



Demonstration houses in Černošice, the Czech Republic





IEA – SCH Task 28 / ECBCS Annex 38: Sustainable Solar Housing



Basic information

Traditionally shaped, private built, single family house was built in 2003.

A building site for this private built house was set by regulating plans, which do not respect optimal solar orientation (in general: when assigning orientation of building, roof type and other parameters, spatial planning does not consider factors of sustainable housing, mainly optimal solar orientation). Therefore, gables had to be south-north oriented and solar collectors had to be placed on the porch.

The house consists of two functional parts. First one is living heated area of 86 sqm designed for 4 persons. Second one is an auxiliary space of 52 sqm. The house was finished in December, 2003 and is indwelled since.

1st floor plan



Objectives

An investor desired for a house with a minimal impact on the environment. Hence, except energy performance, also another environmental aspects were considered. For example, composting toilet and rain water storage were set. Investor wished for biomass fire place too, so it was compromised as a small fire-stove. There was an challenge to build a "common" brick house of a maximal reduction in energy consumption and not to significantly exceed standard costs.

Building construction

Construction of solid brick (unburnt lime-sand bricks). Insulation 300 mm of mineral wool. Innovative: minimal dimension of a framework was "compensated" by maximum of thermal insulation. Special wooden frame was developed for free laid mineral wool.

U-values

External wall	U = 0,122 Wm ⁻² K ⁻¹
Socle	U = 0,159 Wm ⁻² K ⁻¹
Roof	U = 0,108 Wm ⁻² K ⁻¹
Floor	U = 0,272 Wm ⁻² K ⁻¹
Windows (glazing)	U = 1,100 Wm ⁻² K ⁻¹

Technical systems

- warm air heating, mechanical ventilation with heat recovery
- earth heat exchanger
- solar collectors 5,0 m²
- integrated heat storage (IZT) 950 litres
- fire stove 9/5 kW
- central regulation
- lighting tube for staircase
- composting WC

Energy performance

Total energy demand: 29 kWh/m²

Space heating and ventilation air: **12 kWh/m**² Energy sources: solar energy, biomass, electricity (low tariff)

Domestic hot water: 34 kWh/m²

energy sources: biomass, electricity (17 kWh/m²) solar collectors (17 kWh/m²)

Parameters declared above are calculated. The house is being monitored since January, 2004. System was proved by failure of its active heating part. For about 14 days there was average temperature of 19°C by exterior temperature of – 20°C.

Note: If "super" windows (and doors) had been used, the passive house standard would has been performed.

Costs

Realization costs were about **4 mio. CZK** (ca.123000 EUR). There are approximately 0,5 mio.CZK extra costs when comparing with a common house of this standard.

Planning tools

Energy performance of the house comes partly from former experiences of several engineers and architects and partly from a model developed in cooperation with Czech Technical University, Faculty of Civil Engineering.

Marketing strategy

The marketing strategy can not still be based on economical arguments only. Economical pay-back time is playing important role for many investors when making decision on energy parameters, but never plays role when making decision on baywindows, doorknobs or garages.

Marketing can be based on both environmental and economical parameters. A standard shape and material of such type of house can be an advantage for rather conservative investors.



The design principles of the house are published at venues of ECOHOUSE (association for sustainable housing) and discussed at the website. The parameters of energy performance will be monitored in co-operation with investor.

Investor: Detail planning and energy concept: Realization: Vančák family Aleš Brotánek, Jan Brotánek ALTERSTAV s.r.o., Vysoké Mýto





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