

Hot Cool: Warmte en koude in de Nederlanden

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ASSOCIATION FOR DHC

Up to 2008 The Netherlands and Flanders did not have a dedicated association for district heating and cooling. Of course this does not mean that DHC did not exist in these countries. But the market penetration was low. In the Netherlands the market share was only 3 % in 2008 and in Flanders even much lower. Individual heating with natural gas has been the standard for many years since the discovery of the Groningen gas reservoir. Collective systems have been regarded as old-fashioned despite the fact that the natural gas reserves are declining rapidly.

It was obvious that there was a need of an organisation to promote DHC regarding the potential for reduction of CO₂ and the introduction of renewable heat. In 2008 some thirty companies decided to found the association Warmtenetwerk for this purpose.

Nowadays 175 organisations participate in Warmtenetwerk. The participants represent all kind of stakeholders for district heating (DH). The board consists of six persons, each of them representing a group of stakeholders: municipalities, DH companies, contractors, waste-to-energy companies, equipment suppliers and consulting engineers. In this way a wider support is guaranteed.

DISSEMINATION

Dissemination of the possibilities to utilise waste heat and to distribute renewable heat is the first priority of Warmtenetwerk. Despite a restricted budget without governmental subsidies a lot of activities have been developed in a short period of time. Of course a website has been made but also several congresses, excursions and international study tours to Vienna, Munich, Dresden, Copenhagen and Malmö. A visit to these European cities was an eye-opener to most of the participants.

Writing articles in papers and magazines proved to have been very helpful as well. Warmtenetwerk even publishes an own magazine in full colour. And a book with the most important facts about DHC and several best practice projects appeared to be a bestseller with more than 12,000 copies sold.

STUDY 2 X 20 IN 2020

The Dutch and Belgian governments have a serious problem with the development of renewable energy. The Hague and Brussels promised to the EU a share of respectively 14 and 13 % renewable of their gross energy consumption. However, nowadays the share is only 4 % for the Netherlands and 3 % for Belgium. In both countries the focus has been on renewable electricity. As heat is dominant in the gross energy consumption, this policy is not really smart.

The independent consulting company CE Delft investigated in 2010 for Warmtenetwerk the potential for renewable heat and reduction of heat demand for the year 2020. CE Delft concluded that savings of 20 % and a share of 20 % renewable heat in the gross heat consumptions could be met by 2020. But these ambitious figures would only be realised by a government with sufficient support for renewable heat.

SUBSIDIES FOR RENEWABLE HEAT

In 2012 the Dutch Ministry of Economic Affairs and Agriculture changed its policy. Minister Maxime Verhagen promised subsidies for renewable heat. He also introduced a competition between heat, electricity and biogas. Subsidies for the generation of renewable energy will be given to the producers with the lowest cost per MWh. Renewable electricity will have to compete with renewable heat and biogas. By doing so the government can keep the renewable energy budget low and increase the share of renewable strongly at the same time.

Warmtenetwerk was engaged in the market consulting for the new subsidy scheme called SDE+. The first tender in the new scheme was made in April 2013. It appeared to be an overwhelming success for renewable heat. More than 90 % of the requests for subsidy came from initiatives for deep geothermal projects and for cogeneration and heating based on biomass including waste-to-energy.

Minister Freya Van den Bossche of the Flemish department of economic affairs also introduced a subsidy scheme for the production of renewable heat. She recognised the fact that renewable electricity needs much more financial support per MWh than renewable heat.

FOCUS ON DEEP GEOTHERMAL

Among the subscribers in the SDE+ 2012 were 31 projects for deep geothermal heat. The market for deep geothermal is still juvenile in The Netherlands. There is only one project at a greenhouse in Bleiswijk with some years' experience. Some other greenhouse owners near The Hague are just starting up after having solved problems with natural gas and mineral oil in the well water.

Greenhouse companies have developed most of the new schemes. However they invest in small DH grids, as there is a surplus of heat available. In most cases they sell heat to their colleagues but a greenhouse owner in Pijnacker is selling geothermal heat to the municipal swimming pool and schools as well.

The first geothermal project for DH in a residential area is in The Hague. Geothermal heat is popular among politicians and citizens in The Netherlands. Geothermal heat is renewable and the potential in the Dutch area is high.

WASTE-TO-ENERGY COMPANIES TAKE THE LEAD IN DH

In contrast to the waste-to-energy plants in Sweden and Denmark with average energy efficiencies of 80 % the waste incinerators in The Netherlands and Flanders have a rather low efficiency as the

focus has been on electricity generation.

However, today the waste-to-energy companies are rapidly increasing their share in the heat market. In Amsterdam the municipal waste management company AEB cooperates with Vattenfall NUON. Their heating grid is expanding each year with the connection of several thousands of houses and office buildings. The city of Amsterdam strongly supports the development of district heating.

Waste company HVC is investing in DH grids for their waste-to-energy plants in the cities of Alkmaar and Dordrecht. Developing new grids for waste-to-energy is an important issue but the heat can also be utilised for existing schemes.

In 2011 the existing DH grid of RWE Essent in the city of Enschede converted from cogeneration on natural gas to heat from the waste-to-energy plant of Twence in Hengelo.

In 2011 Twence also began with the supply of steam to Akzo Nobel Chemicals. There are more waste-to-energy plants in Flanders and The Netherlands selling steam to industry or, as in Ghent, to a hospital but the most striking example is the steam grid for seven chemical industries in Delfzijl. Groningen Seaports took the initiative for a common carrier for steam at the industrial area of Delfzijl. E.ON Energy from Waste is supplier of the steam with an entirely new plant.

Contractor VS Hanab is now carrying out a very impressive project in the field of waste-to-energy for the city of Rotterdam. This Dutch company received an order worth 100 million euro from Warmtebedrijf Rotterdam for the connection of the waste-to-energy plant of AVR at Rozenburg to the centre of Rotterdam.

INNOVATION

Although the market share of DH is low in The Netherlands and Flanders there are several innovative initiatives. A nice example is the DH Polderwijk in Zeewolde. Biogas from two separate dairy cattle farm is transported over a distance of more than five kilometres to two CHP modules in Zeewolde. In 2011 the project won the first price in the category new schemes of the International District Energy Awards. The peculiar cooperation between the utility RWE Essent and a farmer was for the jury one of the reasons to award this project.

But there is more. An interesting innovation is the application of an organic rankine cycle (ORC) at the waste-to-energyplant of MIROM at Roeselare. MIROM operates a DH grid but in summer there is of course a surplus of heat. The ORC utilises this surplus for the generation of electricity.

In the city of Maastricht RWE Essent realised a quite innovative project on waste heat from a paper mill. The chimney of the cogeneration plant of the Sappi paper mill supplies 5 MW of heat at 90 degrees. The heat is utilised for a district heating grid but also for the production of cooling and the generation of electricity in a natural gas expansion plant. The natural gas is heated to 90 degrees and then expanded from 40 bar to 8 bar pressure. The generator of the expansion motor has an output of 500 kW.

Another example of the utilisation of industrial waste heat is in the area of the port of Terneuzen along the canal to Ghent. Several greenhouses are being heated in this area by waste heat from Yara. Parallel to the heating grid there is a grid for CO₂. The greenhouses need CO₂ as a fertiliser and this gas is available from Yara as well.

Dutch industry is developing several novelties such as a heat pump for low exergy grids, a thermo-acoustic heat pump, heat exchangers for corrosive fl ue gases, domestic adsorption chillers and a combined heat and power unit with a gas turbine running on pyrolysis oil. The technical university Twente in Enschede plans to demonstrate this gas turbine at its campus with a bi-directional connection to the district heating of Enschede.

Finally, the technical university of Delft is developing a system for a transition of their district heating into a smart grid.

DISTRICT COOLING

In the city of Amsterdam NUON Vattenfall has established a lake cooling system. Furthermore there are several projects with seasonal storage of heat and cold in an aquifer. The DHC at the Media Park in Hilversum is an interesting combination of combined heat and power, absorption chillers, seasonal storage in an aquifer and free cooling using evaporative cooling towers.

The application of absorption chillers running on DH is not widely spread in The Netherlands and Flanders. Examples are the university hospital of Bruges, hospitals in Rotterdam, Tilburg and Breda and the district cooling in Maastricht.

There is, however, a growing demand for cooling. That is the reason why Eneco developed a new project in the city of Utrecht with adsorption chillers. The adsorption process allows a lower supply temperature in the district heating grid.

STILL HURDLES TO OVERCOME

Today the climate for DHC in the Netherlands and Flanders is much more positive than in 2008. There are a lot of new initiatives. The introduction of a subsidy for the generation of renewable heat is a big step forward. However, there are still important hurdles for the expansion of DH.

First of all the financial crisis drastically reduced the number of new houses. This caused a delay in the development of DH in new residential areas. Although there are ongoing projects in existing residential areas this is regarded as difficult both technically and financially.

An important issue is the calculation of energy efficiency for new buildings and the energy labels for existing buildings. An electric heat pump in an individual house shows an impressive improvement in the label according to the Dutch calculation rules whilst connection of a house to DH has no effect in most cases! In Flanders the situation is even worse! A house with an individual gas boiler gets a better label than the same house connected to a DH grid with even 100 % renewable heat!?

Warmtenetwerk is discussing this matter with the governments, as it is a hurdle for the growth of renewable heat. The heating market is still dominated by individual gas boilers and there is a strong lobby for heat pumps in individual houses. The contribution to reduction of greenhouse gases by electric heat pumps is very moderate in the Netherlands.

The average emission of CO₂ is 0.56 kg per kWh of electricity generated by the Dutch power stations. An electric heat pump needs a high COP in order to reduce CO₂. The performance of heat pumps is in practice often worse than the figures from the laboratories.

The taxes on natural gas are still moderate for households and low for industrial consumers. Although the Netherlands will change soon from exporter of natural gas to importer the government in The Hague is not very active with plans to reduce the dependency on natural gas. Industries still have freedom to spoil surplus heat. But this will change. Antwerp and Rotterdam may take the lead in this. The Port of Antwerp for instance is working on plans for utilisation of the heat from chemical industries and refineries. In the Port of Rotterdam activities for the realisation of a grid for using surplus heat started this year in the Botlek area.

WARMTENETWERK IN 2013

The association Warmtenetwerk will carry on with the promotion of DHC in The Netherlands and Flanders. In 2013 the association will celebrate its fifth anniversary. At the annual meeting in Hertogenbosch on the 10th of October the plans for 2013 will be revealed by chairman Gijs de Man. Of course the main activities are focused on the Dutch-Flemish area. But Warmtenetwerk will also develop activities to improve contacts with other countries. Warmtenetwerk has become a member of the European technology platform for district heating DHC+ in 2012 to show that it seriously wants to participate in the European developments and exchange of knowledge and experience.