hybrid GEOTABS

Controlling the power of the ground by integration

Case Study Building - Ter Potterie Care Home, Bruges

Building Location	Bruges, Belgium
Owner	Mintus Brugge
Architect	Van Langenhove Michel, Zandstraat 517, 8200 Bruges, BE
Engineers	Studiebureau Boydens (TECH) Studiebureau Vermeulen (STAB)
Building Type	Elderly Care Home
Certifications	Not at present
Date Completed	May 2016

DESCRIPTION

A relatively high ambient temperature and consumption of domestic hot water make this home a very energy demanding building. Due to the 24/7 constant occupation rates regardless time of day, this facility was an excellent candidate to introduce the use of geothermal energy.

A BTES (borehole thermal energy storage) field is installed in the grounds in order to equip the whole building with concrete core activation. Two heat pumps in the basement and two condensing gas boilers in the attic provide the circuits that operate at a low heating mode and cooling circuits, that operate at a high cooling mode. The boilers can be activated as emergency power supply for the concrete core activation, and hot water production in the case of heat pump failure. All areas are supplemented with radiators as quick adjusting temperature elements, if necessary. The installed concrete core activation is utilised for both the heating and cooling of the building. There are no active cooling elements placed, cooling occurs passively.

Through the use of vertical boreholes (90 st - 75 m), the building provides its own energy for heat generation, thus reducing the need for fossil fuels. Fossil fuels are only utilised for the production of high temperature hot water. The vertical holes ensure the soil acts as an energy storage medium. During the extraction of heat, which occurs during the winter months, the soil is brought to a lower temperature. This free energy is obtained from the cooled soil and in turn is used to chill water used to cool the building in the summer months. Due to this interaction, there is continuous regeneration of the soil during a full year term. This guarantees the power supply required for both cooling and heating of the building.

GENERAL BUILDING DATA

Number of spaces	121 rooms, 5 shared bathrooms, 1 bathroom ground flr, 1 nursing station per living group, living room/lounge areas and central storage.
Number of occupants (design)	121 residents
Gross floor area	16,103 m^2
Conditioned floor area	10,048 m^2 (area that is heated and/or cooled)
Type of ground source	BTES (Borehole Thermal Energy Storage)
Total annual thermal energy use	kWh/(m^2·annum) not yet available
Heating	Gas (Condensing) boiler
Ventilation	Central
Ventilation characteristics	mechanical supply, mechanical exhaust, heat recovery
Net volume	41,316 m^3
Building envelope:floor area ratio	2.83

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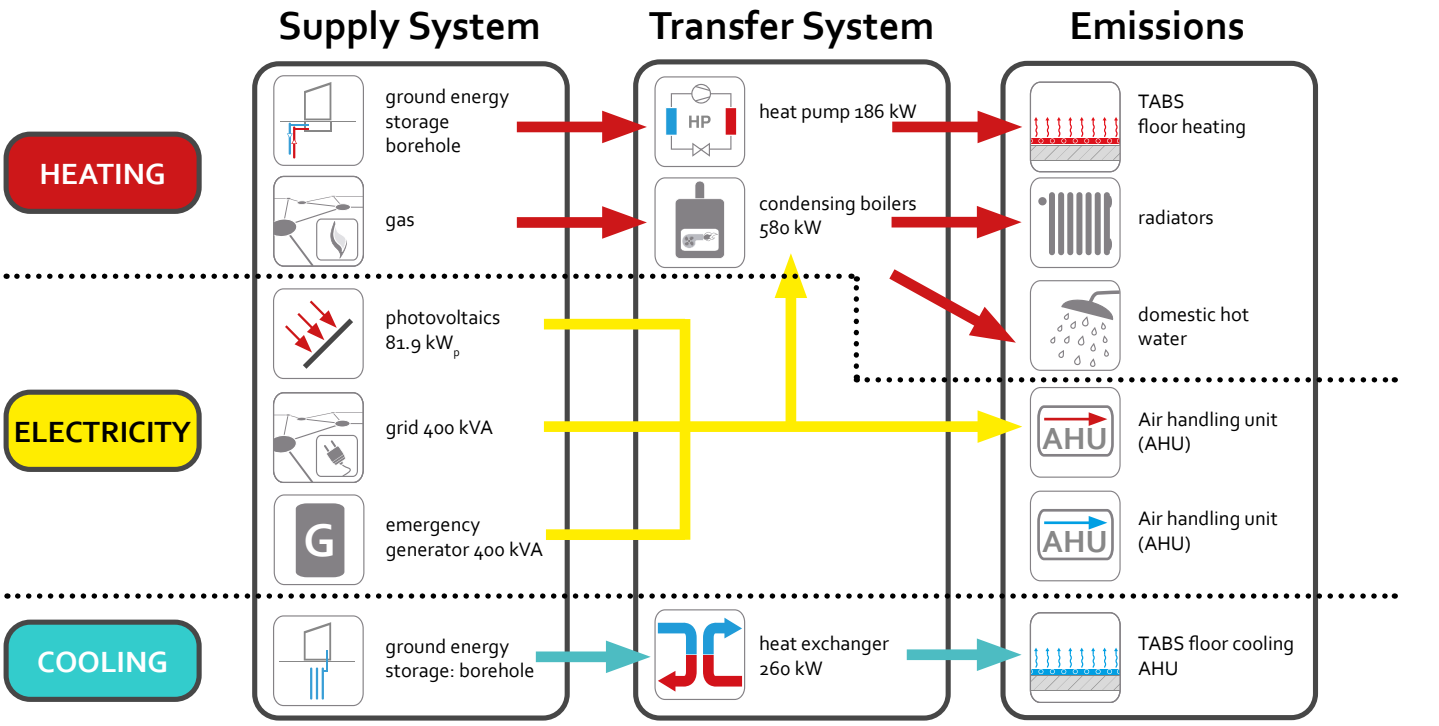

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TER POTTERIE ENERGY EMISSION SYSTEMS

Heating	Main: TABS, Secondary: Radiators and floor heating
Cooling	Main: TABS, Secondary: Floor cooling, Other: AHU

BUILDING FEATURES

Building construction type	Heavy weight
Average U-value for opaque elements (roof, walls, floors)	0.25 W/m²·K
U-value of glazing	1.69 W/m²·K
G-value of glazing	0.54
Glazing area (% of facade)	31 %
Air tightness level / n50 air change rates	Not yet measured / h
Orientation of main facade	NE / SW
Type of shading (e.g. manual)	Automatic
Net space heating demand (kWh/(m²·annum))	kWh/(m²·annum) not yet available
Net space cooling demand (kWh/(m²·annum))	kWh/(m²·annum) not yet available

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PARTNERS

GEOTABS^{hybrid} brings together a transdisciplinary team of SMEs, large industry and research institutes, experienced in research and application of design and control systems in the combined building and energy world.

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