De Tas, Biddinghuizen, Netherlands

Renovation of a senior citizens home with individual double function heat pumps for space heating and domestic hot water and a closed ground source loop.

Key facts

Building
Location Biddinghuizen, Netherlands
Construction 2011
Heat distribution individual in building
Heated area 76 m² living/apartment
Level of insulation high

Heat pump and source
Number of heat pumps 54
Installed power 3,5 kW
Operation mode monoenergetic
Heat source Individual ground source loops
Brand and type ITHO-Daalderop WPU4
Refrigerant R 134A
Noise emissions 38 dB

Heating system
Heat demand
Heating temperature 35°C

Domestic hot water
Type of system Double function
Storage size 150 litres
Max. Temperature 60 °C
Circulation system

Other information
Electric energy
Consumption year kWh
Investments costs €12.000/apartment
PV installation no
Solar thermal no

Lessons learned
Based upon the experiences in this project the heat pump supplier ITHO-Daalderop together with 'Energiegarant' and a number of Housing Corporations gone further in this development. Examples are:

- Bomenwijk - Den Haag
- Soendalaan – Delft

Even larger high rise buildings have been realized.

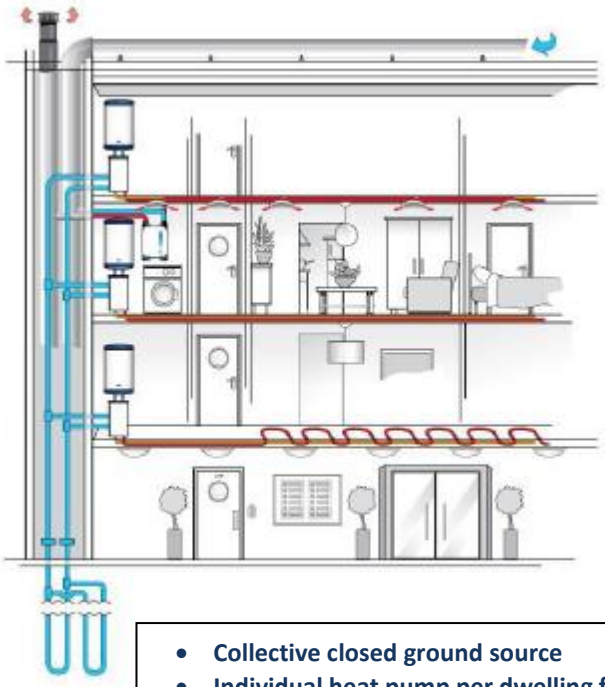
The De Tas complex in Biddinghuizen is furnished as an apartment complex for seniors and offers space for 54 rental apartments. There are 16 apartments on the ground floor. 19 apartments have been built on both the 1st and 2nd floor. Residents could choose which property they preferred. The building uses renewable energy via individual heat pumps. An additional advantage of this system is that it provides residents with cooling in the summer. This is especially important for seniors.

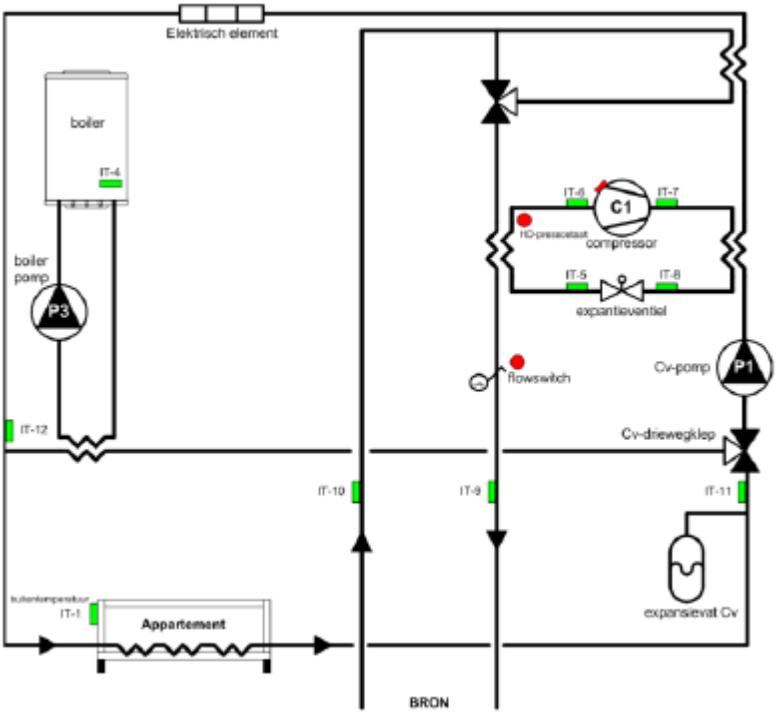
All properties are on the ground floor and have a spacious living room, a separate dining room, a large and a small bedroom and a storage room. The houses on the ground floor have a garden. The houses on the floors have a balcony, depending on the type of property, this balcony is indoor or outdoor. On the ground floor there is a storage room for every tenant. At the front door is an extra space for setting up possibly a mobility scooter with a charging option. Residents have furnished the home as much as possible to their preference and have therefore been given the necessary choices for finishing the kitchen and bathroom.

- Walls Rc = 3,0 m2.K/W m2K/W
- Roof Rc = 3,0 m2.K/W m2K/W
- Ground floor Rc = 3,0 m2.K/W m2K/W
- Glazing Uc = 1,2 W/m2.K W/m2K
- Infiltration 0,625 l/s.m2
- EPC < 0,5

Monitored house: floor area: 54 dwellings each approximately 76 m^2. Variables monitored: room temperature, room temperature setting, operating mode, temperature, ground source temperature

De Tas, Biddinghuizen, Netherlands, Technical details





- **Collective closed ground source**
- **Individual heat pump per dwelling for heating, cooling and hot water**
- **COP approx 6 for heating, COP approx 3 for hot water**
- **Balanced ventilation**

Description of the technical concept

By distributing water at ground source temperature, energy efficient free cooling is available in all apartments. Individual heat pumps use the same source for heating and hot water. Hot water is produced at night, when no room heating is required, and stored for use during the day. The low temperature of the two-pipe system avoids thermal distribution losses.

The source consists of several vertical heat exchangers, connected in parallel. The flow of all sources is matched by tuning the flow resistance. Thermal energy from the floor cooling system is fed into the system in the summer, regenerating the ground source. The heat capacity of the ground sources will level out variations in the energy balance from year to year. An overall balance is achieved by careful dimensioning of windows and openings.

The system concept consists of:

- Individual heat pump (3,5 kWth) and vertical ground sources (brine or water, 90 m)
- Floor or wall heating
- Ventilation system with heat recovery 300 m3/h

De Tas care center in Biddinghuizen has individually designed heat pumps with a closed source for each apartment. Since the installation of the heat pumps, the temperature of the source has decreased every year. The ground heat exchangers that are filled with pure water could freeze. Therefore, in conjunction with Feenstra, Triple Solar has installed an energy roof that is connected at source and thus regenerates the source.