

AbSolut

Integration of Absorbtion Technologies in District Heating & Cooling Systems for Enhanced Economic and Ecological Impact



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AbSolut ... framework conditions

- Challenge to decarbonise the heating and cooling sector
 - Reduction of energy consumption
 - Increase of energy efficiency
 - Production of renewable energy
 - Reduction of dependency on single sources
- DH use approximately 75% fossil fuels in Europe, 48% in Austria
- Final energy consumption provided by DH -> 20 TWh in Austria (20%)
- DH pipelines 5,600 km in 2020 -> 6,500 in 2030
- Extensive change in heating technologies and additional efficiency measures



AbSolut ... increasing the value for absorption heat pumps

Development of system concepts for the optimized and cost-efficient integration of absorption heat pump technologies in DHC systems

Addressing main challenges:

- Decarbonization of peak loads
- Transport capacity bottlenecks
- Expansion of district heating systems
- Integration of RES (solar thermal, waste heat)
- Provision of cold supply in summer

Project partners:



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".



AbSolut ... model solutions



Economic efficient absorption chiller integration for cold supply



AHP system concepts to increase efficient DH supply



AHX for transfer substation to subcool the primary return temperature

Model Solutions

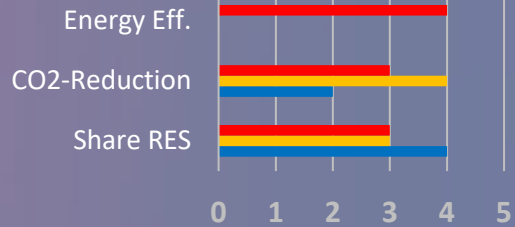
Integration of absorption chillers in district cooling

Absorption heat pumps in district heating

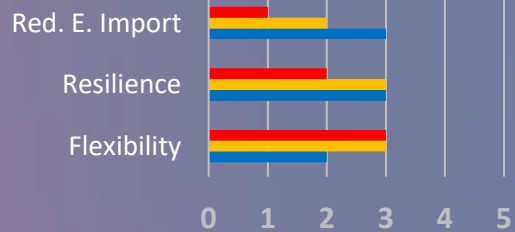
Absorption heat transfer in district heating



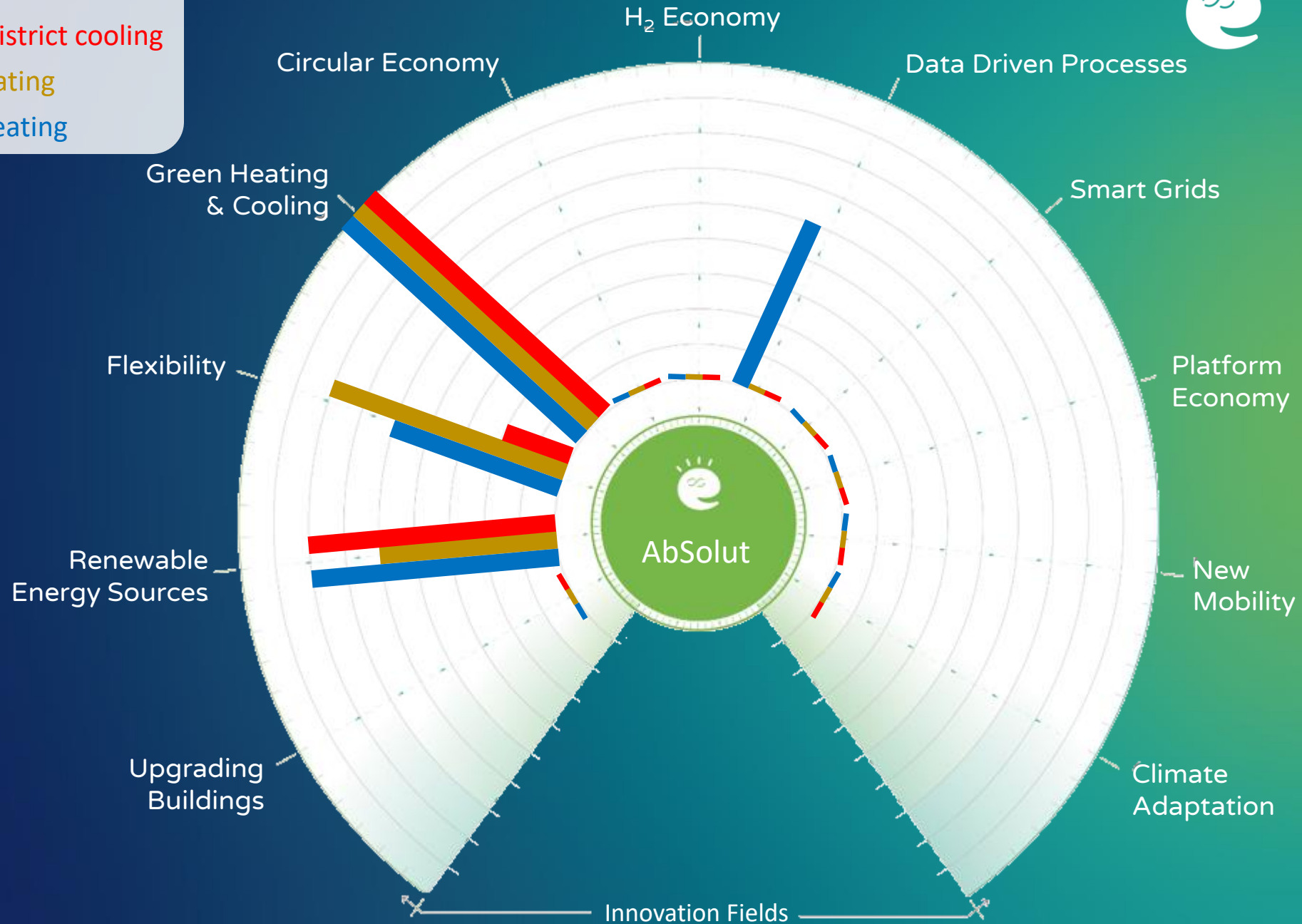
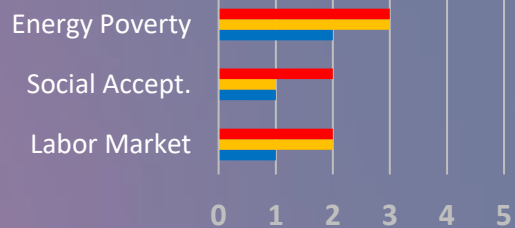
Ecological KPI



Resilience & System Stability



Cross-cutting Topics





Overall outcome of model solutions

1

Economic efficient absorption chiller integration for cold supply

Utilisation potential exists for large cooling systems and industrial/commercial use

Implementation of best-practice system concepts

Increasing technology acceptance for cold supply

2

AHP system concepts to increase efficient DH supply

First implementation, detailed planning, overall simulations for AHP in complex waste heat utilisation system for cooling circuits

Test technology in a heterogeneous plant system, evaluate the limits of the technology and solve the challenges in the system

3

AHX for transfer substation to subcool the primary return temperature

High utilisation potential for large DH grids with several sub-grids to expand grid capacity.

Technical realisation and control optimisation of an AHX as transfer substation should be analysed in detail on real-scale pilot.



Model solution... AHX for transfer substation

Application & Result

- **Application:** Reduction of return temperature
- **Efficient supply concept:** Absorption heat exchanger (AHX) as a transfer substation in a district heating grid involves utilizing the temperature difference between the primary and secondary supply to subcool the primary return temperature below the secondary one.

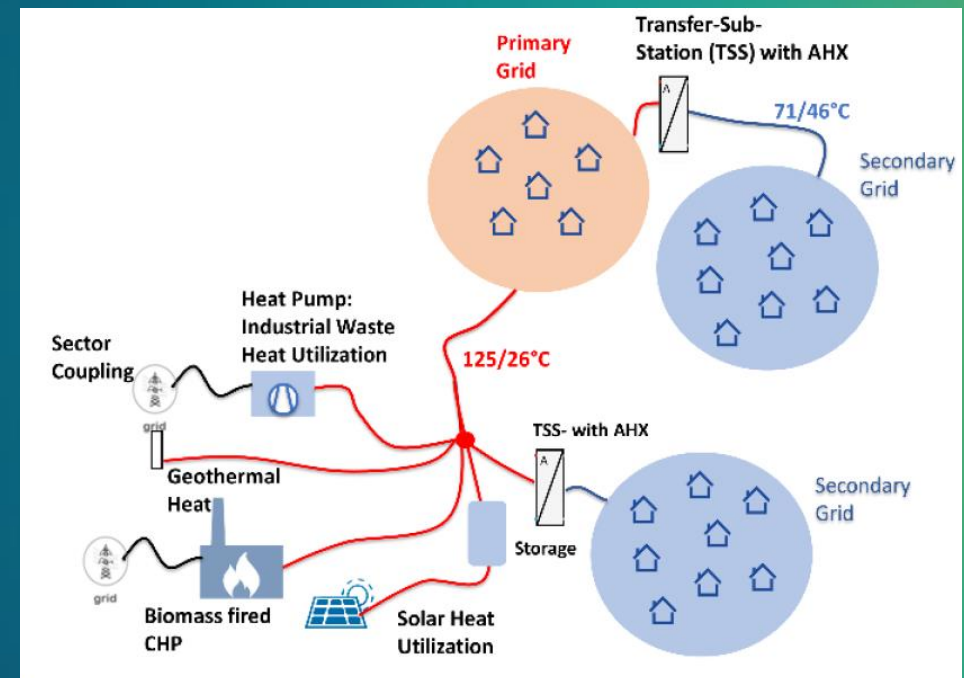
Main purpose

Subcooling up to 20 K

Performance increase up to 30 %

Increase the heat capacity in existing DH-grids, especially if renewables used for supply

Detailed lab tests, and year-round simulation



Source: Zotter, G. et. al. An energetical, exergetical and experimental analysis of an absorption heat exchanger used as transfer substation in an already existing district heating grid, 14th IEA Heat Pump Conference, 2023.



Model solution... AHX for transfer substation

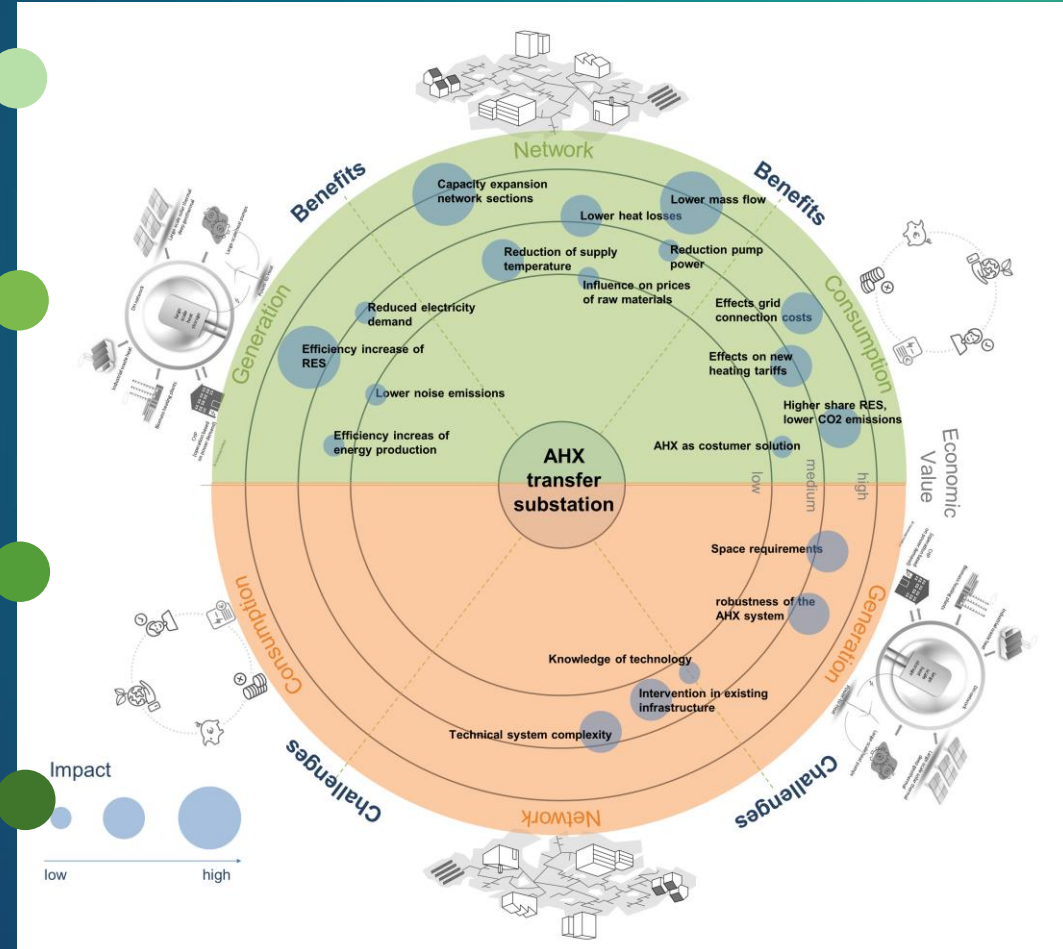
Results & Economy

I High ratio between primary and secondary supply temperature

II Economic efficiency calculated, arising from the higher capacity in the grid sections, based on grid-related costs

III Integrate the efficiency effects of RES in DH grids

IV Higher investment costs, economic value of benefits and operational costs -> IRR up to 10 %





Conclusion & Outlook

- Overall, there are many sensible applications for absorption heat pumps and chillers in heating and cooling grids.
- Importance of realization of best-practice solutions
- Increase market and technology acceptance
- Enhance the efficiency, sustainability, and performance of DH systems



AbSolut – Integration of absorption technologies in district heating and cooling systems

Project partners



Project Information



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