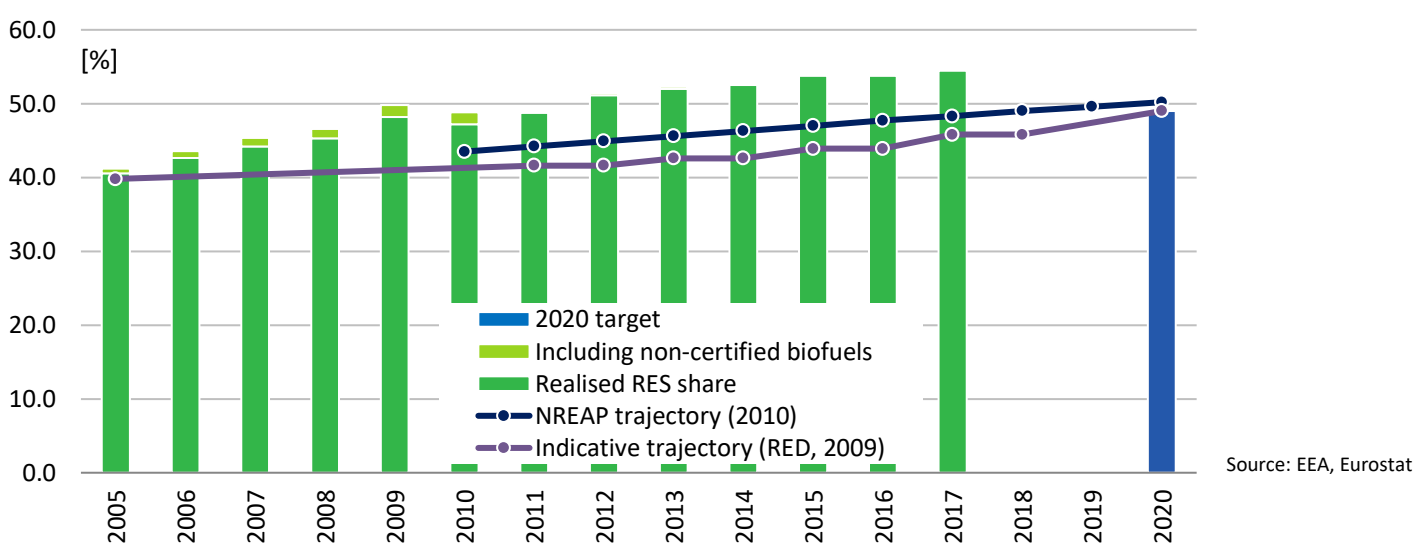
Sweden

Renewable Energy Policy Factsheet

September 2019

Summary

Sweden surpassed its 2020 nationally binding renewable energy in 2013. Main support measures to promote renewable energy in Sweden consists of a renewable quota scheme, various tax regulation mechanisms and subsidy schemes. Renewable heating and biofuels for the transport sector are supported by tax exemptions. Sweden has a joint support scheme with Norway, thus being the first EU Member State to implement a cooperation mechanism, as defined under the 2009 EU Renewable Energy Directive. The Swedish coalition government has agreed on a target of 100% renewable electricity production by 2040.



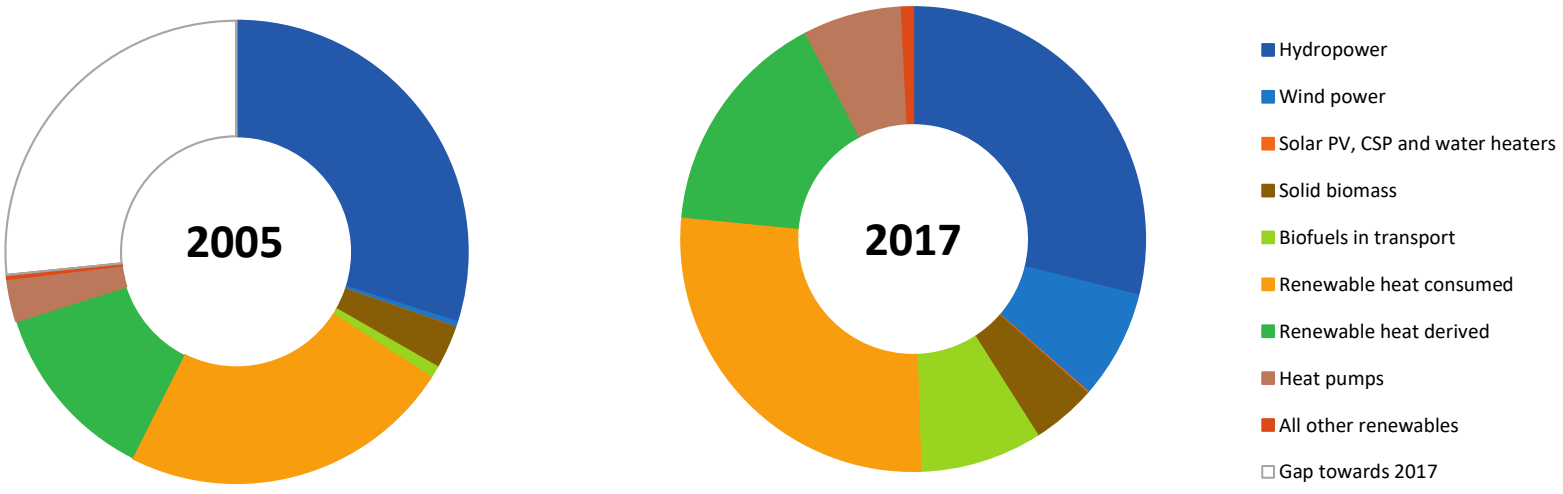
Source: EEA, Eurostat

Abbreviations used:

RES: renewable energy sources
RES-E: renewable electricity
RES-H/C: renewable heating/cooling
RES-T: renewable transport fuels

Data for 2017

Overall RES share:	54.5%	Avoided fossil fuels:	35.9 [Mtoe]
Overall RES 2020 target:	49.0%	Avoided fuel expenses:	16.3 [billion euro]
Share RES-E in electricity:	65.9%	RES Turnover:	7690 [MEUR]
Share RES-T in transport:	32.1%	RES Employment:	43100 [jobs]
Share RES-H/C in heating:	69.1%		



Source: Eurostat, 2019.

	2005	2017		
	Energy	Energy	Employment	Turnover
Hydropower	5883.1 ktoe	5687.4 ktoe	4700 Jobs	950 MEUR
Wind power	77.9 ktoe	1480.9 ktoe	2700 Jobs	620 MEUR
Solar PV, CSP and water heaters	0.2 ktoe	19.8 ktoe	600 Jobs	100 MEUR
Solid biomass	588.8 ktoe	881.3 ktoe	20700 Jobs	4460 MEUR
Biofuels in transport	166.3 ktoe	1669.7 ktoe	8300 Jobs	350 MEUR
Renewable heat consumed	4579.6 ktoe	5321.3 ktoe		
Renewable heat derived	2504.8 ktoe	3112.4 ktoe		
Heat pumps	585.9 ktoe	1348.1 ktoe	5100 Jobs	1030 MEUR
All other renewables	55.2 ktoe	153.8 ktoe		
Gap towards 2017	5233.0 ktoe			

Source: Eurostat, EurObserv'ER, 2019.

Hydropower jobs & turnover only covers 'small hydropower'. PV=Photovoltaics, CSP=Concentrated Solar Power. Biofuels in transport only covers compliant fuels (employment and turnover additionally cover the non-compliant biofuels). Derived heat includes heat produced in main activity producer plants and heat sold produced in autoproducer plants. Its counterpart is the final heat consumption in the final consumption sectors (such as households).

CURRENT RENEWABLE ENERGY POLICY

Sweden is abundant in cheap renewable energy sources and the willingness to harness these resources is high. In accordance with the 2009 EU Renewable Energy Directive, Sweden agreed to a binding overall target for a share of renewable energy in gross final energy consumption of 49% to be achieved by 2020. This is the highest target in the EU. In 2015 renewable electricity already accounted for more than 50% of the fuel mix of total electricity production in Sweden.

On the basis of the overall 50% renewable energy target, Sweden set an objective of 25 TWh of renewable electricity to be delivered under the joint certificates-based Swedish-Norwegian renewable quota scheme by 2020 compared to 2002. This scheme is market-based and technology-neutral.

Sweden is the first EU country to implement a cooperation mechanism, as defined under the 2009 EU Renewable Energy Directive, with the introduction of a joint Swedish-Norwegian tradeable green certificate ('elcert') market in 2012. In April 2017, the two countries announced their agreement to extend the joint elcert scheme towards 2030. Sweden will increase its target under the elcert scheme with 18 TWh to 2030. The scheme between the two countries will be in force until 2045.

With a view to facilitating wind power, Sweden has established a planning framework of 30 TWh by 2020, with 20 TWh onshore and 10 TWh offshore. These are not production targets but rather intended to guide the municipal spatial planning.

In 2016, the Swedish Government concluded an agreement on Sweden's long-term energy policy. The agreement consists of a common road map for a controlled transition to an entirely renewable electricity system, with a target of 100% renewable electricity production by 2040.

The main support measure for *the promotion of electricity from renewable energy* in Sweden is a renewable electricity quota system. It is a technology-neutral support scheme among the full range of renewable power generation technologies that are commercially not (yet) viable. Obligated parties, i.e. electricity suppliers and large electricity consumers, have to comply with pre-set annual renewable quota. They have to ensure that a corresponding minimum percentage share of their annual electricity deliveries (electricity suppliers) or consumption (obligated consumers) was produced from a renewable source. To that effect, they have to submit ("cancel") an adequate number of tradable green certificates ("elcerts"), where each elcert stands for 1 MWh of electricity produced from a specific renewable source. Elcerts are issued to Swedish and Norwegian operators of renewable power plants participating in the Swedish-Norwegian renewable electricity quota scheme, generally during a period of 15 years. In Sweden the competent authority is the Swedish Energy Agency.

So far, the Swedish-Norwegian renewable quota scheme has proven quite cost-efficient (in terms of additional costs per supported MWh of renewable energy) and effective (in terms of target compliance). Its design compares favourably to renewable electricity quota schemes elsewhere in Europe. Yet a design weakness of the scheme is that renewable power plant operators are exposed to high vulnerability of the elcert price to macroeconomic business cycles. This is partly due to the fact that the overall targets of the scheme have been expressed in absolute terms (TWh) , whereas annual quotas for obligated parties have been expressed in relative terms, i.e. percentage points of electricity deliveries (for suppliers) or electricity consumption (for large companies). Less than anticipated macroeconomic growth at the time system targets and quota were set has translated into lower electricity demand than anticipated with knock-on effects upon the (weakening) elcert

market. In February 2013 the monthly average of the elcert spot price reached a level of SEK 234.80 (€27.24) / MWh against SEK 46.56 (€2.33) / MWh in June 2019.[1] Remedial interventions to invigorate the elcert market are being considered for implementation. This would require to amend the act governing the renewable quota scheme in Sweden, in close consultation and possible coordination with the Norwegian authorities.

Other support measures to promote power generation from renewable sources include a partial exemption from a real estate tax applicable to wind power installations. This tax is imposed on owners of plots of land on which power stations are located. Conversely, for hydropower stations the land owners are required to pay a substantially higher rate than the standard rate. Furthermore, small-scale power plants are exempted from an energy tax on electricity consumption (wind power installations < 125 kW, solar power installations < 255 kW, other renewable power installations < 50 kW). Electricity produced from solar, wind, wave, tidal, hydro, geothermal or biomass plants is eligible for a 0.6 SEK/kWh (€ct 5.6 / kWh) reduction of a tax raised on electricity fed into the grid, up to a certain level. regulation mechanisms applicable to wind energy and renewable electricity generating installations below 50 kW capacity. Moreover, a 30% investment subsidy scheme for PV installations is in force.

Tax exemptions are the main incentives to support *renewable energy for heating purposes* as well as for promoting biofuels for transport purposes. Tax exemptions include income tax deduction of installations using renewable heating sources in apartments and single-family houses when replacing conventional heating, exemptions for renewable heat producers of energy and CO2 taxes and a nitrous oxide tax, all imposed on fossil heating fuel.

The main support scheme to foster *renewable fuels for transport purposes* is a biofuel quota scheme. Furthermore, also biofuels for transport purposes are exempted from energy and CO_2 taxes. In addition, subsidy and tax mechanisms are provided for the purchase of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs), including:

- A so called "Super green car premium" (Supermiljöbilspremie) of SEK 20,000 (€1860) for PHEV and SEK 40,000 (€3720) for BEV is available for the purchase of new cars with CO2 emissions of maximum 50 gr / vehicle-km
- Five year exemption from the annual circulation tax
- Reduced addition to the employee's income tax base for using a company lease car when it concerns an electric vehicle compared to an ICE company lease car
- Investment subsidy of 50% on home charges to a maximum of SEK 10,000 (€930) and a subsidy scheme for public re-charging stations.

[1] http://www.skm.se/priceinfo/history/ . The exchange rates applied are SEK 1 = EUR 0,116 for February 2013 and SEK 1 = EUR 0,093 EUR for June 2019.

OVERVIEW OF MAIN SUPPORTING POLICIES

The main renewable energy support measures applied in Sweden are summarised in Tables 1 and 2 below. See the previous section for more details.

Table 1: Overview of support schemes to promote renewable energy in Sweden

	NON-FISCAL SUPPORT SCHEMES					FISCAL AND OTHER STATE FUNDED INCENTIVES					
	Feed-in premium	tendering	Renewable electricity quota scheme with certificates	Tendering	Biofuels quota scheme without cetificates	Investment subsidy	Reduced real estate tax	Energy tax reduction	Income tax credits	Nitrous oxide tax exemption 2)	Energy and CO_2 tax exemption
RES-E											
- Offshore wind			x								
- Onshore wind			x				x	x			
- Solar			x			x		x			
- Hydro			x				1)	x			
- Geothermal			x					x			
- Solid biomass			x					x			
- Biogas			x					x			
RES-H/C											
- Solar thermal						x	x		x	x	x
- Geothermal									x	x	x
- Biomass										x	x
- Biogas										x	x
- Large ambient heat application										x	x
- Small scale installations, e.g. solar thermal collects, heat pumps, biomass boilers and pellet stoves									x	x	x
- Others, i.e. aerothermal, hydrothermal							o		x	x	x
RES-T											
- Biofuels					x						x

1) Increased real estate tax.

2) Renewable sources do not emit NO_x

Sources: RES Legal, EurObserv'ER, GSR/REN21

Table 2: Brief description of key policy instruments aimed at promoting renewable energy production in Sweden

Instrument	*Description*
Electricity Certificate Scheme	The electricity certificate scheme is the main support scheme for promoting renewable electricity in Sweden. It is a market-based support system which aims to increase the production of renewable electricity in a cost-effective manner. Since 2012, Sweden and Norway have had a common market for electricity certificates and a common target whereby the electricity certificate scheme must contribute to expansion in the order of 26.4 TWh of renewable electricity production by the end of 2020. Each country has to provide half of the financing, but it is up to the market to determine where and when new production will take place. The common electricity certificate market is the first example in the EU of a common support scheme as described in Article 11 of the 2009 EU Renewable Energy Directive.
Investment subsidy for solar PV installations	The investment subsidy scheme covers the installation of all kinds of solar photovoltaic cell system and solar electricity/solar heating hybrid systems that are connected to the grid. The support is given to all types of actors, both companies and public organizations as well as private individuals.
Tax reduction - real estate tax	Owners of power stations or owners of land on which a power plant is located pay an annual real estate tax, contingent on the value of the power plant. With few exceptions, the real estate tax does not differ for renewable and fossil energy sources. One such exception is for wind energy, which is subject to a reduced tax payment.
Energy tax reduction	Energy produced in electricity generators with a capacity lower than 50 kW is not taxable. The capacity limit is slightly higher for certain renewable sources, e.g wind (125 kW) and solar (255 kW).
Tax reduction for micro-scale renewable electricity production	In order to facilitate investments by private individuals and enterprises in the production of electricity from renewable sources for their own consumption, micro-producers receive financial compensation for the surplus electricity that they feed into the grid.
Exemption of energy and CO_2 tax for renewable fuels	Energy tax is an overall concept for excise duties on fuels and electricity, regulated under the Act on Energy Tax. Energy tax is payable on most fuels and is based inter alia on energy content. CO_2 tax is payable on every kilogram of carbon dioxide for all fuels other than biofuels and peat. Renewable fuels for heating and transport purposes.
Wind Power Network	The aim of the Wind Power Network is to promote the expansion of wind power by means of information initiatives, training events, exchanging experiences, and financial aid for projects relating to wind-power issues. The Wind Power Network is funded the Government (Swedish Energy Agency) by means of an appropriation for planning aid intended for wind power.

For further information:

Member State Progress Report, available at the Renewable Energy pages of the European Commission, https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports

EurObserv'ER 16th annual overview barometer, https://www.eurobserv-er.org/category/all-annual-overview-barometers

EEA charts on progress of renewable energy sources for EU and per Member State, https://www.eea.europa.eu/data-and-maps/indicators/renewable-gross-final-energy-consumption-4/assessment-1

International Energy Agency (IEA) database on policies and measures , https://www.iea.org/policiesandmeasures/renewableenergy/?country=Sweden

RES Legal database: http://www.res-legal.eu/search-by-country/sweden

Global Status Report by REN21, http://www.ren21.net/gsr-2017

https://ec.europa.eu/commission/sites/beta-political/files/energy-union-factsheet-sweden_en.pdf (European Commission/ DG ENER, Energy Union Factsheet Sweden, November 2017)

European Alternative Fuels Observatory, http://www.eafo.eu/content/sweden ; http://www.eafo.eu/eu

Morgan, Sam (2018). Swedes set to smash renewable target 12 years early. EurActiv article, 17 July 2018, updated 21 July 2018. https://www.euractiv.com/section/energy/news/swedes-set-to-smash-renewable-target-12-years-early/

What is meant by …?

Auctions for granting renewable energy support	An auction is a process of granting production or investment support to renewable energy projects based on the lowest bids by eligible project developers.
Feed-in tariff (FiT)	A support scheme which provides for a technology-specific remuneration per unit of renewable energy payable to eligible renewable energy producers. A proper, periodic review of FiT rates is often undertaken with the aim to prevent both too high FiTs so as to minimise regulatory rents, i.e. supra-normal returns and too low FiTs to preclude below-target market uptake because of FiT levels that are perceived by market participants to be less attractive. In addition, feed-in tariffs often include "tariff degression", a mechanism according to which the price (or tariff) ratchets down over time.
Feed-in premium (FiP)	A scheme which provides for a support level per unit of renewable energy to eligible renewable energy producers, typically for a period of 10-20 years, at a pre-set fixed or floating rate. The premium is typically adjusted periodically to exactly offset change in the average energy wholesale market price, based on a pre-specified benchmark market price. A floating FiP may move freely or may only be allowed to move within a pre-set interval.
Grants	Grants are non-repayable funds disbursed by one party (grant makers), often a government department, corporation, foundation or trust, to a recipient, often (but not always) a non-profit entity, educational institution, business or an individual. (Source: Wikipedia.org)
Green public procurement	In Green public procurement contracting authorities take environmental issues into account when tendering for goods or services. The goal is to reduce the impact of the procurement on human health and the environment. (Source: Wikipedia.org)
Renewable quota scheme (RQS)	A RQS mandates certain market actors (typically retail suppliers or large energy end-users) to respect a pre-set minimum share or amount of their total energy procurements from renewable sources of energy. Typically a tradable green certificate (TGC) scheme is operated to enable the obligated parties to prove their compliance with the prevailing renewable quota target by means of TGCs.
Sliding feed-in-tariff	A FiT scheme which pre-sets technology-specific declining feed-in tariffs for certain prospective vintages in line with the technology-specific learning curve, as projected by the National Regulatory Agency (NRA). Often a degression rate is used indicating the %/annum decrease in the rate level.
Soft loans	Loans at concessional (below market-based) terms, for example at sub-market-conform interest rates, made available in several Member States to stimulate certain renewable energy technologies.
Tax credits	These are amounts a tax paying entity is allowed to deduct when declaring payable taxes, for example company tax or income tax, to the tax authorities , for example the producer tax credits (PTCs) used in the United States to stimulate among others wind energy deployment.

This project is funded
by the European Union under
contract nº ENER/C2/2016-487/SI2.742173