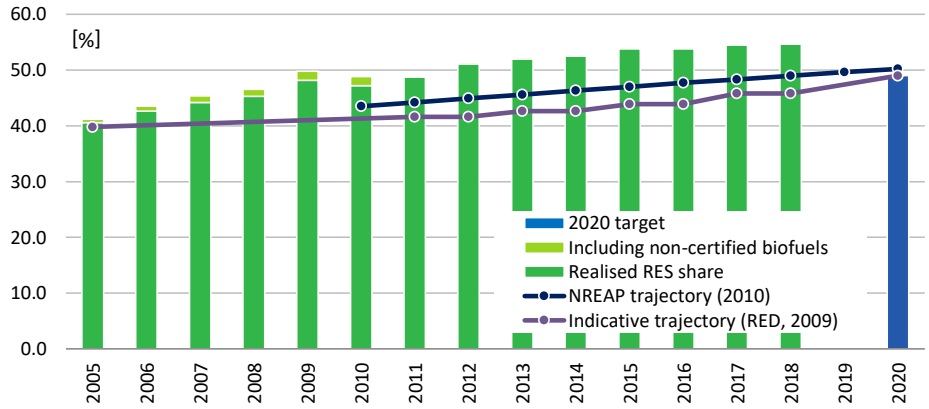
Sweden

Renewable Energy Policy Factsheet

October 2020

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.



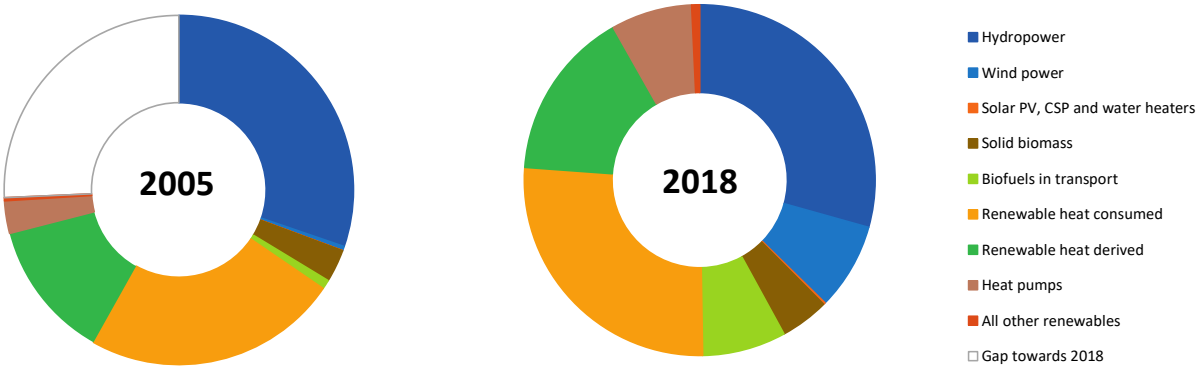
Source: EEA, Eurostat

Abbreviations used:

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

Data for 2018

Overall RES share:	54.6%	Avoided fossil fuels:	41.8 [Mtoe]
Overall RES 2020 target:	49.0%	Avoided fuel expenses:	24.0 [billion euro]
Share RES-E in electricity:	66.2%	RES Turnover:	8930 [MEUR]
Share RES-T in transport:	29.7%	RES Employment:	51300 [jobs]
Share RES-H/C in heating:	65.4%		



Source: Eurostat, 2020.

	2005	2018		
	Energy	Energy	Employment	Turnover
Hydropower	5883.1 ktoe	5707.7 ktoe	4300 Jobs	860 MEUR
Wind power	80.0 ktoe	1555.9 ktoe	4600 Jobs	980 MEUR
Solar PV, CSP and water heaters	0.2 ktoe	35.0 ktoe	1200 Jobs	220 MEUR
Solid biomass	588.8 ktoe	876.6 ktoe	18900 Jobs	4080 MEUR
Biofuels in transport	166.3 ktoe	1499.7 ktoe	10900 Jobs	490 MEUR
Renewable heat consumed	4587.9 ktoe	5140.0 ktoe		
Renewable heat derived	2504.8 ktoe	3043.1 ktoe		
Heat pumps	585.9 ktoe	1451.3 ktoe	7800 Jobs	1620 MEUR
All other renewables	55.2 ktoe	143.3 ktoe	3600 Jobs	680 MEUR
Gap towards 2018	5000.4 ktoe			

Source: Eurostat, EurObserv'ER, 2020.

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 10020 (€ 960) for PHEVs with CO2 emissions of maximum 70 gr / vehicle-km and SEK 60,000 (€5760) for BEVs is available for the purchase of a new car with a maximum of 25% of the new car price
- Five year exemption from the annual circulation tax of about SEK 1760 (€ 170)
- 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.

So far, the assessment by the European Commission of draft National Energy and Climate Plans of the Member States is available. The Commission's assessment of the draft integrated National Energy and Climate Plan of Latvia – regarding the targets for year 2030 for the share of renewable energy and gross final energy consumption only[2] – is shown in Table 1 below.

Based on the formula contained in Annex II of the Governance Regulation, 's renewables share would have to reach the level of 64% in 2030 (European Commission, 2019) against the historical rate of **54.6%** in 2018 (eurostat, 2020a). The European Commission (2019) considers the proposed RES share by 2030 of **65%** to be a significant share, slightly above the share of 64% that results from the formula. The Commission deems the ambition level of the proposed **32.3 Mtoe** as Sweden's

[1] http://www.skm.se/priceinfo/history/ . The exchange rates applied are SEK 1 = EUR 0,116 for February 2013 and SEK 1 = EUR 0,096 EUR for September 2020.

[2] Gross final energy consumption is included as well as its level negatively affects the share of renewables: given a certain level of final consumption from renewable sources, the more total final energy consumption can be reduced, the higher share of renewables can be achieved.

Table 1: Overview of Sweden's actual performance (2018), targets (2020), proposed contributions (2030) under the Governance Regulation, Regulation (EU) 2018/1999 and contribution ambition assessment by the European Commission, regarding the share of renewables and the level of gross final energy consumption

National targets and contributions	2018	2020	2030	Assessment of 2030 ambition level
Share of energy from renewable sources in gross final consumption of energy (%)	54.6	49.0	65.0	Above 64% (result of RES formula)
Final energy consumption (Mtoe)	32.0	30.3	32.3	Low

Source: European Commission (2019); Eurostat (2020a, 2020b)

proposed contribution to the EU 2030 target for final energy consumption to show a low ambition level, considering the level of efforts required at the EU level to collectively reach the Union's 2030 efficiency target. In 2018 Sweden's gross final energy consumption amounted to **32.0 Mtoe** (Eurostat, 2020b).

Sweden's final National Energy and Climate Plan (NECP) keeps the target for the renewables share by year 2030 at **65%**, just like the proposed share in its draft NECP. The 64% target share is slightly higher than the rate resulting from the formula in Annex II of the Governance Regulation. To achieve this target, many relevant cross-sectoral and sector-specific policies relevant for the uptake of renewables are being adopted, such as (Government of Sweden, 2020):

- A carbon tax amounting in 2019 to SEK 1.18 (€ct 11,75) / kg CO_2 with (partial) exemptions for certain sectors exposed to foreign competition and sustainable biofuels
- The *Klimatkliv*, an investment grant scheme for which investment proposals are evaluated on the basis of cost efficiency of GHG reductions in terms of SEK / CO_2eq. reduction
- The *Environmental Code* and the *Planning and Building Act*, advancing a sustainable environment, energy efficiency and the uptake of renewables, notably in the built environment
- A biofuels quota scheme and various stimuli in favour of electrification of the transport system
- The '*Industrikliv*', a state initiative which assists Swedish industry with the development of technologies and processes for reducing process-related greenhouse gas emissions.

As for Sweden's contribution to the EU energy efficiency target for year 2030, Sweden has adopted an energy intensity target instead of target levels of energy consumption. Assuming the Swedish economy grows by 2% Sweden's energy intensity target translates into a gross final energy consumption level by 2030 of 339TWh, equal to **29.1 Mtoe**. This is more ambitious than the 32.3 Mtoe level implicitly proposed in Sweden's draft NECP.

OVERVIEW OF MAIN SUPPORTING POLICIES

The main renewable energy support measures applied in Sweden are summarised in Tables 2 and 3 below. See the previous section for more details.

Table 2: 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 3: 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:

CEER, 2017. Status Review of Renewable Support Schemes in Europe. http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/2017/C16-SDE-56-03%20Status%20Review%20RES%20Support%20Schemes.pdf

European Alternative Fuels Observatory, https://www.eafo.eu/countries/sweden/1755/incentives

European Commission, 2019. Assessment of the draft National Energy and Climate Plan of Sweden. SWD(2019) 278. Brussels, 18 June https://ec.europa.eu/energy/sites/ener/files/documents/se_swd_en.pdf

EEA, 2019. Progress towards renewable energy source targets at member State and EU-28 levels. Copenhagen, 19 December https://www.eea.europa.eu/data-and-maps/daviz/actual-res-progress-indicative-trajectory-9#tab-chart_3

European Union, 2018. Regulation (EU) 2018/1999 on the Governance of the European Union and Climate Action, OJEU L328/1, Brussels, 21 December https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1999&from=EN

Eurostat, 2020a. Renewable energy statistics; Share of renewable energy almost doubled between 2004 and 2018. Luxembourg, January https://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics

Eurostat, 2020b. Energy consumption in 2018. Primary and final energy consumption still 5% and 3% away from 2020 targets. Luxembourg, 4 February https://ec.europa.eu/eurostat/documents/2995521/10341545/8-04022020-BP-EN.pdf/39dcc365-bdaa-e6f6-046d-1b4d241392ad

Government of Sweden, 2020. Sweden's Integrated National Energy and Climate Plan. Stockholm, 16 January https://ec.europa.eu/energy/sites/ener/files/documents/se_final_necp_main_en.pdf

International Energy Agency (IEA) database on policies and measures https://www.iea.org/policies?topic=Renewable%20Energy

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

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/

REN21, 2020. Global Status Report 2020. Paris, 16 June https://www.ren21.net/wp-content/uploads/2019/05/gsr_2020_full_report_en.pdf

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

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)

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.

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