Increasing flexibility in DH systems

Elements and solutions from the ThermaFLEX project

ISEC 2024, Graz

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This project is supported with the funds from the Climate and Energy Fund and implemented in the framework of the RTI-initiative “Flagship region Energy”.

ThermaFLEX in a nutshell

01.11.2018 – 30.10.2022 Duration

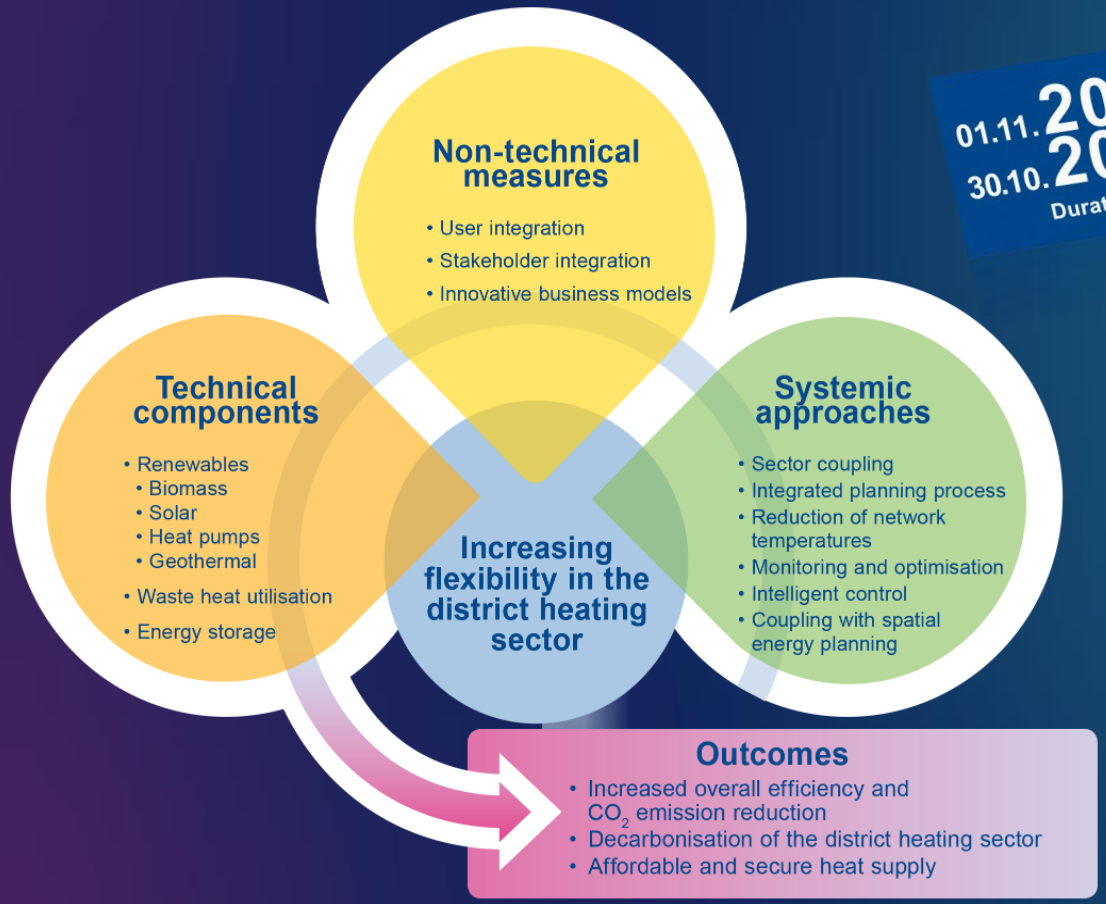
28 Partner

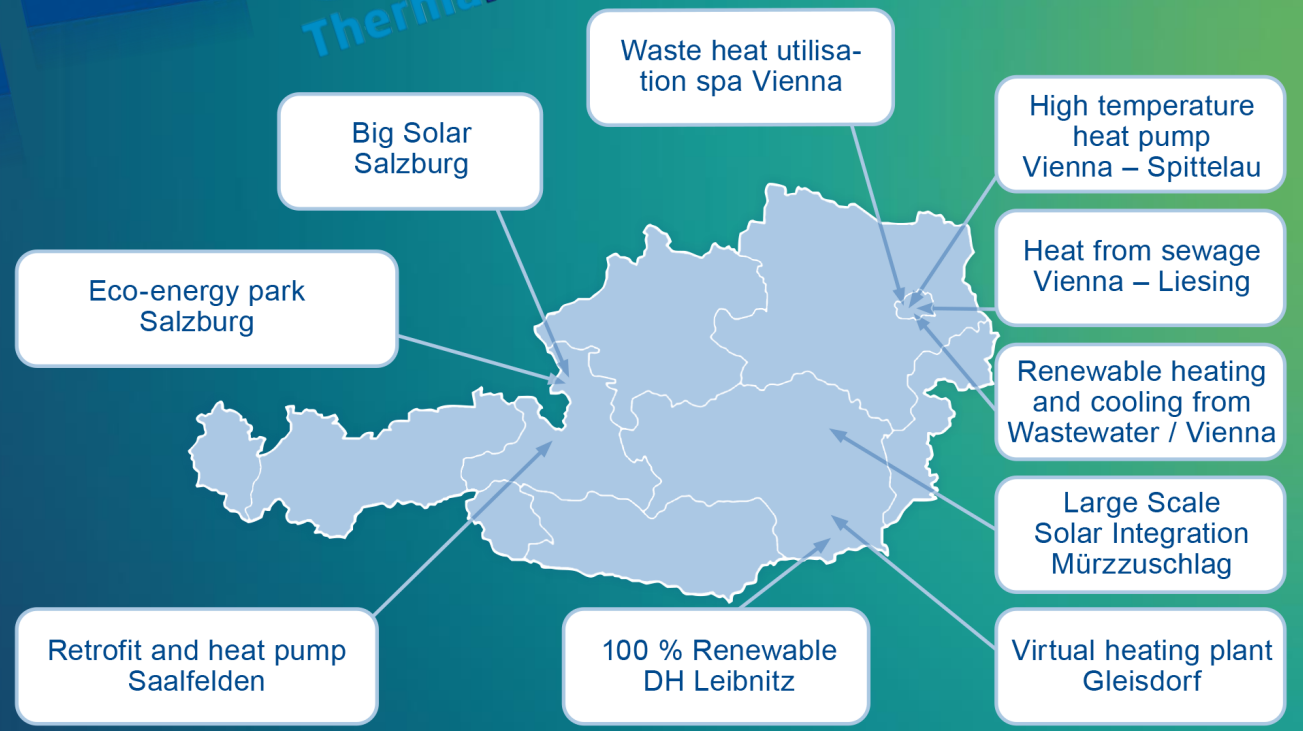
4,6 Mio Euro Budget

10 Demonstrators

6 Model Solutions

ThermaFLEX

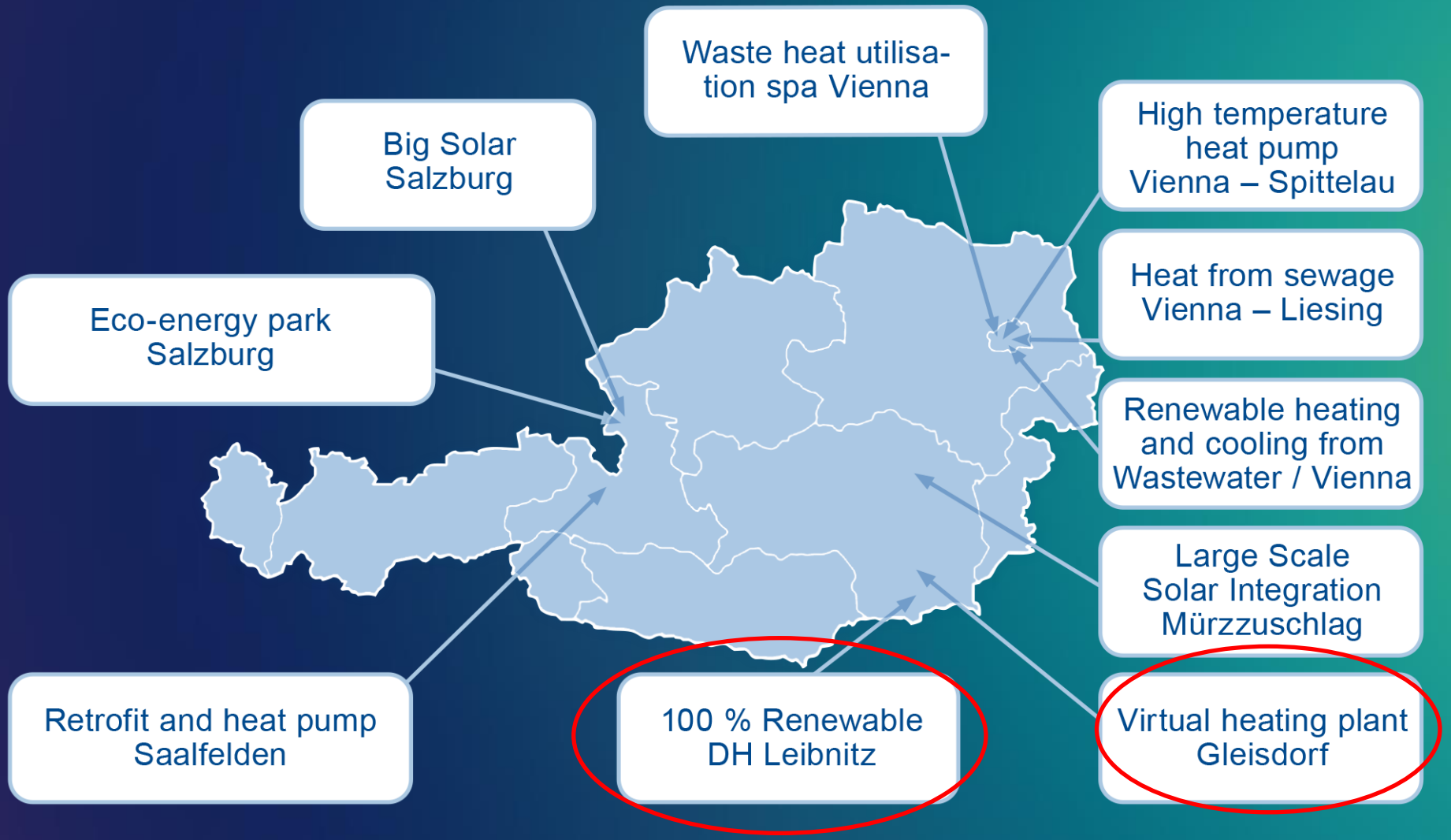




Overall direct impact

- 200 GWh heat generation → 20,000 households
- Up to 45,000 t CO_2/a emission reduction
- Up to 30% increase in efficiency

Demonstrators and model solutions



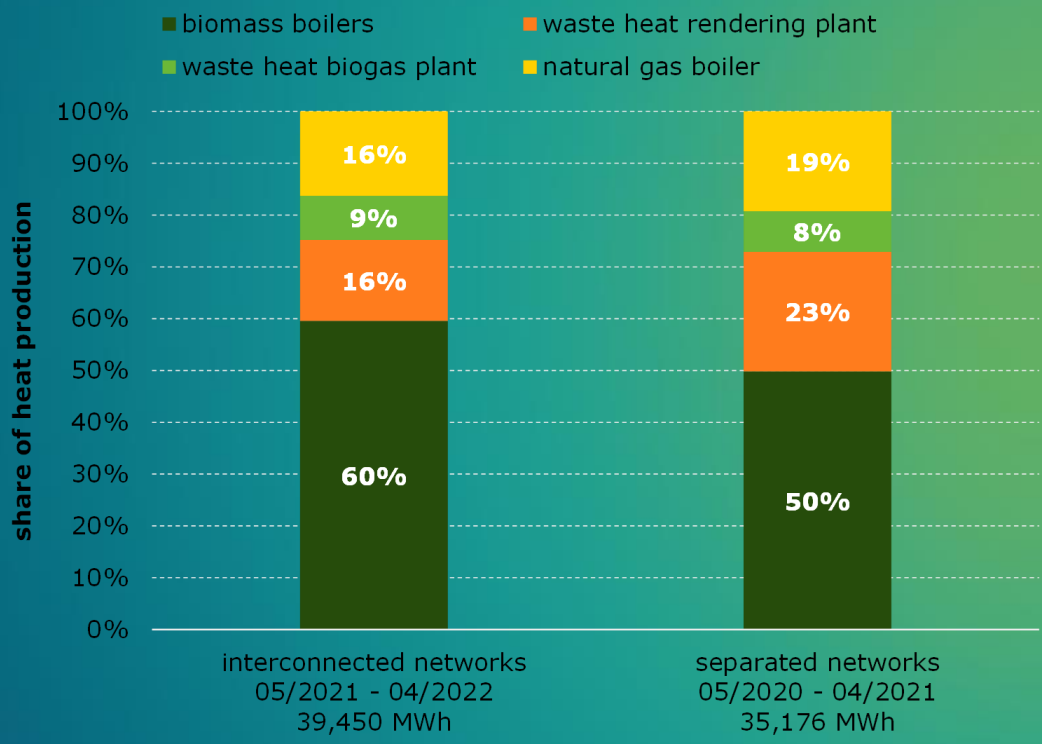
Model solution: Low-carbon DH Leibnitz

- DH network Leibnitz
  - In total 3 different DH operators
  - Overall goal: nearly 100% renewable DH

- Main measures
  - Extension and interconnection of DH networks via bidirectional heat transfer station
  - Waste heat utilisation at a rendering plant
  - Storage integration and storage management
  - Smart control (EMS - Energy Management System)
  - Stakeholder and user integration

Model solution: Low-carbon DH Leibnitz

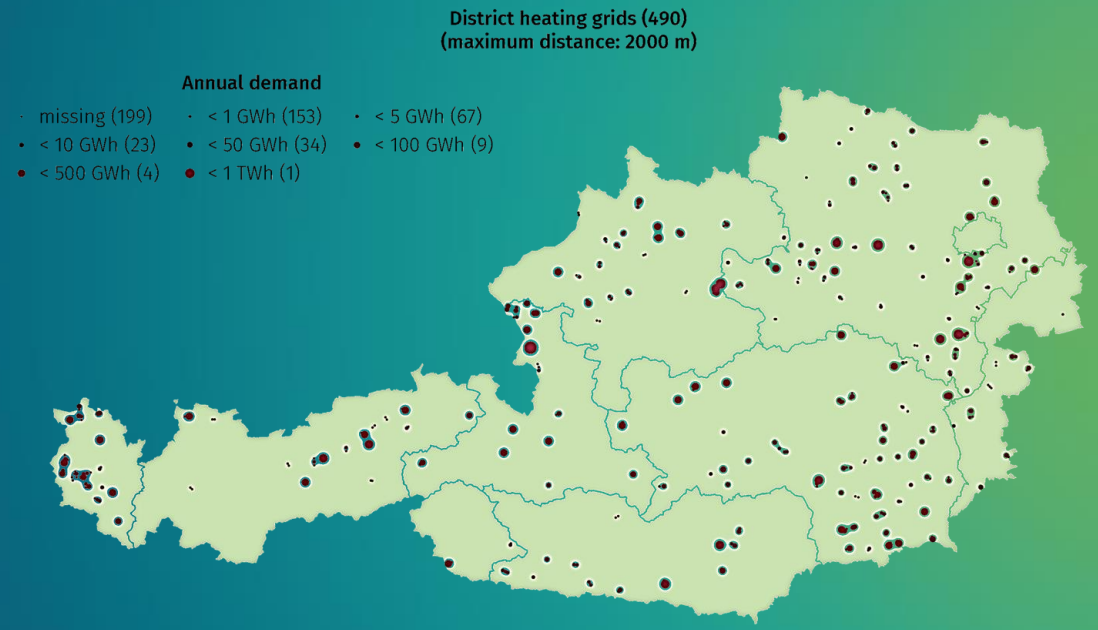
- Main results
  - Increase of generated heat: 4,270 MWh
  - Mean waste heat utilisation: 7,150 MWh
  - Reduction of fossil energy share to 16%
  - Reduction of gas boiler operation up to 70%
- Direct impact potential (interconnection)
  - CO_2-reduction: 1,400 to/a
  - Increase of renewable share: 19 %
    (reference separated networks)



Model solution: Low-carbon DH Leibnitz

- Roll-out scenarios (interconnection)
  - Distance as main influencing parameter
  - Lack of geospatial information
  - Estimated potential reproducers
    - *893 DH networks (distance of 3 km)*
    - *490 DH networks (distance of 2 km)*
    - *214 DH networks (distance of 1 km)*

- Impact potential 2040* (interconnection)
  - CO_2-reduction: 44,600 to/a
  - Increase of renewable share: 0.83 %

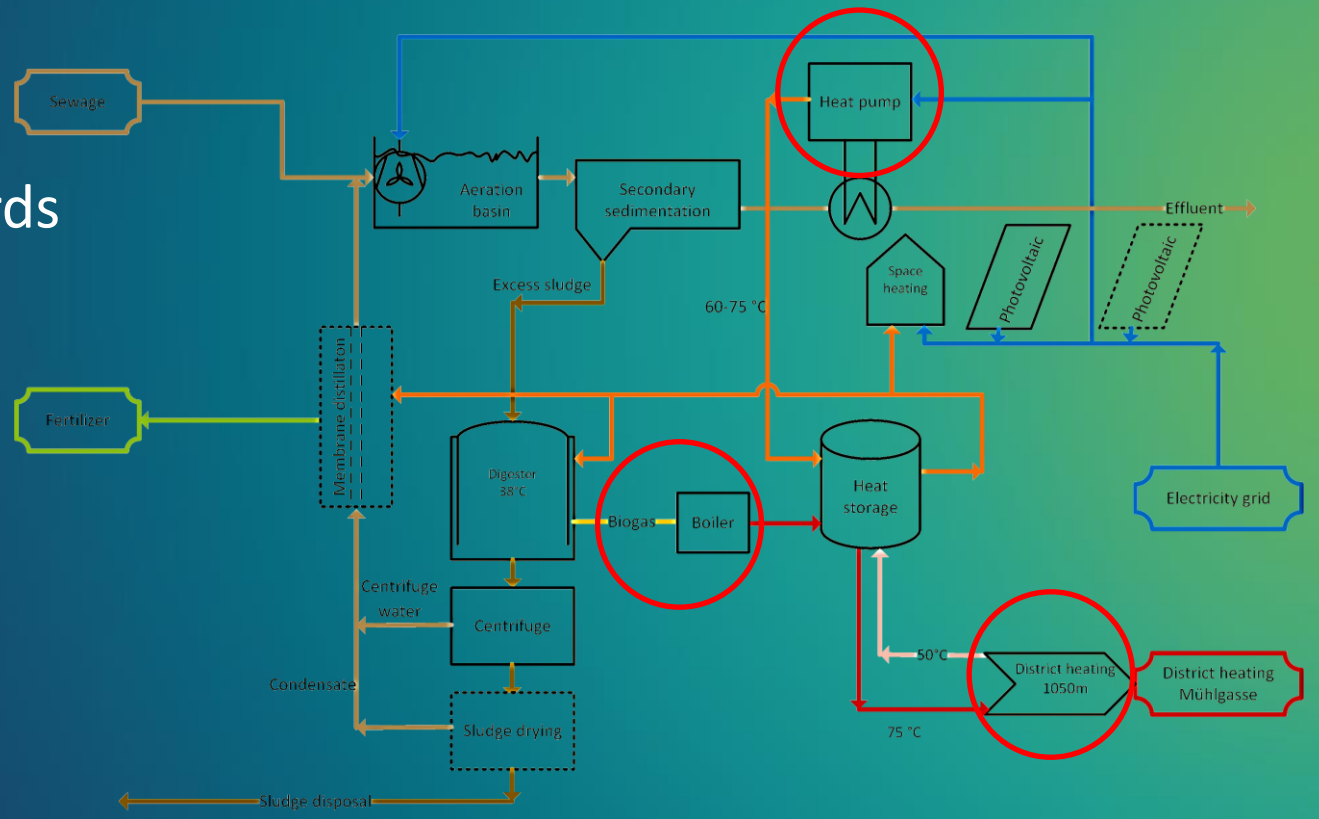


DH networks in Austria with a maximum distance of 2 km to other DH networks

* 40 use cases

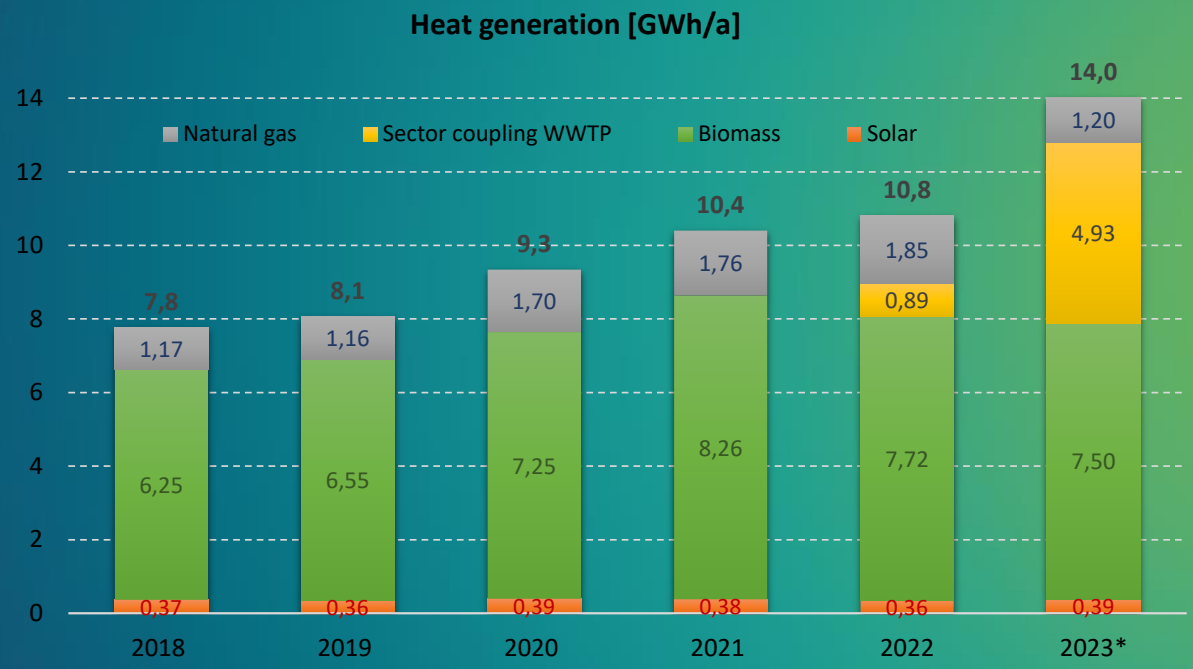
Model solution: Virtual heating plant Gleisdorf

- DH network Gleisdorf
  - Operated by Stadtwerke Gleisdorf
  - Overall goal: transformation towards 4th generation DH
- Main measures
  - Supervisory control system → virtual heating plant
  - Sector coupling with wastewater treatment plant
  - Cascadic heat use



Model solution: Virtual heating plant Gleisdorf

- Main results
  - Increase of generated heat
    - *3,000 MWh (from 2018 – 2022)*
    - *6,200 MWh (from 2018 – 2023)**
  - Sector coupling
    - *Wastewater and biogas: 5,000 MWh*
    - *Full exploitation of the biogas*
    - *Temperature decrease discharge water*

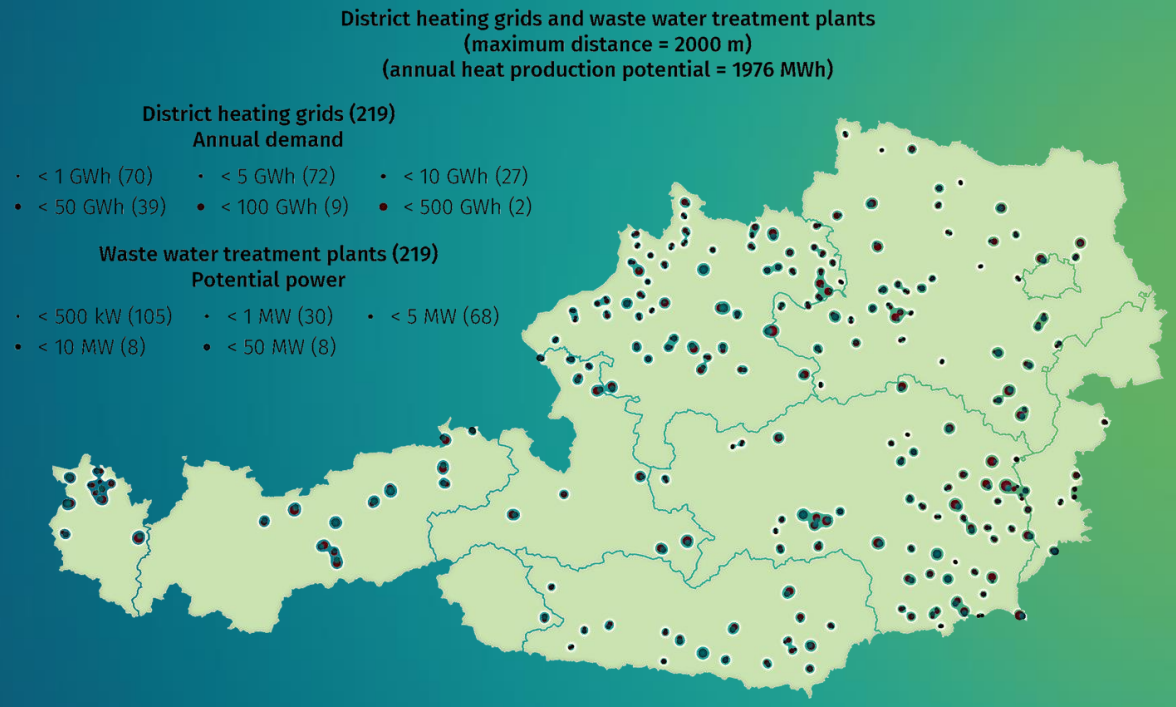


- Direct impact potential (sector coupling)
  - CO_2-reduction: 1,072 to/a
  - Increase of renewable share: 48 % (reference 2021)

* estimated

Model solution: Virtual heating plant Gleisdorf

- Roll-out scenarios (sector coupling)
  - Distance as main influencing parameter
  - Lack of geospatial information
  - Estimated potential
    - *3,500 GWh/a (distance of 5 km)*
    - *2,800 GWh/a (distance of 3 km)*
    - *1,976 GWh/a (distance of 2 km)*
    - *440 GWh/a (distance of 1 km)*



Wastewater treatment plants and DH networks with a maximum distance of 2 km

- Impact potential 2040* (sector coupling)
  - CO_2-reduction: 50,300 to/a
  - Increase of renewable share: 0.94 %

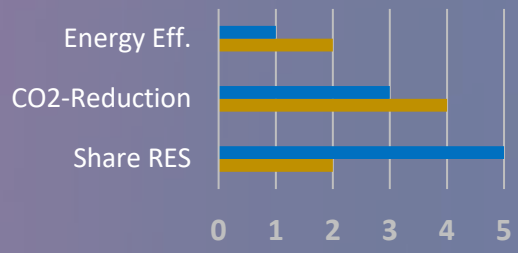
* 60 use cases

Model Solutions

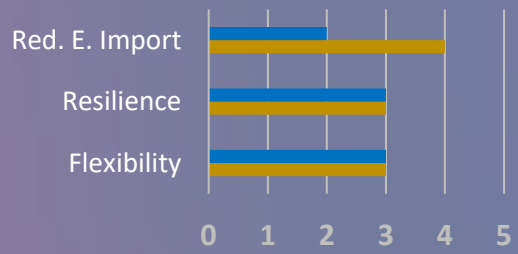
Low-carbon district heating

Virtual heating plant

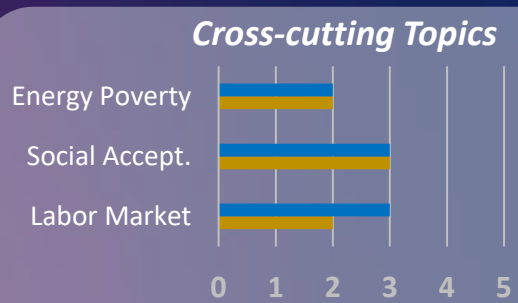
Ecological KPI

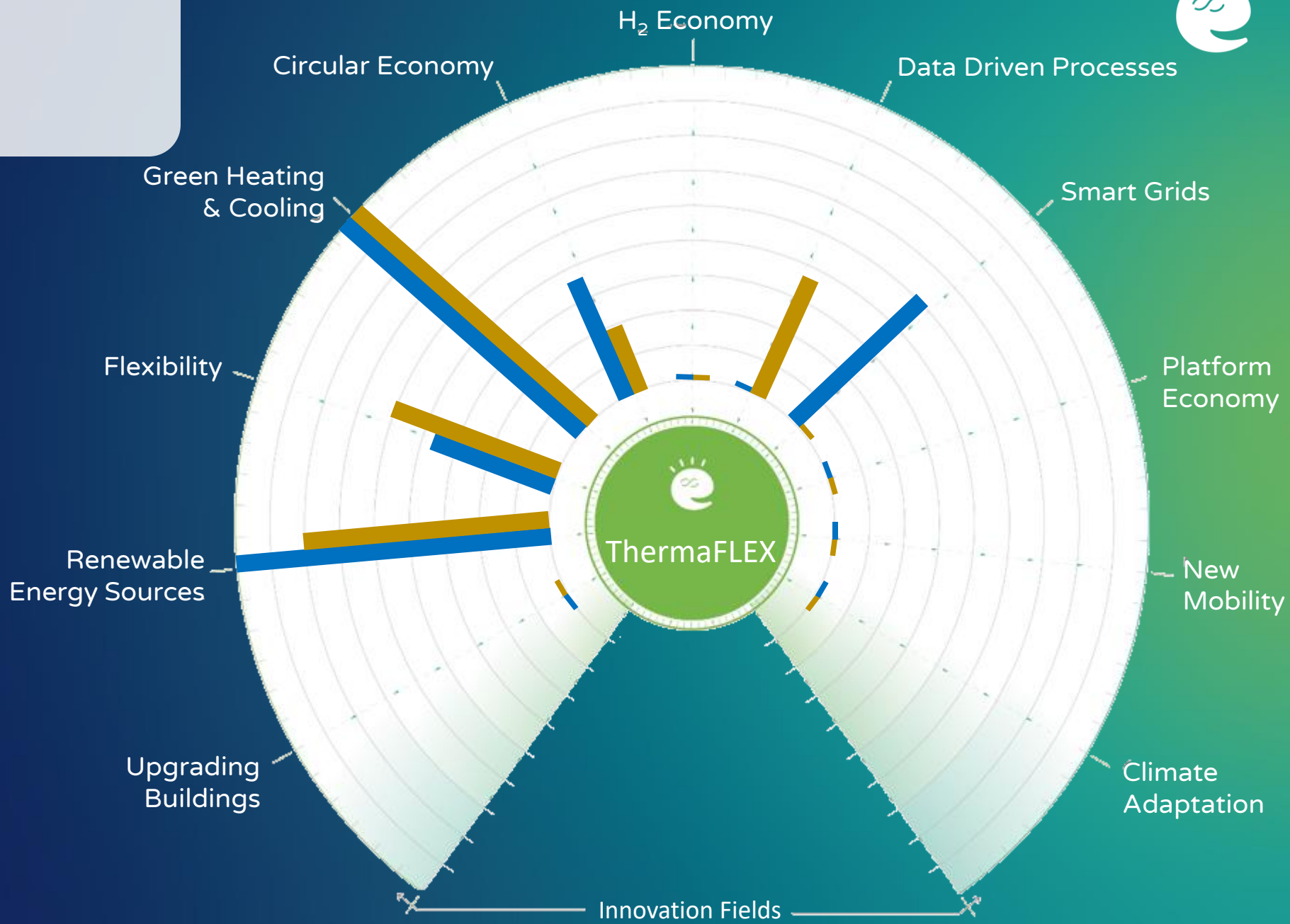


Resilience & System Stability



Cross-cutting Topics





Take-home messages

- Development and implementation of flexibility measures and continuous adaption is vital → long-lasting process
- Use all options for improving the flexibility of DH networks
  - Integrate locally available energy sources
  - Extension/densification of network → link to spatial energy planning
  - Synergies to other infrastructures or ongoing developments
- Stepwise and consequent reduction of system temperatures as a key measure → start as soon as possible
- Bad stakeholder/end-user integration and communication → no appropriate and economic DH network operation is possible

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Information

WIEN ENERGIE · EVN · Burgenland Energie

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klima+ energie fonds

VORZEIGEREGION ENERGIE