WELCOME TO EXPERIENCE SWEDEN IN

HÄRNÖSAND

- ENERGY, WASTE AND INDUSTRY
- MUNICIPAL INFRASTRUCTURE
- TECHNOLOGY IN THE REGION
- POLITICAL, SOCIAL AND CULTURAL LIFE

Photo by: Samed Kaj

CONTENT

WELCOME TO EXPERIENCE SWEDEN IN **HÄRNÖSAND!**

Sweden is an open and dynamic country, often called “the most modern country in the world”. A number of reforms over the past decades has created stable economic policies combined with competitiveness, innovation and an open approach to trade so as to make Sweden a model of economic success.

Sweden is home to many large multinational companies such as Ericsson, Saab, Volvo, AlfaLaval, TetraPak, IEAK, H&M, Skype, Spotify, AstraZenica, Electrolux and Ericsson but also to hundreds of smaller exporting companies.

Equality is important in Sweden, and wealth is more evenly distributed across the regions than anywhere else in the EU. Remarkably, Sweden is the only EU country in which each and every region has a higher GDP per capita than the EU average.

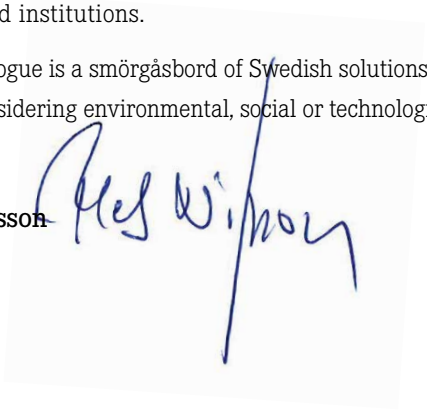
University education in Sweden is free to all citizens of the EU, and students from other countries can obtain scholarships for studies in Sweden. Childcare and hospitals are mainly paid for with tax. In Sweden, parents have 480 days of parental leave, and fathers use 25% of these days.

Only 1% of the waste in Sweden is put on landfill sites, and biofuels, hydropower and wind power generate most of the heat and electricity in Sweden. As the first country in the world, Sweden in June 2017 adopted a climate law of having zero net CO_2 emissions by 2045 in order to comply with the Paris Agreement.

In Härnösand, you can easily experience this in a single day or two. Compared to the main cities like Stockholm or Göteborg, everything is located within a few minutes of the hotel. There is no traffic congestion, no troublesome bureaucracy or permits to visit the different plants and institutions.

This catalogue is a smörgåsbord of Swedish solutions that you are invited to partake of as inspiration when considering environmental, social or technological challenges.

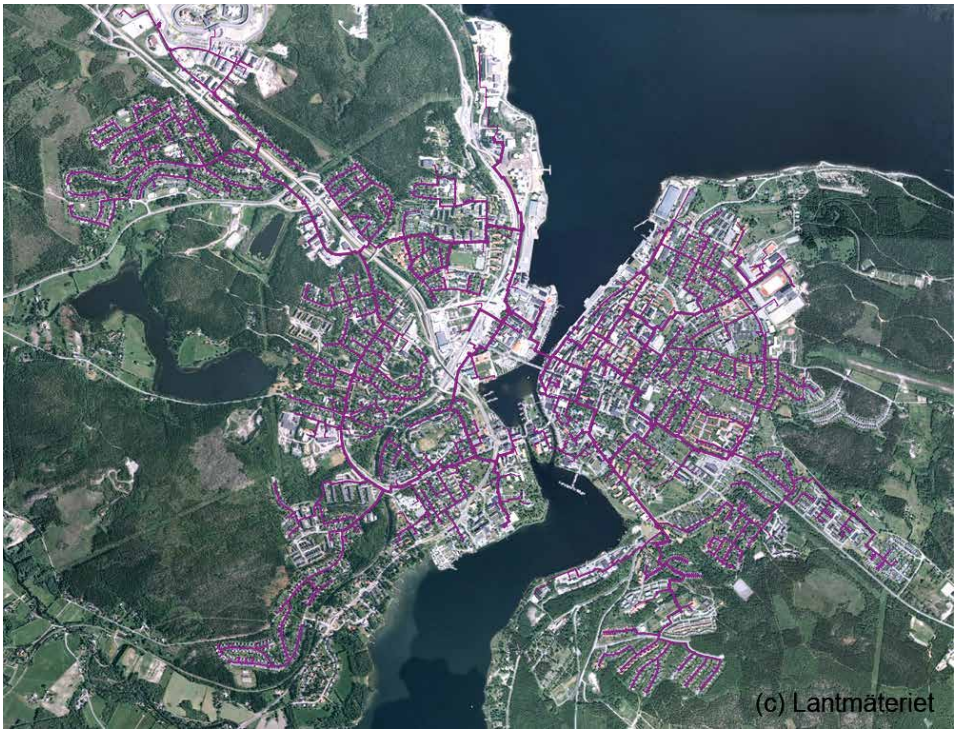
Fred Nilsson



1 POWER PLANT USING BIOFUEL

With bio fuel from the surrounding forests, the city power plant produces both heat and 25% of the electricity used in the city.

If you live in Härnösand, you use 100% renewable energy.
The power plant is fuelled with bio fuel from the surrounding forest industry.
Small trees, branches and roots are turned into wood chip and burned in the furnace. The heat generated powers a turbine with an 11.7 MW generator providing roughly 25% of all electricity used in the city.
The power plant is equipped with the latest air cleaning technology, removing most of the sulphur, NOx and particles from the gas emitted.
As only bio fuels are used in the CHP plant, your CO_2 emissions from electricity and heat are very low.



The streets marked show where district heating is located in Härnösand

2 DISTRICT HEATING

In Härnösand, your house in heated with district heating connected to the central power plant.

There is no need to worry about heating your house in Härnösand. The district heating network operates at 75 °C in the summer and 115° in the winter.

In your house, the district heating is used both for domestic hot water and the heating system.

Every building has a separate heat exchanger and control system. The pressure in the building heating system is generally 1–2 bar and in the network 6–9 bars. To indicate whether there is a leak between the systems, the district heating water is coloured green.

Even though it can be very cold in Härnösand in winter, down to -30° C, because of the efficient district heating network, your heating cost is not expensive.

HÄRNÖSAND ENERGY PARK

To promote research and development, the local multi-utility company has created Härnösand Energy Park, where companies can test and put on display new equipment and where local schools can learn about renewable energy.

The local multi-utility company HEMAB plays many roles in the local community. HEMAB runs the power plant and district heating network, waste collection and handling, the waste water treatment, the electric grid and other infrastructure functions of the city. But, HEMAB also teach your children about how the city functions.

Every year, all 3,000 schoolchildren in the city visit one selected utility installation so as to learn about local energy solutions, water, sewage and waste management. HEMAB also provides local business with resources to develop new products and test new technology.
Small wind power, concentrated solar energy, solar trackers and algae farming are examples of local development.
By establishing Härnösand Energy Park, HEMAB has created an arena for both educating schoolchildren as well as providing a testbed and display area for local companies.
Härnösand Energy Park is a unique installation in Sweden, and has played an important role in the development of Absolicon Solar Collector AB

3

SOLAR HEAT AND POWER

Some of the heat you receive from the district heating network comes from the sun.
Absolicon is a world leading company in concentrating solar energy and supplies the district heating network.

4

Swedish summer is beautiful and Swedes love the sun, maybe as the winter is so long and cold. The energy from the sun is used by the world-leading company Absolicon, founded in Härnösand, to heat buildings and the district heating network of Härnösand. As a result, some of the heat that you can feel when touching radiators in buildings in Härnosand comes from solar energy.

Using the city district heating network as a place to try new solutions, three different implementations of the solar collectors can be demonstrated: roof-mounted on a school and on the bus terminal and ground-mounted in Härnösand Energy park.

Absolicon also has a production line for the new T160 solar concentrator installed at Hernoverken and is delivering solar collectors all over the world. Many visitors come to Härnösand every year to learn more about solar concentrators and to see the production line.

WIND POWER

When you enter Härnösand, you see three large wind turbines. The location at the top of the hill right by the sea is very good; one of the windmills was once the best producing wind turbine of the country!

5

your home in Härnösand, you may choose to buy the electricity from the local production.

The power plant and the wind turbines together produce 50 GWh per year. But there are also big plans for expanding the wind power capacity.

In the forest area 50 km west of the city, the energy company EON and the forest company SCA are planning 150 wind turbines with 3 MW installed power capacity each. When built, they will produce more than 1 TWh of electric energy, almost 1% of the total electricity consumption in Sweden.

The building process is under way with different approvals from local and regional authorities already cleared.

The project will generate hundreds of employment opportunities within Härnösand during the building period and many heavy transports will be coming in through the harbour.

THE ENERGY COMPANY (EON) AND
THE FOREST COMPANY (SCA) ARE PLANNING
150 WIND TURBINES

6 INDUSTRIAL FORESTRY SYSTEM

Härnösand is the administrative centre in the world's most efficient forest management and processing region.

The county has 250,000 inhabitants and with €25 billion invested in pulp and paper mills, sawmills and forest management, the county is per capita one the most capital intense industrial regions in the world.

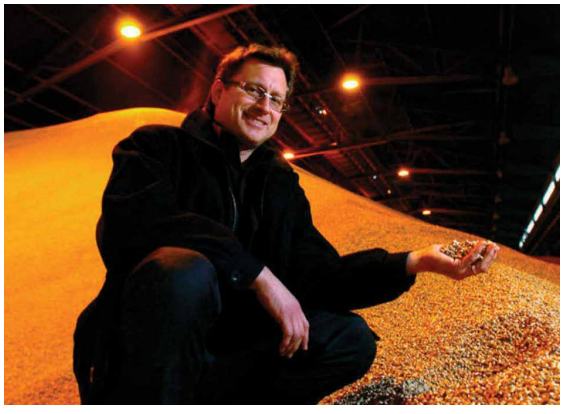
The Swedish Forest Management Law from 1903 states that the forest owner is responsible for replanting when taking down trees. The law has resulted in a growing volume of standing trees ever since.

In the past, a ruthless harvesting of low-cost raw material for the forest industry created large clear-felled areas. After the public and environmental concerns, today most of the forests are certified for environmental management according to FSC or PEFC where 5% of the forest must be set aside for biodiversity and recreational use.

Forest cover around streams, old trees, valuable biotopes and cultural heritage are now protected, and the forests in the region may be the most productive natural forests in the word.

7 WOOD PELLET PRODUCTION

Härnösand has the largest wood pellet production site in Sweden. The wood pellets are used for heating in both single households, municipal houses, district heating and industry. Thanks to the composition of the fuel, the combustion is very clean.



10 kg of sorted food waste produces biogas with the energy equivalent of 1 litre of petrol.

8

KITCHEN WASTE AND BIOGAS

In Härnösand, your household waste is sorted and recycled. A national tax has ended the tradition of the city landfill and instead the waste has become a valuable resource.

Already in the household, waste is sorted into 10 fractions. Your house or flat has two large bins with partitions for food waste for biogas production, paper for recycling, clear glass and coloured glass to produce new bottles, packaging to be dissolved and the fibres reused, metal and plastic for recycling and finally the small portion of residual mixed waste for incineration to produce district heating and electricity.
Batteries and light bulbs are also collected separately at each household.
The food waste is treated in a biogas reactor using the latest dry fermentation technology in order to obtain the maximum amount of biogas with the minimum need for process heating.
It is a small unit, dimensioned for up to 6,000 tons of waste per year.
The biogas is upgraded to bio-methane and used as fuel for cars and trucks, including the bin lorries that every fortnight pick up your household waste.

OTHER WASTE FROM HOUSEHOLDS AND COMPANIES

Forty years ago, everything was put onto landfill sites and buried underground. Today, waste is collected from strategic locations in the city in various fractions, from households, near where you live and work and in facilities for waste to be recycled or reused.

Containers are located at strategic sites, allowing the sorting of paper, plastic, metal, packaging, glass and batteries.

This to allow sorting of waste for citizens without access to the central facility or if you suddenly find that after a busy week there is more waste than will fit into your bin at home.

Also, Härnösand has a complete recycling centre where you can sort waste consisting of larger items, like furniture and scrap metal.

Some of the waste is actually functional. So, when you enter, you are first asked to give working things away to be repaired and sold as second-hand equipment. Here you also can sort out hazardous waste like electronics, paint and other chemicals. In this way, households and companies can dispose of everything in a responsible manner, so that it is either reused or recycled.

The vision of Härnösand's Municipality until 2030 is that all waste should be included in a circular economy.

MUNICIPAL INFRASTRUCTURE IN HÄRNÖSAND

CHARGING POSTS

Härnösand has an ambitious plan to replace fossil-fuel-powered vehicles, and is the city with the largest number of charging posts per capita in Sweden.

Most work places have electric outlets to charge electric vehicles.

10

11

SNOW CLEARANCE

As there can be periods with a lot of snow in winter, it is important to have an efficient snow clearance system. Private entrepreneurs are hired by the municipality to clear the roads and pile up the snow so as to make way for pedestrians, cyclists, buses, cars and others.

This system follows specified conditions for when the clearance starts and time for when it has to be finished based on priorities among streets and roads in the city.

12

HULL CLEANING FOR LEISURE BOATS

In Sweden, poisonous paint containing lead is prohibited on ships due to its effects on marine life.

As the only city along the northeast coast, Härnösand has installed a mechanical cleaning system available to boat owners that instead uses grinders that clean the hull.

13

CAR POOLS AND FLEET MANAGEMENT

The local authority manages several car pools to provide city workers with appropriate cars to a low cost.

The company 2MA, with head office in Härnösand, is the leading company for such systems in Sweden. 2MA is using GPS and 3G to control access to the vehicles and many services to manage the car pools efficiently.

14

FIBRE OPTICS TO ALL HOUSES

Most houses in the city has access to a 1,000 MB/s fibre optic connection that can provide TV, telephone and internet. The fibre is provided by a company owned jointly by several neighbouring local authorities, but the services are offered by different commercial companies.

15

WASTE WATER TREATMENT IN THE URBAN AND RURAL AREAS

In the city, all waste water is treated in a central water treatment plant. After sedimentation, filtering, aerobic treatment and chemical precipitation of phosphorus, the water is almost clean and is discharged into the sea. The sludge is used for construction soil.

For summer houses in rural areas, there are still primitive toilets in use, often in a stand-alone shed. The city sells plastic buckets with strong lids in which faeces are mixed with lime and pellets. When full, the bucket is returned and the waste treated. Another alternative is to use an electric toilet that burns the faeces to ash.

If there are water toilets in rural areas, there are two alternatives. Either the waste water is stored in a septic tank or treated in a three-chamber tank from which water is released into the ground. The city then sends a sludge tanker lorry regularly to empty all the septic tanks and the three-chamber tanks to transport the sludge to the treatment plant.

UV water purification systems installed at the water treatment plant.

16

DRINKING WATER IN THE TAP

In Härnösand, you often use the tap water directly as table water for your meal, sometimes with some lemon. The city water comes from a nearby lake. After treatment with a limited amount of chemicals, a sand filter and a bacteria-killing UV-treatment, the water is of drinking quality in all the taps in the city.

TECHNOLOGY IN THE REGION

18

PRODUCTION OF WOODEN HOUSES

Your house in Härnösand is most likely built of wood. Building with logs was the traditional way to make houses.

The region has a long tradition of making prefabricated family houses in wood. About 10% of the multifamily houses are also built in wood in Sweden. Two of the largest sawmills in Sweden are in the region, Bollsta and Tunadal sawmills.

17

AQUAPONIC FISH AND TOMATO FARMING

The largest aquaponic agricultural plant in Europe is also solving the problem with eutrophication due to fish farming at sea. Based on 20 years of research, a unique green house in Härnösand is producing both fish and tomato.
The farm system reuses the water for the fish farm 10,000 times by recycling it in a nutrition bed for the tomato plants.

19

BIOCOAL OR BLACK PELLETS

An emerging technology in the region makes it easy to replace coal and liquid fossil fuels with biomass materials.

Wood and other biomass raw materials are initially transformed into bio coal or “black pellets”, with similar burning characteristics as coal, making substitution and refining easy.

In the pre-treatment process, the characteristics of the pellets are carefully engineered so as to create an optimal solid energy carrier. Compared to traditional white pellets, both energy value and bulk energy densities are significantly increased while the material is also becoming water resistant and more fragile (less grinding energy is needed).

Other changes improve combustibility and reduces ash emissions and ash-related problems during final conversion. By means of the treatment, the fuel is thus adjusted so to be similar to that of coal (but substantially cleaner), and the black pellets can be ground and directly substitute for coal at a power plant or at a (biomass to liquid fuel) petrol refinery.

20

SOLAR COOLING AT HOSPITAL

The local hospital has a unique solar cooling installation, where concentrated solar energy is powering a CW10 from the Swedish company SaltX. The solar concentrators move during the day to follow the sun's movements across the sky and are producing both heat and electricity.

21

GREEN PLANTS CLEAN THE AIR

At the regional airport, an innovative ventilation system uses green plants to clean the air. Using an indoor garden in the airport, the air is purified in an energy efficient and cost-saving manner.

The technology is also made into office products by a local company.

22

REMOTE CONTROLLED AIRPORT

As the first in the world, the regional airport is equipped with advanced camera and control systems that allow the flight operators to remotely operate the airport of Örnsköldsvik.

This system allows reduced cost and increased aviation safety for the air traffic in northern Sweden.

POLITICAL, SOCIAL AND CULTURAL LIFE IN HÄRNÖSAND

POLITICAL LIFE

23

The city is governed by a democratically elected council that appoints the mayor, the municipal board and the members of five sectoral boards responsible for different areas.

Even though the municipal parties all have national mother organisations, each local party is an independent non-governmental organisation with its own members who elect the officers and the local board. Both the local and national party organisations are based on volunteers who participate in the boards and carry out administrative tasks without monetary compensation.

Election to the council is every four years, but internally in the parties, small referendums among the members are often held to create a party position.

In the last 6 years, the City of Härnösand has been governed by a coalition between the Social Democratic Party and the Green Party.

CITY PLANNING PROCESS

24

The Swedish process to change the city plan is a democratic process controlled by national legislation and involving many stake holders.

If there is no agreement among the neighbours, the process can take many years of appeals.

It ensures everyone's right to the process and aims to protect the value of private property on nearby premises.

25

SIDA
PARTNERSHIP FORUM

The Swedish International Development Cooperation Agency, SIDA, is a government agency with the mission of reducing poverty in the world with a focus on African countries but also Bangladesh, Cambodia and Myanmar.

In Härnösand, SIDA has established its national centre for cooperation with organisations and the business community.

They arrange training courses and offer grants for cooperation and to develop ideas.

26

WOMEN'S SHELTER

Social work in the city is often conducted by civil organisations, membership-based clubs organized with annual meetings, statutes and a board of volunteers to promote and organize different activities.

One example is the Women's shelter that gives support to women escaping domestic violence and intimate partner violence of all kinds.

The city contributes to the organisation by financing living quarters and with an annual cash contribution. Part of the financing also comes from national level.

27

MINIMUM STANDARD OF **LIVING**

Every citizen in Härnösand has by law the right to a minimum standard of living.

If you fall ill or become unemployed, there are state insurances granting you 80% of your pay for 2 years. But after that, if the individual does not have personal assets, the city will take responsibility.

The basic standard of living includes an apartment where parents and children have separate rooms, food and clothing, TV, dental and hospital costs.

28

LEISURE FACILITIES WITH ARTIFICIAL SNOW

In wintertime, you are likely to go skiing. The city manages several cross-country ski tracks that are maintained by local clubs, often with electric light during evening hours. From the top of the island, 5 minutes from the city centre, Härnösand has an alpine ski resort with three lifts. Both the cross country and downhill leisure facilities use artificial snow-making and grooming so as to lengthen the season.

29

PROTECTED FORESTS WITH WHEELCHAIR ACCESS

Härnösand has several protected natural environments only a few kilometres from the city centre.

The areas are managed by local contractors and are open to the public.

They both serve as a refuge for endangered species and for recreation for the city's residents. Several of them have wooden platforms and walkways to allow those with disabilities to access the natural scenery.

30

OLD CITY CENTRE PRESERVED

During the rapid urbanisation in Sweden, many cities destroyed their cultural heritage by demolishing traditional wooden dwellings to make room for new and more profitable concrete buildings.

In Härnösand, the buildings surrounding the old square were instead moved to a historical park where they continue to show what life was like in former times.

Also, a full city block of traditional wooden buildings from the period 1720 –1800 around the central church was fully preserved and is today the most expensive and prestigious area in the city to live.

SCIENCE CENTRE
TECHNICHUS

To promote an interest in science and technology among school children, the municipality operates a science centre with daily programmes for regional schools. The science centre also operates programmes to encourage entrepreneurship and presents exhibitions. Using famous characters from Swedish picture books, Technichus has been able to reach a record number of visitors. The science centre has also been important in gaining public support for the large wind power investments in the region.

ABSOLICON
SOLAR COLLECTOR AB

Absolicon is building on a Swedish research tradition, which started in the 1970 and intensified during the referendum regarding the use of nuclear power in Sweden. In 2002, a group of entrepreneurs started to exploit the commercial possibilities and the first installation was commissioned in 2005. During 2005 to 2012, several pilot installations and commercial applications was developed. Absolicon in its current form was then formed in 2013 and was introduced on the Swedish stock exchange in 2016.

The business idea is to excel in the knowledge, product experience and production technology of small parabolic troughs and in systems that profitably can provide energy to industries, district heating and large buildings using concentrated solar energy.

Absolicon Solar Collector AB • Fiskaregatan 11 SE- 871 33 Härnösand, Sweden
Phone: +46 611-55 70 00 • Fax: +46 611-55 72 10 • Email: info@absolicon.com • www.absolicon.se