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Promoting Energy efficiency to Local Organisations through dissemination Partnerships in Europe

Best Actions for Collaboration in Countries for a High efficient Use of energy in Structural funds

Cogeneration to replace boilers - Arnhem - Netherlands

With the aim of replacing the three heating plants which supplied 684 housing units, the regional electricity company, NUON, in association with the two housing bodies concerned, decided to install a cogeneration unit.

Target Groups	Sector	Field
- Local authority - Energy utilities	- Energy supply - Buildings (including municipal properties)	- CHP - Third Party Financing - Contracting

ANALYSIS

CONTEXT

Cogeneration is an important factor in the CO2 reduction and energy control policy implemented in the Netherlands. It is a unique programme of operations, on the one hand because the energy companies accept their responsibility for environmental protection by encouraging energy control and the use of clean energy, and on the other because cogeneration is considered to be the best way of achieving the programme's objectives.
In Arnhem (140 000 inhabitants), the regional electricity company, NUON, provides and runs 3 cogeneration plants.

EXECUTION

The Immerloo district, which dates from the 1970s, includes six blocks with a total of 684 apartments. These were heated by three heating plants installed in the blocks themselves. In 1994, NUON met with the two housing bodies concerned, Volkshuisvesting (municipal body) and Archipel, to discuss the possibility of installing a cogeneration plant when the boilers needed replacing. These discussions led to NUON proposing a complete heating supply operation.

TECHNICAL DATA

The power plant was built between the apartment blocks on a Town plot. An architect designed a three-storey building taking aesthetic aspects into account. Construction began in June 1996 and lasted 6 months. The ground floor houses the exchanger and heat output to the apartments as well as the transformer for injecting medium voltage electricity into the NUON network. On the first floor, there are two cogeneration installations. On the second floor are the three boilers and the ventilation system and finally, on the roof, are two backup coolers.
The cogeneration plant power is 295 kW with a thermal capacity of 512 kW, while 1,300 kW of power is generated by the gas boiler.

ARNHEM COGENERATION PLANT

COST AND BENEFITS

Installing the cogeneration system involved a series of energy-saving measures in the buildings: for example, all the radiators and some ascending pipes in the four blocks have been replaced and high efficiency glazing has been fitted in the apartments.

The total price of the project is 900,000 Euros which is 15,400 Euros/kWe. This is very high but includes all investments (building, network, boilers, cogeneration modules and planning). Volkshuisvesting paid 45,000 Euros in extra costs, for its participation in the power plant building.

The primary energy saving made by this installation was 300,000 m^3 of natural gas per year for a total gas consumption of about 1,000,000 m^3. The two units run for slightly over 3,500 hours per year, essentially in winter and during the day, which gives an annual electricity production of 2,100,000 kWh. Since the electricity is all injected into the NUON network, there has not been any problem with connection. The environmental advantages lie in a saving of 500 tonnes of CO_2 emissions in primary energy and 800 kg of NOX.

PARTNERSHIP

HEAY SUPPLY CONTRACT

NUON and Volkshuisvesting have concluded a 15 year heat supply contract.
NUON will be in charge of investments for a new boiler and eventually any replacements, as well as the resulting running costs, management expenses and variable costs including gas.
Volkshuisvesting receives the heat at a price corresponding to the heat of one boiler running at 84% efficiency of GCV (Gross Calorific Value). It will obtain a reduction of 10% of this price.

NUON is responsible for ensuring optimal operation of the power plant.

OPERATOR MOTIVATOR

As a power distribution company, NUON can more easily supply heating through cogeneration. It can therefore provide the customer with the required product and use more efficient means of production for the purpose.

Volkshuisvesting had several reasons for choosing a construction with all heat generation subcontracted. First of all, the boilers had to be replaced and a budget had been assigned for the purpose. But, by concluding a contract to supply heat, Volkshuisvesting was not obliged to use it for the purchase of new boilers. There were also environmental reasons in the sense that they wanted to help save energy.

RECOMMENDATIONS

DIFFICULTIES ENCOUNTERED

At the beginning, there was some tenant resistance to this cogeneration project. In fact, NUON and Volkshuisvesting had to start by explaining that the cogeneration installation would use energy more efficiently than the existing boilers, and also that a separate building, close to their apartment blocks, would be needed for the cogeneration plant.
The questions particularly concerned this building and its emissions. For gas motor emissions, NUON and Volkshuisvesting simply explained that there are legal standards which would be respected, but the building had to contribute added environmental value. NUON and Volkshuisvesting solved this question by asking the architect who was involved in the original renovation plans, to design the plans. Finally the architect had the idea of constructing a building on several storeys. The two parties involved submitted designs to the tenants' committee. The noise did not pose any real problem as there is a legal standard stipulating 35 dBs, which was respected. This was one of the constraints for the designer.

EVALUATION

The experience gained here was so positive for Volkshuisvesting that the operation is to be repeated close by. They particularly have a large apartment block and a residence for the elderly close to each other. Volkshuisvesting is at the discussion stage with NUON.

The situation is more strained since the electricity market was opened and NUON is now more careful. Before going ahead with new projects which have already been identified, NUON will evaluate the existing installations and try to increase their profitability.

TO KNOW MORE

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