AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY

HEAT PUMPS IN MFH

Austria‘s research activities in IEA HPT Annex 50 and beyond

Thomas Natiesta

AUSTRIAN INSTITUTE OF TECHNOLOGY

BMK

1.400 employees

7 Centers

Austria‘s largest RTO

Applied Research

Infrastructure Systems

System Competence

Federation of Austrian Industries (through VFFI)

Next Generation Solutions

4 Subsidiary Enterprises

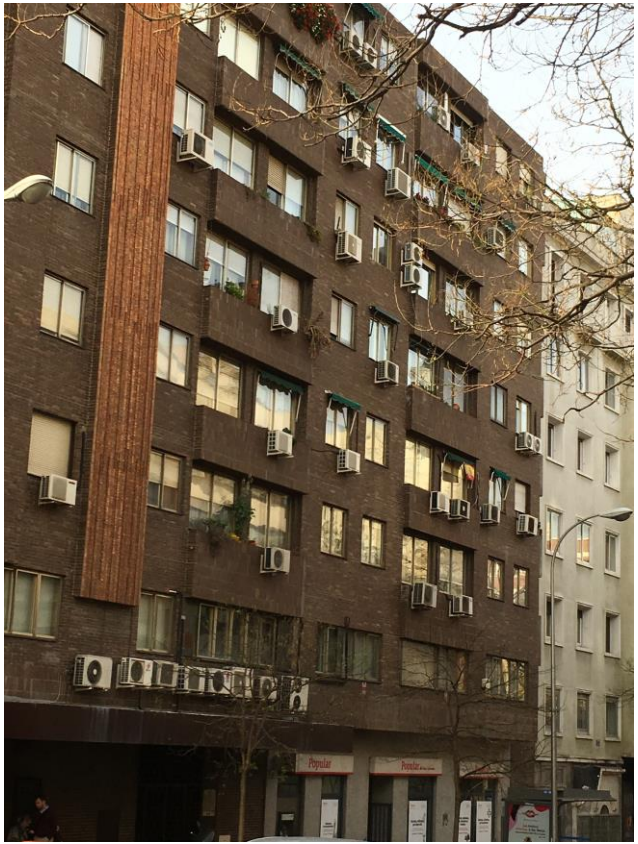
LKR, NES, SL, Profactor 51%

176 m EUR total revenue

Tomorrow Today

as of YE 2021

IS THIS THE SOLUTION ?



IEA HPT ANNEX 50 - AUSTRIA

National project AT

- AIT – Austrian Institute of Technology (Teamleader)
  Thomas Fleckl, Andreas Zottl
- TU – Graz
  Rene Rieberer, Richard Heimrath

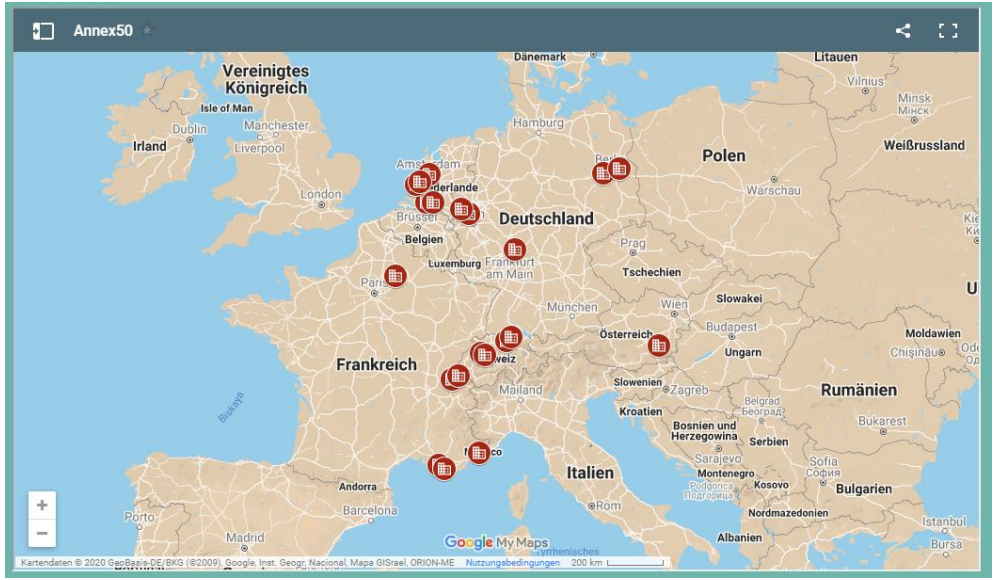
This project was carried out as part of the IEA research cooperation on behalf of the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology.

IEA HPT ANNEX 50 - AUSTRIA

Country Reports

- Task 1: Market Overview
- Task 2.1: Methodology for assessing the performance of combined systems
- Task 2.2: Acoustic characteristics of MFH air-to-water heat pumps with description of measures to reduce noise emissions
- Task 3.1: Optimized refrigeration cycle configuration for Air-Water Heat Pumps for renovated, unrenovated and new MFH
- Task 3.2: System Simulation
- Task 4.0: Demonstration and Monitoring

USE CASES



Best Practice Examples
Heat Pumps in Multi Family Buildings

Hot Ice Weiz, Austria

The project focuses on the use of latent heat with two ice storages and heat pumps in combination with unglazed solar collectors and a PV system. It is designed as a pilot project for local heat supply.

Key facts

Building	
Location	*Weiz, Austria*
Construction	*2015*
Heat distribution	*underfloor heating*
Heated area	*957 m² living*
Level of insulation	*very good*
Heat pump and source	
Number of	*2*
Installed power	*6 kW + 10 kW*
Operation mode	*monoenergetic*
Heat source	*ice storage + solar*
Heating system	
Heat demand 2016/17	*29890 kWh/a* (incl. losses)
Heating temperature	*35 °C*
Domestic hot water	
Type of system	*central*
Heat demand 2016/17	*26200 kWh/a* (incl. losses)
Max. temperature	*60 °C*
Circulation system	*yes*
Other information	
Electric energy consumption 2016/17	*16850 kWh*
Investments costs	*unknown*
PV installation	*yes*

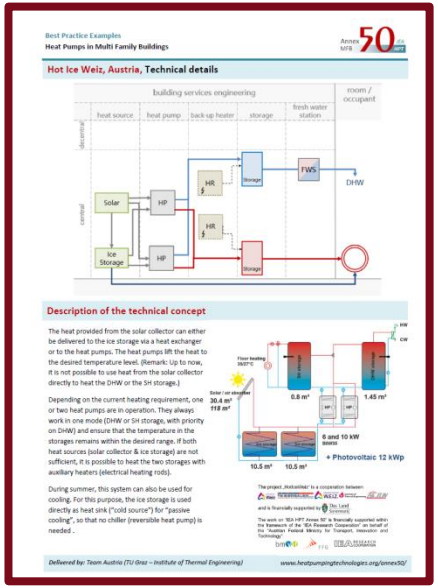
The construction of the MFH (multi-family building) which is located at Bärentalweg 6 in A-8160 Weiz was finished in April 2015. The building is a wood frame construction which accommodates ten different apartments on three floors. The total area adds up to 1477 m², whereof an area of 957m² is heated.

It fulfils the passive house standard and has a calculated heat demand of 9.91 kWh/(m²a).

Lessons learned

- Use of innovative heat source - ice storage connected with solar thermal absorbers works very well for multi - family buildings with very low energy demand (passive house standard).
- Comprehensive concept including PV modules lets increase the energetic independence of the buildings.
- Quality of the system's control is crucial.
- Compared to design data increased heat demand due to increased room temperature & DHW consumption.

Delivered by: Team Austria (TU Graz – Institute of Thermal Engineering)
www.heatpumpingtechnologies.org/annex50/



Best Practice Examples
Heat Pumps in Multi Family Buildings

Hot Ice Weiz, Austria, Technical details

Description of the technical concept

The heat provided from the solar collector can either be delivered to the ice storage via a heat exchanger or to the heat pumps. The heat pumps lift the heat to the desired temperature level. (Remark: Up to now, it is not possible to use heat from the solar collector directly to heat the DHW or the SH storage.)

Depending on the current heating requirement, one or two heat pumps are in operation. They always work in one mode (DHW or SH storage, with priority on DHW) and ensure that the temperature in the storages remains within the desired range. If both heat sources (solar collector & ice storage) are not sufficient, it is possible to heat the two storages with auxiliary heaters (electrical heating rods).

During summer, this system can also be used for cooling. For this purpose, the ice storage is used directly as heat sink ("cold source") for "passive cooling", so that no chiller (reversible heat pump) is needed .

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USE CASE MFH WEIZ

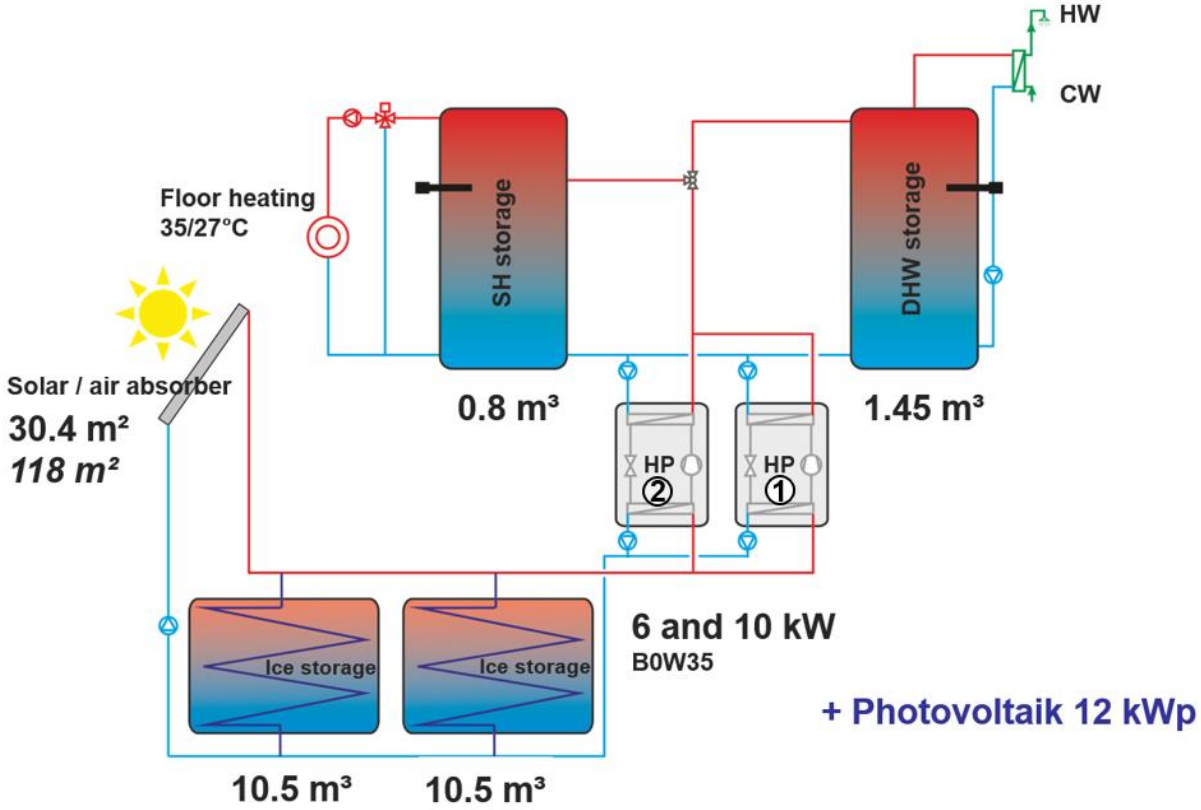
Building details:

- Site: 8160 Weiz
- Heated floor area: 957 m^2
- Year of construction: 2015
- Heat distribution system: floor heating

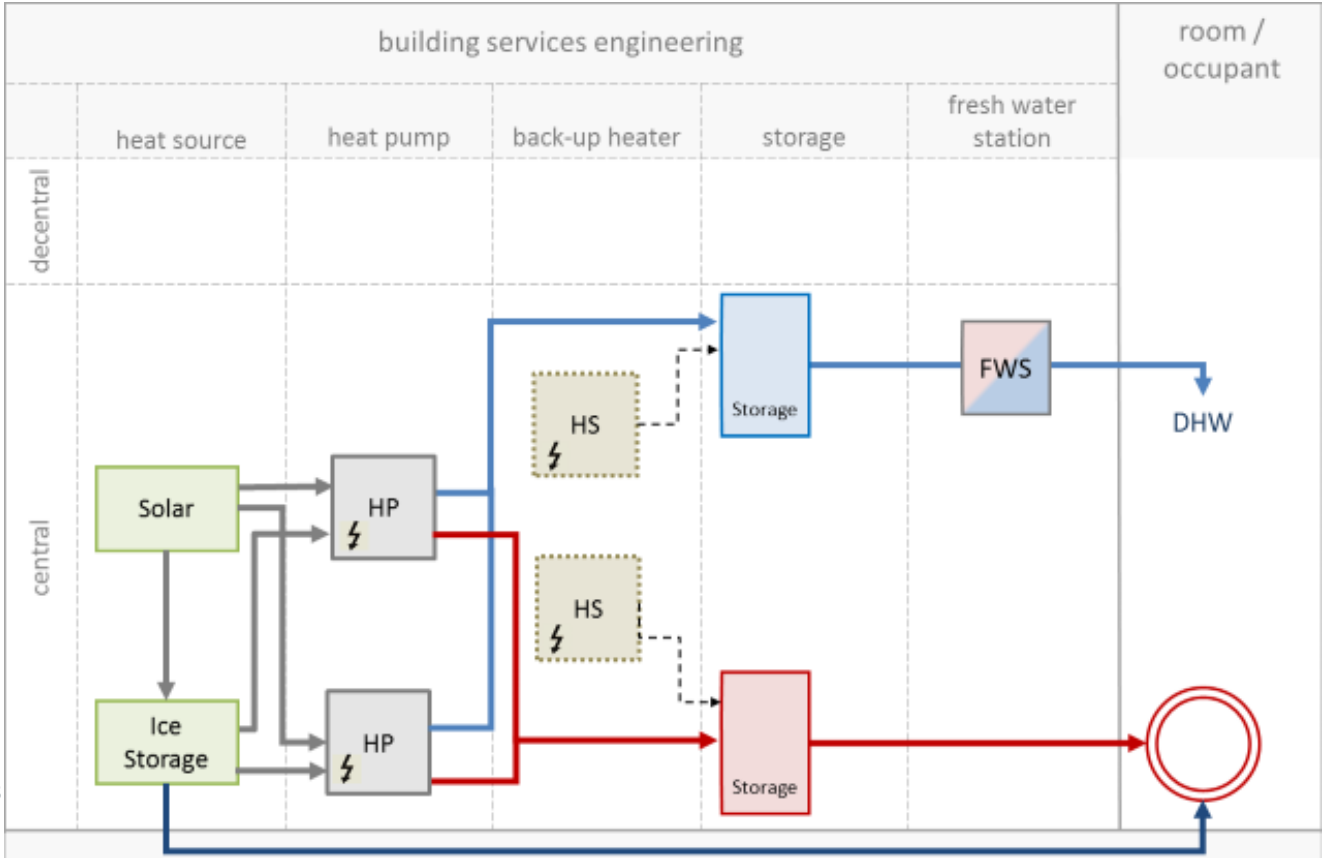
Heating system:

- Heat pump: 2 Brine/Water heat pumps
- Heating capacity: 6 kW and 10 kW
- Sup/Ret-Temperatures: 35/28 (°C)
- DHM Temperature: 60 (°C)

USE CASE MFH WEIZ



USE CASE MFH WEIZ



POTENTIAL FOR HEAT PUMPS IN MFH (IN AT)

existing MFH approx. 260.000

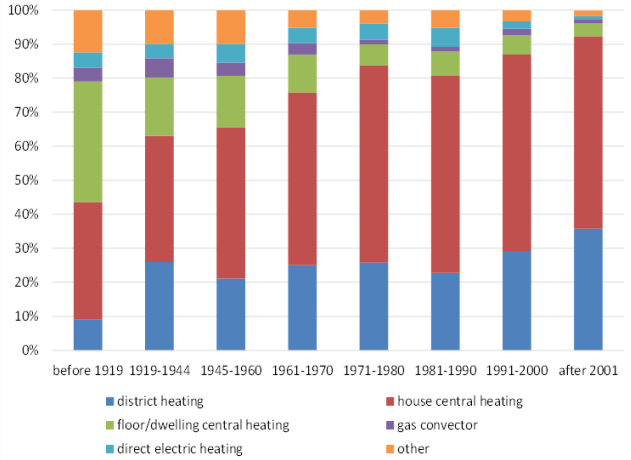
MFH with central heating

approx. 150.000 MFH

Heating demand < 140kWh/m²a

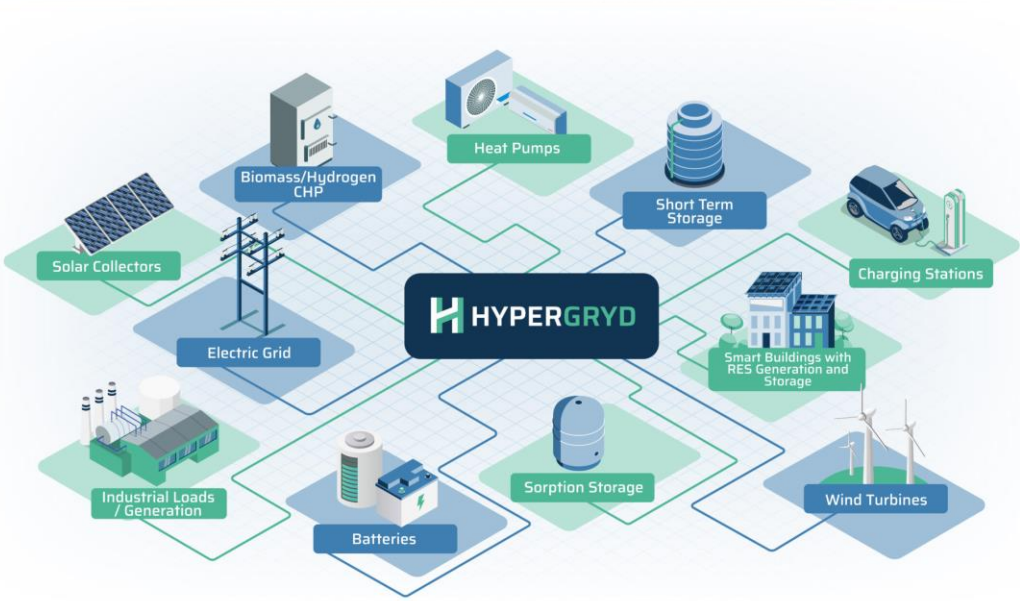
approx. 60.000 – 70.000 MFH

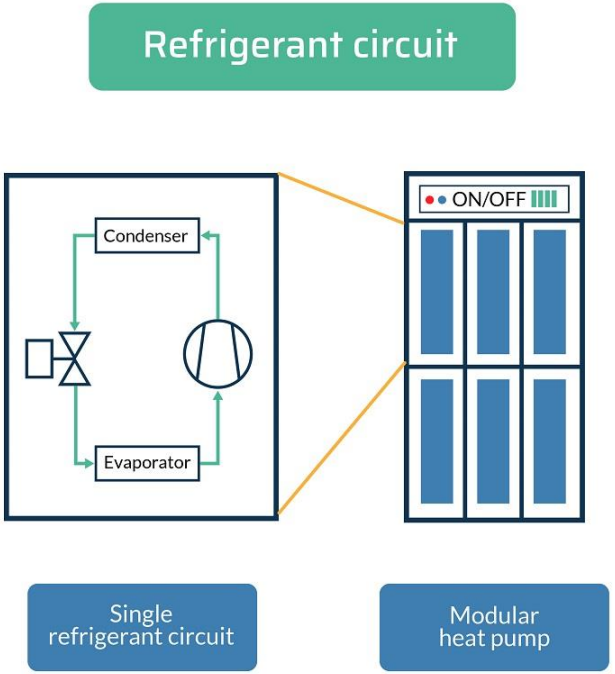
Additional potential of 8000 MFH p.a. due to refurbishment, assuming a refurbishment rate of 3 %



Heating systems in the building stock according to the construction period; data according to Statistik Austria (2016)

GASTHERMENERSATZ/HYPERGRYD





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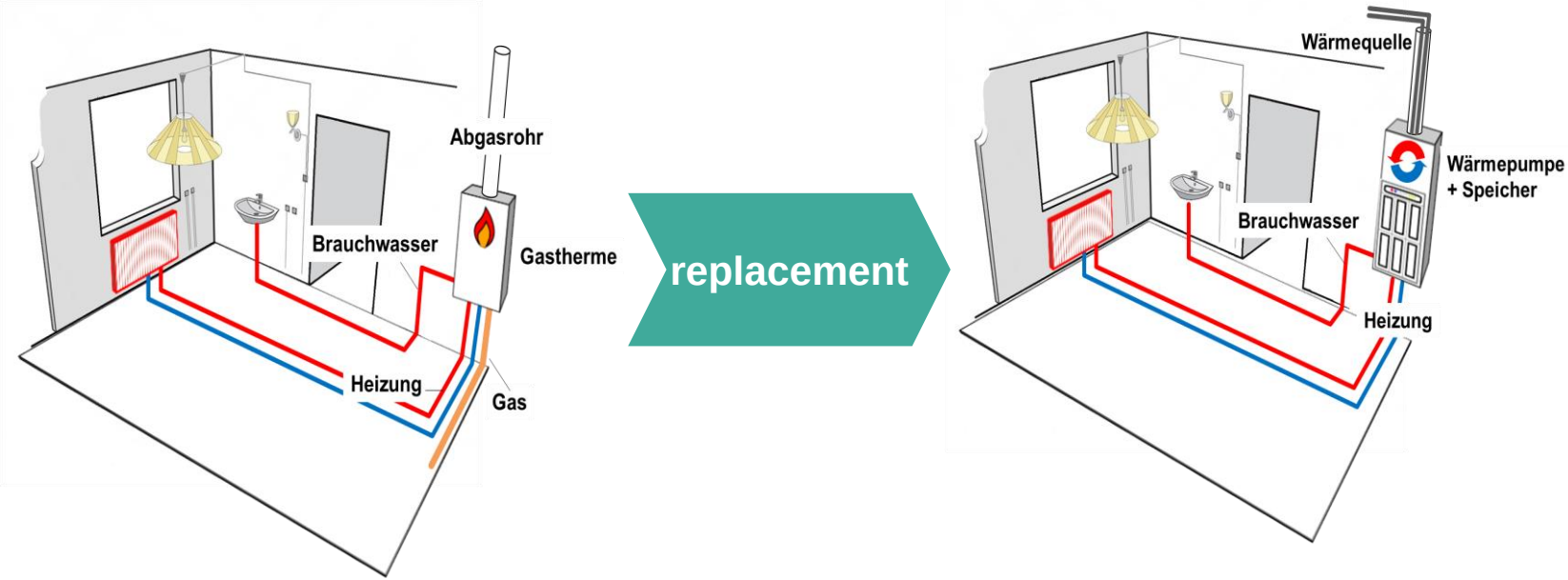

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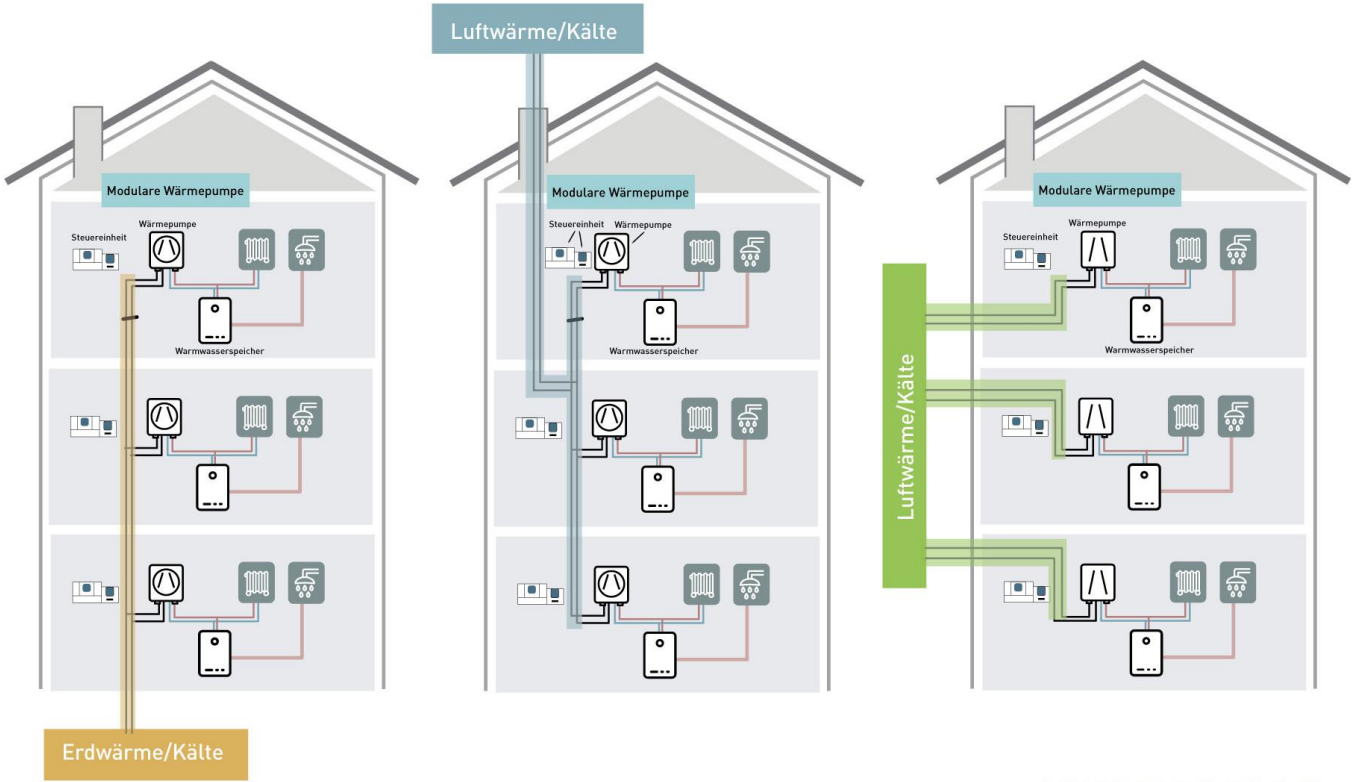
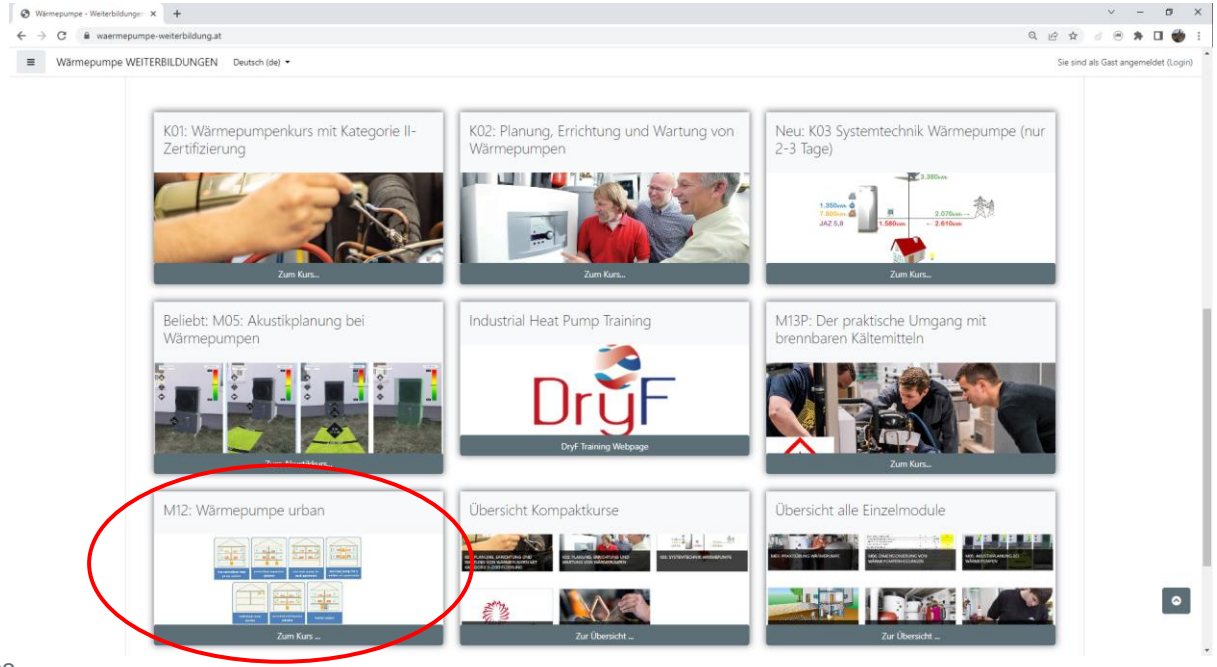


TRAINING MODULE „URBAN HEAT PUMP“

- www.waermepumpe-weiterbildung.at



CONCLUSIONS

- Application of heat pumps in MFH is possible in many cases
  - Many buildings are heat pump ready already
  - Building refurbishment required in some cases
- Existing use cases
- Heat sources
  - Geothermal
  - Outdoor air
- Gasthermenersatz/Hypergryd
  - Solution for decentralized application of heat pumps
  - Several sources possible

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TOMORROW TODAY

THANK YOU VERY MUCH!

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