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CREATIVE CIRCLE
Energiewendekreislauf Eisenstadt

Development of an energy transition cycle in the city of Eisenstadt

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FORSCHUNG Burgenland RESEARCH & INNOVATION
Burgenland Energie
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4ward Energy Research GmbH

Agenda

- Motivation
- Concept of the Energy Transition Cycle
- Renewable Energy Community
- Cooling Center
- Wastewater heat utilization
- Outlook

Project Description

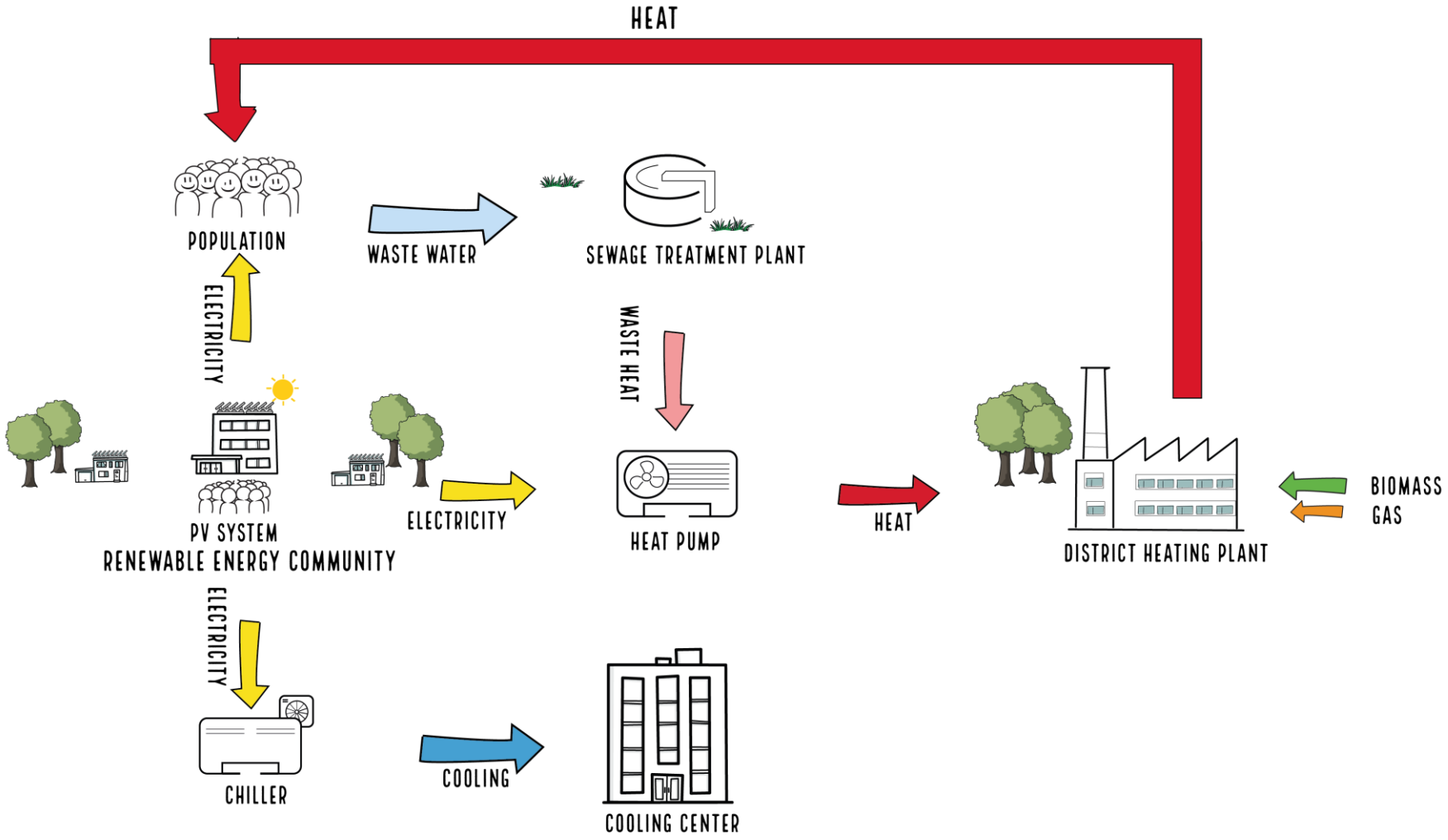
- **Start**: 01.05.2022 **End**: 30.04.2025
- **Duration**: 36 Monate (expected to be extended by 12 months)
- **Funding Program**: Leuchttürme für resiliente Städte 2040
- **Konsortium**: 8
  - Forschung Burgenland GmbH (Lead Partner
  - Burgenland Energie
  - Abwasserverband Eisenstadt Eisbachtal
  - RAUMBILD – Ingenieurbüro für Raumplanung e.U.
  - RAUMBILD – Planungskommunikation & Beratung
  - Ing. Leo Riebenbauer GmbH
  - Reiterer & Scherling GmbH
  - 4ward Energy Research GmbH

This project is funded by the Climate and Energy Fund and carried out within the framework of the "Leuchttürme für resiliente Städte 2040" program.

Motivation

- Integration of more renewable energy into the local system
- Local utilisation of locally generated energy
- Relief/support of the grid infrastructure (electricity + heat)
- Sustainable waste heat utilization
- Development of future-proof business models
- Measures against energy poverty
- Measures against summer overheating
- Participation of all population groups

Concept of the Energy Transition Cycle



Renewable Energy Community

Renewable Energy Community

- Based on the Renewable Energy Directive II of the European Commission
  - In Austria defined in the Erneuerbaren-Ausbau-Gesetzespaket and the ElWOG
  - valid since July 2021
- A renewable energy community is allowed to:
  - generate renewable energy itself,
  - consume,
  - store,
  - and sell self-generated renewable energy to members,
  - **by using the public power grid**
- Advantage of reduced grid fees and taxes
- Several framework conditions to consider

Renewable Energy Community Eisenstadt

- Foundation: 2022
- Energy Sources: Photovoltaic Systems
- Participants: 341 (Metering points)
  - 92 with Photovoltaic systems
- Total consumption: 706 MWh/a
- Total surplus production : 311 MWh/a
- Energy trade with the Energy Community: 128 MWh/a

Raiffeisen Burgenland
NACHHALTIGKEITSINITIATIVE

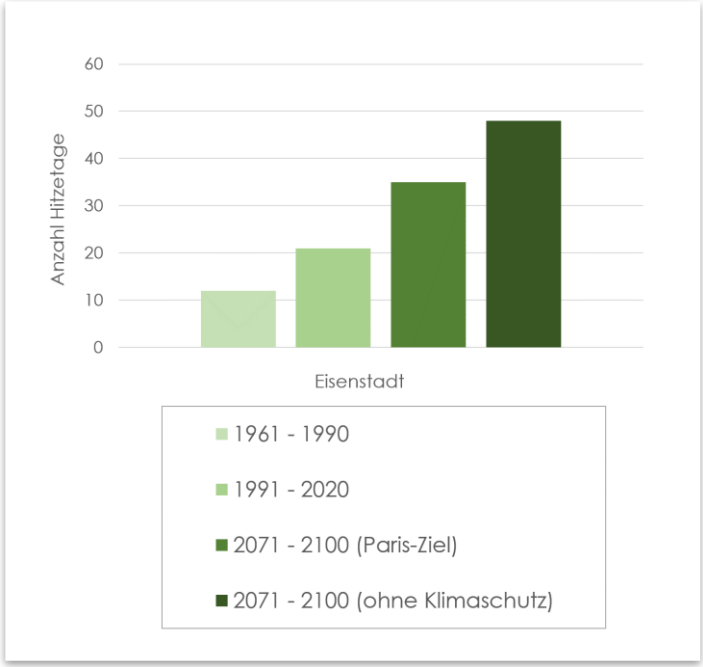
Gemeinsam in eine bessere Zukunft

- Challenge: Fair distribution key of the heat pump and the other members

Cooling Center

Cooling Centre

- Significant increase of hot days (> 30°C) in the last years
  - The Burgenland region is especially affected
- Protection of vulnerable groups:
  - Small children
  - Pregnant women
  - Elderly people
  - People with chronic illnesses



Source: Geosphere Austria

- Even a brief stay in a cooled room can significantly reduce the risk of heatstroke.

Cooling Centre

- Location: Lobby of the city hall in Eisenstadt
- First Opening: July 2023
- Supply of local renewable electricity from the energy community
- Cooling via innovative textile ducts
  - Low flow velocities
  - No draughts
  - Reduction of operating costs up to 40 %

Source: Pressestelle der Stadtgemeinde Eisenstadt

Source: Sandra Koeune

Source: Reinhardt Judt

- Additional Infrastructure:
  - Drinking water, books, exhibition of local artists, Information on climate protection and climate change adaptation

Waste heat utilisation

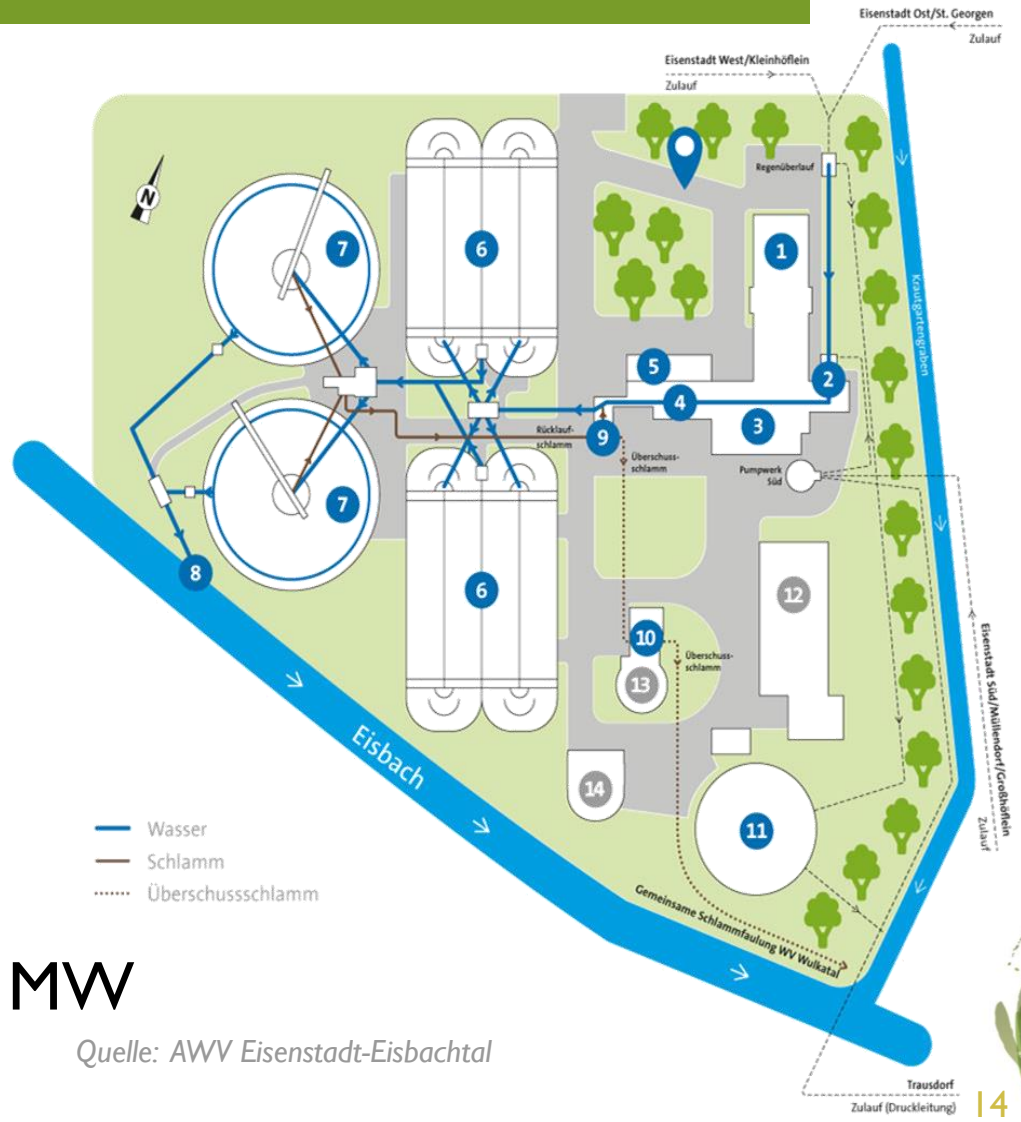
Waste heat utilisation - Framework

Source: GeoDaten Burgenland

Source: GeoDaten Burgenland

Waste heat utilisation - Framework

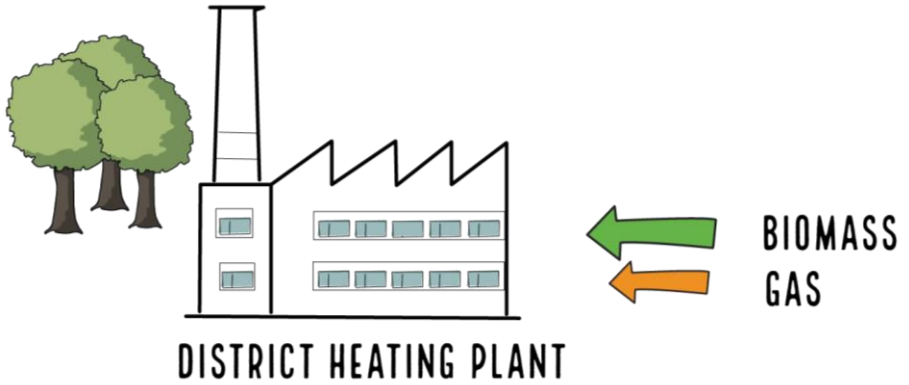
- Temperature level
  - Min: 2,5°C
  - Max: 26,5°C
  - Mean: 16,5°C
- Flow Rate
  - Mean: 105 l/s (~ 378 m³/h)
- Max withdrawal capacity(Δt=4 K) = 2 MW



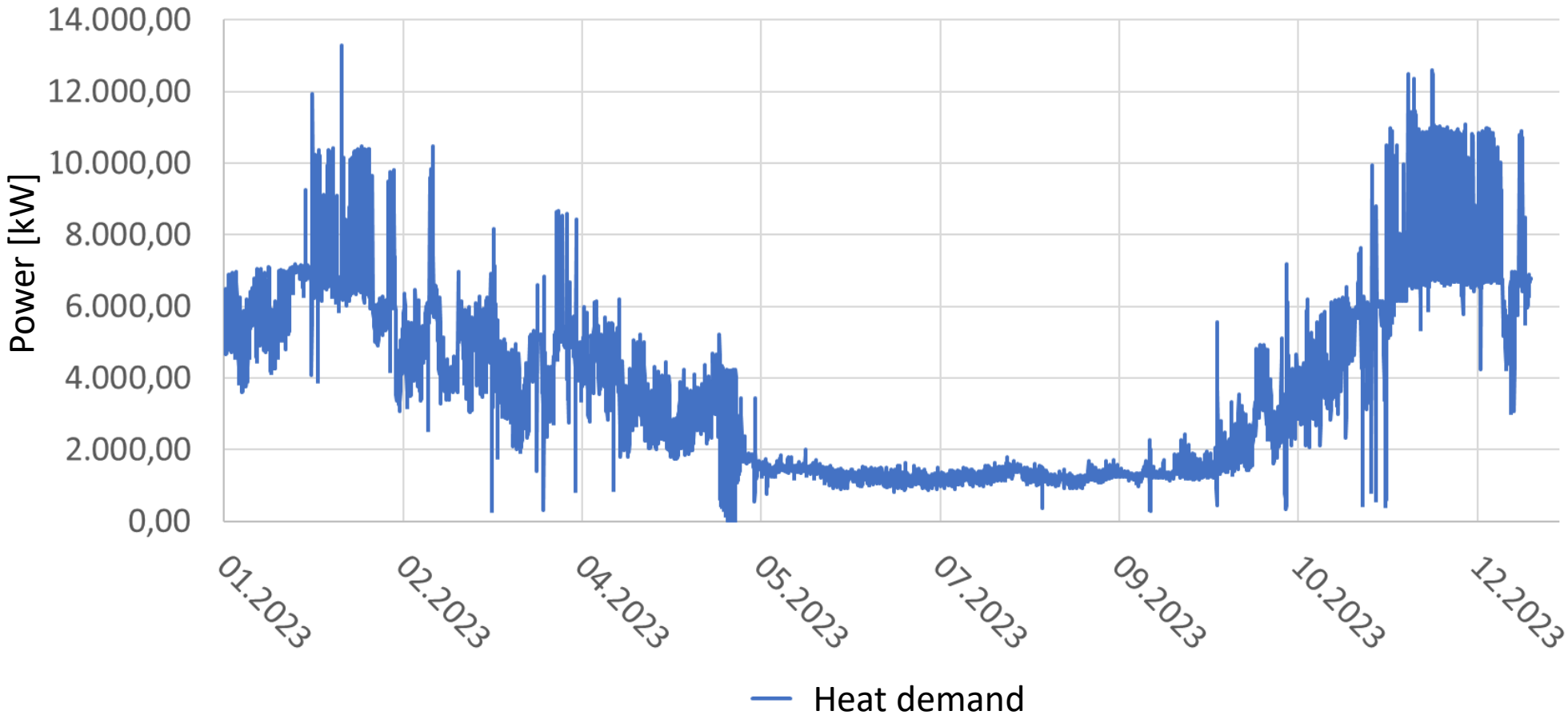
Quelle: AWV Eisenstadt-Eisbachtal

Waste heat utilisation - Framework

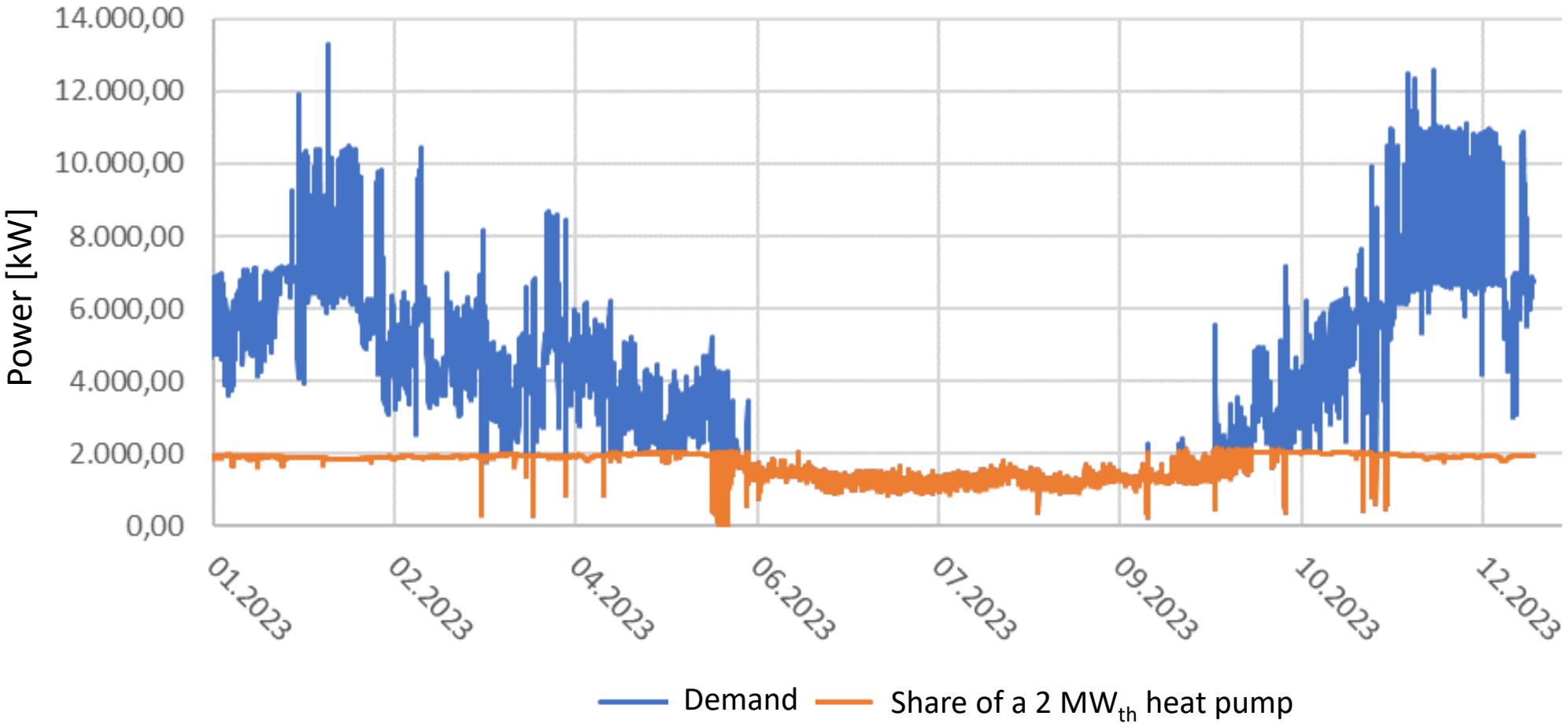
- Biomass boiler: 7 MW_{th}
- Gas boiler: 5+2 MW_{th}
- Thermal Puffer storage: 550 m^3
- Expansion 2024: + 7 MW_{th} Biomass boiler
- Heat demand 2023: 34.800 MWh



Heat demand of the district heating grid

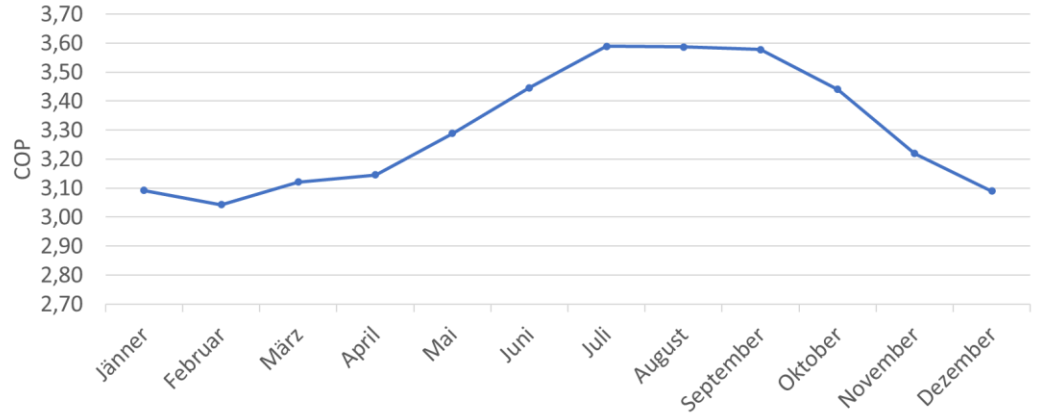


Heat supply of the district heating grid



Heat Pump

- Thermal Power: 2020 kW
- Electrical power: 614 kW
- Refrigerant : R717 (Ammonia)
- COP (W15/W85): 3.29



- Theoretically possible heat supply: 14 800 MWh (42 % heat requirement 2023)
- Heat pump can cover the whole demand during summer
- Sustainable electricity supply:
  - PV system at the wastewater association (400 kWp planned)
  - Renewable Energy Community
  - Public Grid (remaining share)

Conclusion / Outlook

- Renewable Energy Community is established and constantly growing
- Cooling Centre was opened in 2023
  - Extensive monitoring planned for summer 2024
- Detailed planning of the heat pump will be finalized in the next weeks
  - Investment decision of the heat pump is expected for summer 2024
  - Commissioning and monitoring of the entire energy transition cycle in 2025