

100% locally renewable energy in the Western harbour of Malmö in Sweden

City of Malmö, Sweden

Summary

The main objective is to supply a new urban district with 1000 dwellings in the Western harbour of Malmö, Sweden, with 100% locally produced renewable energy. The system is based on an annual energy balance with use of favourable local conditions and existing infrastructure. Main investors are the energy company Sydkraft AB together with the City of Malmö and several developers. The European Commission and the Swedish Government have contributed to the project. The energy system is in use, since 2001, and the main part of the district is built. An extensive research and evaluation programme will be carried out until 2004.

End-user area	Target Audience	Technical
<input checked="" type="checkbox"/> New buildings	<input type="checkbox"/> Citizens	<input checked="" type="checkbox"/> Energy efficiency
<input type="checkbox"/> Refurbishment of buildings	<input type="checkbox"/> Households	<input type="checkbox"/> Heating
<input type="checkbox"/> Transport and mobility	<input type="checkbox"/> Property owners	<input type="checkbox"/> Cooling
<input type="checkbox"/> Financial instruments	<input type="checkbox"/> Schools and universities	<input type="checkbox"/> Appliances
<input type="checkbox"/> Industry	<input type="checkbox"/> Decision makers	<input type="checkbox"/> Lighting
<input type="checkbox"/> Legal initiatives (municipal regulations, directives, etc)	<input checked="" type="checkbox"/> Local and regional authorities	<input type="checkbox"/> CHP
<input type="checkbox"/> Planning issues	<input type="checkbox"/> Transport companies	<input type="checkbox"/> District Heating
<input type="checkbox"/> Sustainable communities	<input type="checkbox"/> Utilities	<input checked="" type="checkbox"/> Solar energy
<input checked="" type="checkbox"/> User behaviour	<input type="checkbox"/> ESCOs	<input type="checkbox"/> Biomass
<input type="checkbox"/> Education	<input type="checkbox"/> Architects and engineers	<input checked="" type="checkbox"/> Wind
<input type="checkbox"/> Other	<input type="checkbox"/> Financial institutions	<input type="checkbox"/> Geothermal
	<input type="checkbox"/> Other	<input type="checkbox"/> Hydro power
		<input type="checkbox"/> Other

Context

Four fifths of the world's population will be living in cities within a few decades. Urbanisation generates economic development and well-being, but also leads to problems with water and sewage, traffic, poor energy systems and over consumption of resources. Solving the cities' environmental problems is therefore the key to a sustainable future.

A new urban district is constructed in Malmö's Western Harbour, which was under focus during the first European Housing Expo Bo01 - City of Tomorrow between 17th May and 16th September 2001. The theme of the housing expo and district is the city of tomorrow in the ecologically sustainable information and welfare society.

The aim is for the district to be an internationally leading example of environmental adaptation of a densely built urban environment. It will also be a driving force in Malmö's development towards environmental sustainability.

The City of Malmö has a renewable energy agreement with the European Commission within the Campaign for Take Off and Malmö was awarded the Grand Prize as the best project (100 communities for 100% renewable energy) at the Altener conference in 2000. The City of Malmö has established a partnership with Sydkraft, Bo01- City of Tomorrow, The Swedish National Energy Administration and Lund University in order to attain their energy target for the area of 100% locally renewable energy.

Objectives

The main objective is to supply a new city district with 1000 dwellings in the Western harbour of Malmö with 100% locally produced renewable energy.

Process

Planning for the project started in 1997. The energy system was in use in May 2001. A research and evaluation programme will continue until 2004.

The demand for 100% renewable energy means that there must be a balance between production and consumption on an annual basis. Sun, wind and water will be the basis for energy production together with energy from refuse and sewage from the district.

A large percentage of the heating will be extracted from the sea and rock strata and heat will also be generated by solar collectors. Wind power and photovoltaics generates electricity. Biogas will be extracted from refuse and sewage from the area

Financial resources and partners

Total investments for the energy system: approximately 10 million Euro (Sydkraft AB). Contribution from EC, 5th FP, SURE/RESECO-project: 1,9 million Euro. Contribution from Swedish Government, Local investment programme: 1 million Euro.

The partners were:

Business: Sydkraft AB, Malmö

Public: City of Malmö; Swedish National Energy Agency; European Commission

University: Lund University

Results

In the Sure/Reseco project main focus is on energy use and generation in the city area. The Bo01 district is originally planned for 85 000 m² housing area. In the first phase, finished during year 2001, approximately 50 000 m² housing area are built. The energy system is however designed for 85 000 m². According to the quality program that was worked out, the maximum average specific energy consumption is 105 kWh/m² per year, heat, electricity and cooling (if any) together. Sydkraft estimated the heat part to 70 kWh/m² and the electricity part to 35 kWh/m². Besides this, the electricity demand for the heat pump, pumps and fans was estimated and included. This means that the total energy end use is approximately 4 800 MWh electricity/year and 6 300 MWh heat/year. The amount of comfort cooling is not estimated on base of floor area, it depends on the demand in the district.

The energy generation is balanced against the energy use and the estimated figures show that the area will be supplied with energy from 100% locally renewable sources. The amount of energy end use is

greatly depending on the tenants' behaviour. Many of the houses are prepared for individual metering in the electricity, heat and water consumption. IT-solutions will be used to present data for the tenants.

The energy generation is based on 120 m² PVs, 1 400 m² solar collectors, a wind power mill with maximum power of 2 MW, aquifers and a heat pump with COP of 3,15 and bio gas produced from 1 000 households. The biogas will be produced in a plant just outside Malmö. The biogas will be used in the existing natural gas network or for car fuel.

Lessons learned and repeatability

This project is a major demonstration project where we have learned a lot about how to combine different renewable energy technologies to one integrated system. This shows that it is possible to build a new urban district with no additional CO₂-emissions from energy production.

There is still a need to increase knowledge and acceptability for renewables among planners, developers and architects. One example is to construct houses and roofs for solar collectors and photovoltaics to be integrated.

The planning process is very important. A common ground such as a quality programme and contracts are important tools in the process.

The project has drawn a lot of attention to Malmö, both nationally and internationally. During the Housing Expo, 2001, 400.000 visitors came to see more of the new district. There are still a lot of study visits from all over the world coming to Malmö to learn more about the environmental measures and the energy system.

In the 5th FP project SURE RESECO we have share a lot of experiences with our European partners in Tallinn, Copenhagen, Dublin and Barcelona. Several new projects have been created as a spin-off from SURE/RESECO.

The energy concept in Malmö with sun wind and water is based on favourable local conditions but the technology can be use almost any where in the World!

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