

# District Heating & Cooling

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*Three Metering Case Studies: Matching Needs and Technology*

## Featuring

Greenhouses Tap into District Heating in the Netherlands

Baltimore Thermal Wins Marketing Award

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# Amer Heat: Penetrating a New Market Segment

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The Provincial North Brabant Energy Company (PNEM) started a major district heating system in the early 1980s connecting two cities with 125,000 and 150,000 inhabitants to the Amer Power Station. PNEM distributes electricity, natural gas, district heating and water and provides cable television networks in the province of North Brabant in the southern part of the Netherlands. PNEM is the largest energy distributor in The Netherlands. The company has some 2,600 employees with gross annual revenues of approximately 2 billion guilders, or 870 million ECU (Can.\$1.45 billion, U.S.\$1.16 billion).

## *The Dutch have an ambivalent relationship with the greenhouse effect.*

In response to government policies on the environment, PNEM is extending its field of operations to energy-saving and environmental services. To limit the greenhouse effect, the company's target is to reduce the carbon dioxide emissions by 10 percent by the year 2000. District heating is one of the spearheads in the actions to achieve that goal. The systems set up to serve the two cities are aimed at traditional



This is an aerial view of the glass greenhouses of Plukmadese Polder with the heat-delivering Amer Power Station in the upper right.

Courtesy of Amer Heat. Photographer: Flying Camera-Eindhoven Airport.

European district heating customers: houses, apartment buildings, offices, schools, hospitals and factories. There is, however, another major heat consumers' group in the Netherlands: commercial greenhouse gardeners.

The Dutch have an ambivalent relationship with the greenhouse effect. On a small scale we use it in glass — or greenhouse — horticulture. Agriculture and horticulture are among the most important economical activities in Holland. Peppers from Holland and tulips from Amsterdam are famous. With exported goods of 56 billion guilders — 24 billion ECU (Can

\$40.7 billion, US \$32.5 billion) — we are the second largest exporter of agricultural products in the world. Many of those products are grown in glass greenhouses. In fact, we have more than 9,600 hectares (23,722 acres) of glass greenhouses. In that form the small-scale greenhouse effect is an essential factor in our economy.

## **Integrating Horticulture and Energy**

You won't be surprised to read that the Dutch climate doesn't offer enough heat of its own all year round for glass greenhouse horticulture. Additional heat-

ing of glass greenhouses is necessary. Usually the commercial gardeners use individual boilers for that purpose, with some 3.5 billion cubic meters of natural gas burned per annum. This is 8.5 percent of the country's total use of natural gas.

Penetrating that heat market became PNEM's aim. There was, however, one problem: there were no commercial gardeners nearby the power station or the already existing district heating systems. The fact is that power stations are less easy to move than commercial gardeners. That's the reason why the adage of the project became: "don't bring the heat to the glass greenhouse, but bring the glass greenhouse to the heat." As a result, PNEM became a sort of agricultural real estate developer, actually a "green estate" developer, with the objective to attract commercial gardeners from their traditional, but full to overflowing, area of Westland between Rotterdam and The Hague.

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The power station involved is the Amer Power Station, the largest in The Netherlands with a total capacity of 2,000 megawatts. Since 1980, waste heat from the coal-fired power station has been used for district heating systems in two major cities, Breda and Tilburg, some 15 and 20 kilometers to the south. The goal was to develop a greenhouse area within a few kilometers of the power station where commercial gardeners wouldn't burn gas, but instead use Amer Heat. If successful, PNEM would penetrate a completely new market for district heating systems.

The company was not able to do that on its own. Therefore, a steering committee was formed in the early 1980s. The local municipalities of Made and Oosterhout, two regional horticulture auction houses, the provincial association of farmers and PNEM (as heat distributor)



*Horticulture is an important economic activity in the Netherlands. Eight-and-a-half percent of the sales of natural gas are attributed to heating glass greenhouses.*

Courtesy of Amer Heat

participated in the committee. The mayor of Made was named chairman. In close cooperation with the local municipalities, the Plukmadese Polder area close to the utility was designated for glass greenhouse horticulture. The farmers' association proved to be vital in convincing potential settlers that the project was serious enough to embark upon. They tended to give higher credibility to people who speak their own "farmers" language than to energy distributors telling them that their offer is the best. Another important role was set aside for the representation of the auction houses, those being the only channels through which commercial gardeners can sell their products.

The development of the first 100 hectares (248 acres) of Phase I of Plukmadese Polder started in 1985. Commercial gardeners appeared to be very interested in settling in the new area. The first lots were sold in the same year, and by 1986 the first two companies were operational.

### **Securing the Marketing Mix**

Since then the development of the area has been a great success. The reason is that PNEM offers commercial gardeners more than just heat. PNEM has a complete marketing proposition, a proposition

in which all four "P's" of the marketing mix fall into place. And the company has a strong commitment to achieve the 200-hectare (494-acre) target and to create as large a commercial gardening area as possible.

The "P" of product is comprised of land, heat, water and pure carbon dioxide (CO<sub>2</sub>). Land can be bought for a relatively low price, with roads, water systems, heating systems, electricity and drainage systems already in place. The heat comes from a reliable energy source and is always available for a guaranteed period of 25 years. The water supply's quality is high. This is of great interest for the commercial gardeners because of their ecosystem. The percentage of chloride is minimal. Moreover, we deliver cheap and pure CO<sub>2</sub> for the improved growth of plants and vegetables. In the past, commercial gardeners used CO<sub>2</sub> that was produced as they burned gas in their boilers. PNEM supplies it through a system that can be regulated very precisely.

In addition to the "physical" products PNEM delivers, an important part of the product is service. There is a 24 hour-a-day emergency service, including advice on energy use and energy savings.

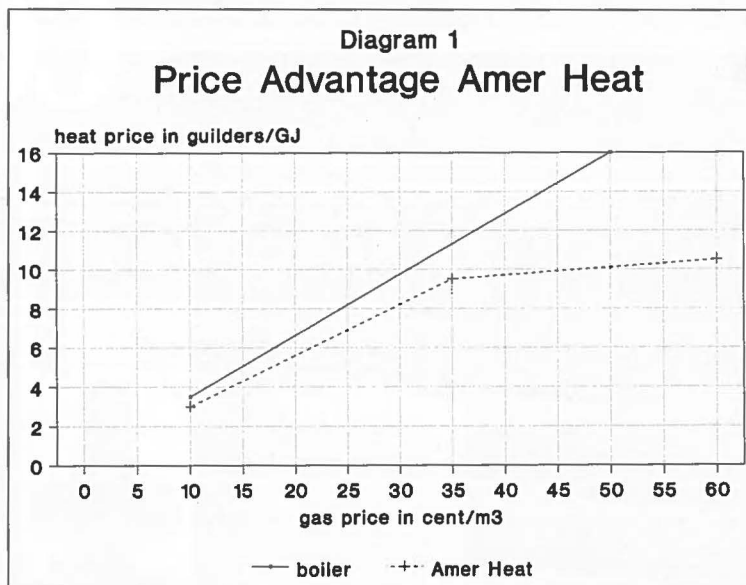
For the "P" of price, PNEM offers a heating cost that is at least 22 percent below the cost of burning natural gas in their own boilers over a longer period of time. This percentage will increase rapidly if the price of natural gas — which is now relatively low — should go up. Diagram 1 represents the advantage in heating costs. This advantage is guaranteed in the lower price levels, but increases rapidly when the gas price reaches some 35 cents (in guilders) per cubic meter. This increase has its origin in the fact that the cost of Amer Heat is less dependent on the fuel cost and primarily based on the capital cost of the investments in the infrastructure. In addition, the cost of water and CO<sub>2</sub> are low as well.

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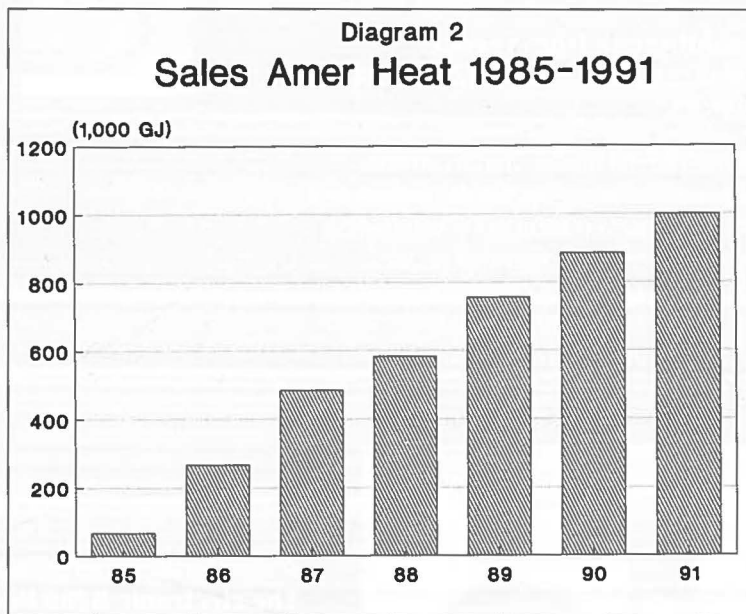
For the "P" of place there are ideal infrastructure and opportunities for expansion. Roads are ready. The infrastructure for delivery of electricity, heat, water and CO<sub>2</sub> has been developed. The area is situated close to the two relevant auction houses in the region, close to the highways leading to the ports of Rotterdam and Antwerp and to the large export market in Germany. Because Plukmadese Polder is a newly developed area, there are many possibilities for accommodating new businesses and existing-business expansion. These are possibilities that hardly exist elsewhere.

The whole proposition has been promoted—our last "P" of the marketing mix—under the name Amer Heat, a name by now well-known in the horticulture industry. PNEM plays an active role in the acquisition of new settlers, using free publicity, trade markets, advertising and personal contacts. The most important component of convincing prospective commercial gardeners are the entrepreneurs

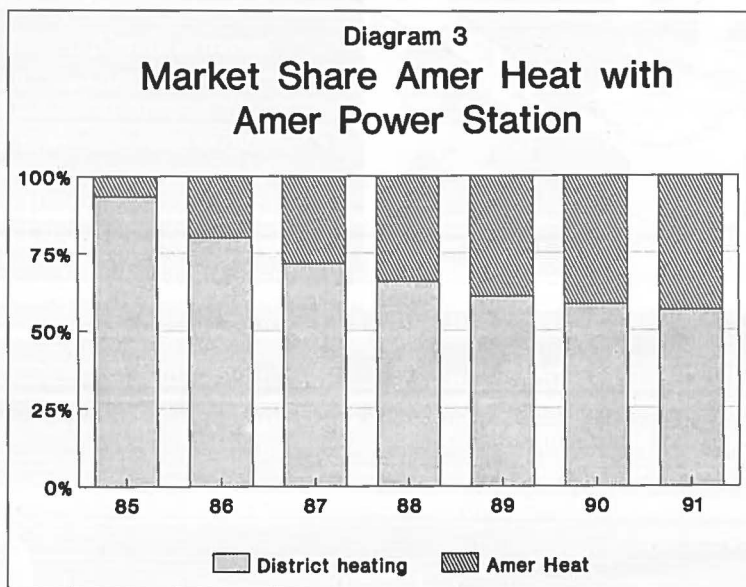
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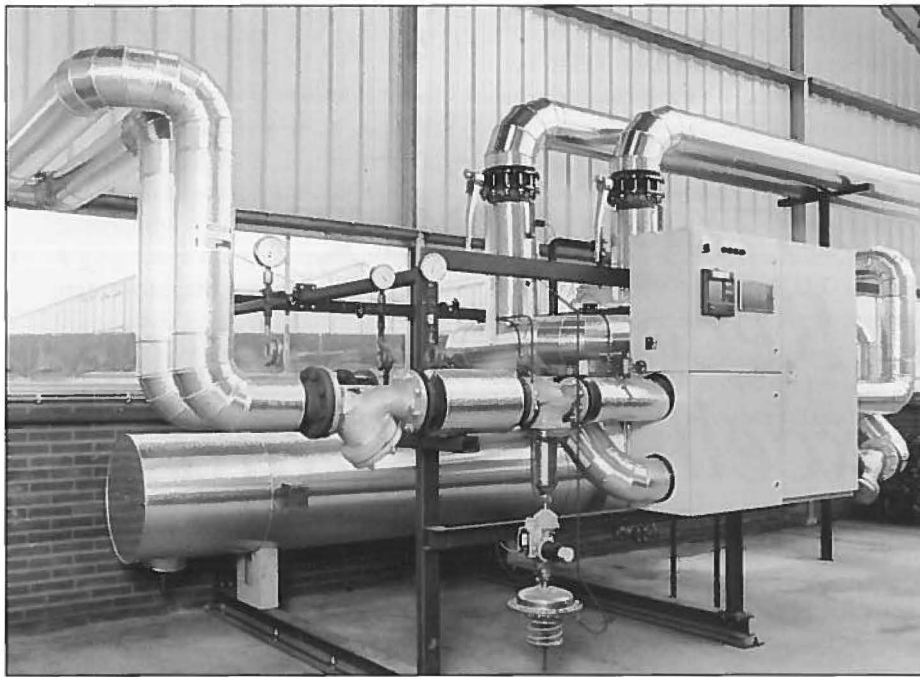
Courtesy of Amer Heat.



Courtesy of Amer Heat.



Courtesy of Amer Heat.



In the glass greenhouse, a heat exchanger is used to exchange heat from the primary system of 110 degrees C to the secondary system in the glass greenhouse.

Courtesy of Amer Heat.

who have already settled in the area. They are familiar with the challenges, opportunities and facilities of horticulture. Their experiences and enthusiasm often have been the last push in getting new settlers.

### Sales Result in Success

This marketing concept especially attracts commercial gardeners from the traditional glass greenhouse area in Holland, the Westland Area mentioned earlier. Plukmadese Polder offers new frontiers for those entrepreneurs. New frontiers and new possibilities at low cost. Commercial gardeners no longer "Go West," they go south to Plukmadese Polder.

By now 60 hectares (197 acres) are sold and 45 hectares (148 acres) are in use for glass greenhouse horticulture. The average size of one business is around 2 hectares (5 acres), with the largest around 8 hectares (20 acres). In the glass greenhouse, the waste heat of the power station is used to grow chrysanthemums, tomatoes, peppers, cucumbers, cabbage and roses.

A second area of 70 hectares (173 acres) is now under development. Options for an additional 8 hectares (20 acres) have been granted for this Phase II. The heat

sales have increased spectacularly every year. Diagram 2 shows an increase from 67,000 gigajoules (18,605,900 kWh) in 1985 to 1,000,000 gigajoules (277,700,000 kWh) in 1991.

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As Diagram 3 demonstrates, the market share of glass greenhouse heating in the total sales of heat from the Amer Power Station has increased from 6 percent to over 40 percent. The other 60 percent is mainly transported to the 18,000 customers of district heating in the two connected cities, Breda and Tilburg.

### The Environment Benefits from Amer Heat's Success

But the commercial gardeners are not the only ones to benefit from this new marketing concept. Every year 400,000 cubic meters of natural gas are conserved per hectare of glass greenhouse. This also means a vast reduction in CO<sub>2</sub> emissions: 420 tons of CO<sub>2</sub> annually per hectare. If the project reaches its full scale of 250 hectares (618 acres) in the year 2000, 100,000 tons of CO<sub>2</sub> emissions will be prevented every year, thus limiting the greenhouse effect on a global scale.

Overall, the new market concept has been highly successful, because it proved beneficial to commercial gardeners and to the environment. PNEM's customers benefit because they have at least 22 percent lower heating costs. And the country benefits because it reduces the emissions of carbon dioxide and — not mentioned so far — nitrogen oxides. Amer Heat is good for the customer and good for the country. Amer Heat uses the greenhouse effect on a micro level and helps to prevent the greenhouse effect on a global level. It proved to be so successful that in various other parts of the country feasibility studies are being held or proposed to examine the possibilities of copying our concept.



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