



RENEWABLE ENERGY POLICY REVIEW

SWEDEN

Sweden plans to be World's first oil-free economy by 2020. Indeed, in Sweden a share of 21% of total heat consumption is provided by biomass and biofuels. Sweden has an extensive district heating sector. District heating accounts for about 40 % of the heating market in Sweden. The change in the fuel mix has been impressive: compared to 1970, when oil was the main fuel, oil accounts for only a few percent today. More than 62 % of district heating fuel today is biomass.

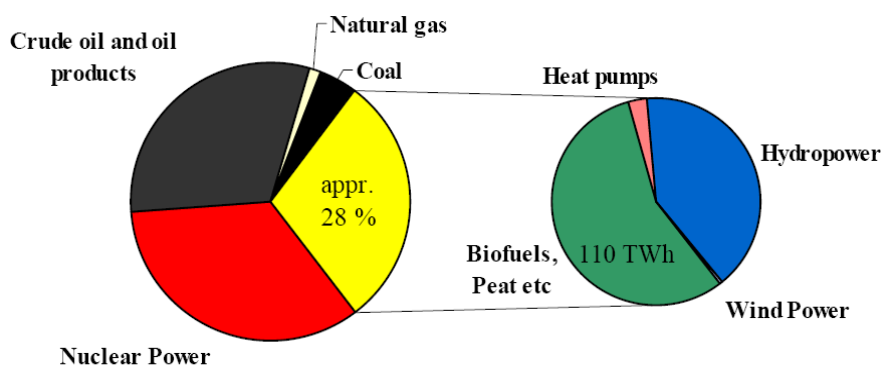
However, Sweden is moving away from its RES-e target. RES-e production has decreased between 1997 and 2006, mainly due to a lower level of large-scale hydro production. Nevertheless, hydro power– on average – is supplying almost half of Sweden's total electricity production, other RES like biowaste, solid biomass, off-shore wind and PV have shown significant growth. In Sweden, a comprehensive policy mix exists with tradable green certificates as the key mechanism. Wind energy today accounts for less than one percent of the electricity production; however, the potential for wind energy is substantially larger.

KEY FIGURES

- The **share of RES in total Primary Energy Consumption** was of 31.29% in 2007.¹
- The **share of RES in the gross final energy consumption** was 39.8 % in 2005.
- The **share of RES in the gross electricity production** was 48.47% in 2006, with Hydro power– on average – supplying almost half of Sweden's total electricity production
- The **share of all biofuels** in the transport sector in 2006 was 3.1%.
- Sweden energy dependence on imports amounts to 45% in 2005.

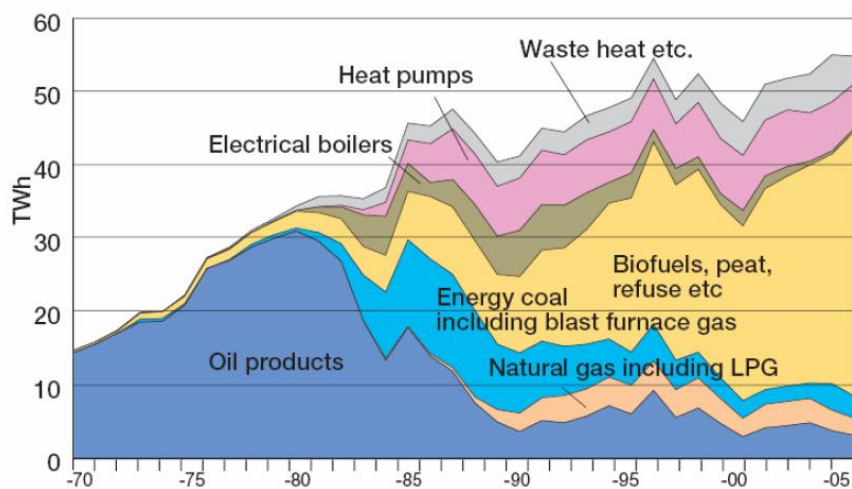
¹ EurObaromet'er

Primary energy share in Sweden



N.B. the share of renewable energy varies from year to year; depending on rainfall, cold winter etc.

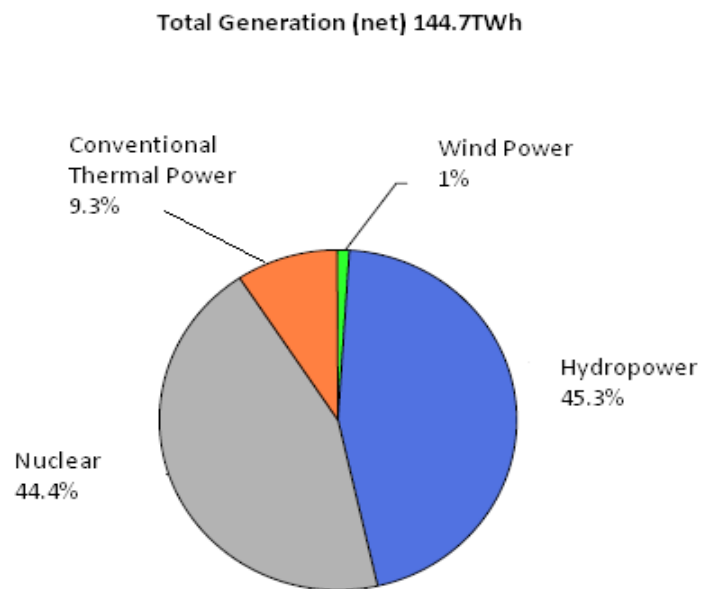
Energy Input to district Heating



SOURCE: STATISTICS SWEDEN; ADDITIONAL PROCESSING BY THE SWEDISH ENERGY AGENCY

Source: Swedish Energy Agency

Power Production in 2007, by type of power (%)



Source: Statistic Sweden

Technology specific figures

- In 2007, **hydropower** and **wind** registered an increase in electricity generation (by a 7.3% and a 44.9%, respectively), thus reaching 65.6TWh the former and 1.4TWh the latter.
- Total biofuels consumption in 2007 was 305 327toe of which 181 649toe of bioethanol and 99 602toe of biodiesel.²
- Sweden had one of the highest primary energy productions – without import and export - of solid biomass in the European Union, amounting to 8,441Mtoe that produced 8,538TWh of gross electricity.

RES TARGETS

Mandatory targets set by the Directive on the Promotion of the use of energy from renewable sources

- 49% share of RES on the final consumption of energy in 2020.

² EurObserv'er

- At least 10% share of renewable energy in final consumption of energy in transport by 2020.

Indicative Target set by the RES- electricity European Directive from 2001³

- 60 % Share of RES on gross electricity consumption by 2010.

Indicative Target set by the European Biofuels Directive from 2003⁴

- Biofuels consumption of 5.75% of petrol and diesel use for transport in 2010.

National commitments

- 12.1% of RES in primary Energy Consumption by 2010.
- The RES-E target from the EU Directive for Sweden is 60% of gross electricity consumption by 2010. In June 2006 the Swedish target was amended to increase the production of RES-E by 17 TWh from 2002 and 2016.
- There is no National target for heating and Cooling.

Progress towards the Targets

- The Swedish share of RES-E for gross electricity consumption decrease to 48.47% in 2006 from 54.3% in 2005, due to decrease in Hydropower production.
- In 2006, biofuels by energy content stood at 3%.

³ Directive 2007/71/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market. Currently in force, sets targets up to 2010.

⁴ Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport. Currently in force, sets targets up to 2010, with indicative targets by 2005.

RES POLICY INSTRUMENTS

Support for RES electricity

Quota obligations

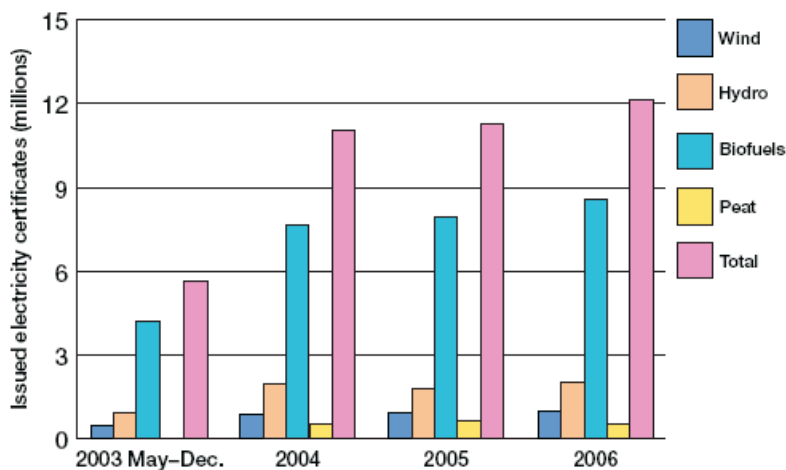
The electricity certificate system is a market based support system to assist the expansion of electricity production in Sweden from renewable energy sources and peat. Its objective is to increase the production of electricity from such sources by 17 TWh by 2016 relative to the production level in 2002.

One electricity certificate unit is issued to each approved producer for each produced and metered megawatt hour of electricity from renewable energy sources, or from peat.

Plants commissioned after the start of the electricity certificate system are entitled to receive electricity certificates for 15 years, or until the end of 2030, whichever is the earlier.

Plants that were started up before the certificate system was introduced are entitled to certificates until the end of 2012. Plants that, at the time of their construction or conversion, received a public investment grant after 15th February 1998 (in accordance with a grants programme for certain investments within the energy sector), and are entitled to certificates until the end of 2014.

Figure 2. Number of electricity certificates issued, by types of energy source, 2003–2006.



Source: Svenska Kraftnåts accounting system, Cesar

Resource	Quota in % (in year)	Year
All RES technologies	12.60%	2006
All RES technologies	16.90%	2010

The demand for electricity certificates is created by the obligation that electricity suppliers and certain electricity users are required to purchase certificates corresponding to a particular proportion of their electricity sales and/or electricity use. This proportion, or quota, has been decided for each calendar year, and set at such a value that the system will play its part in achieving the objective of increasing the production of electricity from renewable energy sources by 17TWh by 2016, relative to production in 2002.

Grants

For local authority land use planning for wind power. The electricity certificate system supports renewable electricity. As the country is experiencing some difficulties in seeking to achieve its planned objective for wind power (namely 10TWh of wind power production by 2015), this grant seeks to assist achievement of the planning objective by supporting local authority land use planning for 2007 and 2008.

Grants for research and development in the field of wind energy

Förordning 2003:564 authorises grants supporting research and development in the field of wind energy, e.g. measures aiming at environmental sustainability, purchase of technology and development programmes prior to market entry. Off-shore projects as well as on-shore projects with plant at least 71 meters high and exposed to average wind strength of 6.5 meters per second or higher are entitled to receive the grant.

The amount of the subsidy depends on the measure taken and is conditional upon the fact that the total means allocated to the subsidy programme are not exhausted:

- Measures fostering environmental sustainability. Basically, the energy agency reimburses 40% of the additional costs arising for a renewable energy plant compared to a traditional power plant. Small and medium-sized enterprises as specified in Förordning 2003:564 may be granted a subsidy of 50% of these additional costs. The applicant may even be reimbursed 100% of the additional costs if he can prove that he is unable to construct the plant without the subsidy and guarantee that the plant will not receive any other investment subsidy thereafter (Förordning 2003:564).
- Technology grants may amount to a maximum of 50% of the additional costs and shall not exceed a total of 200 000€ within a period of three calendar years. These amounts are specified by Regulation Nr. 1998/2006 by the European Commission, which Förordning 2003:564 refers to.
- Developments costs prior to market entry. Up to 25% of the costs arising directly from the development of energy technology products may be reimbursed. This subsidy is paid until the total subsidy budget is exhausted.

The costs arising from the subsidy are borne by the state. The national budget provides the national energy agency with a total of 350 m SEK to allocate subsidies for a period of five years.

Investment Subsidies

Resource	Support level [%/total investment]	Start year	End year	Comments
Solar PV	70% of the cost of the installation may be refunded (with a maximum of 50000 SEK/building).	2005	2007	for public buildings

Support for RES Heating and Cooling

Investment Subsidies

In 2006, the Swedish government announced a grant scheme for investment in solar heating on commercial premises. This scheme will run until the end of 2010.

Resource	Support level [%/total investment]	Comments
Solar Thermal	maximum subsidy of 800 € for a one family house	For installations in houses
Solar Thermal	30% of its costs covered	For public buildings
Geothermal heatpump	grant of 3500 EUR	Start year 2006. For the replacement of electric storage heaters and oil boilers in a building by heating systems containing water as a heat transfer fluid

Tax exemption

Today only 8 percent of Swedish houses are heated by oil, those households get tax rebates if they switch to renewable sources.

Renewable heat has been supported in an indirect way by raising taxes on fossil fuels. Bioenergy, solid waste and peat are tax-exempt for most energy uses. The investment aid to district heating grids indirectly reinforces the promotion of bioenergy.

Support for Biofuels

A tax relief system is currently in place. Green taxes such as the carbon dioxide tax promote biofuels in an indirect way. In addition, the Swedish government is currently increasing the number of alternative fuel pumps and ensured that 36% of the vehicles it used in 2006 were fuelled, either wholly or in part, by biogas, ethanol or electricity. Finally, a subsidy is granted for investment in filling stations for biogas and other renewable fuels: SEK 150m was set aside in 2006 and 2007.

Tax exemption

Bioethanol and biogas are exempted from the tax on petroleum products and from the tax on CO₂.

Others

- Obligation for large filling stations to provide biofuels. For large size service stations that supply more than 3000 m³ of petrol or diesel a year. Either ethanol or biogas, and since an ethanol filling station is

much cheaper than a biogas filling station, ethanol filling stations are normally the preferred choice by the station owners.

- Environmental policy for government vehicles
- In addition, there is also a subsidy for buyers of new so-called environmental cars (biofuel cars, hybrid cars etc) of 10 kSEK⁵ per car payed by the government to the buyer. This is a relatively new scheme.

Support for all RES

Investment Subsidies

Resource	Support level [%/total investment]	Start year
All RES- technologies	30% of the cost of installing those technologies- Credit to the tax account	2005

Sources:

European Commission Factsheets by Country

http://ec.europa.eu/energy/energy_policy/facts_en.htm

Member States Reports in the framework of the Directive 2001/77/EC on renewable electricity

http://ec.europa.eu/energy/res/legislation/electricity_member_states_en.htm

Member States Reports in the framework of the Directive 2003/30/EC on biofuels

http://ec.europa.eu/energy/res/legislation/biofuels_members_states_en.htm

Swedish Energy Agency

<http://www.stem.se>

Chalmers, University of Technology

<http://www.chalmers.se>

EurObserv'er Barometer

<http://www.energies-renouvelables.org/observ-er/sig/eufores/sig.asp>

Statistic Sweden

http://www.scb.se/default_2154.aspx



In the framework of the EU co-funded project: RES 2020: Monitoring and Evaluation of the RES Directives implementation in EU27 and policy recommendations to 2020



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