General Perspectives on the Law of Energy Transition in Sweden

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A. Introduction

Sweden and its Nordic neighbors are recognized as leaders in the energy transition required to counter the threat of climate change.[1] However, there is no specific law for the energy transition in Sweden. Rather, there are a number of circumstances which have led to the energy transition in Sweden. Despite being a relatively geographically large country, Sweden has a rather small population and is much less densely populated than other European countries. Its plentiful natural resources, historical events and various economic incentive systems (codified in laws) have also contributed to the energy transition in Sweden.

Despite this favorable status, Sweden still derives roughly 26 % of all energy from fossil energy. Most of this share is used in the transport sector, but several industries are also still reliant on fossil fuels in their production. Some large industries, such as steel (a historically and strategically important industry for Sweden), want to phase out fossil energy and replace it with green hydrogen, which will require a substantial expansion in fossil-free electricity generation.[2] The Swedish Energy Agency estimates that the electricity needed annually by 2050, in a high-electrification scenario, will be triple that of 2020's level.[3] In any scenario, the fossil-free electricity production must increase in Sweden. This chapter provides a background on the laws related to Sweden's energy transition in general and specifically

1 According to the latest International Energy Agency (IEA) country review, Sweden is a leader in the energy transition, see: IEA, 2019 Country Review Sweden, 'Sweden is a leader in the energy transition, according to latest IEA country review' <https://www.iea.org/news/sweden-is-a-leader-in-the-energy-transition-according-to-latest-iea-country-review> accessed 29 February 2024.

2 The hydrogen would be used instead of fossil fuels to heat up the steel, see: Swedish Environmental Protection Agency, 'Resultat i olika branscher 2022' <https://www.naturvardsverket.se/amnesomraden/klimatomstallningen/klimatklivet/resultat-i-olika-branscher-2022/gron-vatgas-for-fossilfri-varmning-av-stal/> accessed 29 February 2024.

3 The Swedish Energy Agency, *Scenarier över Sveriges energisystem 2023: Med fokus på elektrifieringen 2050* (2023) ER 2023:07, 9.

with regards the current obstacles in the expansion of renewable energy production in Sweden.

B. Energy Mix and Current Energy Goals in Sweden

Sweden's climate and energy goals are interlinked and closely aligned with the EU goals. The overall goal of zero net GHG emissions is to be reached by 2045. The overarching directive for Swedish energy policy is that it should be based on the same three pillars as energy cooperation in the EU. The energy policy aims to combine security of supply, competitiveness and ecological sustainability. It is stated on the government's homepage that:

> "the energy policy must thus create the conditions for efficient and sustainable energy use and a cost-effective Swedish energy supply with low negative impact on health, the environment and the climate, as well as facilitate the transition to an ecologically sustainable society."[4]

In addition to the goal of a fossil-free electricity system, there are additional energy efficiency goals. In 2030, Sweden must have 50 % more efficient energy use compared to 2005. It is also expressed that the transport sector has to reduce its greenhouse gases by 70 % by 2030 compared to the levels in 2010. However, even though Sweden has rather ambitious national political goals, the measures to reach those goals are not necessarily aligned.

In general, Sweden's energy mix has long been composed of largely renewable energy sources. At the turn of the century, a lot of hydropower was installed, and biomass has long been an important part of the energy mix and is, in fact, still increasing. In the past 40 years, the energy supplied by biomass has tripled.[5] In recent years biomass has accounted for about 30 % of the total energy supply (about 150 TWh).[6] Biomass is primarily

4 Swedish Government, 'Mål för energipolitiken' <https://www.regeringen.se/regeringens-politik/energi/mal-och-visioner-for-energi/> accessed 18 June 2025.

5 The Swedish Energy Agency, *Energy in Sweden 2022: with energy balance for years 1970–2020* (2022) ET 2023:1, 9.

6 The Swedish Energy Agency, 'Energy in Sweden Facts and Figures' (2025) <https://www.energimyndigheten.se/energisystem-och-analys/nulaget-i-energisystemet/energilaget//> accessed 18 juni 2025. Even though biomass is the largest source of energy in Sweden this Chapter is not focusing on that type of fossil-free energy but rater on other sources of renewable energy, primarily for electricity production as that is where the current energy transition will take place – through electrification.

used in district heating and by the industrial sector.[7] The transport sector is also increasingly incorporating biofuel into its fuel mix.[8]

Since the 1970s, the supply of fossil energy has decreased by more than half.[9] In 2023 fossil sources accounted for about 26 % (130 TWh) of the total energy supply in Sweden.[10]

Nuclear power increased between the 1970s and 90s and thereafter held steady until 2019, when a few of the reactors were taken out of operation.[11] In 2023 about 27 % of the total energy supplied was from nuclear fuel (136 TWh).[12]

Hydropower has been stable since the 1980s. In 2023 it accounted for about 13 % (66 TWh) of the total energy supply in Sweden.[13] Wind power has steadily increased since 2010. In 2023 the supply from wind power was 34 TWh (compared to 3 TWh in 2010).[14] In total it contributed to about 7 % of the total energy supply in 2023.

Biomass (30 %) is the largest source of energy in Sweden, followed by nuclear power (27 %), fossil fuels (26 %), hydropower (13 %), and wind power (7 %). The rest comes from a variety of sources, including a small portion from solar (3 TWh).[15] However, about 30 TWh of electricity has been exported in recent years,[16] so the percentages do not add up. Even though the supply of energy was 507 TWh (including 29 TWh export of electricity), the total energy use in Sweden was 353 TWh in 2023. The difference in energy is transformation losses, etc.[17] In 2023, the residential and service sector used 140 TWh, industry 136 TWh and the transport sector 78 TWh.[18]

The transport sector still uses fossil fuels in Sweden to a large extent. Also, industry uses fossil fuels in its production, but not as intensively as in transport. The housing and service sector only account for about 6 %

7 The Swedish Energy Agency (n 5), 9.
8 In 2020 the transport sector used about 17 TWh (compared to one TWh in year 2000), see: ibid 9.
9 ibid 8.
10 The Swedish Energy Agency (n 6), 9.
11 The Swedish Energy Agency (n 5), 9.
12 The Swedish Energy Agency (n 6).
13 ibid.
14 ibid.
15 ibid.
16 ibid.
17 ibid.
18 ibid.

of the energy (9 TWh) deriving from fossil energy. However, the transport sector is still heavily reliant on fossil fuels, with 69 % (54 TWh). Industry accounts for about 17 % (23 TWh) of energy deriving from fossil fuels.[19] The national goal of reducing carbon emissions in the transport sector by 70 % by 2030 therefore seems an efficient way of reducing carbon emissions in Sweden.

C. Historical and Political Background

Sweden began building out its electricity system during a period of industrialization. When industry demand for electricity rose, the Swedish Government responded by changing the water law in order to enable a fast expansion of hydropower.[20] The 1918 Water Law was adopted and was valid until 1983. However, due to nature protection laws, the development of hydro in Sweden essentially ceased in 1970. At this point Sweden had exploited most of its rivers. Now, a few rivers are protected as "national interests" in Chapter 4 of the Environmental Code and, as a result, hydropower cannot be developed in those rivers.[21]

Earlier hydropower traces back to medieval times, used to run mills. At that time, environmental laws were in place, ensuring that one-third of the river must be free-flowing and that fish connectivity must be ensured.[22] However later, when hydropower was introduced at large scale in Sweden, there were no environmental requirements and permits for the installation had no expiration, and many of those permits remain valid today.[23] Today the hydropower in Sweden is facing a different reality including a strict provision on water quality deriving from the EU Water Framework Directive.[24]

19 ibid.

20 See Evert Vedung/Magnus Brandel, *Vattenkraften, staten och de politiska partierna* (2001) 43.

21 Nationalälvarna are considered of national interest according to Chapter 4 of the Environmental code.

22 See The law for mills (1228).

23 For a historical overview of the hydropower development and its permit regime, see Jan Darpö, 'Tradition och förnyelse på vattenrättens område. Om mötet mellan gamla tillståndsregimer och moderna miljökrav' (2014) 214:2 Nordic Environmental Law Journal 101, 102; See Chapter 4, section 6 of the Environmental Code.

24 See Directive 2000/60/EC of the European Parliament and of The Council of 23 October 2000 establishing a framework for Community action in the field of water policy [2000] OJ L 327/1 (hereafter referred to as Water Framework Directive).

Another important event that fueled the energy transition in Sweden was the oil crisis in 1970s. Prior to the oil crisis, it was common that oil was used to heat up houses among other things. 80 % of Sweden's energy supply was from oil in the 1970s.[25] However, the oil crisis resulted in a move away from oil towards district heating in communities and cities,[26] electric heating, installations of heat pumps and burning of biomass instead of oil. Sweden also introduced its nuclear power and continued its expansion of hydropower. Thus, electricity became a cheap option to heat houses in the following years. As a result, Sweden's greenhouse gas emissions from home heating have decreased by 92 percent from 1990 to 2023 according to the Swedish Environmental Protection Agency.[27] However, the green house gas (GHG) emissions, in general, have increased between 2023 and 2024 in Sweden with 5,8 %, from 44,4 million ton to 51, 5 million ton according to the official statistics.[28]

In summary, Sweden's relatively fossil-free energy system is due to its naturally watercourse-rich environment, suitable for hydropower; the introduction of nuclear power; and a natural shift away from oil after the crisis. The increase in solar and wind has come only in recent years.

D. Laws Enabling the Transition from Fossil Fuels

There is no law that specifically focuses on the energy transition, but Sweden does have a Climate Law. Specifically, the Swedish Climate Act (2017:720) regulates the government's climate policy work. For example, Section 3 of the Climate Act states that the government's climate policy must be based on the long-term timed emissions target established by the Riksdag (Sweden's national legislative body). According to the aforemen-

25 The Swedish Government, 'Regeringens klimathandlingsplan – hela vägen till nettonoll' (2023) Skr. 2023/24:59, 21.

26 See the Swedish Energy Agency (n 5), 28 for more specific numbers on district heating. Today the use is between 54 and 60 TWh compared to about 10 TWh in 1970.

27 The Swedish Environmental Protection Agency, 'Sveriges utsläpp och upptag av växthusgaser', see: <https://www.naturvardsverket.se/data-och-statistik/klimat/sveriges-utslapp-och-upptag-av-vaxthusgaser/> accessed 18 juni 2025.

28 Statistikmyndigheten, 'Utsläppen av växthusgaser från Sveriges ekonomi ökade 2024', see: <https://www.scb.se/hitta-statistik/statistik-efter-amne/miljo/miljoekonomi-och-hallbar-utveckling/miljorakenskaper/pong/statistiknyhet/utslapp-till-luft-4e-kvartalet-2024/> accessed 18 juni 2025.

tioned paragraph, the work must also be conducted in a way that provides for the conditions for climate policy and budget policy goals to cooperate with each other. In addition, according to Section 4 of the Climate Act, the government must present a climate report to the Riksdag in the budget bill every year. In the year following ordinary parliamentary elections, the government must, according to Section 5 of the Climate Act, present a climate policy action plan. In each action plan, the government presents its policy to achieve the climate goals during the current term of office. The climate policy action plan was most recently presented by our current government on December 21st 2023.[29] In the plan, electrification was one of the core areas identified as important to reduce emissions.[30] Also, the permit processes for energy infrastructure have been identified by the government to be too complex and long,[31] a notion which has also been suggested multiple times by industry and has been the topic of state commissions.[32] However, the existence of long and complicated permit procedures has been disputed by some academics in Sweden,[33] which now is also supported by official statistics.[34]

This electrification would take place in both the transport sector[35] and the industrial sector, and create significant demand for more fossil-free electricity.[36] In the plan, an increase in nuclear power is emphasized as essential for a robust electricity system, due to it being a more stable source of electricity than solar and wind. However, an increase in all sources is still essential, according to the plan.

In 1991, Sweden became one of the first countries to introduce a carbon tax. The primary intention of a carbon tax is to change behavior, by reducing the incentive to use fossil fuels. Currently, as of 2025, the carbon

29 ibid.
30 ibid 13, 85.
31 ibid 74.
32 See for example SOU 2022:33, *Om prövning och omprövning- en del av den gröna omställningen*, (2022). there is also a ongoing state comission on the topic as well, Sveriges Riksdag, *Miljötillståndsutredningen,* Dir. 2023:78 (KN 2023:2) that published an interim report in 2025, see SOU 2024:98, *En ny samordnad miljöbedömnings- och tillståndsprövningsprocess*.
33 See Jonas Ebbesson/Jan Darpö, 'Professorer: Lobbyister och företag sprider myter om svensk miljölagstiftning' <https://www.altinget.se/artikel/professorer-lobbyister-och-foretag-sprider-myter-om-svensk-miljolagstiftning> accessed 29 February 2024.
34 See for example SOU 2024:98 (n 32), 657.
35 Swedish Government (n 25) 141.
36 ibid 14.

tax is 1510 SEK/tonne carbon.[37] However, in order to not double regulate companies that are also part of the EU Emission Trading System (EU ETS), their carbon tax is reduced. In Sweden there are about 800 facilities included in the EU ETS.[38]

In order to reduce the GHG emissions from the fuels used for transport, Sweden adopted a law to require that biofuels are mixed with fossil fuel.[39] Among other things, the idea was that this steering tool would contribute to reaching the national goal of a 70 % reduction in greenhouse gas emissions from domestic transport by 2030. From January 2022, the reduction requirement was 7.8 % for petrol and 30.5 % for diesel. In 2023 the reduction requirement for jet kerosene was 2.6 %. However, due to a recent political shift, the reduction requirements were contested. From January 2024 the reduction requirement for petrol and diesel was reduced to 6 % and by 2027 the plan was that the system would cease to exist.[40] However, from July 2025 reduction requirement is increased to 10 % for both diesel and petrol and the system will continue to exist for the foreseeable future.[41] Some scholars argue that the system is not an efficient way of cutting GHGs.[42] The EU *reduction requirement* is instead, after the implementation of RED III in 2023,[43] to be met through electricity sold from public

37 Swedish Government, see: <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/> accessed 18 June 2025.

38 The Swedish Energy Agency, see: <https://www.energimyndigheten.se/en/sustainability/emissions-trading/Participating-in-EU-ETS/the-union-registry/compliance/> accessed 18 June 2025.

39 Lag (2017:1201) om reduktion av växthusgaser från visa fossila drivmedel.

40 See more: Swedish Energy Agency, 'Reduktionsplikt ' <https://www.energimyndigheten.se/fornybart/hallbarhetskriterier/reduktionsplikt/> accessed 29 February 2024.

41 See recent changes in Law (2017:1201) on the reduction of greenhouse gas emissions from petrol and diesel.

42 See for example: Pierre Kjellin, 'Forskare sågar reformen med höjd reduktionsplikt för bensin och diesel' <https://transportnytt.se/forskare-sagar-reformen-med-hojd-reduktionsplikt-for-bensin-och-diesel/> accessed 29 February 2024. However, Riksrevisionen consider it an efficient instrument, see: Swedish Government, 'Riksrevisionens rapport om reduktionsplikten för bensin och diesel' <https://www.regeringen.se/contentassets/227afea1d2a24478b15c5323784e3eba/riksrevisionens-rapport-om-reduktionsplikten-for-bensin-och-diesel-skr.-20232444.pdf> accessed 29 February 2024.

43 Directive 2018/2001/EU on the promotion of the use of energy from renewable sources, 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources [2018] OJ L 328/82 as amended by Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation

charging stations, as fuel companies receive a direct incentive to support electrification, e.g. through an expansion of public charging stations.[44]

Sweden also has an energy tax on fuels and electricity. Currently, for electricity, it is 43,9 öre per kWh (not including VAT).[45] This tax's purpose is not primarily to change people's behavior, although adding tax to people's energy consumption surely has such an effect. One feature of the tax code is that small-scale producers of renewable energy are exempted from paying energy tax on the excess electricity that is distributed and sold. When it comes to solar, which is the most common type of energy produced at a small scale, the installation can have a maximum power of 500 kW.[46] Hence, small-scale renewable energy production is indirectly subsidized.

In addition, and specifically focusing on the introduction of renewable energy, *the electricity certificate system* has incentivized a transition towards more renewable electricity in Sweden.[47] An electricity certificate is basically a confirmation issued by the state that one megawatt hour (MWh) of electricity has been generated from renewable sources in accordance with the Electricity Certificate Act.[48] An individual producer of renewable energy can receive certificates for 15 years.[49] In addition, electricity suppliers are required to purchase electricity certificates corresponding to a certain proportion of the electricity that they sell, known as their quota obligation.[50] Electricity certificates are therefore traded on the Swedish and Norwegian markets to fulfil those quotas. The price is later added to the consumer's electricity bill. This incentive system implies that the renewable electricity producers are receiving an extra income by selling the certificates, in addition to the electricity price.

The electricity certificate system was introduced in 2003. Since 2012, the electricity certificate market has been common between Norway and Sweden, with a joint goal of increasing the renewable electricity production

(EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652 [2023] OJ L 2023/2413 (hereafter referred to as RED III).

44 Swedish Government (n 25) 66 f.

45 See law (1994:1776) on energy taxes on fuel and electricity, Chapter 11, section 3.

46 ibid, Chapter 11, Section 2, Second paragraph, 2.

47 See the Swedish Energy Agency, 'The Swedish–Norwegian Electricity Certificate Market, ANNUAL REPORT 2020' (2020).

48 Electricity Certificate Act (Lag (2011:1200) om elcertifikat).

49 See the Swedish Energy Agency (n 5).

50 ibid 7.

by 28.4 TWh before 2020. This was already achieved in May 2019.[51] The Swedish parliament decided in 2017 to increase the target for 2030 by another 18 TWh. However, that was reached in March 2021. In 2022, there were no longer any new plants that could be eligible for certificates and the system is currently being phased out.

In order to move towards a green transition at the household level there is a "green" tax reduction for installations of solar cells and electric chargers since 2021.[52] However, the installation of solar cells has been subsidized since 2009.[53] Since 2023, households were temporarily eligible for government support to renovate their homes to be more energy efficient, for example, insulation and investment in heat pumps.[54] The policy gave some subsidies for the material cost of insulating your house or the material investment cost of buying a heat pump, etc. Up to 30,000 SEK could have been granted (50 % of material cost). A general subsidy for households wanting to renovate their current homes is also available, but an energy efficiency motive is not necessary for the subsidy. A private person can use up to 50,000 SEK deductions per year (30 % of the labor cost).

Hence, there are a number of laws governing various incentive systems, both towards industry (mainly carbon tax) and household level subsidies. However, there is no longer any incentive system in place for new large-scale renewable energy production.

E. Renewables in the Electricity System – Political Goals and Predictions

The increase of renewable energy has been a common goal for Swedish politicians. However, the goal of 100 % renewable electricity by 2040 has been adjusted to 100 % fossil-free electricity by 2040, as a concession to including nuclear power in the mix.[55]

51 ibid 5.

52 See Ordinance on tax reduction for green technology: Förordning (2020:1080) om förfarandet vid skattereduktion för installation av grön teknik.

53 See Ordinance on state support for solar cells: Förordning (2009:689) om statligt stöd till solceller.

54 See Ordinance on grants for energy efficiency in single-family homes: Förordning (2023:402) om bidrag för energieffektivisering i småhus. However, the subsidy ceased to exists in June 2025.

55 See Swedish Government (n 4).

The push for more fossil-free electricity is essential as electricity production has to increase to meet the future demand from the industry and transport sectors. As it stands today, Sweden is a net exporter of electricity. In recent years, Sweden has exported about 30 % of the electricity it produced.[56] However, in an increasingly electrified future, the fossil-free production of electricity has to increase, along with accompanying infrastructure for storage and reliable sources for baseline power to balance the grid (e.g. pump storage (hydro) and nuclear).

In the scenarios from the Swedish Energy Agency about 97–187 TWh will be needed annually for industry in 2050 in a high-electrification scenario.[57] In the industrial sector it is mainly the production of hydrogen that contributes to the increase in electricity. The idea is that hydrogen should be used in industrial processes, such as steel manufacturing, in order to move away from traditionally fossil fuel-intensive activities.[58] The electricity needed for production of hydrogen is estimated to be about 22–100 TWh in 2050. Fossil fuel use by the industrial sector is expected to decrease 58–70 % by 2050. Common among all the electrification scenarios, is that the use of fossil fuels will decrease by 70–77 % from 2020–2050.[59]

In the transport sector, the total energy consumption will decrease mainly as the car fleet is estimated to be totally electrified by 2050. By 2050, it is estimated that the transport industry will only require around 50 TWh, a reduction of 29 TWh from today's level.[60] However, such a transformation requires significant expansion of charging infrastructure and availability of rare materials for batteries, among other things.[61]

The housing and service sector is predominately fossil-free and the focus there is on energy efficiency measures, like changing from inefficient electric heating to heat pumps, etc. The total demand is expected to slightly increase due to data centers and increased electrified work machines.[62]

56 The Swedish Energy Agency (n 6). In 2024 the export was record high with 33,4 Twh, see:<https://www.svk.se/om-kraftsystemet/kraftsystemdata/elstatistik/> accessed 18 June 2025.
57 The Swedish Energy Agency (n 3).
58 RISE Research Institutes of Sweden, *Prestudy H2ESIN: Hydrogen, energy system and infrastructure in Northern Scandinavia and Finland* (2022) 3.
59 The Swedish Energy Agency (n 3) 12.
60 ibid 13.
61 ibid.
62 ibid.

In 2022, the new government changed the landscape for incentives in the Swedish market and important subsidies for offshore wind power were withdrawn, as well as bonuses for buying electric cars. Previously, the grid connection fee had been waived for offshore wind power, in order to promote the development of this renewable, but this implicit subsidy is no longer in place. The share of electric cars has grown, from 18 % of the newly registered cars in 2021 to 32 % in 2022[63] and 38 % in 2023,[64] indicating that since the withdrawn bonus (in November 2022), the uptake of electric vehicles has slowed. In September 2024, newly registered electric vehicles had decreased by 8 % compared to 2023. However, newly registered electric busses and electric trucks had increased in Sweden.[65]

Due to Sweden's relatively clean electricity production, politicians are pushing towards pursuing a broad electrification of society as a path towards achieving their climate goals. Hence, the future will require more electricity. It is too early to say if these changes can be accomplished without the subsidization of new renewable energy production in Sweden.[66]

In addition, there has been some backlash related to the availability of rare materials needed for all the batteries required by this transition towards electrification.[67] According to the EU Regulation on Critical Raw

63 Statistikmyndigheten, 'Tredubbling av elbilar på två år' <https://www.scb.se/hitta-statistik/redaktionellt/tredubbling-av-elbilar-pa-tva-ar2/#:~:text=Man%20skulle%20kunna%20s%C3%A4ga%20att,bilar%20%E2%80%93%20en%20f%C3%B6rdubbling%20sedan%202020> accessed 29 February 2024.

64 Trafikanalys, 'Samma nivå för nyregistrerade personbilar 2023 som året innan' <https://www.mynewsdesk.com/se/trafikanalys/pressreleases/samma-nivaa-foer-nyregistrerade-personbilar-2023-som-aaret-innan-3295203?utm_source=rss&utm_medium=rss&utm_campaign=Alert&utm_content=pressrelease> accessed 29 February 2024.

65 Trafikanalys, 'Elektrifierade fordon i Sverige – en analys av laddbara fordon över tid och geografi', Rapport: 2024:10, 14–15, see:<https://www.trafa.se/globalassets/rapporter/2024/rapport-2024-10-elektrifierade-fordon-i-sverige---en-analys-av-laddbara-fordon-over-tid-och-geografi.pdf> accessed 18 June 2025.

66 The Swedish Government, 'Budgetsatsningar inom energiområdet för att säkra tillväxt och grön omställning ' <https://www.regeringen.se/artiklar/2023/10/budgetsatsningar-inom-energiomradet-for-att-sakra-tillvaxt-och-gron-omstallning/> accessed 29 February 2024.

67 See Anahita Jannesar Niri/Gregory A. Poelzer/Steven E. Zhang/Jan Rosenkranz/Maria Pettersson/Yousef Ghorbani, 'Sustainability challenges throughout the electric vehicle battery value chain' (2024) 191 Renewable and Sustainable Energy Reviews, 114176.

Materials (CRM),[68] 10 % of our consumption of these materials should be sourced in the EU by 2030. It seems like a small contribution, but an electrification of the EU will require a significant scaling up. Rare materials have been found in northern Sweden, but the Sami people operate reindeer herding land in the same areas. The Sami are the aboriginal people in Sweden, meaning the conflict is not only of *national interest* but also a question about a possible violation of human rights. Nevertheless, importing these materials from China, Russia and Africa also has a negative social dimension.[69] The ability to recycle batteries and reuse the raw materials are therefore becoming crucial in enabling this transition.

F. The Administrative Structure in Sweden Relevant for Renewable Energy Activities

1. Municipal Planning Monopoly in Sweden

Another important aspect of the Swedish system is that the municipalities have a lot of power. The constitution expressly states that municipalities have a *planning monopoly*[70] and right of self-determination. There are a number of different municipal plans.[71] With regards to energy-related activities (for example wind power) these developments often take place in overview plans, which are not legally binding plans.[72]

This means that municipalities are self-governed to a large extent, although there is legislation in place, adopted at the national level, which the municipalities have to follow. Income taxes are primarily municipal-level

68 Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020 (Critical Raw Materials Act).

69 See for example: Reuters, 'DR Congo presses Apple over minerals supply chain, lawyers say' <https://www.reuters.com/markets/commodities/dr-congo-presses-apple-over-minerals-supply-chain-lawyers-say-2024-04-25/> accessed 29 July 2024.

70 However, the planning process includes public participation and the County Administrative Board can intervene and reassess certain plans (detailed plans), or inform the municipality that the national interests are not accounted for in its audit opinion,, see Chapter 11, Section 10 and 11 and Chapter 3, Section 16 of the Swedish Planning and Building Act.

71 For a general description of the various plans, see Gabriel Michanek/Charlotta Zetterberg, *Den Svenska miljörätten* (2021) 527.

72 See Chapter 3, Section 3 of the Planning and Building Act.

taxes. However, the national goals associated with the climate or energy transition are not transposed as requirements for municipalities. The system lacks vertical integration. If any of the 290 municipalities do not work towards a sustainable energy transition in their activities and planning, there is no punishment. There are some municipalities that take climate change seriously and want to contribute to the energy transition, but it is not a formal requirement that can be enforced today.

As mentioned above, there is no obligatory planning for onshore wind power, but some municipalities have planned for wind power in their overview plans. In the marine environment, wind power development is planned in Marine Spatial Plans.[73] These plans are currently under consultation and are to be revised to include more wind power capacity in the sea.[74] However, none of the plans that include wind power are legally binding and the areas identified are not necessarily suitable locations from an environmental point of view. Thus, they do not sufficiently guide developers to find suitable locations for wind power today.

There are no *national plans* for renewable energy development, but there is some guidance from the state level through the instrument of "national interests". These interests represent protection both for general types of land and water areas, and specific geographic areas that are of national interest.[75] In Chapter 4 of the Environmental Code the national parliament has specified which areas of Sweden are considered to be of national interest while Chapter 3 of the Environmental Code describes a number of interests that shall be protected "as far as possible". Higher protection is only granted when considered to be of national interest.[76] Energy production, reindeer husbandry and nature protection are some examples of specific interests mentioned under Chapter 3 of the Environmental Code. Some geographical areas often host more than one of these

73 For more info on the Swedish Marine Spatial Plans, see: Swedish Agency for Marine and Water Management, 'Marine Spatial Planning' <https://www.havochvatten.se/en/eu-and-international/marine-spatial-planning.html> accessed 18 June 2025.

74 Swedish Agency for Marine and Water Management, see proposal for new plans: <https://www.havochvatten.se/planering-forvaltning-och-samverkan/havsplanering/forslag-till-andrade-havsplaner-2025.html>accessed 18 June 2025.

75 See the Environmental Code, Chapter 3 regarding general provisions and Chapter 4 regarding specific geographical areas.

76 In practice the various national interests are pointed out by the relevant state authority. However, such an identified area of interest is not legally binding. It is the Court that, in each individual case, assesses whether the interest is of national interest. See Michanek/Zetterberg (n 71) 159 f.

types of interest. These interests can function simultaneously, but in some cases, they are considered to be in conflict with one another. Conflicts between these interests are, in fact, common.[77] If the interests cannot be ensured simultaneous protection, the interest that better promotes good management from the point of view of public interest shall be prioritized.[78] The conflict should also be assessed in light of the main purpose of the Environmental Code: to promote sustainable development.[79]

When a site is considered to be of national interest, it is not totally protected. It is only *significant damage and detriment* that can be guarded against. There is, however, no clear definition of what this means. In the preparatory works, it is mentioned that protection does not cover "trivial" impact and that the measure must have a consistent negative impact, or a temporary very large impact, on the interest.[80] Hence, the instrument of national interests do not have a significant impact on how land use is prioritized in general as it only becomes legally relevant in the specific permit process and does not necessarily guide developers to find suitable locations for energy production today.

These national interests should be accommodated in the municipal plans. However, there is no priority between these interests in the plans, and if conflicts exist, they are handled at the permit stage in the individual assessment. If wind power is planned in an overview plan, the plan can later influence the permit authorities when deciding whether a specific wind power park is placed in a suitable location in accordance with the Environmental Code, even though the plan is not formally legally binding.[81] Thus, it is not until the permit stage – when wind power developers have chosen a location – that the location will be fully assessed. However, even if the location is suitable from an environmental point of view, the

77 The national interests are appointed by separate interest groups, for example; Sametinget points out the areas that are of importance for reindeer husbandry and the Swedish Energy Agency points out areas that are of importance for energy production.

78 Chapter 3, Section 1 of the Environmental Code.

79 ibid Chapter 1.

80 See Swedish government, Prop. 1997/98:45, part II, 30. 591; See Swedish government, Prop. 1985/86:3, 172. The meaning of "significant damage" was also discussed in the Vedabron Case where the Government suggested that while the installation would indeed seriously affect parts of the area, the overall assessment indicated that the area as a whole would not be significantly damaged by the development, see RÅ 1993 not 550.

81 For example, see MÖD 2005:66; MÖD 2007:47; and MÖD 2009:4.

municipality can hinder any wind power development due to its veto right under Chapter 16, Section 4 of the Environmental Code.

There are also specific municipal energy plans, first adopted in the 1970s, which are plans addressing how the municipality shall promote energy conservation and strive towards a secure and sufficient energy supply.[82] These energy plans shall – in addition to providing information on supply, distribution and use of energy in the municipality -also include an analysis of the impact the proposed activity has on the environment, health and the conservation of land and water and other resources.[83] These plans have not yet shown to be of any significant importance towards implementing energy political goals, but in a new state commission, it has been proposed that these plans shall be used to a greater extent for such purpose.[84]

In order to better steer towards national goals a more holistic planning approach has been identified as a possible solution for enabling sustainable use of our land and water areas.[85] Today there is the possibility to adopt regional plans, even though they would not be legally binding. Such plans have the potential to span municipal borders and introduce a more comprehensive approach to energy system planning, but are not currently used as such an instrument.[86]

In summary, there are plans that have the potential to influence the development of the energy system, but these plans are not legally binding. Another aspect of the plans is that they do not have a larger geographical perspective, which is needed in order to be efficient from an energy and environmental perspective. However, these types of plans are currently lacking in Sweden.

82 Section 1 of Lag (1977:439) om kommunal energiplanering.

83 ibid Section 3.

84 SOU 2023:18, *Värdet av vinden: Kompensation, incitament och planering för en hållbar fortsatt utbyggnad av vindkraften,* 98.

85 See Maria Pettersson, *Renewable Energy development and the Functioning of Law – A Comparative Study of Legal Rules Related to the Planning, Installation and Operation of Windmills* (Doctoral thesis, Luleå University of Technology 2008); Anna Christiernsson, *Rättens förhållande till komplexa och dynamiska ecosystem* (Doctoral thesis, Luleå University of Technology 2011); Melina Malafry, *Biodiversity Protection in an Aspiring Carbon Neutral Society, the relationship between biodiversity and renewable energy in a European Union context* (Doctoral thesis, Uppsala University 2016).

86 See Chapter 7 of the Planning and Building Act.

2. Legal framework in the energy transition and the land and environmental courts

The Environmental Code is the central legislation in Sweden when it comes to the expansion of renewable energy. Thus, wind power and hydropower, for example, require a permit under the Environmental Code (including reassessment of old permits). Large-scale solar parks do not require a permit under the Environmental Code but is considered such measure that will "significantly change the natural environment" and therefore need to undergo certain consultation, where the requirements under the Environmental Code are applied.[87] Since the main aim of the Environmental Code is to enable a *sustainable development*[88], this implies that Sweden's energy transition has to be a sustainable one.

Even if the permit procedure is undertaken under different legislation, the Environmental Code is still relevant due to its very wide scope of application. In addition, many other pieces of legislation refer to some of the basic rules stated under the Environmental Code. This is the case, for example, if an offshore wind park is located in Sweden's exclusive economic zone,[89] when a concession is needed for grid infrastructure,[90] or when a building permit is required for the installation of solar cells on a roof.[91]

Energy activities – like all other activities and measures – have to be in line with the general rules of consideration presented in Chapter 2 of the Environmental Code, independent of whether or not a permit is required for the activity.[92] The operator of the activity is the one who must show that these rules are fulfilled[93] and is required to acquire the information needed to mitigate any environmental impacts from the activity.[94] The precautionary principle, including the requirement to use the "best available technology", is codified in this chapter.[95] The most discussed provision in relation to wind power installations is Section 6. It stipulates that a *suitable site* should be chosen that makes it possible to achieve the purpose

87 See Chapter 12, Section 6 of the Swedish Environmental Code.
88 ibid Chapter 1, Section 1.
89 See Lag (1992:1140) om Sveriges ekonomiska zon, Section 6.
90 See Ellagen (1997:857) Chapter 2, Section 17. In addition, a hearing under 12:6 of the Environmental Code is needed.
91 See Planning and Building Act (2010:900), Chapter 2, Section 2 and 10.
92 See Michanek/Zetterberg (n 65) 106.
93 Chapter 2, Section 1 of the Environmental Code.
94 ibid Section 2.
95 ibid Section 3.

of the activity with a minimum of damage or detriment to human health and the environment. This provision is often applied in conjunction with Section 3. For example, if no mitigation measures are possible to avoid impact on a protected species, then the location may not be seen as suitable. If the applicant has not shown that it is the most suitable location, the Court or authority assessing the activity can deny the applicant's permit. The limitation to this requirement can be found in Chapter 2, Section 7 which states that the application of the consideration rules still need to be *reasonable*:

"The rules of consideration laid down in Sections 2 to 5 and Section 6's first paragraph shall be applicable where compliance cannot be deemed unreasonable. Particular importance shall be attached in this regard to the benefits of protective measures and other precautions in relation to their cost."

Thus, the general rules of consideration are preventive in nature, and indicate that responsibility resides with the developer to gather the sufficient knowledge of the potential environmental impact from its activity and to prove that the activity aligns with the consideration rules. These rules are often the basis for decisions by the relevant authority or courts when assessing permit decisions for activities, but they are also used when the authorities undertake supervision of activities. Since Sweden is a rather large country geographically, in cases where conflicts exist, such as with species protection, it is often ruled by the court that the developer has not shown that it is the most suitable location in accordance with Section 6.

The provision in the chapter ensures that the most suitable location is chosen for the activity and that the "best available technology" is used. It is based on this chapter that most permit conditions are formulated. This is true especially for ones that limit the impact on the environment during the construction, operation and dismantling of the installation.

With the exception of offshore wind power in the exclusive economic zone (which requires a government decision), most permits/concessions, etc. are appealed to the land and environmental courts in Sweden and either start at one of the 21 county administrative boards or at one of the five land and environmental courts in Sweden. The decisions from the county administrative boards are appealed to the land and environmental courts and finally the Land and Environmental Court of Appeal. If decisions start at the land and environmental court the final stage is the Supreme Court in Sweden. Some decisions start at the municipal level (for example building

permits). Those decisions are appealed to the county administrative boards and can, in some cases, be appealed all the way to the Supreme Court.[96]

G. Conflicts in Electrification and the Expansion of Renewable Energy

1. Introduction

There are sustainability conflicts that may be an issue when deciding where to locate the renewable energy production. Even if a suitable location, from an environmental point of view, is chosen, wind power development can still be hindered by the municipal veto or the lack of grid infrastructure. But even though these hindrances exist, the increase in renewable energy production is still advancing steadily. This suggests that these potential conflicts may not ultimately be such a significant issue, and that there are still places where the conflicts do not arise, or can be mitigated. However, as renewable energy continues to expand and available land diminishes, these conflicts may become more apparent. This is especially the case since electrification, including expansion of renewable energy, cannot come at the expense of preserving important habitats and species or other values that are crucial to ensuring a *sustainable* energy transition.

2. Wind Power Development

(a) The Permit Procedure of Wind Power – General Conflicts Over Land and Water Areas

Wind power is steadily growing in Sweden, and has grown especially quickly for the past few years. In 2024, it produced 41 TWh and it was almost at the same level as nuclear (49 Twh) in Sweden.[97] In 2026, the Swedish Energy Agency estimates that the production will be 52 TWh (based on the current permitted installations from 2013–2017).[98]

96 That is the case when the Land and Environmental Court of Appeal makes it possible to appeal its decision (for example if case is of a prejudicial nature, see Chapter 5, Section 5, lag (2010:921) om Mark- och miljödomstolar.

97 Energiföretagen, see: <https://www.energiforetagen.se/49761b/globalassets/energiforetagen/statistik/energiaret/2024/energiaret_2024_250415.pdf >accessed 18 June 2025.

98 Swedish Government (n 25), 88.

In Sweden, the development of wind power requires a permit under the Environmental Code if the installation is sufficiently large,[99] as wind power is considered an "environmentally hazardous activity" based on the environmental effects it has, such as noise pollution.[100]

Depending on how far offshore the wind power installation is to be located, different permit regimes are applicable.[101] If the installation is located in the territorial sea, the municipal planning and veto is applicable and a permit is required under the Environmental Code. The application is sent to the Land and Environmental Court at the first instance due to its location offshore, and thus its status as a water activity[102] in addition to being an environmentally hazardous activity.

However, if the installation is within the economic zone, a permit is required by the government by the Law (1992:1140) on Sweden's exclusive economic zone.[103] But as mentioned before, the basic rules in the Swedish Environmental Code is applicable, hence the legal assessment is similar. For example, in *Stora Middlegrund*, the Government did not grant a permit because the location was not suitable from an environmental point of view.[104]

During a permit procedure for wind power, the rules of consideration in Chapter 2 of the Environmental Code are applied.[105] As the environmental impact from wind power is rather dependent on the wind farm's *location*, it is crucial that the developer chooses a location that is suitable from an environmental point of view.[106] And if in close proximity to people or vulnerable species, the permit is accompanied with suitable requirements – permit conditions – on measures to limit its impact. Permits commonly

99 The Miljöprövningsförordningen (2013:251)), Chapter 21, Sections 13–15.
100 Chapter 9 § 1, p. 3 of the Swedish Environmental Code.
101 For more information on the legal preconditions for offshore wind power in Sweden, see Melina Malafry/Marcus Öhman, *Rättsliga förutsättningar för havsbaserad vindkraft* (Vindval Report 7028 2022).
102 See Chapter 11 of the Environmental Code.
103 Lag (1992:1140) om Sveriges ekonomiska zon, Section 5.
104 The location was offshore in the exclusive economic zone. The location was also within a Natura 2000 site. See the government's decision on the 27 July 2023, KN2023/01037. A Natura 2000 permit was also denied as the County Administrative Board considered that there were still alternative locations, hence the derogation rules were not applicable, see decision of the County Administrative Board in Halland on the 13 March 2023 (3406–2021).
105 See below Section 6.2.
106 See Chapter 2, Section 6 of the Environmental Code.

place time limits on the construction phase for offshore wind power due to harbor porpoises and mating periods for fish,[107] and on the operating phase due to bats. A specific example of this would be that wind power turbines must be in "bat mode" during the summer period (15 July-30 September).[108] After the EU Court decision on "Skydda skogen",[109] where the EU Court emphasized that listed species are protected independent of their conservation status, "bat mode" has still been considered to be a sufficient mitigation measure to avoid impact on the listed bat species in case law.[110] The effect on birds is more difficult to mitigate, and it is common that the location has to be changed if it would have too severe an impact on certain species.[111]

Even though Sweden has a low population density, the Swedish Nature Protection Agency estimates that 98 % of its land area has existing interests present as well.[112] Despite these potential hindrances to development, according to Darpö, only about 9 % of the applications for wind farms, between 2014–2018, were prevented due to species protection.[113] This indicates that species protection may not be a large obstacle in Sweden yet.

The military's national interest covers about 30 % of the land area while the core areas used for reindeer herding encompass about 18 %.[114] When a conflict arises with the national interest of energy production, as illustrated by the development of wind power, it is not always one interest that trumps the other. In MÖD 2010:38 the Environmental Court of Appeal found that the interest in establishing a wind farm could be reconciled with the inter-

107 See for example judgment by the Land and environmental Court of Appeals on the 8 December 2015 in case number M 6960–14.

108 Bat mode implies that the rotor blades of the wind turbines are stationary. This must be carried out when the wind at hub height is less than 6 m/s with a duration of at least 10 minutes, during the period one hour before sunset to one hour after sunrise. See for example judgment by the Land and Environmental Court of Appeals on the 6 November 2017 in case number M 3892–17 and judgment by the Land and Environmental Court of Appeals on the 21 January 2019 in case number M 2579–17.

109 See judgment by the EU Court of Justice on the 4 March 2021 in case number C-473/19 and C-474/19.

110 See judgment by the Land and Environmental Court of Appeals on the 26 April 2022 in case number M 610–21.

111 See for example judgment by the Land and Environmental Court of Appeals on the 3 April 2014 in case number M 2504–13.

112 See the Swedish Nature Protection Agency, *Nulägesbeskrivning – vindkraftens förutsättningar, Underlag till Nationell strategi för en hållbar vindkraftsutbyggnad* (2021) 22.

113 Jan Darpö/Jonas Sandström, *Artskydd och beslutsprocesser* (2010) 10.

114 ibid 23.

ests of reindeer husbandry, the interest of recreation and the preservation of the landscape. However, in later case law, more attention was given to the cumulative effects of the wind farm on the interest of reindeer herding. In MÖD 2019:5, some of the wind turbines were accepted while others were not permitted due to their impact on nature and reindeer herding.

If the wind farm negatively affects a Natura 2000 site, a permit is required. A dispensation from the Species Protection Act is also required if certain species are affected. However, it is very seldom that the potential effect on species actually hinders wind power development in Sweden. There is also no case law (at least from the higher courts) where the derogation rules, from the nature protection directives, have been used in order to obtain permission for wind power.

When it comes to offshore wind power, it is more common that the activity effects a Natura 2000 site, and thus requires a Natura 2000 permit. The reason for this may be that those areas are not excluded when the areas for national interest are appointed at sea. On land, however, Natura 2000 areas are excluded.[115]

Even though conflicts with humans are less common at sea, offshore wind power is often in conflict with Sweden's national defense interests, especially in the Baltic. The government decides the permit issue when the interests of total defense are at risk of being affected. According to Chapter 21, Section 7 of the Environmental Code, in these cases the court must submit the matter to the government with an opinion. The interest of defense can thus prevent wind power installations if the intended wind farm can affect its interests. This was the case when it came to the *Taggen* wind farm, where a permit was never granted due to the interests of total defense.[116] The construction of the wind farm was determined to be hindered by a shooting range located 25 km away. In another case, *Hanöbukten/Blekinge offshore*, the government rejected the permit application because it affected

115 The Swedish Energy Agency, *Riksintresse vindbruk 2013* (2013). See also: Swedish Energy Agency, 'Riksintressen energiproduktion-vindbruk' <https://energimyndigheten.se/fornybart/tillstand-och-provning/riksintressen-for-energiproduktion/riksintressen-for-vindbruk/kriterier-och-undantag/> accessed 29 February 2024.

116 See: Vattenfall, 'Vindprojekt i Sverige' https://group.vattenfall.com/se/var-verksamhet/vindprojekt/taggen accessed 29 February 2024. Was only re-referred when the amendment permit also included water activities, see the Land and Environment Court of Appeals decision on 17 November 2017 in case no M 8189–17.

the interests of total defense.[117] In that case, there were more aspects to take into account as it was an important airspace and water area for air and submarine training, and the wind farm was considered able to affect the technical systems and radar operations in the bay.[118] The military has investigated how the interest can coexist, after a request by the government.[119] However, in November 2024 the governemnt rejected 13 wind power parks in the Baltic due to the military interest, after the total defence suggested that most of the Baltic was not suitable for wind power from their perspective.[120]

Also, due to the shallow water in the Baltic Sea, there are many places that are technically suitable for wind power, but where nature protection is also a concern. Harbor porpoises, overwintering birds (for example long-tailed ducks) and fish mating grounds are especially affected by offshore wind parks. Wind power has frequently been planned in close vicinity to Natura 2000 sites in Sweden.[121] Three of the parks that were assessed in 2023 by the Government required a Natura 2000 permit. In *Stora Middlegrund* the Natura 2000 permit was denied.[122] The county administrative board here also assessed its permissibility under the derogation rules, but found them not to be applicable as the applicant failed to show that no *alternative locations* for the wind park were possible.[123] In the other two cases – *Kattegatt Syd* and *Galatea-Galene* – the county administrative board awarded the permit in the first instance. However, both decisions

117 The land and environmental court first handled the question, but because the application affected the interest of the military, it must hand over the case to the government in accordance with Chapter 21, Section 7 of the Environmental Code. This must be done for the entire permit, the land and environmental courts may not decide on the conditions in any part (see MÖD 2005:13). See also the government's decision of 20 December 2016, no. M2013/00540/MR.

118 The government's decision of 20 December 2016, no. M2013/00540/MR.

119 The Swedish Defence Research Agency, *Möjligheter till samexistens mellan Försvarsmaktens verksamhet och utbyggd vindkraft* (2022 FOI-R-5293–SE). See also Sveriges Riksdag, *Samexistens mellan vindkraftverk och Försvarsmaktens behov.* (2020/21:2611).

120 Swedish government, see: <https://www.regeringen.se/regeringens-politik/miljo-och-klimat/havsbaserad-vindkraft/> accessed 18 June 2025.

121 One reason for this is that the areas of *national interest* for off shore wind power has a criterium of depth in the sea (under 35 meters).

122 Decision of the County Administrative Board in Halland on the 13 March 2023, no. 3406–2021.

123 According to 6 (4) of the Habitats Directive one of the requirements is that no alternative solutions exist.

have been appealed and one case is still at the Land and Environmental Court of Appeal awaiting a decision.[124]

Another problem with the Swedish system is that there is no *exclusivity* in the water, other than internal waters (closest to land).[125] Different companies can thus plan and apply for permits in exactly the same area. This was the case with *Kattegatt Syd*[126] and *Galena-Galatea,*[127] which had part of the park in the same area. Both these parks were to be located in the Swedish exclusive economic zone, hence, the government is responsible for the decision.[128] Based on a very vague evaluation, the government considered that *Kattegatt Syd* was preferred to *Galatea-Galene* as it promotes "long-term stewardship of public resources", as it has come furthest in the permit procedure.[129] A state commission has been looking into the issue and an auction system for offshore wind power has been proposed.[130]

(b) NIMBY and the Municipal Veto

As renewable energy development increases on shore, local resistance is also increasing. "Not in my back yard" (NIMBY) is a prevalent sentiment in the Swedish setting. Even though locals are not resistant to wind power in general, they do not want it in their close vicinity, where they can see or hear it.[131] This includes opposition for locating in areas that they use for recreation. This opposition has been the subject of a state official report discussing how people living nearby should and could be compensated.[132] As it is today, people can be part of the public consultations prior to a

124 The Natura 2000 permit for Kattegatt Syd has been confirmed by the Land and Environmental Court of Appeal but the case regarding Galene is still awaiting decision by the court. See: Land and Environmental Court of Appeals decision on the 18 February 2025 in case number M 7648–23.

125 If internal waters you need "rådighet" prior to applying for a permit, see Lag (1998:812) med särskilda bestämmelser om vattenverksamhet, Chapter 2, Section 1.

126 The government's decision on the 15 May 2023, KN2023/0160 (*Kattegatt Syd*).

127 The government's decision on the 15 May 2023, KN2023/01077 (*Galatea-Galene*).

128 See Lag (1992:1140) om Sveriges ekonomiska zon, Section 5.

129 See the government's decision on the 15 May 2023, KN2023/01077 (*Galatea-Galene)* 23 (n 129).

130 See SOU 2024:89, *Vindkraft i havet.*

131 See Maarten Wolsink, 'Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support' (2000) 21 (1) Renewable Energy 49, 51.

132 SOU 2023:18, *Värdet av vinden* (n 86).

development of a wind farm as almost all wind parks are considered to have "significant environmental impact" and therefore be required to compose an environmental impact assessment (EIA).[133] If the opinions by the people living nearby are not accommodated they could appeal the decision if they are considered "concerned" by the decision.[134] The individuals do not need to be the neighbor to the wind farm, only to be disturbed by it any way, from noise etc. What is important is that the individuals that are disturbed by the wind power can appeal the decision if the nuisances are not only *theoretical or insignificant*.[135] For example, if it is possible to be disturbed by noise or sun glare/shading, the person has a right to appeal (independent of how far away that person lives).[136] Therefore, it is not possible to decide a certain distance from the wind power as it depends on the local surroundings.[137]

The *municipal veto* is also hindering wind power development in Sweden. Municipalities are strong political entities in Sweden with a large scope for self-determination, including a monopoly on planning, that is derived from the Swedish Constitution.[138] Due to a change in the law, the municipality was bestowed veto power when it comes to wind power specifically (Chapter 16, § 4 EC). In the past, a dual permit/approval was required for wind power, an approval under the Planning and Building Act (municipal decision) and an environmental permit under the Environmental Code. Since 2009, the procedure has changed and building approval under the Planning and Building Act is no longer needed. The aim was to speed up the processes for developing wind power,[139] but instead the municipal veto was introduced, which has worked to hinder these developments.

This veto is used at any stage of the permit procedure and does not require any reasoning or motivation. This has been confirmed in 2023 by the Land and Environmental Court of Appeal, where the municipality

133 See Chapter 6 of the Swedish environmental Code.
134 ibid Chapter 16, Section 12.
135 See for example NJA 2004 sid 590.
136 See for example MÖD 2005:33, MÖD 2005:33, MÖD 2006:66 and 29 September 2015 in case number M 5746–15.
137 However, if the distance is more than 4 km it is common that the individual is not considered concerned, hence, has no right to appeal. See for example MÖD 2009:11 and NJA 2012 s 921 (regarding offshore wind power and the wind farm was located 10–11 km away from shore).
138 See for example Chapter 1, Sections 1 and 7 Regeringsformen (RF) (Kungörelse (1974:152) om beslutad ny regeringsform).
139 See Swedish government, Prop. 2008/09:146.

changed their mind in the appeal process.[140] Currently, the municipal veto is one of the largest hindrances for wind power development in Sweden. Between 2020 and 2024 about 64 % (83 of 130) wind power projects on land was stopped due to the municipal veto.[141]

According to the Swedish Environmental Code, Chapter 16, Section 4, a municipality's agreement is a prerequisite for granting licenses to wind power installations. More specifically, the provision states:

"A permit for a wind power installation may be issued only if the municipality where the installation is intended to be constructed has agreed to it".

That the municipal veto is problematic and hinders development of wind power in Sweden has long been acknowledged[142] and discussed in the literature.[143] Michanek suggests that this municipal veto rule, which is exclusive to the permitting of wind power installations,[144] can be questioned with regard to Article 13 of the Renewable Energy Directive. He considers it questionable whether the provision is necessary and proportionate.[145] One could argue that, due to the specific governing structure in Sweden, where municipalities have strong local self-governance, it may be considered *necessary* that the municipality can decide how the land and water should be used in its municipality. It may be more difficult to argue that the provision is proportionate. Less intrusive rules could serve the purpose that the municipality has a say on wind power developments. For example, the veto could require a motivation as a minimum. The veto rule could also give rise to discriminatory practices, as some developers may be accepted and others not. Hence, the way that the veto rule is formulated and interpreted today may be in conflict with EU law. However, the legality of the provision has not yet been challenged, either by a wind power developer or the EU

140 Judgment by the Land and Environmental Court of Appeals on the 11 August 2023 in case number M 5427–22.

141 See Henrik Westander/Jacob Risber, 'Kommunala vetot landbaserad vindkraft 2020–2024' <file:///C:/Users/melte722/Downloads/Kommunala-vetot-landbaserat-2020–2024–2025–04–07.pdf> accessed 18 June 2025.

142 See SOU 2021:53, *En rättssäker vindkraftsprövning*.

143 See Gabriel Michanek, 'One national wind power objective and 290 self-governing municipalities' in Marjan Peeters and Thomas Schomerus (eds), *Renewable Energy Law in the EU – Legal Perspectives on Bottom-up Approaches* (Edward Elgar Publishing 2014) 144, 160; Melina Malafry (n 85) 76.

144 Although, other large-scale projects may also need a municipal approval when the government assesses the permissibility, see Chapter 17, section 6 of the Swedish Environmental Code.

145 See Michanek (n 143).

Commission.[146] It is also questionable how the municipal veto will stand as the new provisions on planning of acceleration areas for renewable energy activities are implemented.[147] Such planning does not have any room for municipal veto rule as what is important is that it is a suitable place for renewable energy production from a nature protection perspective more so than in terms of municipal preferences. However, it is uncertain whether or not the planning for acceleration areas will be utilized to a large extent in Sweden.

In summary, hindrances to onshore wind power development can arise due to noise pollution disturbing neighbors, conflict with Sami rights and reindeer herding, or a question of species protection. However, in practice, the most common hindrance in Sweden is the municipal veto power.

3. Photovoltaics in Sweden

(a) Introduction

The development of solar cell installations in Sweden has taken off rapidly, but began from a very low level. In 2022, the number of installations increased by 60 %, leading to a total installed capacity of 2384 MW, an increase of 50 % in installed capacity from the year before.[148] The installations in Sweden make a small overall contribution to electricity production in Sweden and there are not yet many large installations, with most confined to installations on roofs of buildings.

(b) Photovoltaics on Buildings

Photovoltaics have largely increased in recent years due to the 2022 "energy crisis" arising from the Russia's invasion of Ukraine. Personal installations on homeowners' roofs became an attractive investment, due to the soaring cost of electricity and strong reliance on electric heating in homes. Even though energy prices in Sweden have since fallen, the installation of solar cells still has a value for households, acting as a buffer from such periods of extreme electricity prices.

146 See Article 263 and Article 267 TFEU.
147 See RED III (n 43).
148 Swedish government, 89 (n 25). See also: Swedish Energy Agency (n 6).

There are also green subsidies in Sweden for installation of photovoltaics where 20 % of the costs (installation and material) are being covered by the government. A household with a photovoltaic installation can sell excess electricity that it generates. Hence, households can make money/save on future energy purchases. In addition, home production is exempted from energy taxes, as mentioned before.[149] Prior to the recent energy crisis, the installations of photovoltaics on home roofs were not always primarily an economic decision, but rather seen as a "environmentally friendly" thing to do, especially for the climate.[150]

Installation of photovoltaics on buildings in Sweden requires neither a permit nor approval from the authorities, expect under certain circumstances.[151] For example, if the building is a valuable building in accordance with Chapter 8, Section 13 of the Planning and Building Act, then a building permit is required. As a photovoltaic installation may distort a building with cultural value, it is important that the installation is assessed prior to its installation.[152]

Certain protected buildings under the Culture Environmental Act require a permit from the county administrative board prior to its installation.[153] It is common that the Church of Sweden has an interest in becoming more "environmentally friendly" and by installing photovoltaics the Church considers that it does something for the environment. However, historic churches often have high cultural value and the court often find during their assessment that an installation would distort the building's cultural value, and hence not be permissible.[154]

In practice, the majority of buildings do not possess cultural value that a photovoltaic installation would harm and thus there are no real legal obstacles or permit procedures to pass before an installation is undertaken. Rather, our dark winters, with very little light, may be the largest hindrance to broad deployment on the built landscape.

149 See below Section 4.

150 As discussed in Melina Malafry, 'Skyddet av kulturvärden i omställningen till ett koldioxidneutralt samhälle – En studie av det rättsliga skyddet av kulturvärden mot installation av solceller i plan- och bygglagen respektive kulturmiljölagen' (2020) 2 Nordic Environmental Law Journal 77.

151 See Plan and building Act (2010:900), Chapter 9, Section 3 c.

152 See for example MÖD 2021:21.

153 For a discussion on relevant case law, see Melina Malafry (n 85).

154 See RÅ 2007:75 (Fläckebo) and the judgment of the Administrative Court in Karlstad judgment on the 22 February 2021 in case number 4859–19 (Säffle).

(c) Large-Scale Photovoltaic Parks

A rather new development in Sweden is the large-scale installation of photovoltaic parks on the ground. The Swedish Government Official Reports on the Swedish Planning and Building Act did not advise that large installations located on the ground should require a building permit.[155] Neither is there a permit requirement under the Environmental Code. Due to its impact on the *natural environment*, a hearing in accordance with 12:6 of the Environmental Code has been required.[156] Even though there is no permit requirement under either the Environmental Code or the Planning and Building Act, it is possible for the developer to apply for a voluntary permit in accordance with the Environmental Code.[157] However, in another Government Official Report about the environmental assessment and permit processes in Sweden, it was suggested that large photovoltaic parks should require a legal assessment prior to their operation.[158]

There are examples of solar parks being built on agricultural land, where both food production and electricity production is combined.[159] However, the legal development is rather difficult as agricultural land is protected land according to the Swedish Environmental Code and its land use cannot be changed if not for reasons of public interest, and even then only if no alternative locations could be used instead.[160] However, this may change as the provision protecting farmland has room for interpretation and the farmer's interest may be considered to be of more importance in the future.

4. Hydropower

The largest share of renewable energy in Sweden comes from hydropower. According to the Swedish Energy Agency, hydropower counts for

155 See SOU 2021:47, *Ett nytt regelverk för bygglov*.
156 See judgment by the Land and Environmental Court of Appeals on the 11November 2022 in case number M 1026–22.
157 See Chapter 9, Section 6 b of the Environmental Code.
158 See SOU 2024:98 (n 32), 1184.
159 Landbruksnytt, 'Solel och lantbruk i kombination' <https://lantbruksnytt.se/solel-och-lantbruk-i-kombination/> accessed 29 February 2024.
160 See Land and Environmental Court of Appeals judgement on the 11November 2022 in case number M 1026–22 and M 15064–21.

around 65–70 TWh of electricity a year, representing about 44 % of Sweden's net electricity production (on average in the last 20 years).[161]

However, the majority of hydropower installations in Sweden have old permits,[162] and hydropower is putting a lot of pressure on the Swedish lakes and rivers due to water regulation and lack of connectivity. In order to decrease the environmental impact, reassessments are needed of the hydropower permits in Sweden. This is also needed due to the requirements under the EU Water Framework Directive.[163] The idea is that *modern environmental requirements*[164] need to be adopted for the hydro in Sweden, including those that have old permits, in order to meet our obligations by the Directive.

How modern environmental requirements should be introduced in Sweden has been under investigation for many years, as the reassessment system that was in place was not fit for the purpose. In 2014, it was calculated that the reassessments needed would take over 800 years.[165] In 2022, Sweden adopted a National Action Plan (NAP) for reviewing hydropower plants with an aim to introduce modern environmental requirements.[166] However, due to the "energy crises" – the rise in electricity prices after Russia's invasion of Ukraine – the Swedish Government first decided to pause the plan for a year.[167]

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161 It is depending on the year but on average the last 10 years. See: Swedish Energy Agency (n 6).

162 The other hydropower permits were assessed under older water laws; 3 266 of them under the 1918 water law, 127 of them by even older laws, and 261 of them by the Water Law from 1983. See Swedish Government, *Vattenverksamhet* (SOU 2009:42) table 3.6, 95. As referred to in SOU 2014:35, *I vått och torrt – förslag till ändrade vattenrättsliga regler,* 270.

163 Water Framework Directive (n 24).

164 See Chapter 11, Section 27 of the Environmental Code.

165 See Swedish Government, *I vått och torrt – förslag till ändrade vattenrättsliga regler (*SOU 2014:35) 271.

166 See Swedish Agency for Marine and Water Management, 'Regeringens beslut och prövningsgrupper' <https://www.havochvatten.se/arbete-i-vatten-och-energiproduktion/vattenkraftverk-och-dammar/nationella-planen-nap/regeringens-beslut-och-provningsgrupper.html#:~:text=Den%20nationella%20planen%20f%C3%B6r%20omst%C3%A4llning,L%C3%A4nsstyrelsen%20ska%20ansvara%20f%C3%B6r%20samverkansprocessen> accessed 29 February 2024.

167 The Swedish Government, 'Omprövning av vattenkraftverkens miljötillstånd pausas 12 månader' <https://www.regeringen.se/pressmeddelanden/2022/12/omprovning-av-vattenkraftverkens-miljotillstand-pausas--12-manader/> accessed 29 February 2024. The pause has now been extended to July 2025, see: <https://www.regeringen.

The national plan aims to balance the need for improved ecological status with the need for hydropower.[168] The plan is to be undertaken within 20 years, putting the responsibility for reassessment on the hydropower owner. In order to introduce environmental requirements, it would basically mean that minimum flow would be increased and fish passages may need to be built. Some plants may also be required to be dismantled. A fund – the Hydroelectric Environmental Fund – was also introduced to finance the measures needed.[169] Even though there is a plan for how the current hydro plants will be brought into alignment with EU law and biodiversity protection, there is still much to be done, with many plants to reassess and very scant resources to do so. It is too early to say if the reassessment will result in a significant reduction in electricity production, or if it enables expansion of some of the hydropower stations, through the application of the derogation rules in the Directive.[170]

There are also plans to introduce pumped storage in old hydropower plants in Sweden, in order to enable more flexibility in the grid. However, the environmental consequences of such facilities are still uncertain.[171]

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se/pressmeddelanden/2024/05/regeringen-forlanger-pausen-av-vattenkraftens-omprovning-till-1-juli-2025/> accessed 18 June 2025.

168 The law is changing in 2025 to enable a more "acceptable" reassessment of hydro power plants from an energy system perspective, see: <https://www.regeringen.se/pressmeddelanden/2025/05/forbattrade-villkor-for-omprovning-av-vattenkraften/> accessed 18 June 2025.

169 See Swedish Agency for Marine and Water Management, 'Vattenkraftens miljöfond' <https://www.havochvatten.se/bidrag-utlysningar-och-anslag/andra-bidrag-for-battre-havs--och-vattenmiljo/bidrag/vattenkraftens-miljofond.html#:~:text=%C3%85tta%20svenska%20energibolag%20har%20g%C3%A5tt,kan%20f%C3%A5%20hj%C3%A4lp%20av%20oss> accessed 29 February 2024.

170 The Swedish Energy Agency is predicting that the production will increase a small amount 0,5 TWh because of increased precipitation due to climate change, see Swedish Energy Agency (n 3).

171 See Vattenfall, 'Vattenfall tar Juktans pumpkraftverk till nästa steg' <https://group.vattenfall.com/se/nyheter-och-press/pressmeddelanden/2023/vattenfall-tar-juktans-pumpkraftverk-till-nasta steg#:~:text=Investeringsbeslut%20%C3%A4r%20planerat%20till%202027,ett%20av%20fyra%20p%C3%A5g%C3%A5ende%20expansionsprojekt> accessed 29 February 2024.

5. Access to Grid Infrastructure

In Sweden, hindrances associated with access to the grid for electricity production from wind or solar and other variable sources have long been acknowledged and have been the topic of numerous discussions and legal proposals.[172] However, the permit system in Sweden is still considered a problem. One of the problems is that a concession for a transmission line is something that is applied for after a permit for the production site is settled. Hence, the time lapse between these permits can be very long. In a recent proposal for legislative change in Sweden due to the implementation of RED III, the law was proposed to be changed in order to combine the environmental impacts assessments for various parts pf the "project".[173] However, this was a possibility prior to RED III but not utilized in Sweden, as it is difficult to assess the environmental impact from the grid infrastructure prior to its actual assessment under the Electricity Act. Therefore, these procedures require a better integration in the Swedish system in order to function.

And now, as electrification is crucial for the carbon-neutral future, fossil-free electricity production must increase rapidly and be supported by a stable distribution infrastructure. Based on the way things work today, it is a challenge to get necessary grid infrastructure in place as fast as needed. This also implies that renewable energy production is not necessarily built in the most suitable locations from an environmental point of view, but rather where there is already access to necessary grid infrastructure. The status quo is therefore that the development of the electricity system is not very efficient. Better planning may be a way forward to enable a more sustainable and efficient energy transition.[174]

However, even if production sites are located close to current transmission lines, it is not certain that there is capacity for more electricity to be

172 Svenska Kraftnät, *Tröskeleffekter och förnybar energi – En rapport till Regeringen* (2009); Swedish government, Prop. 2013/14:156; and Malafry, *Biodiversity Protection in an Aspiring Carbon Neutral Society,* 78 (n 85).

173 Klimat- och näringslivsdepartementet (2025), *Promemoria: Genomförande av bestämmelser i förnybartdirektivet om tillståndsförfaranden för förnybar energi*, Dnr KN2025/00895.

174 Malafry, *Biodiversity Protection in an Aspiring Carbon Neutral Society* 278 (n 85).

distributed. This has been identified as an obstacle by the Swedish Energy Market Inspectorate.[175]

At the level of the transmission state operator (TSO) Svenska Kraftnät's level, there is a huge infrastructure expansion needed to meet the future demand of electricity. It is identified that not only more stable transmission lines are needed in Sweden, but also connection to the rest of the Nordic countries, etc. In addition, the system must be more flexible in order to handle more variable sources like wind and solar, which are expected to grow in the near future.[176] The current hydropower, peak power plants and an extension of the grid is considered important to balance the grid in the Nordic countries. A few challenges are identified by the Nordic TSOs. There is a need for "flattening the curve", to balance out the consumption and production of electricity. The slowness in the legal system is also expressed as a challenge, as infrastructure development often takes a long time due to the many parallel processes involved.[177] However, the most urgent challenge is that of stability, to enable more flexibility in the current system.[178]

H. Conclusion and Way Forward

The energy transition in the Swedish context may be very different from the rest of Europe. Since the oil crisis in the 1970s, a move away from oil has been natural in the Swedish economy, and coal and natural gas have not been a significant part of our energy mix in recent years. However, the transport sector is still reliant on fossil fuels. The transition we are facing is therefore more about the *electrification* of our energy system and society. Hence, the industrial and transport sectors are estimated to be highly dependent on fossil-free electricity in the future. A large increase in fossil-free electricity production is therefore needed. As available land is diminishing, conflicts may be intensified over land use. Land allocated to Sami people in the North, protected areas for biodiversity and species protection may

175 The Swedish Energy Market Inspectorate, *Kapacitetsutmaningar i elnäten*, Ei R2020:06.

176 Svenska Kraftnät et al., 'Nordic Grid Development Perspective 2023' <https://www.svk.se/siteassets/om-oss/rapporter/2023/svk_ngpd2023.pdf> accessed 29 February 2024.

177 However, this has long been acknowledged to be a problem but no changes have been proposed, see SOU 2019:30, *Moderna tillståndsprocesser för elnät*.

178 Svenska Kraftnät et al. (n 176) 14.

be diminished. However, a sustainable energy transition requires that other sustainability goals are also fulfilled, making it more important how and where we produce fossil-free electricity. Given the current EU-level push for fast deployment of renewable energy activities, long permit procedures are identified as a problem at the national level. However, as it is a complex process by nature – as many sustainability aspects have to be assessed – it is difficult to speed up these processes in general, even though in some cases the delay is not motivated.

Looking forward, the new requirements in RED III regarding mapping and planning for *acceleration areas* of renewable energy may be an important aspect in finding the right locations for renewable energy installations in the future. However, Sweden do not seem to think that it is a suitable instrument in the Swedish context, even though better planning could be benefical, not only for the environment, but also for the developer. The order, as it is today, where the developer chooses a location, and potential conflicts are handled first at the permit stage, is a very inefficient way of enabling an expansion of renewable energy. As *location* is the key to the renewable energy installation's *sustainability,* it is a crucial development that the planning infrastructure will be given more guidance, especially regarding areas that are to be excluded due to nature protection interests. If the planning is undertaken with an attempt to avoid or mitigate potential conflicts, we may enable a more sustainable energy transition, however, such planning requires a more integrated and holistic planning than the one that is in place in Sweden today.

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