Hot Ice Weiz, Austria

Newly built block of passiv houses as a pilot project with fresh water system and the use of latent heat with two ice storages

Key facts

Building

Location	Weiz, Austria
Construction	2015
Heated area	957 m² living
Level of insulation	Passiv Haus Standard

Heat pump and source

Number of heat pumps	2
Installed capacity	*10kW + 10kW*
Operation mode	*monoenergetic*
Heat source	Solar and ground
Brand and type	Viessmann
fresh water system	
Refrigerant	R407C
Sound level	*dB*

Heating system

Heat demand	
Heating temperature	*30°C*
Storage size	800 *litres*
Heat distribution	Floorheating/cooling

Domestic hot water

Type of system	*Fresh water*
Max. Temperature	55 *°C*
Circulation system	central distribution
Legionella measures	Thermal – fresh water
Storage size	1450 *litres*
Number of storage tanks	- 1
Temperature control	

Other information

Electric energy	
Consumption 2016	*16850 kWh*
Investments costs	*unknown*
PV installation	790 m²
Solar thermal	790 m²
ICE Storage	2 x 10 m³

Lessons learned

- Use of innovative heat source – ice storage connected with solar thermal absorbers works very well for multifamily buildings with very low energy demand (passive house standard).
- Comprehensive concept including PV modules lets increase the energetic independent of the buildings.
- Compared to design data increased heat demand due to increased room temperature & DHW consumption.

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).

An ice storage of 2 x 10 m3 that releases water to ice at the phase transition and absorbs heat the other way around when ice becomes water. In the application in Weiz, this is not that much more expensive than ground collectors for the heat pump and actually need less surface area. In addition to the ice buffer, two Viessmann heat pumps of 10 kW each are installed that can work in cascade. A heat storage tank of 800 liters for space heating is installed next to a storage tank of 1450 liters for domestic hot water (DHW). This storage tank for DHW is installed as a Fresh Water tank and can also be direxctly loaded from the unglazed solar thermal (PVT-) system in summertime. Both storage tanks can be reheated electrically. The photovoltaic installation of 13kWp is aimed as much as possible at own use. The house can be heated and cooled with underfloor heating. Cooling from the ICE-storage directly is only used when the room temperature is higher than 25°C. Room climate is supported with balanced ventilation and heat recovery.

The project „HotIceWeiz“ is a cooperation between Weiz, TB-BIERBAUER, W.E.I.Z., Institute of Thermal Engineering, SG ELIN
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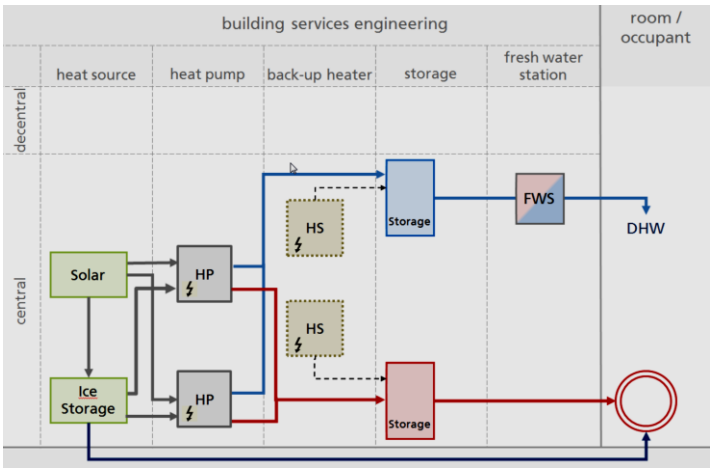
Hot Ice Weiz, Austria, Technical details

Technical room with Viessmann heat pumps and storage

Solar PVT panels by Viessmann

Ice Storage tanks and pvc heat exchangers



Description of the technical concept

The ICE-buffer stores heat and feeds the heat pump as source. The way in which it works has several flexible control mechanisms which is explained in a presentation by Fernwärme Weiz GmbH.

The heat provided from the solar collector can either be put into the ice storage by a heat exchanger or fed to the heat pumps. It is impossible to use heat from the solar collector directly to heat the DHW or the SH storage because the temperature is too low and must be brought to a higher level by the heat pumps before.

Depending on the current heating requirement, one or two heat pumps work. They always work in one mode (DHW or SH storage) and ensure that the temperature in the storages remains within the desired range. Instead of the solar collector, the heat pump can also be fed from the ice storage. If both heat sources are not sufficient, there is the further possibility to heat the two storages with an auxiliary heater.

Innovationszentrum Weiz gives more information