



REFERENCE FACILITY

A residential building with a ground source heat pump and ice storage-based heating and cooling system in Dobrodzień



Creating environmentally friendly living space for future generations

Innovative energy extraction from the ground, air, water and ice

An innovative energy system that generates heat in winter and cools rooms in summer and in addition generates electricity in an E-PVT thermal hybrid solar collector plant.



20 m³ 17 kW pre-fabricated storage of energy.

The sustainable residential building situated in Dobrodzień in south-western Poland, offers its dwellers the maximum comfort and a positive energy balance, and thereby the reduction of energy costs to a minimum.

The building with a 400 m² living area on a 1-hectare site is lavishly equipped to ensure a pleasant life every day in modern architecture, among perfect quality products and far-reaching energy efficiency.

Having worked smart home of the future" that is second to none with, for example the technologies for heating and cooling with Europe's most recognised building experts and partners, the Investor constructed a "whose source is energy storage in ice (ice heating).

Advantages:

- + An internal system of heating and cooling devices that are based on surface technology and that use the floor and ceilings.
- + The most economical and ecological ventilation with a ground-coupled heat exchanger.
- + The system for controlling lighting, household equipment, room temperature, audio and video electronic devices, roller shutters or monitoring accounts for the smartness of the facility. Everything is based on a mobile application and in-house fingerprint recognition technology. Every building dweller can take care of his or her needs from any place in the world using a smartphone.

Residential building in Dobrodzień

A ground-source heat pump-based heating and cooling system and 20 m³ 17 kW energy storage in ice.

Ice heating ensures domestic comfort

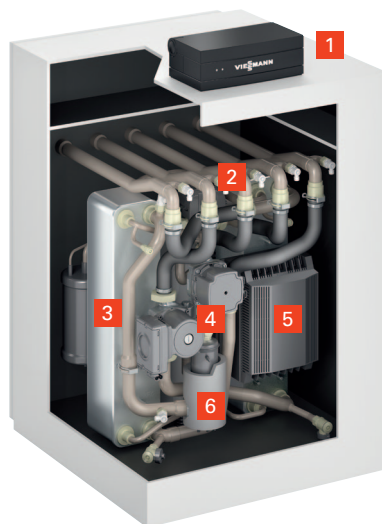
The system for storing energy in ice operates on the following simple principle: solar energy, heat, is extracted from the air and the ground, and the energy is stored at low temperatures in underground energy storage in water and ice. A heat pump extracts heat from the energy storage via a heat exchanger or directly from air-solar collectors or an E-PVT collector plant and raises its temperature to a higher level that corresponds to feed temperature of the building's heating circuit. Heat extraction from the ice storage causes the storage to freeze; at 0°C the water changes its state from liquid to solid (ice) and crystallisation energy releases. The amounts of the energy released when the water freezes and extracted when the ice melts is the same as the energy needed to heat up water from 0°C to 80°C – and vice versa.



Comfortable interior



E-PVT thermal hybrid solar collector plant.
20 panels whose total electric power is 6.5 kW_p and thermal power is 17 kW.



VITOCAL 300-G

17 kW brine-water heat pump

- 1 Vitotronic 200 (Type WO1C) control unit
- 2 Hydraulic plug-in fitting
- 3 Condenser
- 4 Primary and secondary circuits pumps (high efficiency shunt pumps)
- 5 Power-modulating scroll compressor
- 6 Flow through heater for heating water

Viessmann's innovative energy systems

Viessmann is the key supplier of heating and cooling technology for the residential building in question. The most innovative energy system has been applied to generate heat in winter and to cool rooms in summer. In addition, the system uses E-PVT thermal hybrid solar collectors to generate electricity that is consumed in the building.

One Vitocal 300-G 17 kW heat pump unit and a 20 m³ energy storage system have been installed.

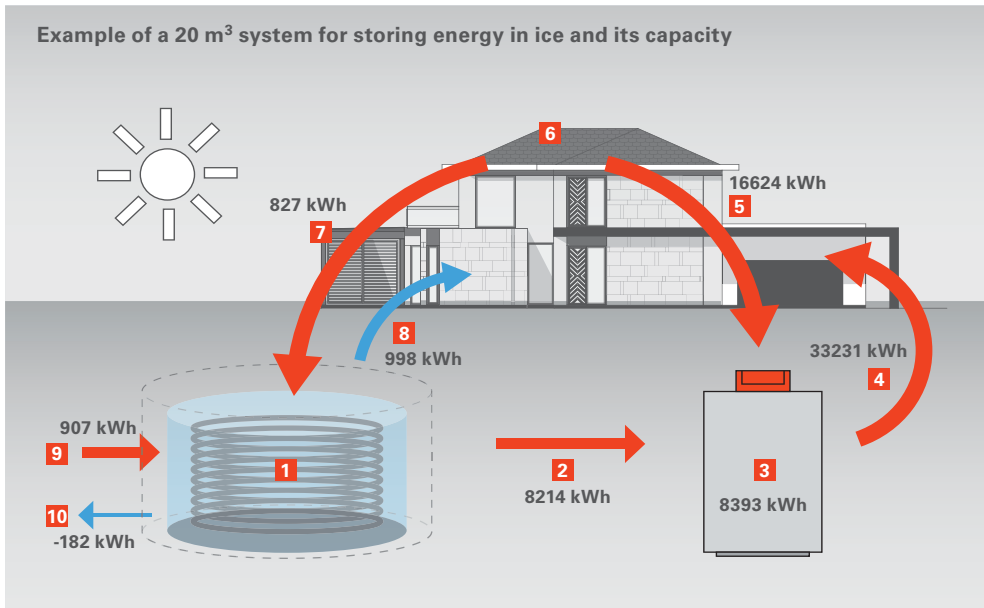


Interior of energy storage



Smart home control panel.

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- 1** energy storage in ice (20 m³ – 17 kW)
- 2** energy storage – heat pump
- 3** heat pump – amount of energy consumed
- 4** thermal load of the building
- 5** E-PVT hybrid collector – heat pump
- 6** E-PVT hybrid collector
- 7** E-PVT hybrid collector – energy storage
- 8** passive cooling – “natural cooling”
- 9** extraction of energy from the ground
- 10** energy losses to the ground



Damian Skoruppa
Viessmann Expert
in energy storing in ice

“Smart home of the future offers much more than a completely new form of living and dwelling only. As an expert, I am calling this *Creating environmentally friendly living space for future generations* because the dweller is surrounded from everywhere by extremely comfortable and easy-to-use technology.”

“Viessmann is a partner whose systems are ideally fitted for each other and ensure low energy consumption which is important in today’s economic and political situation. Compared to conventional buildings, we use 50% of energy less.”

Damian Skoruppa