



Case Study Building - Infrac, Dilbeek, Belgium



Building Location	Dilbeek, Belgium
Owner	Infrac cvba
Architect	evr-Architecten Gent, Belgium
Engineers	Boydens Engineering
Building Type	Offices
Certifications	Energy Cert. E peil 45 - K21
Date Completed	March 2011

DESCRIPTION

INFRA is an office building constructed according to the low-energy building concept, resulting in a very high energy performance. This building contains open-plan offices, cellular offices and meeting rooms. Heating and cooling are provided by a heat pump installation connected to a ground-source heat-exchange loop running through an array of deep boreholes.

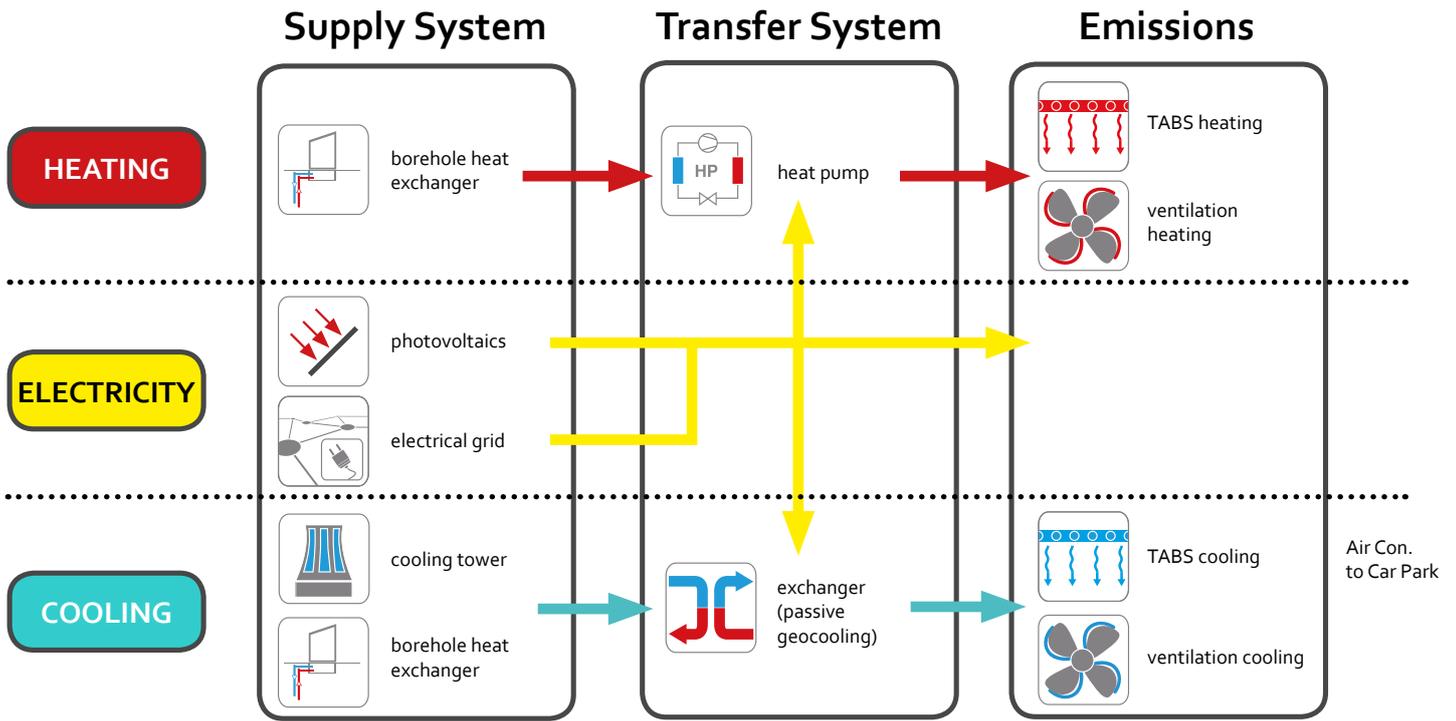
Solar gains are reduced by solar protection in the form of mobile side fins or overhangs above the windows. Internal heat gains are limited by the use of daylight sensors to dim the lighting during periods of sufficient daylight with the knock-on effect of reducing heat produced by the lighting during periods of peak cooling demand. The building is both heated and cooled by a system of thermally-activated concrete in the floor slabs. The fine-tuning of the temperature to the desired level is achieved through pre-cooling or pre-heating the ventilation supply air.

The building was designed to be a high performing office building. The demands are mostly met by TABS, using heating provided by the ground-source heat-pump and passive cooling provided directly from the borehole field. Further efforts to reduce the energy demands have been made by installing high-performance side fins, combined with a daylight control.

GENERAL BUILDING DATA

Number of spaces	21 spaces: offices, kitchen, cafeteria, server cooling rooms & parking
Number of occupants (design)	+/- 90
Net floor area	2,232 m ² + parking
Conditioned floor area	2,232 m ² (area that is heated and/or cooled)
Type of ground source	Vertical Borehole Thermal Energy Storage (BTES)
Total annual thermal energy use	28.23 (heating) + 36.94 (cooling) = 65.17 kWh/(m ² ·annum)
Heating	Small electric boiler (domestic hot water) & heat pump (space heating)
Ventilation	Central
Ventilation characteristics	mechanical supply, mechanical exhaust, heat recovery
Net volume	7,520m ³ (without basement)
Building envelope:floor area ratio	1.067 (conditioned), 0.68 (conditioned and non-conditioned)





INFRA ENERGY EMISSION SYSTEMS

Heating	Main: TABS, Secondary: Ventilation plus CAV/VAV heating coils
Cooling	Main: TABS, Secondary: Ventilation

BUILDING FEATURES

Building construction type	Heavyweight
Average U-value for opaque elements (roof, walls, floors)	0.14-0.2 W/m ² ·K
U-value of glazing	1.0 W/m ² ·K
G-value of glazing	0.46
Glazing area (% of facade)	19 % window : wall ratio
Air tightness level / n50 air change rates	1.3/h
Orientation of main facade	South West
Type of shading (e.g. manual)	Bris Soleil and automated sunscreens
Net space heating demand (kWh/(m ² ·annum))	28.23 kWh/(m ² ·annum)
Net space cooling demand (kWh/(m ² ·annum))	36.94 kWh/(m ² ·annum)

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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