2 MegaWatt-project, Haarlem, Netherlands

Renovation of nine apartment blocks with a new heating system based upon solar thermal energy and the first large scale application of absorption heat pumps feeding a fresh water system for collective domestic hot water.

Key facts

Building

Location	Haarlem, Netherlands
Construction	2001
Heat distribution	2 pipe Hydronic
Heated area	26,740 m² living
Level of insulation	

Heat pump and source

Number of heat pumps	16
Installed capacity	38kW's each
Operation mode: supported by gas boilers and solar thermal	
Heat source	Aquifer ground source
Brand and type	ROBUR GAHP - WS
Refrigerant	NH3
Sound level	dB

Heating system

Heat demand	2,137,000 kWh/a
Heating temperature	40°C

Domestic hot water

Type of system	Fresh water system
Max. Temperature	60°C
Circulation system	open
Legionella measures	thermal
Storage size	9 x 9,500 litres
Number of storage tanks	9
Hot water consumption	12,600 m³/a
Temperature control	

Other information

Investments costs	5,335,000 Euro
Electric energy Consumption year	kWh
Solar thermal	2,850 m²
Solar thermal yield	1,433,000 kWh/a

Lessons learned

This example has set the basis for further market developments. The 2 WM project is part of the continuous innovation process. Eneco Energie realized more than 50 of this type large scale solar thermal systems in the housing sector. The project leader has after these projects founded his own EsCo BIJZON, with a number of comparable projects.

Additional information on ENECO factsheet

The 382 apartments in Schalkwijk (Haarlem) in nine three to four storey apartment blocks that make up this social housing development needed a new heating system. Originally the apartments were equipped with small individual gas-fired kitchen water heaters and a collective gas fired distribution system for space heating. Normally all the apartments would get their own individual high efficiency gas boiler. But after consultation the housing corporations 'Elan Wonen', 'Pré Wonen' and 'de Woonmaatschappij' together with the energy company ENECO and the City of Haarlem decided to take a different, more sustainable, approach and invest into a sustainable heating system.

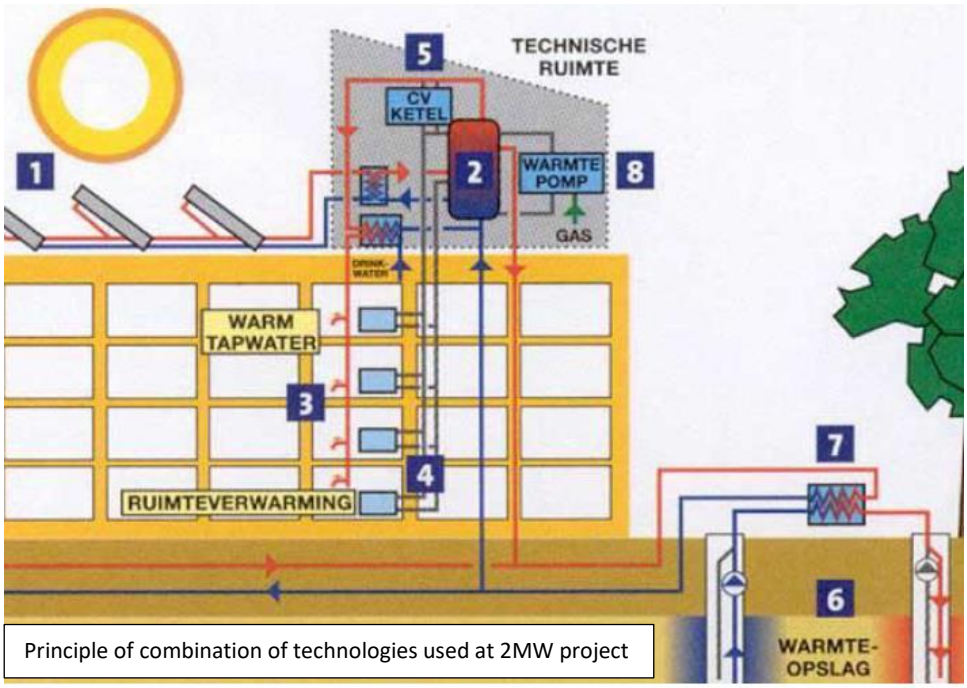
The name "the 2MW-project" refers to the capacity of central heating plants. In the project at that time a unique combination of sustainable technologies were used: solar-collectors, Gas Absorption Heat Pumps and aquifer heat and cold storage. In fact this was the first application of this type of heat pump after a development phase supported by the Dutch government.

The technologies that make up the 2 MegaWatt-project:

- Solar collectors installed on the rooftop and buffering hot water in the fresh water 9,500 litre storage tanks for domestic hot water. If the residents use hot water, cold sanitary water flows through the hot buffer tank to the tap. That hot water is directly used at the tap/shower/kitchen.
- When the storage tanks are filled the overflow from the solar collectors is used to regenerate the ground sources. This an open source aquifer system consisting of two wells 80 meters apart and 110 meters deep.
- Sixteen Robur ground source gas absorption heat pumps are installed for space heating and domestic hot water in winter time or when no solar heat is available.

The 2 MegaWatt-project at that time was the most sustainable heating system in the Netherlands. The housing corporations like to invest in good social projects in the field of housing and public space. Eneco Energie wants to show that it is not as difficult to realize a sustainable project as it sometimes seems.

2 MegaWatt-project, Haarlem, Netherlands Technical details



Principle of combination of technologies used at 2MW project

Description of the technical concept

In 2007 it is reported that the project is technically progressing better. In 2006 it became clear through a residents' survey that not all residents are satisfied with the performance of the installation. Most technical problems have now been resolved. As a final addition, the radiators of the homes of the Woonmaatschappij have been enlarged, so that a warmth can also be achieved with a low temperature, increasing the performance of the heat pumps.

Measurements were taken seven years after installation. In the old situation, each home used around 1930 m3 of natural gas for heating and hot sanitary water per year. By improving building materials (better insulation) the energy use is reduced to 1020 m3 of natural gas per year. The total 2 MW-project reduces this value to 525 m3 per home per year. That means a reduction of approximately 70% of the original situation. Additionally, the apartments can be used for another 15 years, thanks to the renovation measures. Therefore the project does not just fit the sustainable building policy, but also can be set as an example for sustainable home management.

The maximum capacity of this installation is 2 MW during the season. Most of this energy is not produced by natural gas or coals. Therefore the installation has an emission of CO2 of just 1,000 tons (=1,000,000 kg) per year. This can be compared to the capacity of 100 acres of forest (around 200 soccer fields of surface).

The project saves 520,000 m3 of natural gas per year in total. That is roughly €200,000 of savings per year, at the current natural gas price (standard winter conditions).