



Application

First Global District Energy Climate Awards

Name of the system: Norrenergi AB

Location of the system: Solna and Sundbyberg in the region of Stockholm, Sweden

Name of the owner: The municipalities of Solna and Sundbyberg

Type of ownership: Solna 2/3 and Sundbyberg 1/3 of the shares

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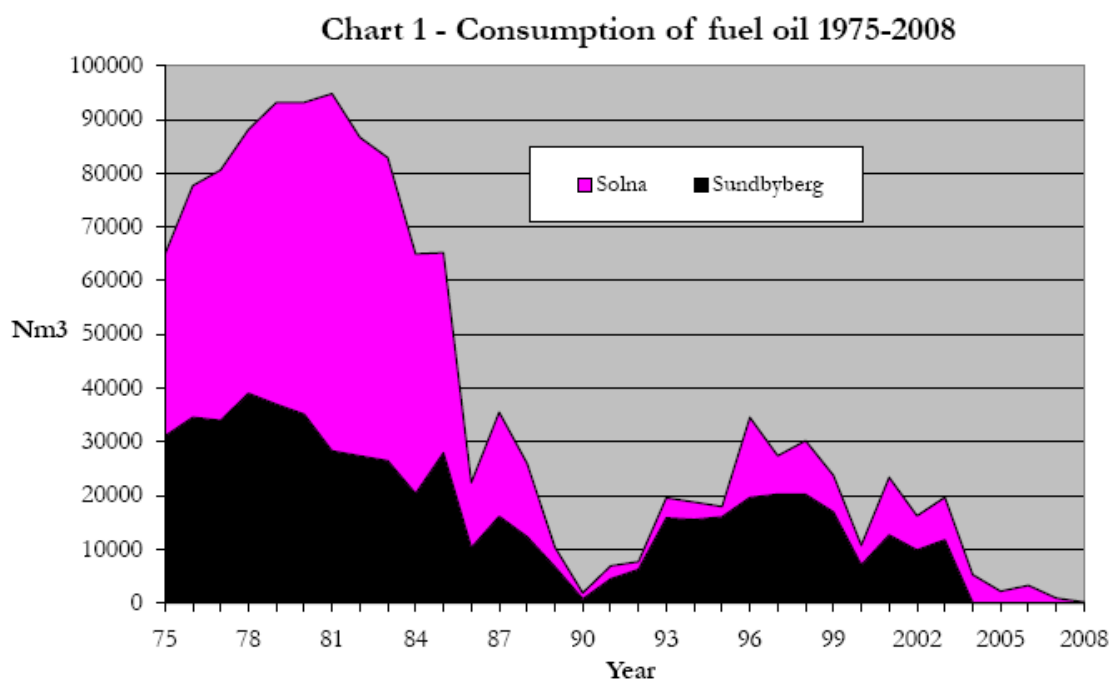
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History

At the end of the 1950ies an important decision was made within the two cities of Solna and Sundbyberg. The decision became the starting point for the district heating systems. This was the foundation to a prosperous co-operation between the two cities within district energy supply.

During the years the two district heating systems have been integrated step by step. In 1985 a common Heat Pump plant was erected. Further integration advantages were achieved successively and at the end of 1992 Norrenergi AB was formed.

In the 1970ies fuel oil was the most dominating fuel, but also waste was combusted in Solna and Sundbyberg. This is history now and we are glad that the consumption of fuel oil today is only 1 % of our production of district heating.



The introduction of bio energy

In 1998 bio fuel was introduced at Norrenergi when tall oil pitch was used for the first time. In 2003 the bio energy site for wood pellets and briquettes was built at the Solna Plant. Today bio energy and heat pumps stand for most of the district heating production, fossil fuel is only 1 % and is planned to be totally phased out.

The eco label Good environmental choice

In 2008 the district heating at Norrenergi was awarded with the eco label “Good environmental choice”. The eco label is owned by the Swedish Society for Nature Conservation (SSNC) which is an environmental organisation governed by its members. In 2009 the district cooling was also awarded with “Good environmental choice”.

Business idea

The business idea in short is to produce, distribute and sell district heating, district cooling and energy services to clients in Solna, Sundbyberg and adjoining areas in neighbor municipalities. Furthermore the idea is to offer a reliable and environmentally adequate product to competitive and long term stable prices.

Products

The main product district heating is produced at the two plants in Solna and Sundbyberg. The hot water distribution network covers more than 90 % of the buildings in Solna and Sundbyberg. Multi family houses, industries, commercial buildings, schools, etc, are connected to the system.

District cooling was introduced in 1995. Many modern offices and commercial buildings include computer centrals or industrial processes that require cooling. Norrenergi had the necessary capability to deliver chilled water. This chilled water derives from the heat pump process with a little extra effort. As a complement to cooling from the heat pump process Norrenergi has a free cooling plant in Frösunda where cold sea water is used to produce district cooling.

Services

The staff at Norrenergi is always devoted to develop the business with the client's demands in focus. This is done with the aim to develop close and reliable contacts with the clients.

Different services are offered to the customers related to heating and cooling.

Market and sales

Market

Norrenergi delivers hot water district heating and services to some 90 % of the total market in the municipalities of Solna and Sundbyberg. The population of the two municipalities amounts to 100 000 persons. More than 30 000 people commute every day to Solna and Sundbyberg to work.

Marketing in Norrenergi strengthens its positions and variety of services is offered to the market. The customers demand is always in focus for the development. Services include contracting but also information, energy audits and control of sub-centrals. The services are linked to district heating but also to district cooling. Norrenergi also pays interest in the increasing demand for information to different groups in the society, e.g. schools, associations and business groups.

Norrenergi's customers are house owners in Solna and Sundbyberg representing most of the people that live and work in the municipalities. The largest customers are in municipal and privately owned housing companies, industries, hospitals and commercial buildings.

Sales

Annual sales of district heating to our 1200 different customers amounts to some 1000 GWh. District cooling sales amounts to some 70 GWh per year.

- Annual heating distribution: 1 TWh
- Annual cooling distribution: 70 GWh
- Number of employees: 68
- Net sales: 600 MSEK approx. 60 MEuro
- Owners: The cities of Solna and Sundbyberg
- 90% of the market in the area (1200 customers)
- 90.000 people get district heating from Norrenergi
- 8,4 millions square metres of buildings get district heating

Advantages

- Convenient for the customer
- High delivery security
- Low environmental impact
- Low climate impact (2 g/kWh)
- Only one chimney instead of thousands
- A mix of different types of fuels is possible

Strategy for the customer work

Customer satisfaction

- Annual customer satisfaction surveys since 1994
- Confirming that the customer has made the right choice
- Increasing the dialogue with the customer (web, visits)
- Improved energy guidance (The energy compass)
- Clear environmental profile (eco labelling)
- My pages (free service on the web)
- Quality, Comparability, Openness
- Gaining and retaining customers
- Simple invoice

Customer comments

- *Congratulations to Norrenergi – Järvastaden is delighted with your success which also gives us advantages.*
Alf Carlsson – CEO Järvastaden

- *Very happy news. Congratulations!*
Per Forsling – Energy specialist, Fastighetsägarna Stockholm

- *Congratulations to you as a supplier who exemplarily accept responsibility for your products.*
Kenth Arvidsson – CEO Arlanda Energi, LFV

- *It would be nice to have a certificate that shows our use of district heating labelled with Good Environmental Choice.*
Anna Wassberger – Toyota Sweden

Communications and marketing efforts

- Customer newsletters
- Customer service seminars
- Customer retention efforts
- Customer service improvements

The Energy compass

The Energy compass is Norrenergi's own tool box for customers who want to take control of their energy consumption. The Energy compass offers a unique hourly presentation of consumption, flow, forward and return temperature. All figures are presented in foreseeable reports. The clear picture of costs and consumption makes budgeting easier as well as obtaining energy saving targets.



Good Environmental Choice

One of the world's toughest eco label

Bra Miljöval is the eco label of The Swedish Society for Nature Conservation. It is referred to as "Good Environmental Choice" in English. The SSNC is an environmental organisation governed by its members. SSNC started eco labelling in 1988 on laundry detergent and paper.

The first company with district heating and cooling labeled

Norrenergi was the first company in the world with an eco label on district heating and cooling. We got the license for district heating in the beginning of 2008. The license for district cooling came this summer of 2009. This means that all of our energy now is eco labeled.

The requirements in general

1. The company must be certified according to ISO 14001.
2. Maximum 10% non-renewable energy in the whole system.
3. Electricity used in heat pumps must origin from renewable sources.
4. All requirements for the procurements of bio fuels are listed on page 12 and 13.

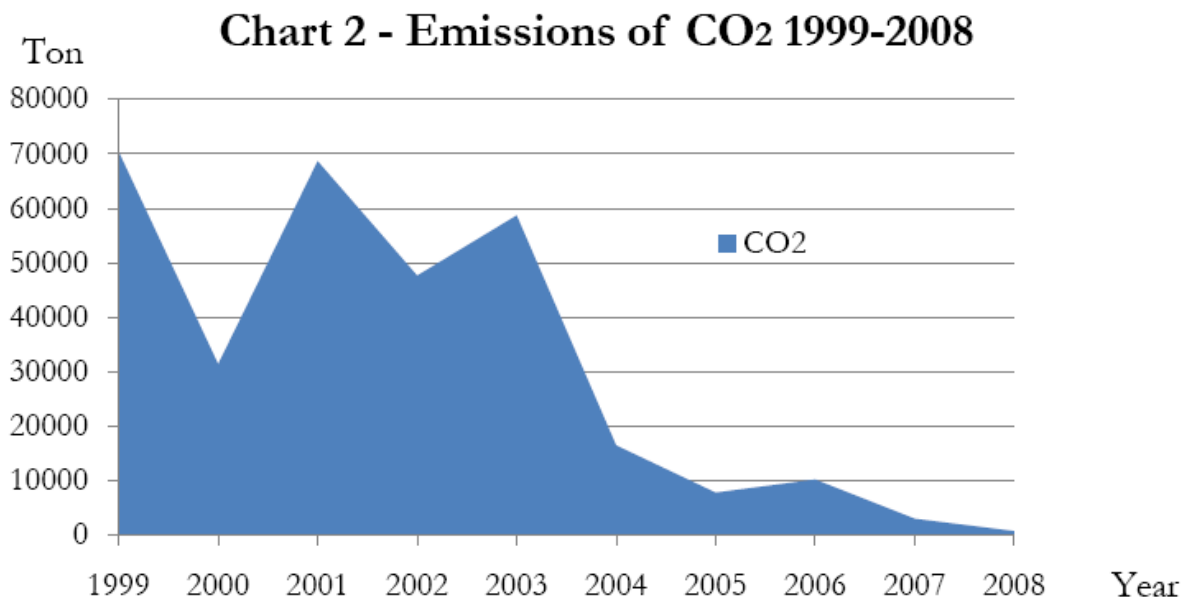
CO₂ and the environment

District heating offers many environmental advantages compared to traditional heating with individual boilers. Norrenergi strives to improve the environment in the densely populated cities of Solna and Sundbyberg. Bio fuel was first introduced at Norrenergi in 1998, but it was when the bio energy site was built in 2003 that we could replace most of the fuel oil. Today almost all combustion consist of wood pellets and briquettes and other bio fuels, fuel oil stands for only 1 %.

The bio fuel together with the heat pumps replace some 70 000 cubic meters of fuel oil. The ambient air quality has been significantly improved. The tunnels for the sewage water have removed all sewage water disposals into this part of the Lake Mälaren. Thereby the water quality has also been significantly improved.

If we look at the emissions of fossil CO₂ during the last ten years we see a reduction almost down to zero. Some of the reduction could be referred to the warm winters in the south of Sweden, but most of the reduction comes from the increasing amount of bio energy in our system.

When the European trading system was introduced in 2005 Norrenergi got more units of CO₂ than needed. These units were sold and the profit was used to increase the share of bio fuels. In 2008 however the profit disappeared as the international trading system was introduced and no heat plant was awarded with units. We are now glad that our emissions are low and that we don't need to buy so many units today.



Environmental management system

The environmental management system at Norrenergi follows the standard ISO 14001. The system has been certified since 2001. Some of the most important commitments in the system are safety and health of the public, protection of the environment and obligations under environmental legislation.

An environmental impact assessment was performed during 1998 and the significant environmental aspects were determined. The significant aspects are important to consider when objectives and targets are established.

Norrenergi is certified according to the international standard ISO 14001:2004.

Environmental policy

Norrenergi provides district heating and cooling with low environment- and climate impact to customers in Solna, Sundbyberg and neighbor municipalities. With our products district heating and cooling we contribute to a better environment.

Our products district heating and cooling are eco labeled with Good environmental choice which means tough requirements for us and our suppliers.

Our environmental management system, which includes production, distribution and selling of energy as well as storage of bio fuel, shall be certified according to ISO 14001.

Norrenergi shall:

Protect the health and safety of human beings

Decrease the usage of finite and slowly renewable natural resources

Prevent pollutants and decrease the spreading of compounds, that do not occur naturally in the nature

Obtain effective energy solutions within its own activities as well as for the customers

Implement reuse and recycle when possible

Comply with applicable legislation, regulations and other demands

Educate, inform and stimulate their employees to commitment, involvement and responsibility in regard to environmental issues

Inform, stimulate and help our customers in their environmental work

Consider environmental aspects in purchases of goods and services

Facilitate continual improvements through preparing and continuously improving the environmental programme and goals

District Heating

Production Units

Norrenergi produces its hot water demand at two different plants, the Solna Plant and the Sundbyberg Plant. The heat pump plant erected in the middle of the 80ies is a part of the Solna Plant. The heat pump plant is one example of the concern for the environment that has always been in focus for the district heating systems in Solna and Sundbyberg.

The Solna Plant

The Solna Plant is located near the little bay connected to the Lake Mälaren.

As in the Sundbyberg case also this plant was erected for the disposal of refuse and was used as this during the 60ies and the 70ies. Nowadays the plant has turned into a bioenergy plant which uses different types of bio fuel. Two boilers use timber powder from wood pellets and wood briquettes to make heat. One boiler uses tall oil pitch as fuel.

The heat pump plant is one of the world's largest heat pump stations. The heat source consists of treated sewage water and lake water. The sewage water is pumped in a rock tunnel from the Bromma sewage plant about 4 kilometer away. After it has delivered its heat content in the heat pump plant it is again pumped into a 12 kilometer long rock tunnel underneath downtown Stockholm out in the Baltic near the central of Stockholm.

The heat pump plant consists of four units at 25 MW heat each. This gives a total capacity of 100 MW. In the plant the temperature is lowered from some 10-15 degrees C down to around 0,5 degrees C. The cold water is used for district cooling. Some 60 % of the annual heat delivery is produced in the heat pump plant. All heat pump units have been converted to use the refrigerant, HFC 134a, that does not have a negative influence on the ozone layer. Since almost all refrigerants have a global warming effect it's very important to keep the refrigerant in the heat pump.

All the electricity used in the heat pumps and in the company as a whole, is 100% hydro power declared according to EPD (Environmental Product Declaration).

The Sundbyberg Plant

The Sundbyberg Plant is located near the beautiful Golf Meadows in central Sundbyberg. Originally, in the middle of the 50ies, the plant was erected as a refuse furnace. The refuse furnace has for a long time been closed.

Nowadays the plant uses bio oil in two hot water boilers with a total capacity of 92 MW heat. The plant also has one boiler for fuel oil and two electric boilers rated at 60 MW, but they are only used when it's very cold in the winter.

Distribution

The distribution network stretches to a total length of 167 kilometers. Construction started at the end of the 1950ies. Today the service area covers most parts of the municipalities in Solna, Sundbyberg and Danderyd.

All along the network there are valve chambers in around 800 places. From these chambers the operating crew can control and service the network. Huge amounts of water circulate through piping system. The total volume is some 10 000 cubic meters.

In situations with disturbances in the network it is important to have a good control of drawings and product specifications. Norrenergi has a computerized mapping system with easy access to every part of the network. This has proved to be a good way to further increase the service in situations with operating problems.

Our suppliers of bio fuel

Bio oil:	Energilotsen, MBP
Pellets & Briquettes:	Lantmännen Agroenergi, HMAB, SCA Bionorr, Korsnäs Sia Latgran, Bioenergi i Luleå, Skellefte kraft, Stora Enso
Tall oil pitch:	Arizona Chemicals, Kemira, Silvex Energy

District Cooling

A step to a better environment

Norrenergi and its customers took an important step to a better environment. District Cooling!

During the summer of 1995 the first deliveries of chilled water took place to customers in the areas near the Solna Plant. The piping system for chilled water replaces obsolete local chillers in the buildings. These old chillers also use refrigerants that can no longer be used.

Advantages

There are several advantages with district cooling. First of all it is economic. There are fairly small investment costs. The energy costs and maintenance costs are also very small. The overall energy efficiency increases with a connection to the district cooling. However, perhaps the most interesting part is that district cooling significantly reduces the use of freons in local chillers.

The energy savings are big since district cooling only uses small amounts of electricity compared to local chillers. Most real estate owners also like the reduction of maintenance work. Finally district cooling makes it possible to exactly measure the need for cooling.

Technology

The chilled water is a "waste product" from the heat pump process. After the heat pumps have used the warm energy in the sewage effluent, a chilled water remains with a temperature of 0,5 to 4 degrees C. This cool water is taken through two heat exchangers rated at 10 MW each. The heats exchangers transfer cool energy to the chilled water system that circulates through the service area. Daily variations in demand are taken care of through the 6500 cubic meter large accumulator.

District cooling is also produced at our free cooling plant in Frösunda. From the bottom of the sea cold sea water, approx. 3-4 degrees C, is pumped into an exchanger station and then on to the cooling water to cool the buildings. Finally the water is led back to the sea.

Distribution

When district cooling was introduced in 1995 the network was quite small. During the years district cooling has become at big product with a large network in Solna and Sundbyberg. Today the distribution network stretches to a total length of 34 kilometers.

Good Environmental Choice - Requirements for the procurement of biofuels

Wood pellets and wood briquettes

1. If the raw material consists of waste products from the sawmill industry, the supplier must have a system for tracing the origins of the raw material back to the sawmill. Information on the origins of the raw material must be provided by the supplier no later than at the time of the fuel delivery.
2. If the raw material consists of wood chips from felling operations, the supplier must have a system for tracing the origins of the raw material back to the forest. Information on the origins of the raw material must be provided by the supplier no later than at the time of the fuel delivery.
3. The supplier must be able to state how much non-renewable energy has been used in the production of the wood pellets or wood briquettes, how the fuel has been transported from the factory, and how far the fuel has to be transported before it reaches Norrenergi.
4. In addition, the supplier must provide a written assurance that:
 - the raw material originates from an FSC-certified [Forestry Stewardship Council] forestry operation or from forestry operations carried on in accordance with principles and processes aimed at supporting sustainable forestry operations;
 - the raw material does not originate from illegal felling operations or from high conservation value forests, see definition on the following page, and
 - the raw material from forestry operations with a rotation time of less than 10 years does not originate from land converted from pasture, meadows or grazing land.

Bio oils

1. The supplier must provide a written assurance that:
 - the raw material does not originate from GMO (genetically-modified organisms), and
 - the raw material does not originate from primary palm oil or PFAD (palm fatty acid distillate).



Definition of high conservation value forest

High conservation value forests are forests with one or more of the following characteristics:

- a) forest areas containing globally, regionally or nationally significant:
 - concentrations of biodiversity values (e.g. endemism, endangered species, refugia); and/or
 - large forest areas containing large landscape level forests, (i.e. large areas of forest undivided by roads, power cables etc.) contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance
- b) forest areas that are in, or contain, rare, threatened or endangered ecosystems
- c) forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control)
- d) forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health) and/or critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

In Sweden, the "high conservation value forest" concept includes the following examples:

- forest of established national interest and forest in process of being declared to be of established national interest with a concentration of key biotopes and/or red-list species habitats outside key biotopes
- mountain forest situated above conservation level (The Swedish Society for Nature Conservation 1988, ISBN 91- 558-5201-7).
- protective forest as defined in §15 of the Forestry Act and forest within water catchment protection zones.

