



## The city of Malmö, Sweden

### 1. Introduction

Malmö is a municipality of 280 000 inhabitants located in Southern Sweden. It is the third largest city in Sweden. It developed from a garrison town in the late Middle Ages, into a shipping and transportation town, then into an industrial city and today is an expansive big city with higher education facilities. Even today some of the blocks of the city have a Middle Ages appearance. Malmö has a lot of parks and other recreational areas around the canals, beaches and harbour.

The City of Malmö has a target to reduce CO<sup>2</sup>-emissions by an average of 25 % over the period 2008-2012, compared to the level in 1990. To achieve this goal, a number of significant measures have been taken in the energy, transport and building sectors over the past years.

The creation of the district of Western Harbour was fundamentally based on a ecological approach to planning, building and construction. The aim was for the district to be an internationally leading example of environmental adaptation of a densely built urban environment. It is also a driving force in Malmö's development towards environmental sustainability. The district is exclusively provided with energy from locally produced renewable sources. Sun, wind and water form the basis for energy production together with biogas produced from organic waste from the district in biogas digesters. Buildings are designed to have a low energy demand and the area is planned to minimise future transport needs and car dependency. Cycle traffic is the most important element in the area's transport system. The district is built with the aim of containing a diverse range of natural life using plant beds, foliage on walls, green roofs, water surfaces in ponds and large trees and bushes.



*Museum of Science and Technology*

A similar concept has been, and is still being used, in restoration of existing districts in the City of Malmö, for example the districts of Augustenborg and Sege Park.

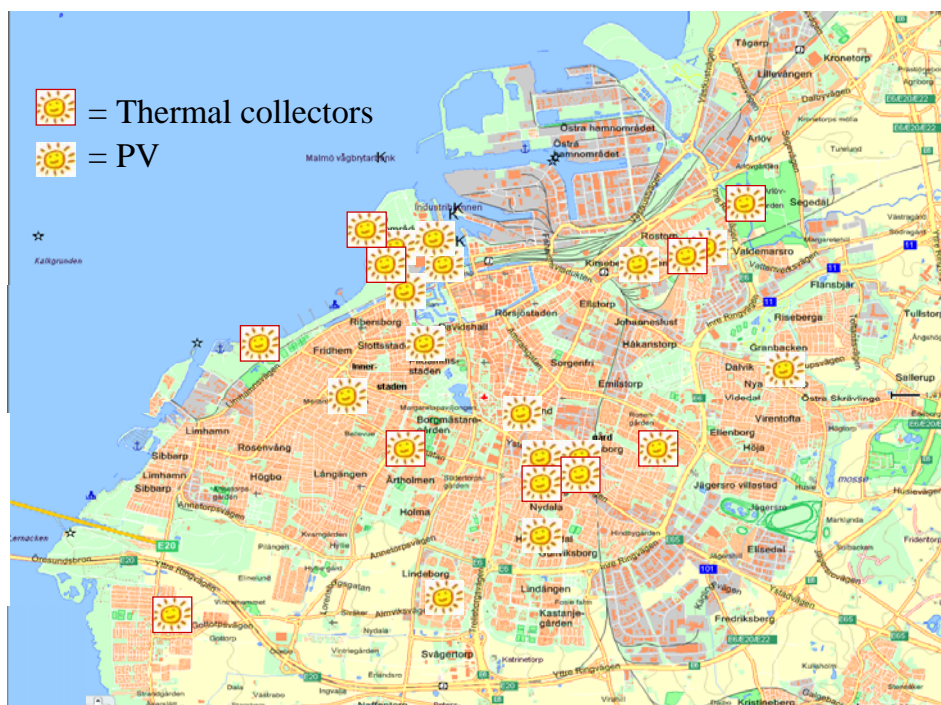


Another important task is to promote sustainable travel, with the intention of increasing the use of public transportation, car-pooling, eco driving and environmentally friendly cars and buses. Malmö has also made investments to make Malmö a cycle friendly city. The city has more than 400 km of cycle ways and was awarded Bicycle City of the Year in Sweden in 2004. Today 40 % of commuter travel and 30 % of total journeys are made by bicycle.

Parallel to the physical investments a number of information campaigns have been carried out to increase the citizens' consciousness of the greenhouse effect and of what can be done to reduce the emissions of greenhouse gases. The local climate work has also engaged a great number of participants from industry, who cooperate with the City of Malmö to find common solutions to decrease energy and fuel consumption and reduce emissions of greenhouse gases.

## 2. Description of the PV programme

Malmö is the city with the largest area of PV installations in Sweden. Since 2001 the municipality has been encouraging PV, the work has included installation of several large PV plants on public buildings. A total of 15 PV-plants have been installed on official buildings like schools, museums and hospitals. The PV plants are installed on existing buildings and have a total area of 3400 m<sup>2</sup> and a peak power of 500 kW.



*Location of PV and solar thermal systems in Malmö*

The city of Malmö is making investments in solar energy to strengthen and market the environmental profile of the city. It is also considered likely that rising energy prices will make PV profitable in the future. An investment in solar energy is one step on the way to reduce CO<sub>2</sub>-emissions and future energy costs and to become more self-sufficient in energy.



In Sweden there is 70% government funding for installation of PV systems on public buildings, with approximately €15 million spent between 2005 and 2008. This is the reason why the majority of PV installations in Sweden are placed on public buildings. Since all electricity producers in Sweden must pay a fee in order to deliver electricity to the grid, the majority of PV installations in Sweden are dimensioned so that production never exceeds the consumption in the building.

Solar City Malmö, the first Solar City Association in Sweden, was established in 2007. The main objective is to promote the implementation and development of solar energy systems and strengthen the solar energy market in southern Sweden. This will be achieved by spreading information and knowledge about solar energy by arranging seminars, guided tours, educational courses, conferences etc.

The largest and most spectacular PV plant in Sweden was completed in July 2007 in the City of Malmö in the old hospital area of Sege Park. The plant has a unique architectural and technical solution and it rests on a 20-meter high steel frame. The total area is 1 250 m<sup>2</sup> PV and a peak power of 166 kW. The area of Sege Park is going through major restoration and there are plans for an expansion with new buildings in the area, for example student apartments. The area will be self sufficient in energy from renewable energy sources like PV, solar thermal plants, biofuels and wind energy.



*Sege Park PV system*

The PV plant on the Museum of Science and Technology was installed in September 2006. 335m<sup>2</sup> of PV is installed on the flat roof, and 180 m<sup>2</sup> on the façade. The total peak power is 67 kW. The plant was awarded Solar Plant of the Year by the Swedish Solar Electricity Programme 2006, for its architectural integration in the building.





*Museum of Science and Technology*

PV was also installed in 2007 on the Mellanhed School as solar shading. The plant has a peak power of 34 KW. Since installation of some kind of solar shading system was necessary to reduce cooling costs in the building, the cost of a regular solar shading system can be deducted from the investment cost of the PV system, which gives a good economy to the installation. The plant was awarded Solar Plant of the Year 2007 by the Swedish Solar Energy Association for its educational purpose. Solar shading has also been used at the Student Union House in Malmö. The surface of PV is 180 m<sup>2</sup> PV and the peak power is 25 kW.



*Student Union House in Malmö*



One of the first PV installations in Malmö was the one at Augustenborg. Augustenborg is an area built in the 1950's that has gone through an ecological change over the past ten years. Solar thermal plants and PV plants have been installed, and the number of green spaces in the area has been increased. The area is famous for its green roofs. PV has been installed at two buildings and in three different types of applications. On one of the buildings PV is installed as solar shading. On the other building, PV is installed as a demonstration plant with different types of PV cells available for visitors to see on the roof and on the façade. The third installation is a PV cell hybrid, with reflectors and PV system functioning as solar shading. The reflectors concentrate sunlight to the PV cells to produce more electricity, and the PV cells are cooled with water producing solar thermal energy. The PV plant on Augustenborg has a total area of 100 m<sup>2</sup> and a peak power 11 kW.

### 3. Summary of problems, barriers, solutions and recommendations

#### **The lack of long-term subsidies for PV in Sweden means it is difficult to find experienced consultants and inspectors**

The government funding for PV installations available from 2005-2008 is not enough to make a stable market for PV companies in Sweden or to provide an incentive for investment in staff training in PV. Because of this there is a lack of competence in the PV area.

It has been difficult to find consultants who know the technology enough to make a good procurement document. Most of the tendering documents have therefore been prepared by the project manager at the Department of Internal Services in the City of Malmö. It has also been difficult to find qualified inspectors to do the final inspection after installation of the PV plants.

One of the most important tasks of Solar City Malmö is to work on a national level to reduce the fees and promote the implementation of a more beneficial and long-term system for selling electricity from small-scale production from PV to the grid in Sweden. This is necessary in order to enable private and larger investments in PV plants. When the market grows, knowledge will increase, and it will be easier to find qualified and experienced consultants and inspectors. Solar City Malmö will also arrange training to increase the knowledge of PV.

#### **Getting building permits for PV installations**

The project manager at the Department of Internal Services in the City of Malmö has experienced difficulty getting building permits for PV installations, due to lack of knowledge at the town planning department. The opinion of the office was that PV systems are ugly and that it was hard to find good examples and reference objects.

It is important to have good reference objects to show what the installation and the PV modules will look like. It is also important to arrange training for the parties concerned. It is an advantage if the PV plant can be integrated in the building in a nice and simple way.

#### **Insecurity among the managers of public buildings**

PV is a new technology, and there have been very few reference objects in Sweden to show as good examples. Some of the managers of public buildings refused to have PV installations on their buildings when the municipality proposed one because they were afraid that the installation would cause problems.



The City of Malmö has gained experience over recent years thanks to the PV installations made so far. There are now several successful reference objects to show. Public awareness of the city's investments in solar energy has grown. Interest among the managers of public buildings has increased, and they have recently started to come up with suggestions and initiatives of their own for PV installations.

#### **4. Sources of further information**

Solar City Malmö website [www.solarcity.se](http://www.solarcity.se)

The City of Malmö's [www.malmo.se](http://www.malmo.se)

Photo credits: Martin Norlund, city of Malmö.

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