



The Willis building – innovation without fossil fuels and with zero CO₂ emissions

“The Willis building is more than just an office: it is an open area with different types of workspaces, creating an atmosphere that inspires innovation. Multi-functional, comfortable, bright and adaptable are the key words to describe its design.”

- Charlotte Ooms, Architect, Archiles Architecten



Carbon footprint reduced to zero

Belcotec is an HVAC installation company that specializes in the realization of high-quality installations, providing tailor-made solutions in heating, air-conditioning and sanitary installations for commercial properties. Clevr is an installation company dedicated to homeowners and self-builders. Belcotec and Clevr have combined their respective strengths to create something unique. The way they complemented each other and their mutual ambition led to the Willis project. An ultra-modern building that stimulates innovation and sustainability. The Willis building was realized by Belcotec as an innovation center for its own

use. “We named it in honor of the inventor of air-conditioning, Willis Carrier”, explained Jan Vangeel, CEO at Belcotec, and added: “We wanted to make a statement with our own building. The energy level* is 28, which is very low for office buildings. For cooling and heating, we use a low-energy ceiling and ventilation with heat recovery. Using green technology means that we do not need fossil fuels. All the energy we need is taken from the ground via a cold heat storage (KWO - Koude Warmte Opslag) system. Combined with a ground-source heat pump, this ensures that we have zero emissions. The building’s electricity is provided by solar panels.”

The KWO installation ensures that both heat and cold can be stored. The system uses the groundwater held in the water-bearing layers of the soil near a building. In summer, the cold water is extracted from the ground to cool the building. The water gradually warms in the rooms before being pumped back into the ground, where it stays until winter. At that point, the warmer groundwater is used by the KWO installation to heat the building using a heat pump. Drawing energy from the groundwater, the heat pump supplies the desired temperature for the heating system.

The use of warm groundwater to heat buildings in the winter saves up to 75 percent of energy consumption. Energy savings achieved by using groundwater to cool the building in summer are even greater – as much as 95 percent. The combination of the cold heat storage system, heat pumps and photovoltaic panels provides superior indoor comfort in the Willis building with zero CO₂ emissions.

Inverter-driven geothermal heat pumps

To create this system, Belcotec



Office room



Open plan office

worked closely with GeoTherma, a company specializing in geothermal heat pumps. “We have worked with Belcotec regularly on various projects, so we immediately understood their concept and what

they needed from us”, commented Tom Hermans from Geotherma. This project was the first time that the company had used new Thermia Mega ground-source heat pump. “We chose to use the

Willis Carrier: the inventor of modern air conditioning

On July 17, 1902, American engineer Willis Carrier designed the first modern air-conditioning system, launching an industry that would fundamentally improve the way we live, work and play.

Willis Carrier found his inspiration on a foggy Pittsburgh train platform in 1902. Carrier stared through the mist and realized that he could dry air by passing

it through water to create fog. Doing so would make it possible to produce air with specific amounts of moisture in it. Within a year, he had completed his invention to control humidity – the basic building block for modern air conditioning.

Naming the building after him is a tribute to his innovative work and a tribute to the pioneers who dare to look forward and inspire innovation.





Conference room

Thermia MEGA XL (21-88 kW) and Thermia MEGA M (11-44 kW). These top-quality, inverter-driven geothermal heat pumps are ideal for the needs of the Willis building and have been designed to provide optimal annual efficiency. Technically speaking, thanks to a variable speed compressor, the Mega can adjust heating capacity to current heat demand with the highest seasonal performance factor (SPF) on the market”, Hermans added.

Organic cooperation

“Belcotec has completed many HVAC projects in childcare centers, schools and commercial buildings. To provide this service, we employ consultant engineers, designers, project managers and installers”, explained Jan Vangeel. The Willis building is now the headquarters of Belcotec and sister company Clevr, where 60 employees are expected generate sales of around 15 million Euros in 2017. “For our own building, we designed the entire installation. In consultation with GeoTherma, we worked out the technical issues surrounding the heat pump. That collaboration was almost organic. Heat pumps are no longer an option or worth thinking for energy-efficient projects”, said Vangeel.

Energy-efficient heating and passive cooling

Tom Hermans explained that energy-efficient heating and passive cooling is now a major focus of GeoTherma’s expertise: *“We are currently working on various apartment buildings in which we are installing Thermia Mega ground-source heat pumps to provide heating and passive cooling.”* According to Hermans, the biggest benefits of heat pumps are not yet known to the general public: *“Passive cooling is just one example. A geothermal heat pump combined with green electricity is the most sustainable way to heat and cool a building.”*

* E-peil (energieprestatiepeil) is a Belgium rating system that ranks building energy classes with financial incentives from the government.

Fact Box

Type of building: office building

Location: Geel, Belgium

Building characteristics:

- Heated and cooled area: ground floor 800 m², first floor 600 m²
- Heated-only area: warehouse 900 m²
- Heating and hot water demand: office 92 kW, warehouse 75 kW
- Cooling demand in office: 178 kW

Applied solution:

- Renewable heating and cooling
- Passive cooling: KWO (cold heat storage) system
- Thermia MEGA XL (21-88 kW) and Thermia MEGA M (11-44 kW)
- 2 boreholes: 85 m deep – flow rate: 30 m³/h

Zero CO₂ emissions

Completion date: April 2017

Design: Archiles Architecten



Heating room with two Mega ground-source heat pumps

GeoTherma specializes in installing top-quality heat pump systems that provide low energy consumption, superior comfort and long-term durability.

GeoTherma was founded in October 2007 by Tom Hermans. His aim was to support installers in the development of heat pump systems and to act as a distributor of the necessary high-quality components.

As dedicated specialists and experts in heat pumps, GeoTherma is the ideal partner for many installation and construction companies.

“Using our skills and experience, we analyze the existing situation and then recommend a system with the correct sizing, a comprehensively prepared execution plan and a complete operational test run, with all work carefully supervised to bring the system into full operation.” - Tom Hermans

Since company was founded, GeoTherma has successfully completed over 2,000 installations across Belgium.



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