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

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 957 m² is heated. It fulfills 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 directly 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.

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.
Hot Ice Weiz, Austria, Technical details

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.