**Case story | DHP-M** [M] **commercial ground source heat pump**

# New apartments **benefit** from **renewable** geothermal **energy**

Staf Gebruers decided use geothermal energy from Danfoss where annual efficiency SPF* is 4,9 what gives 80 % energy savings and saved over 25 t $CO_2$ emissions per year !

**up to**
# 80%
**of heating demand is met using renewable energy with DHP-M** [M] **inverter driven heat pump**

## Rewind to the 80's

Staf Gebruers was a geothermal energy pioneer in Belgium. In 1982, he decided to heat a pig farm from renewable energy. It was one of the first and very innovative systems to use a geothermal heat pump which was ran using a water well. This was a first for Belgium, however the Pioneering spirit always takes a risk. Staf installed two heat pumps of 25 kW on the pig farm. In 1983 when the installation was finished he organized an open day, exhibiting the idea to other farmers. More than 200 farmers came to see how the impressive installation performed. No doubt, over the years the installation has saved Staf a lot of energy, money and $CO_2$.

## Geothermal energy solution powered by Danfoss

When Staf Gebruers and his brother both built a new house in 1986 they decided to install a heat pump. Now, 30 years later the heat pump in his house is still functional. *'Ever since I got my first heat pump, I compared the energy prices and a heat pump has been the most economical way to heat up your home or business. But this is not the most important reason I installed a geothermal heat pump. I wanted the building to be energy neutral on a yearly basis, so I fitted enough solar panels on the roof to be completely independent.'* – says Staf Gebruers

When Staf Gebruers and Jeanne Wens decided to construct an 11 apartment building, he knew it would need a heat pump and energy sourced from the ground. *'I see this building as an investment for the future, not only for myself but mainly for my children and grandchildren. No matter what the energy prices do, there will be a fixed return on investment that no bank can promise me.'* – says Staf Gebruers, with his wife Jeanne Wens adding: *'Maybe it is a strange thing to say but I do not like gas. It feels unnatural to burn the earths' reserves. When we decided on a 11 apartment build for rental, we wanted it to be as fire proof as possible. You never know what could happen with gas and oil, which was not an option for us, and as we have already had a heat pump for more than 30 years, and were very satisfied with the service and personal*



Staf Gebruers and Jeanne Wens at brine manifold



Vertical collector ready to connect to brine manifold

*approach of Ecoterm, we never even looked at another option other than a heat pump.'*

The 11 apartments have different usable areas but all of them will be heated by floor heating where heat is delivered by a Danfoss DHP-M [M] ground source heat pump. DHP-M [M] is a newly designed Danfoss inverter driven ground source heat pump with a variable heating capacity of 11 to 44 kW. Moreover, the heat distribution installation is controlled and balanced by a AB-QM hydronic balancing valve, TWA thermoelectric drive and Basic Plus[2] room thermostats for floor heating, all supplied by Danfoss. All of them allow the control of single zones with a comfortable temperature whilst reducing energy consumption and securing the optimal flow of the heating system.

Luc Van de Velde at DHP-M ᴹ heat pump



Drilling boreholes

## Energy efficiency, comfort and environmental foot print awareness

*'The comfort and coziness of the floor heating is a must. When I am at a friend's house without floor heating, I really miss it. As soon as my feet are warm, my whole body is and I personally think that you cannot compare the comfort of floor heating with that of radiators. So if it is good enough for us, why should we give less to the people who will rent our apartments.'* –says Jeanne. Heat pumps have a relatively low carbon dioxide output: less than half of the $CO_2$ output

produced by fuel or gas residential appliances. By installing a heat pump in his new apartment building Staf Gebruers and Jeanne Wens take a significant part in improving the climate, with sustainable reductions in $CO_2$ emissions of up to 49 %**. *'When you build a new building these days, you should not just focus on the initial cost. With the new building regulations, renewable energy must be part of the total energy consumption. By installing a heat pump in combination with solar panels, your E-peil*** score can drop below 30 and you are exempt from paying*

the cadastral tax for 5 years. This means an additional saving of many thousands of euros in this case. As energy prices rise and fluctuate over the years, being energy independent will give you peace of mind. I'm sure you'll find many short term solutions that are cheaper on the market, however the long term evaluation and excellent quality of Danfoss make it the most preferable choice. Danfoss has an impressive range and can provide you with all the components for a comfortable and economical heating system, from heat distribution controls like thermostats up to power full geothermal heat pumps. All of them are of the best quality, so there is almost no maintenance cost over the lifespan of the building.' – says Luc Van de Velde from Ecoterm bvba, an engineer with more than 20 years of experience in heating system installations.
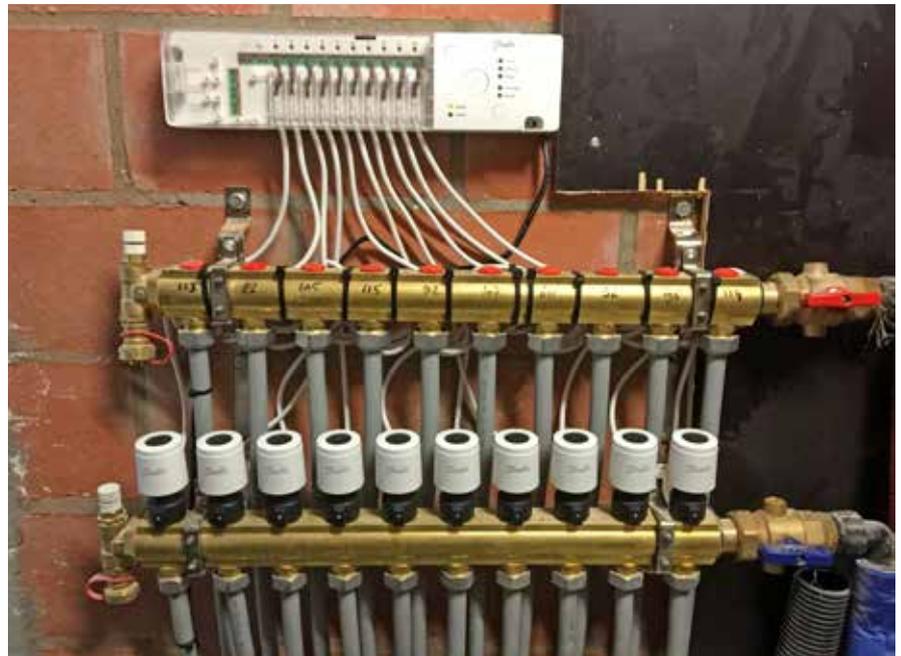


Danfoss CF-MC master controller and floor heating manifold with TWA thermoelectric drive

## Fact box:

**Location:** Belgium, Kasterlee
**Year of installation:** 2016
**Heated area:** 1 149m²
**Ground source:**
8 boreholes with depth of 135 meters each
**Drilling:** GEBO bvba (www.gebo.be)
**Renewable energy sources:**
DHP-M$^M$ ground source heat pump (11-45kW)
**Heating system controls:**
- CF-MC master controller
- TWA thermoelectric drive
- Basic Plus² room thermostats
- ABQM balancing valve
- SonoSelect™ ultrasonic heat meter
**The Building's Energy demand:**
101 384 kWh
**Energy used by heat pump:**
20 702 kWh
**Renewable energy:** 80 682 kWh
**SPF:** 4,9
**$CO_2$ emissions saved per year ****
compared with oil:** 29,8 t
**$CO_2$ emissions saved per year ****
compared with gas:** 25,8 t
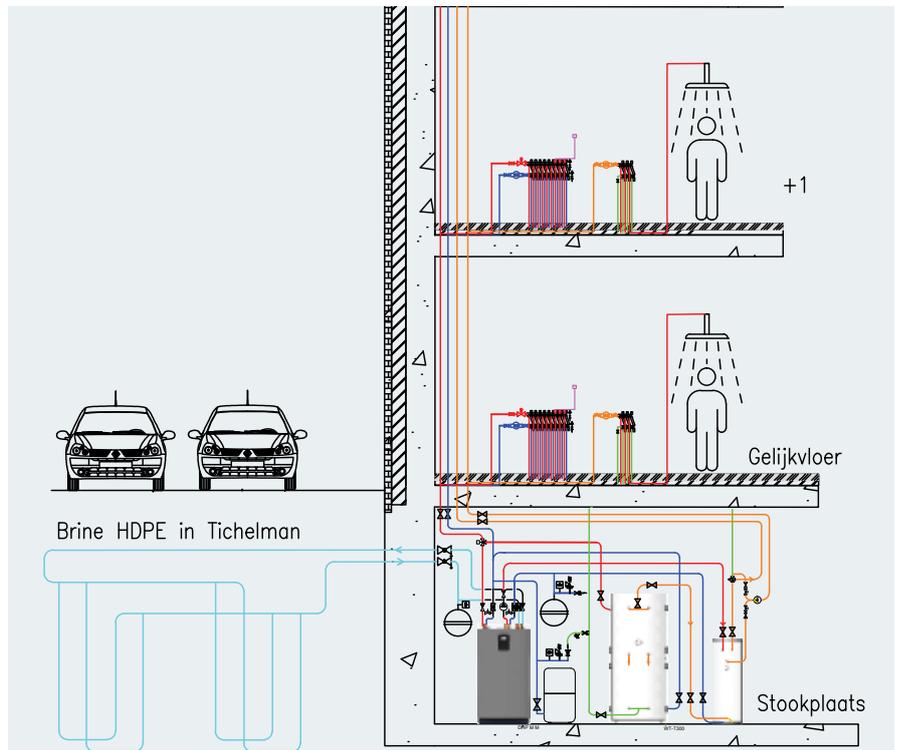


System Solution : Danfoss DHP-M $^M$, WT-C500 + WT-T300

\* SPF - the Seasonal Performance Factor is a simple ratio of the heating provided by a heat pump to the electricity consumed. Means that heat pump converts 1kW of electricity into 3 or 4 kW of heat. SPF as annual efficiency incorporates the whole year, including the warmest and the coldest periods, as well as the production of hot water.
\*\* "Heat pump technology and environmental impact" Swedish Heat Pump Association report
\*\*\* E-peil (energieprestatiepeil) is a Belgium rating system that ranks building energy classes with financial incentives from the government.
\*\*\*$CO_2$ savings has been calculated on co2.myclimate.org for Belgium