Västra Götaland

Regional RES-e Map: Electricity from renewable energy sources (RES-e)

The region	Västra Götaland
Number of inhabitants	1 521 895
Size (in km²)	24,000
Capital	Vänersborg

Short description:

Region Västra Götaland is the third largest region in Sweden and consists of 49 municipalities of which Gothenburg is the biggest. Västra Götaland is Sweden's most prominent industrial region and a Scandinavian transport and logistics centre with Scandinavia's biggest port in Gothenburg. Due to a long tradition in shipping and international trade, business is extremely internationalised. The car industry is the largest industrial sector with Saab and Volvo, including assembly factories in the region. Västra Götaland is one of the Nordic region most visited tourist areas with varying environments, rich cultural heritage and diversity and unique natural values and a strong environmental awareness.

Share of RES (total primary energy, 2002): 25.5 %

Share of RES-e (total electricity, 2002): 89 % (of regional production), 49 % (national)

Target RES-e: (national): 60 % in 2010

The partner organisation: The Swedish Energy Agency (STEM), which was formed in 1998, works towards transforming the Swedish energy system into an ecological and economically sustainable system through guiding state capital towards the area of energy. This is done in collaboration with trade and industry, energy companies, municipalities and the research community.

	Number of plants	Total installed capacity (MW)	Typical installation size	Main present funding mechanism	Short-term perspective (2007)	Mid/long-term perspective (2015)	Main barriers
Wind	114	63,5	1000 kW	RE certificates and environmental bonus	Medium	Medium	Public acceptance, administrative procedures, permits,
Wood biomass	4	61.6 MW	1-10 MWe	RE certificates	Medium	High	Financing, short term support system.
Biogas	19	n.a. 103 GWh	<100 kW	RE certificates	Medium	High	High production costs, financing.
Other biomass (waste)	3	42.2 MW	1-10 MWe	None	Medium	Low	Shortage of fuel, tax uncertainties,.
PV	5	0.03	2-10 kW	RE certificates + 70% subsidies in public sector	Low	Low	Financing, knowledge in building sector, tech. dev.
Hydro <10	298	130	<500 kW	RE certificates	Low	Low	Authorities, knowledge amongst site owners.

Wind

The past:

One fifth of Sweden's ca 650 wind power plants are located in the region. Most of the plants are located at the coast or on the plains but they can be found all over the region.

The present:

The establishments of new plants are limited due to the legislations. The coastline should not be exploited but there are non-restricted areas with good wind conditions on the plains. There is a large interest and many of the new installations are owned by cooperatives or farmers in cooperation with project developers and financiers.

The main barriers & strategies to overcome them:

Except from the economical issues the main barrier are the legislative and planning conditions as well as the public acceptance. A continuous dialogue between key stakeholders and information activities can minimise these barriers. It is also important to visualise and secure the advantages for the local community in wind power establishments in terms of local economy and job creation.

Short-term perspectives (until 2007):

Medium - new plants will come in operation but there will be no major market growth due to the lack of suitable locations without restrictions, the long administrative procedure for permits and the uncertainties of the future support for wind power.

Mid/long-term perspectives (until 2015):

Medium - see above. However, this is also depending on the extension of the RE certificate trading scheme and increased share of quotas as well as cost reductions through technology development.

Wood biomass

The past:

Biomass is widely used for district heating in Sweden. However, biomass has only been utilised for electricity generation in a small extent and than in larger CHP plants due to the low electricity prices. Many of the biomass district heating plants could be complemented with electricity production.

The present:

There are today four installations which of one are under construction. All is owned by a local municipal owned utility. Today several utilities are planning to or investigating the possibilities to invest in biomass CHP.

The main barriers & strategies to overcome them:

The main barrier is the uncertainties of the life span of the RE certificate scheme. There is also a lack of demonstrated small-scale technologies.

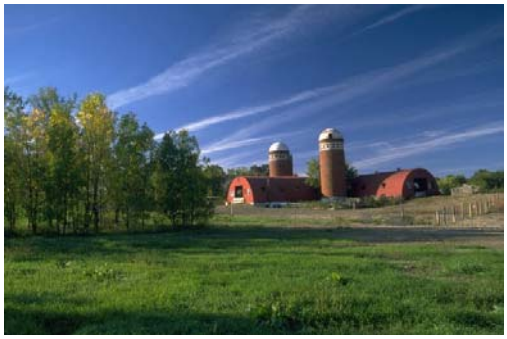
Short-term perspectives (until 2007):

Medium - a few new installations will most probably be installed. However, the market will not deploy.

Mid/long-term perspectives (until 2015):

High - In accordance with technology development, increased electricity prices and the extension of the RE certificate scheme many of the DH plants will have electricity production.

Biogas



The past:

Biogas has been utilised in sewage plants for the internal use of electricity and heat since the 1980-ies and almost 20 is in operation in the region.

The present:

Most of the newly established or planned biogas plants are intended to produce vehicle fuel and are large scale plants. However, with increased electricity prices, RE certificates etc. the interest for small scale CHP plants has returned. Today several actors are planning for or investigate the possibilities of new biogas CHP installations. The most active parties are within the agricultural sector.

The main barriers & strategies to overcome them:

The general interest in the biogas field is for vehicle fuel. The possibilities of the CHP alternative must be highlighted. Information dissemination activities regarding micro-turbines, sterling engines and other existing technologies should be made towards new market actors e.g. farmers etc.

Short-term perspectives (until 2007):

Medium - projects and investments are mainly focused on vehicle fuel production. However, some installations can be initiated in the farming sector and in sewage plants.

Mid/long-term perspectives (until 2015):

High - new market actors e.g. farmers can be of interest in line with higher electricity prices, RE certificates, higher costs for fertilisers and demands for ecological food production.

OTHER RES-e: Biomass waste

The past:

Municipal solid waste and industrial wood waste have been used for district heating and electricity production since the 1980-ies. In accordance with higher recycling targets and the ban on land filling with organic material waste incineration has been considered as a solution.

The present:

One municipality is currently building a CHP plant and another is planning to build one. Last year a plant was taken into operation. Also recently the two already existing plants have increased their capacity. There is also a plan of building a large scale plant in a city nearby the region. This situation leads to a future of possible shortage of biomass waste from the industry and municipal solid waste. The actors are well aware of the situation.

The main barriers & strategies to overcome them:

The uncertainties of the future tax system and taxes on waste combustion is a main barrier. In Sweden the highest need is for small- and medium sized units but the high environmental requirements speak for fewer and larger plants. Technology development and demonstration of smaller units is important.

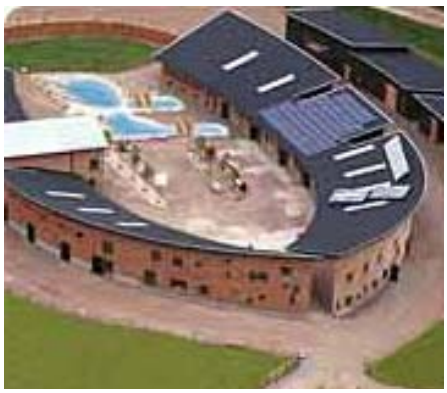
Short-term perspectives (until 2007):

Medium - there is two plants under construction or planned. These will probably be in operation in this or next year.

Mid/long-term perspectives (until 2015):

Low – the development will be stabilised due to the shortage of fuel.

PV



The past:

Electricity from PV is negligible in Sweden. There are a few grid connected PV systems but the main volume (95%) is the domestic off-grid sector, typically recreational applications like holiday cottages.

The present:

There are five grid-connected PV installations in the region. Except from the RE certificates there currently a programme which gives investment support for the public sector through a 70% tax reduction. This will hopefully contribute to some new installations.

The main barriers & strategies to overcome them:

The high investment costs and low electricity prices with consequently low interest from private investors are the main barriers. Other barriers are legislative issues and the knowledge on PV installations in buildings. New demonstration installations and information dissemination can increase the interest in the long-term.

Short-term perspectives (until 2007):

Low - PV will probably not be widely utilized for electricity power generation within the next 5-10 years.

Mid/long-term perspectives (until 2015):

Low - See above.

Small hydro (< 10 MW)

The past:

Small scale hydro power has been an important part for the industrial development but has during the 21st century been replaced by larger installations and nuclear power.

The present:

Today there are 298 plants smaller than 10MW where 240 are smaller than 0.5 MW. There is also about hundred registered installations without any present production. The dammes are usually intact and parts of them are a potential reinstalled power plant.

The main barriers & strategies to overcome them:

The Environmental and water right courts are very strict on leaving permit due to high restrictions for ensured fish- and water life. However, today there are both technology and know-how on how to combine these two parts. To overcome this barrier a dialogue between all stakeholders should be initiated. The knowledge amongst the owners of the possible sites is in general low. Information activities towards this group are essential to reach a demand driven development.

Short-term perspectives (until 2007):

Low - in the short term only refurbishment and upgrades of existing sites is foreseen.

Mid/long-term perspectives (until 2015):

Medium - depends largely on the regulations and investment willingness of site owners.

Main market actors:

The main market actors are companies active in the field of technology manufacturers and suplliers, electricity production, planners and consultants. One of the most important actors are the municipal owned utilities which operates and owns the district heating grids and also in many case the electricity grid as well. They play a key role when implementing RES-e projects both as en energy producer and supplier but also in the grid connection issues for e.g. wind power, small-scale hydro or biogas installations.

Besides businesses, NGO's, active citizens such as farmers and entrepreneurs, networks and other institutions play an important role.

Many of the projects are developed through the municipal utilities, consultants, project developers or research organisations. The projects are in many cases a result of a local cooperation and process in the framework of the municipal energy planning or through cooperation between key actors in different fields.

Most of the important companies in the energy, and especially the RES-e, field are operating on national, European or international level. For example the biomass and waste CHP equipment and turn-key suppliers are big corporations due to the fact of the relatively low amount of projects with high investments. This is also the situation on the wind power field. The equipment suppliers are almost all international companies with regional branch offices and sales through project developers and financiers.

The biogas CHP companies are utilising the equipment and knowledge of both large trans-national suppliers of key technology as well as local equipment suppliers and construction companies in each respectively case.

The small hydro companies are quite few and they operate and sell on national more trans-national basis. Many of them are situated outside the region but have several installations within the region.

The PV companies are in Sweden in general very few. Most of the sales are on the off-grid application as and these are usually sold through mail or internet order businesses. Most of the grid connected installations has been developed by a research organisation in cooperation with a larger utility. This is mostly seen as a demonstration unit and a way of learning more about the technology and the establishment criteria's.

Most important companies:

- Kvaerner Power (biomass/waste CHP)
- Wärtsilä (biomass/waste CHP)
- Pitch Wind (small wind power hybrid systems)
- Wind power developers such as Eulos Vind, AgriVind
- Municipal/local utilities and district heating owners
- Large utilities and grid owners (Vattenfall, Fortum, Sydkraft and Göteborg Energi)
- Technical consultants

NGO's & other institutions:

- Active citizens (usually farmers or entrepreneurs)
- Committed politicians on both local and regional level
- EnergiRåd Väst (the Regional Energy Agency
- The administrative authorities
- The regional administration
- Banks/financiers (Landshypotek, Sparbanker etc.)
- Research project leaders
- Farmers, farmers association (LRF)
- Research institutes (Chalmers, SP, HTU, HB, HIS etc.)
- Associations for bioenergy, small hydro, biogas, wind power and solar energy
- Municipalities

Conclusions:

The electricity certificate system established in 2003 has replaced most of the public grant and subsidy systems which have led to that the most cost-efficient RES-e technologies benefit the most. Wind power still has a support through the so-called environmental bonus system but this will decrease year by year. There is a two-year programme of a 70% support for PV installations on public buildings. This is mainly to support new demonstration units and the know-how of the man key actors.

The electricity certificate scheme involves suppliers, producers, traders, grid owners and users. Electricity producers receive a certificate for each MWh of renewable electricity that they produce. These certificates are then sold to electricity users, who are obliged to purchase certificates equivalent to a certain proportion of their electricity use. Each year, the proportion of renewable electricity that users are required to purchase will be increased. In this way, producers of renewable electricity will receive additional revenue, over and above the price for the actual electricity.

The regional situation on the development on RES-e production is different for each technology. Based on the study made for setting up this technology map, the legislative and support framework and earlier experiences and projects there is three technologies that has better prospects for increase within the region in a short to medium term perspective. These are wind power, biomass and biogas CHP. STEM will focus the activities within the project on biomass and biogas CHP.

The wind power development is driven by project developers and financiers and there are quite a lot of planned establishments both off-shore, on the coastline or the plains. However, the development is strongly dependent on the regional and local authorities and the environmental and building permits. Another barrier is the costs for access to the electricity grid. The project developers and involved parties such as consultants etc. are currently tackling all these barriers. The potential is still high although some areas will be protected from wind mills.

The wood biomass CHP development is strongly depending on the future electricity prices and the extension of the certificate scheme. This development is mainly driven by the local municipality owned utilities and the big utilities. The technology is quite well-known although there is an ongoing technology development. The potential in the region is big (0.5 – 1 TWh) due the existing district heating systems in many towns. Today several small- or medium sized technologies are under development or demonstration. These new technologies could increase the potential by attracting new actors and applications.

Recently new market actors, such as farmers, have shown an increased interest of biogas production due to increased electricity prices, cost for fertilizer and demand on ecological growing and food production. The benefits for the farmers are many – increase value of the manure as nutrition, extra income, possibility to be self-supportive of heat and electricity etc. The potential for biogas CHP based on crops and manure is relatively big.

The sewage plants mostly have biogas production but lots of biogas is just burned in a torch since there has been no use of it. Increased prices and other benefits have made CHP production more interesting.