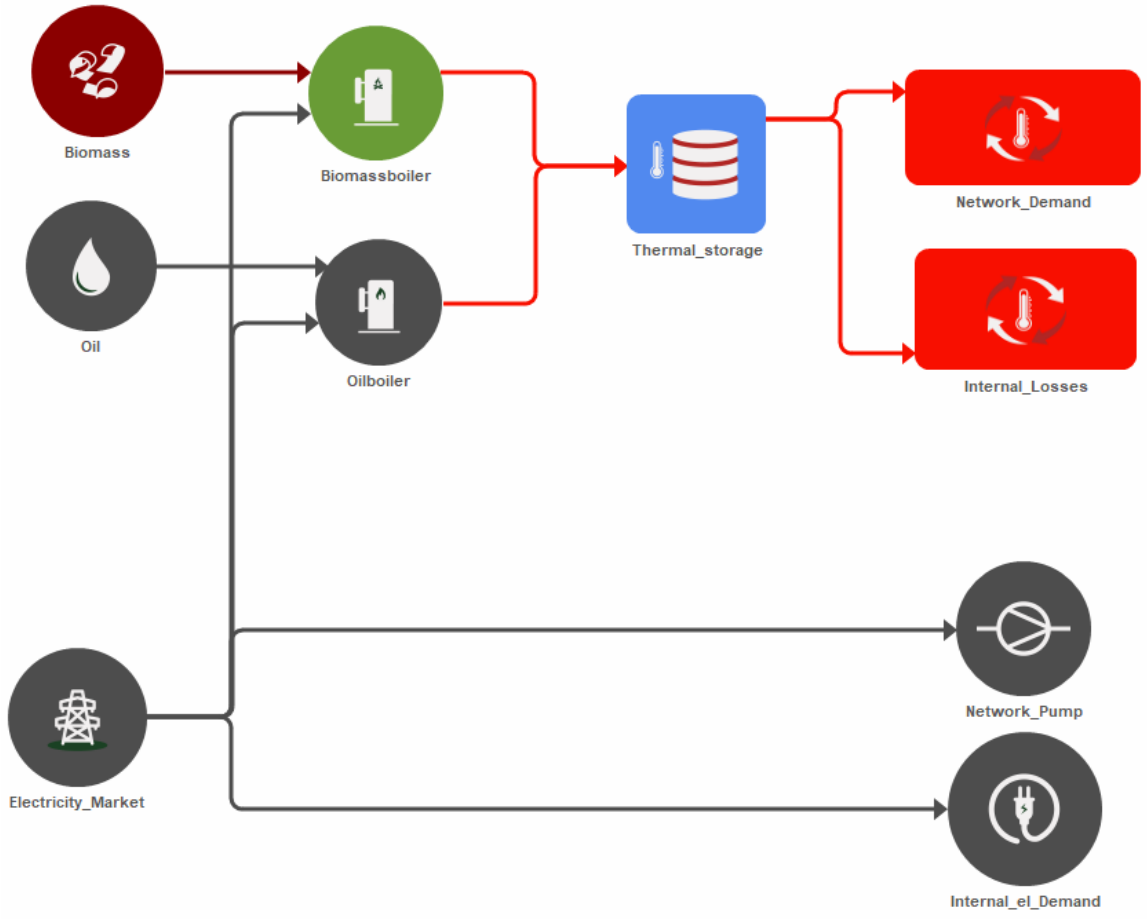
- Small DH system
  - 21 customers
  - 2,1 GWh/year
  - 1 MW biomass boiler, 1 MW oil boiler



source: AEE INTEC

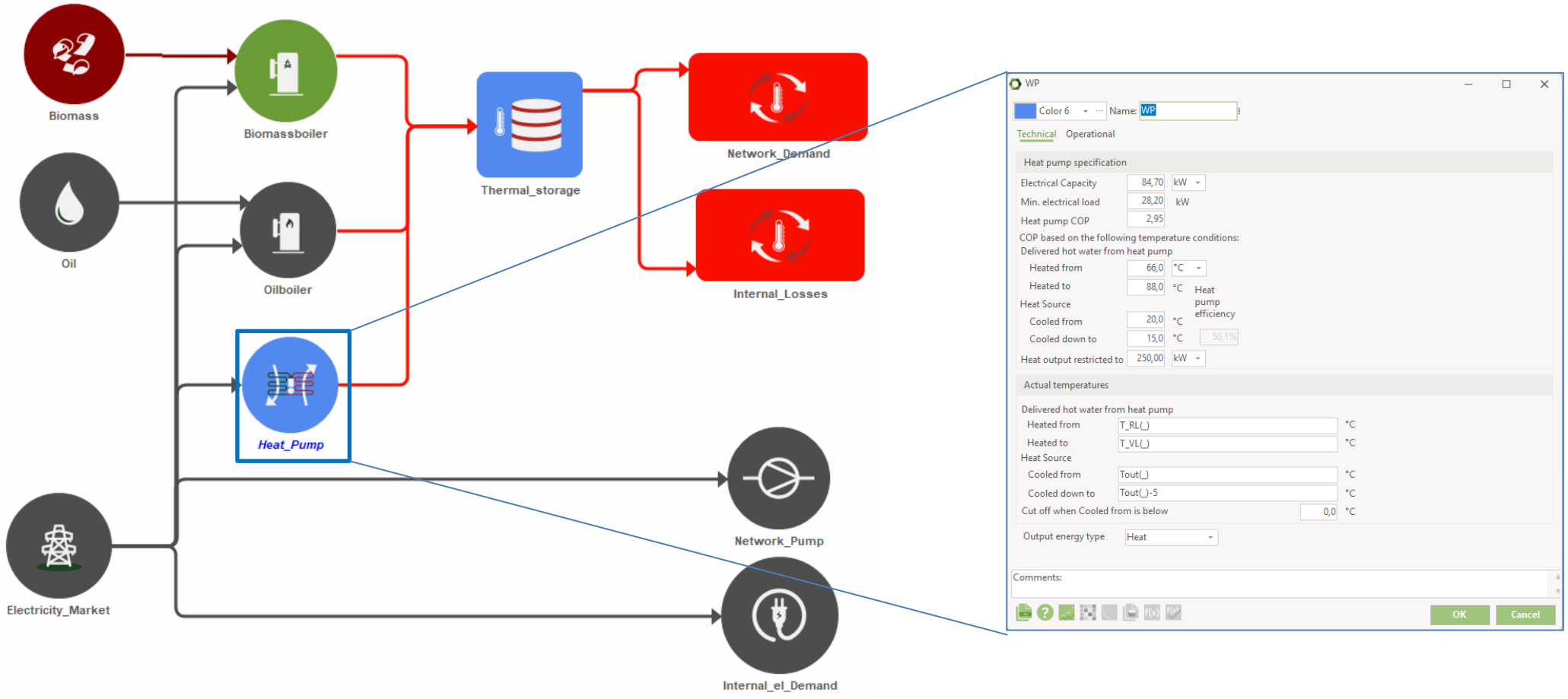
source: Land Steiermark, Digitaler Atlas

Lachtal – Current system



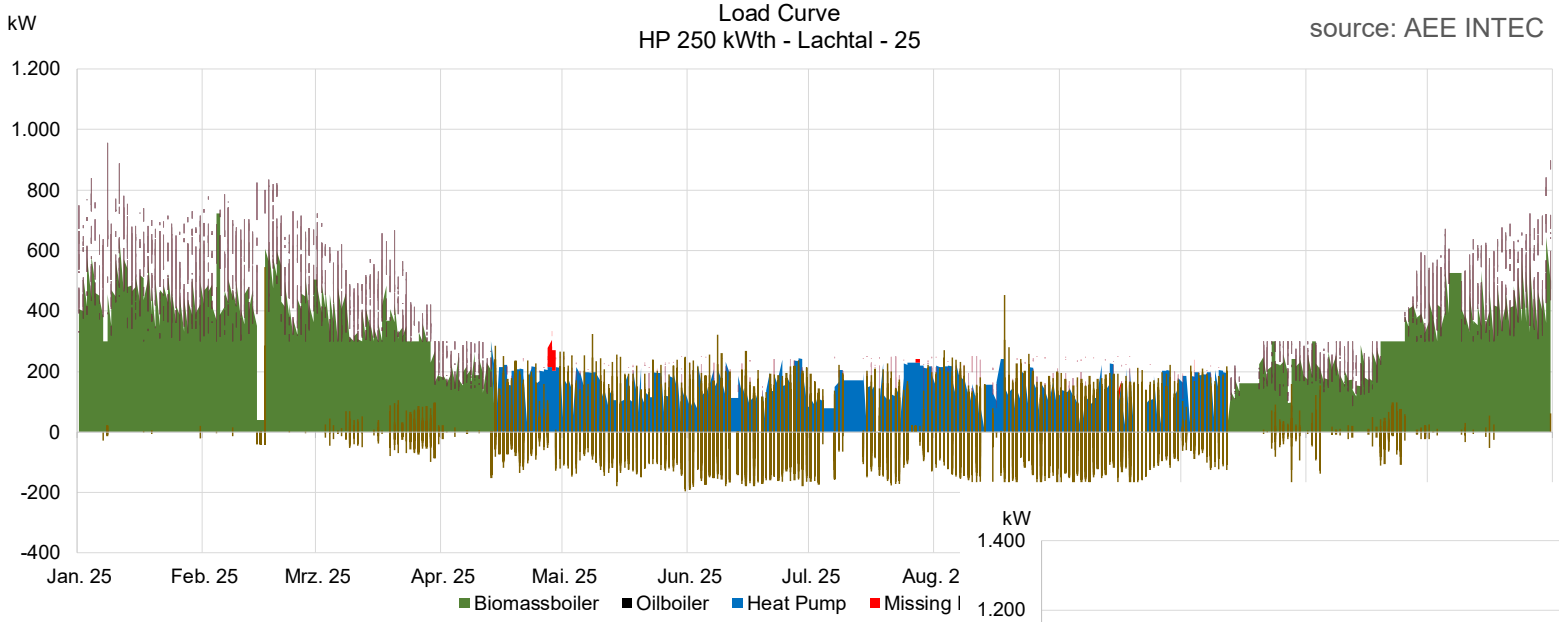
source: AEE INTEC

Lachtal – Current system + Heat pump



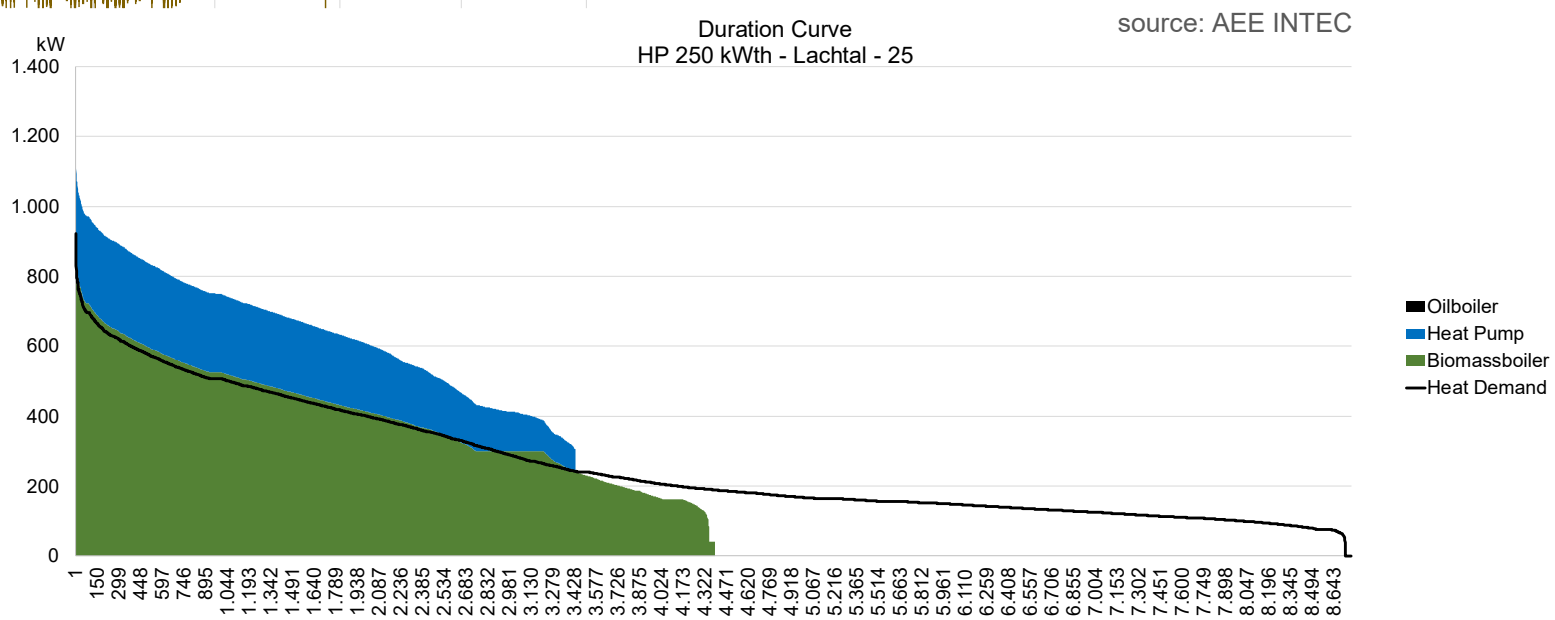
source: AEE INTEC

Lachtal - results



Heat pump integration (250 kW_{th}) for summer

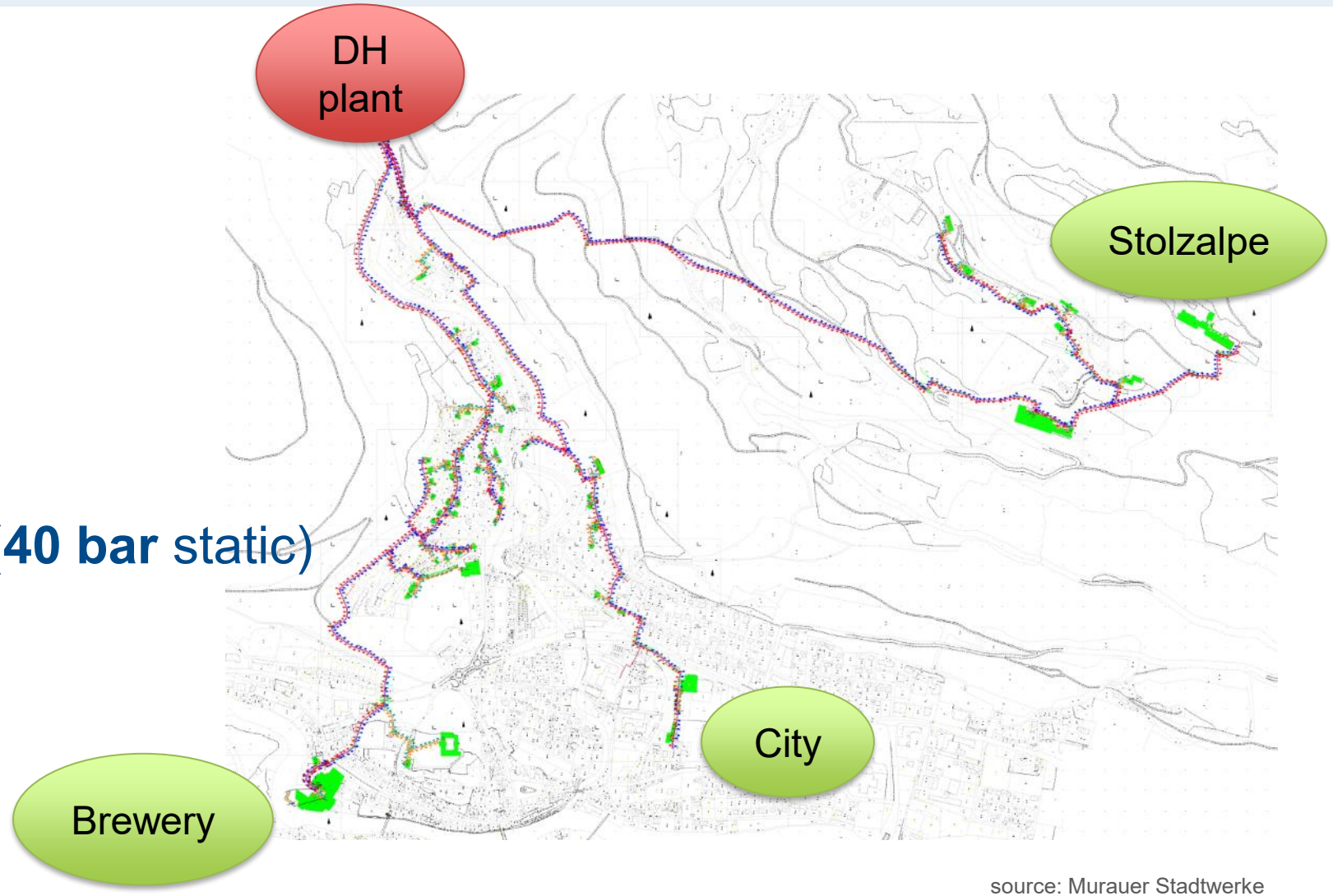
- mid April – mid October



- Operating hours of BM boiler reduced from ~8600 to ~4400
- Part load operation of BM boiler avoided (load < 150 kW_{th})
- No oil boiler required for maintanace of BM boiler

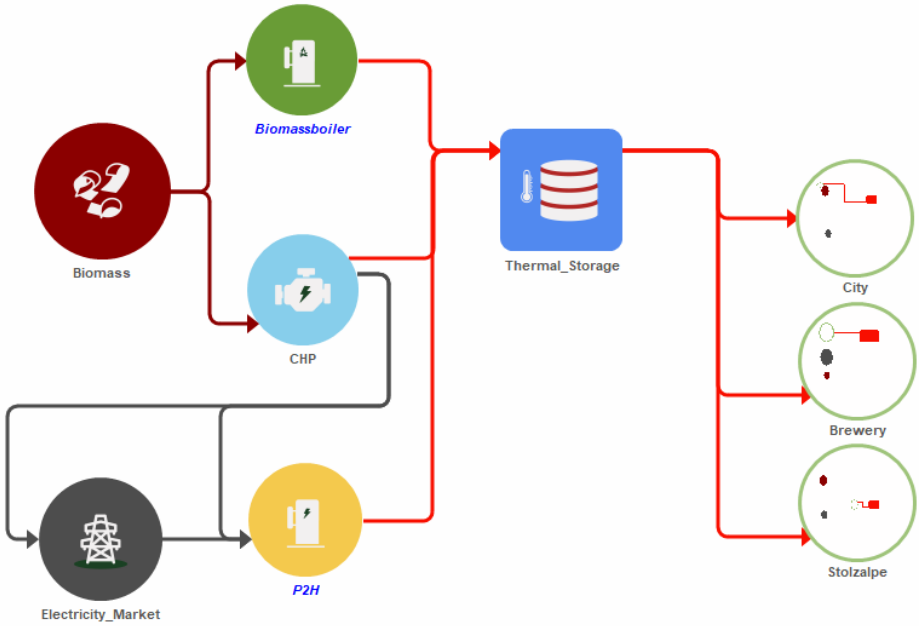
Murau

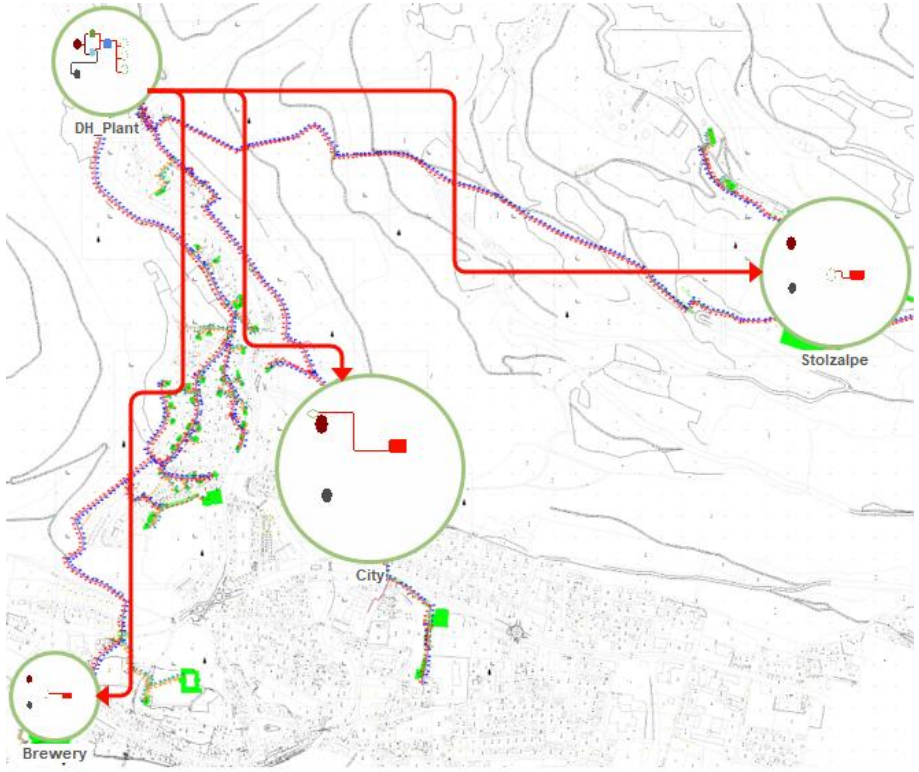
- Medium DH system
- 150 customers
  - 10 GWh/year
  - 3 MW peak load
- 3 DH networks lines
  - Stolzalpe: 90/60°C (**40 bar** static)
  - City: 90/60°C
  - Brewery: **120**/60°C

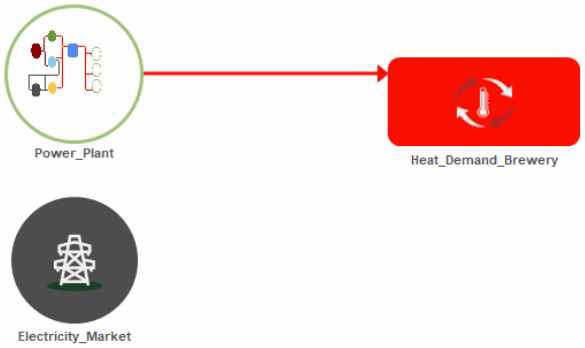


source: Murauer Stadtwerke

Murau - Current system

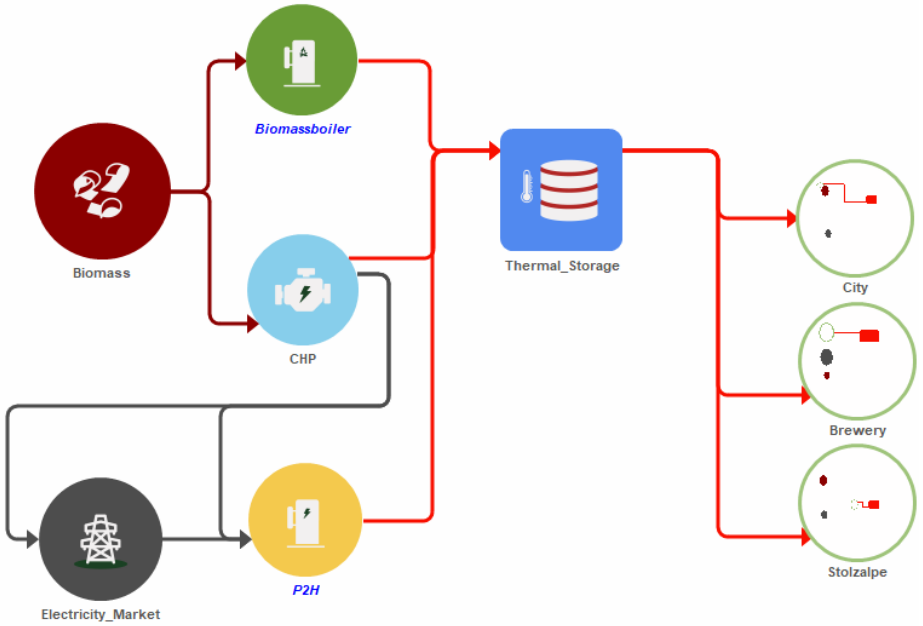


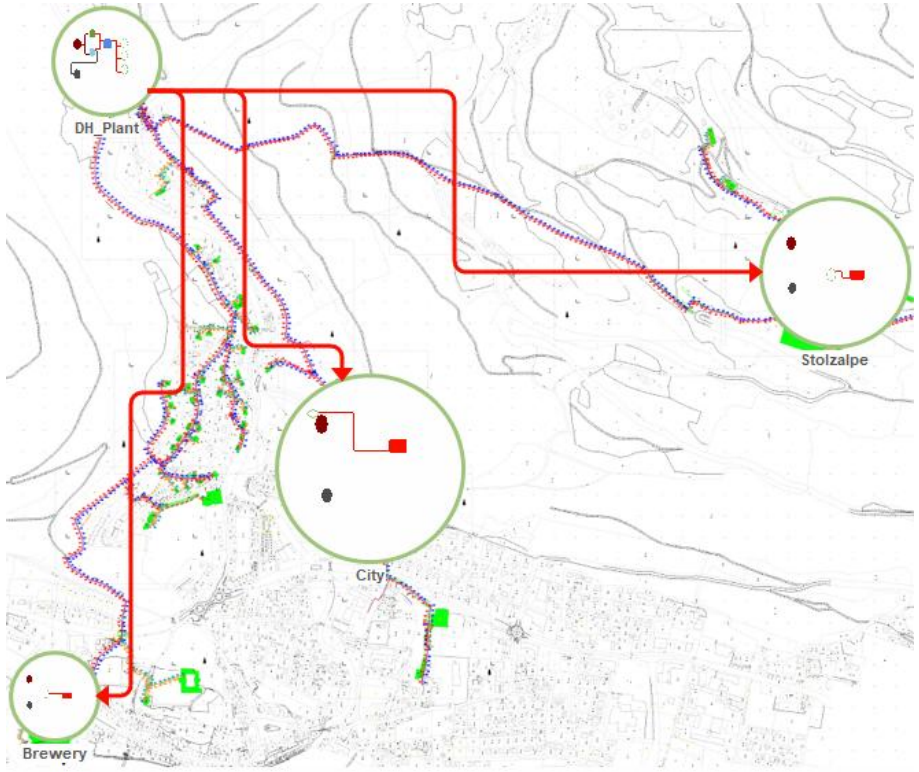


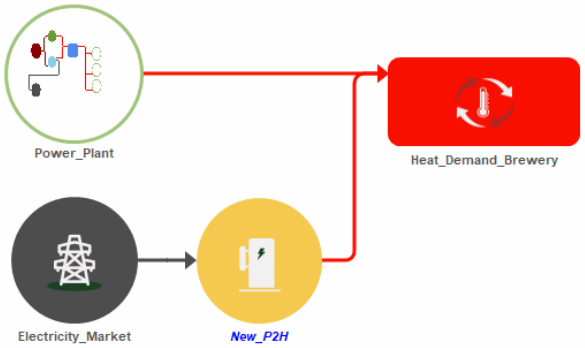


- DH plant
- DH network
- Brewery

Murau - Current system + Power-to-Heat

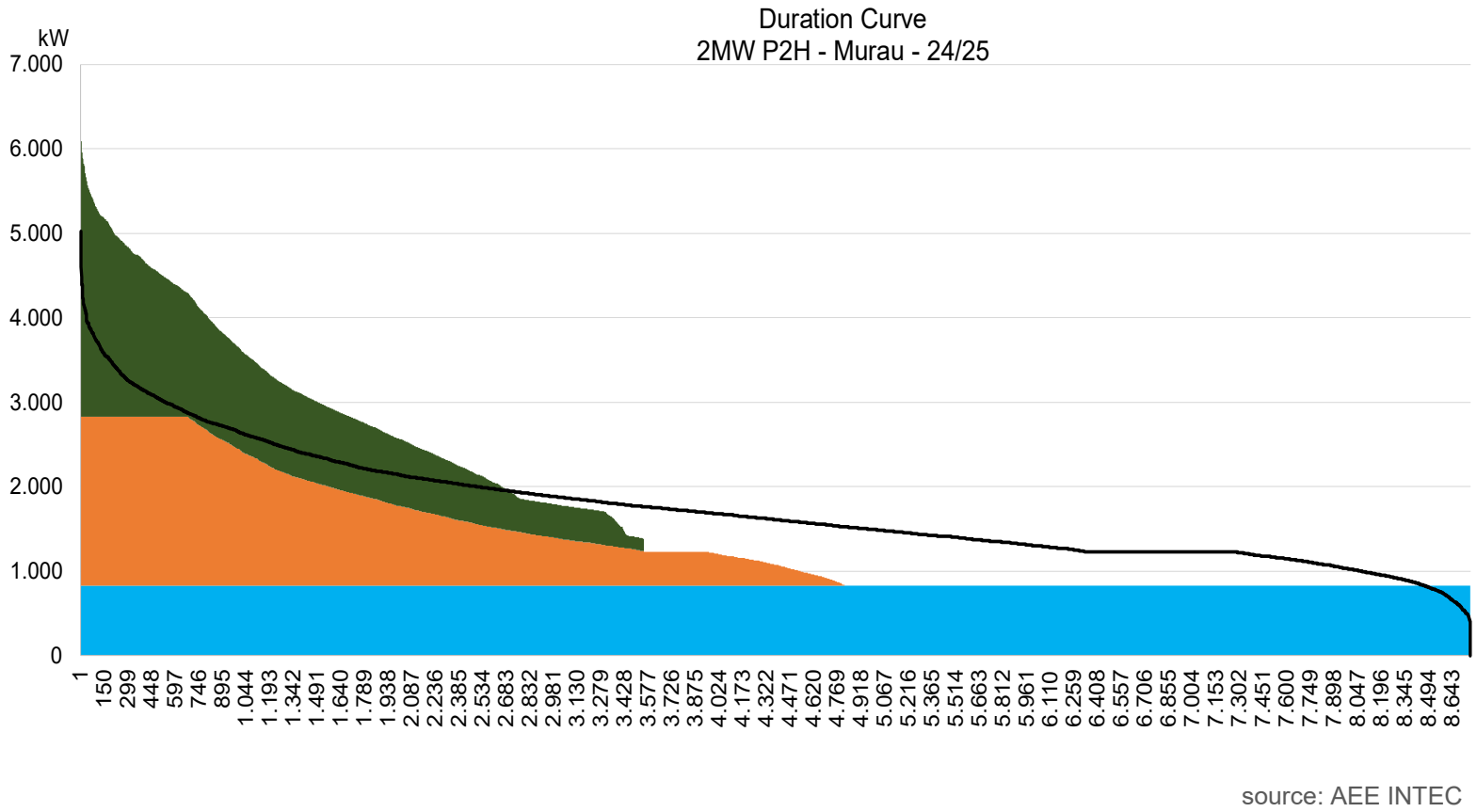






- DH plant
  - P2H: 1,2 MW → 2 MW
- DH network (brewery)
  - T_feed: 120 °C → 95°C
- Brewery
  - P2H: ~0,7 MW

Murau - results



source: AEE INTEC

- CHP cover base load
- Biomass boiler runs the whole year
- No biomass boiler in summer necessary
- Increased utilization of P2H at DH plant
- Easier operation of DH system (120°C → 95°C)

Summary & Outlook

- DH system provide a large potential to use excess electrcity
  - Especially in summer
  - Support of electrcity grid
  - Market-oriented operation

- Outlook
  - Techno-Economic evaluation of case studies
  - Potential for roll-out across the entire district Murau
  - Impact on the electricity grid

Biomass local heating: a new approach
Challenges, solutions and new system approaches

QM Fachtagung, 25.06.2026 in Salzburg (in German only)

Radisson Blu Hotel & Conference Centre

- Latest updates on funding opportunities and strategies for gas network decommissioning
- New approaches to planning, analysis and municipal heat planning
- Technical developments such as summer solutions and sector coupling

source: AEE INTEC

Further information and registration:
https://www.aee-intec-events.at/qm-2026.html

AEE INTEC

IDEA TO ACTION

Acknowledgement:

The project is being carried out as part of the flagship initiative ‘100% Renewable Energy Real-World Laboratories’; it was launched by the Federal Ministry for Innovation, Mobility and Infrastructure (BMIMI, formerly BMK) and is jointly funded by the Austrian Research Promotion Agency and the Climate and Energy Fund.

murau HOLZWELT

Bundesministerium Innovation, Mobilität und Infrastruktur

FFG Forschung wirkt.

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