



# Het Breed is going for gas heat pumps

Soon twenty gas-fired heat pumps will be ready to serve nearly twelve hundred households in housing complex 'Het Breed' in the north of Amsterdam.

It is one of the biggest sustainable housing renovation projects in Europe: Housing complex *Het Breed*, owned by housing corporations Ymere and Eigen Haard. Het Breed in north Amsterdam includes 1.176 residences in deck construction, with architectural value due to the covered passageways and the exceptional way in which the buildings are connected. Out of necessity, renovation of the project has been divided into two phases. Work on the residences will not start until next year, because the necessary 70 per cent advocates had not been reached yet a few years ago. At that time, the renovation had already been launched, by means of the tender of central heating and the domestic hot water system.

Eneco eventually came up with energetically the best solution. 'In the design, we had planned low temperature heating and high efficiency boilers, and for the generation of hot water we assumed solar collectors on the rooftops – on average 1m<sup>2</sup> solar collector per resident', explains project manager Martijn de Jong. With this design in mind, Eneco started the conversion of the four boiler houses.

## Soil resources impossible

Once two of the boiler houses had been equipped with new high efficiency boilers and an enormous solar water heater with a 16.500 liter capacity, De Jong asked

himself the question: 'Isn't there anything more we can do with regard to sustainability?' He thought of the application of solar photovoltaic panels on those rooftops where no solar collectors had been placed. 'And perhaps we should also do something with heat pumps, for the generation of central heating.'

The trail quickly led De Jong to gas absorption heat pumps. The gas-fired heat pumps obtain their heat from the air and not from underground resources, as is the case with electrical heat pumps. 'When you're situated in Amsterdam, drilling is anything but easy. Moreover, multiple boreholes are already in use in the area, and these are all of considerable size', De

Jong explains. Heat pumps, using air as the medium, turned out to be the solution. 'At the VSK-fair I saw the gas-fired heat pumps of Remeha, and because we also use high efficiency boilers of the same firm, this seemed to be a suitable combination. Moreover, Remeha was prepared to deliver the necessary support. Thus we got involved in the process.'

## Ice formation

It turned out not to be possible to equip the two already renewed boiler houses with gas-fired heat pumps. The third and fourth boiler houses however, needed yet to be renovated and technically allowed for installation of the heat pumps. 'To

ensure about 45 per cent of residences of central heating, twenty heat pumps will be installed. The machines will be placed outside on the roofs, 10 have been prepared for each boiler house', De Jong says.

Each unit has a capacity of 35 kW. This comes down to about 350 kW per boiler house. The capacity of boilers in the boiler houses remains the same, approximately 2.500 kW. De Jong has decided not to lower the boiler capacity. 'Because we expect that in case of extremely low temperatures, the heat pumps will produce ice-formation to such an extent that they will have to be turned off by their software. An outside temperature of -10 °C



means that the boilers will take over completely, because the heat pumps will not be lucrative anymore in that situation.'

Apart from that, the capacity per boiler house has already been lowered drastically, as the old boiler houses were equipped with two boilers of 2.500 kW each, thus adding up to 5 MW. Additionally, thanks to insulation of the residences and placement of HR++ glass, later on in the second phase of the renovation, energy demand will decrease by about 50 per cent. Because the housing renovation does not start until next year, each boiler house has temporarily been equipped with an additional boiler of 2 MW. 'The new boiler houses have a capacity shortage due to the insufficiently insulated residences. In 2009 temperatures were also low, but we did not receive any complaints then. However, last winter during Christmas things got very precarious and we decided to place 2 MW worth of emergency boilers. This was definitely necessary.' The entire renovation will be completed in 2014, at which point the last emergency boilers can be dismantled.

## 65-45 degrees

Along with the restart of the housing renovation, Eneco's original plan – low temperature heating in the residences – will also be executed. 'The water temperature will change from 90/70 to 65/45 °C. The decision to return to that lower water temperature had already been made before there was any talk of heat pumps, because the boiler efficiency is higher in that case', De Jong says. The gas-fired heat pumps will also benefit considerably from the lower temperature of the boiler water.

The first ten gas-fired heat pumps were hauled onto the roof before the summer holidays and the second series of ten, intended for the other boiler house, will follow after the summer. Before the start of the heating season, the last two boiler houses have to be completed and the heat pumps functional. After that, Eneco's installation company will start the second phase: the placement of energy meters for central heating and hot water per residence.

## EUROPEAN EXAMPLE PROJECT

Project Het Breed has become a European example project. In three capitals (Amsterdam, Budapest and Sofia), power companies and public authorities are working on the improvement of 2.500 houses. The urban neighborhoods all seem to be lagging behind in maintenance of residences and social connectedness. The three projects are examples of the use of sustainable energy in already existing buildings. The goal is to attain energy savings of more than 50 per cent.

The three renovation projects consist of extensive insulation (house front, floor, roof, and glass) of the building, modernization of the heat distribution networks and the application of large-scale solar energy (collectors) for hot water and replacement of old boiler houses. This leads to a healthier indoor climate and on average lower energy costs.



The residences will be provided with slightly bigger radiators, but because of proper insulation, the actual size of the radiators will not be that bad. The residents did protest the introduction of bigger radiators a couple of years ago however. 'Monstrous things', one resident describes the low temperature-radiators in a local newspaper 'Het Parool'.

Due to the combination of extra insulation and the new installations, the residents will receive, on average, lower energy bills in the future. The new gas-fired heat pumps do not necessarily contribute to this. 'The rates are based on a not-more-than-usual-principle. We make the investment, and in exchange for that the environment will be relieved from CO<sub>2</sub> emissions', De Jong clarifies.

## The old-fashioned way

Apart from renewing the central heating system in the nearly 1200 apartments, the domestic hot water system will be renovated. 'That already was a collective system, but it was constructed in an old-fashioned way', De Jong says. 'From one apartment, a water pipe in the bathroom runs to both the upstairs and the downstairs residences.'

This system is not only worn out, but because of its structure, it is also impossible to meter each residence separately.



'During the next renovation, we will go in once more to provide the residents with an individual meter that is maximized at 12 l/min.' The four solar water heaters with a storage capacity of 16.500 liters each have already been placed and connected to the old water supply system. Two high efficiency boilers will ensure, if necessary, further heating of the pre-heated water in the enormous solar water heaters.

'Low temperature heating perfectly fits the philosophy of Ymere', manager Pieter de Jong explained recently during the presentation of electric wall heating in a residence in the north of Amsterdam. Where possible, Ymere prefers the application of district heating, heat and cold storage or solar heat in case of large-scale renovations. In case of individual housing improvements, Ymere is also investigating other techniques, such as electric wall heating in combination with proper (shell) insulation. The apartments in Het Breed will not acquire the energy efficient A-label, real estate manager Rob Oosterloo reports. 'Some preliminary calculations have been made, and I hope that we will obtain B or C.'

