



Technical support for RES policy development and implementation – Simplification of permission and administrative procedures for RES installations (RES Simplify)



Sweden

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Executive summary

Sweden’s energy supply is characterised by a very large share of renewable energy in especially electricity and heating production. The Swedish approach to promoting renewable energy production is technology neutral; the free market, not the state, steers where new RES installations and power plants are constructed, and which technologies are used.

Wind power is the most rapidly expanding RES-E technology in Sweden. However, without significant permitting struggles and delays, it could grow substantially faster. According to the Swedish Wind Energy Association (SWEA), there are two long permitting procedures that slow down wind power projects the most: environmental permits and grid connection (concession) (SWEA, 2019b). SWEA encourages the Swedish Government to adopt policies towards speeding up and harmonising the two. Furthermore, wind power projects can be blocked by two authorities without a chance to appeal the decision: the Swedish Defence Forces and the municipality, in which the planned wind park would be located. The interests of wind power developers, municipalities and the armed forces could be better aligned in order to benefit all.

An impressive amount of Swedish homes have installed a heat pump as a heating system in the last two decades. Most of small and medium-sized heat pumps do not require any permits or a simple registration, but even in case of the ones that do (geothermal heat pumps), the procedure is rather uncomplicated and quick. The simple permitting procedure may be the key to heat pumps’ success in Sweden.

Table 1 contains a traffic light assessment of the relevant process steps for the installation of onshore wind, offshore wind and geothermal heat pumps in Sweden.

Table 1: Traffic light assessment of the relevant process steps

Process step	Site selection	Electricity production license	Application preparation process	Administrative authorisation	Grid connection permit	Corporate legal-fiscal	Other
Onshore wind	Green	Grey	Grey	Yellow	Yellow	Grey	Yellow
Offshore wind	Yellow	Grey	Grey	Red	Yellow	Grey	Yellow
Geothermal heat pumps	Green	Grey	Grey	Yellow	Green	Grey	Grey

■ No barriers identified	■ Moderate barriers identified
■ Minor barriers identified	■ Not relevant for target country
■ Severe barriers identified	■ No projects implemented

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1. National RES targets and relevant RES technologies

Sweden is a renewable energy frontrunner in Europe with its already virtually fossil-free electricity production. For decades, Swedish electricity production has relied heavily on nuclear power and hydropower. In addition, Sweden uses a lot of bioenergy in heating and industrial processes (International Energy Agency, 2019). However, the share of these traditional energy source is not projected to grow significantly during the next decade (NECP, 2018).

Sweden does not have a national 2030 target for renewable energy, but it has set a target of reaching 100% renewable electricity production by 2040 (NECP, 2018). The target is not legally binding nor indicates that all Swedish nuclear power plants would be phased out by 2040. According to the Swedish Energy Agency 2016 trajectory, the share of RES-E will be 65% of final consumption by 2030 (ibid.). The NECP remains technology neutral, emphasizing the profitability of any technology as an important factor for developing the country's energy system in the near future.

The focus of this report lies in wind power, both onshore and offshore, since both are projected to increase exponentially in the next decade (and two). According to the Swedish Wind Energy Association (SWEA), the Swedish wind power production is projected to expand from the current 20 TWh to 'at least 90 TWh' in 2040, out of which offshore wind would constitute a third (SWEA, 2019a). The same trajectory estimates an annual wind power production of 60TWh by 2030.

Wind power is an excellent fit to the Swedish energy mix as together with the largest electricity production technology, hydropower, there will be opportunities to balance and shift electricity production. Still, there are serious delays and issues with wind power permitting in Sweden, and those bottlenecks need to be solved in order to reach the most favourable wind power production trajectories.

Figure 1 displays the annual deployment of PV and onshore wind between 2010 and 2019. While the wind power deployment took constantly place during the 2010's and an impressive growth in the past two years, the PV deployment started in the mid-2010's and increased over the last years.

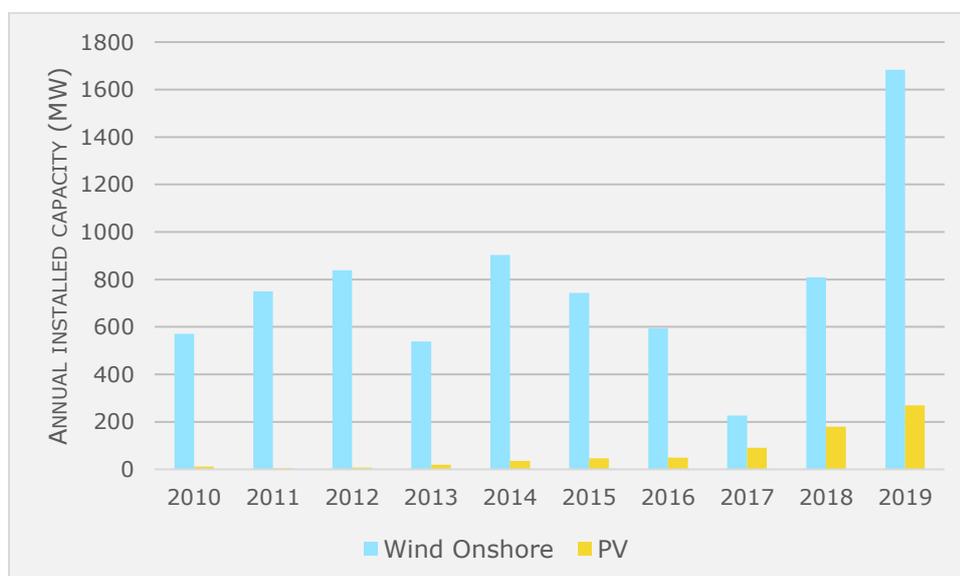


Figure 1: Annual installed capacity of PV and Wind onshore 2010-2019 (source: EurObserv'ER)

Due to its northern location, Sweden also has a large need for heating, which contributes to a considerable share of the total energy consumption. Similar to the electricity sector, Sweden has not set a national 2030 target for the share of renewables in heating and cooling (NECP, 2018). According to a 2016 trajectory, the share of renewables in heating and cooling will increase slightly by one percentage point, to 69 %, by 2030. (ibid.). The development will be reached by increasing the usage of heat pumps, which is why this report will shed light to the successes and problems of small-scale ambient heat installations (heat pumps). The number of heat pumps installed in Sweden has risen rapidly, and the growth is projected to continue (SKVP, 2020; Swedish Energy Agency, 2017). As more than half of Swedish detached houses have installed a heat pump, the technology forms an integral part of the Swedish RES-H energy mix (Polarpumpen, 2020). The most common technologies in non-apartment houses (e.g., detached houses and row houses) are aérothermal and ground source heat pumps (geothermal or hydrothermal) (Swedish Energy Agency, 2017). This report will mainly address the permitting framework for geothermal (ground source) heat pumps as they are the only technology requiring permitting or at least a registration for small or medium-sized installations.

2. Administrative and grid connection procedure

2.1. Relevant process steps

Wind power

Site selection needs to be done as a first step, including acquiring the legal right to the area. The administrative authorisation process follows the site selection. As the box model is accepted in Sweden, the process may begin before the exact coordinates of the wind power plants are selected. The permission according to the Heritage Conservation Act (1988:950) needs to be included in the Environmental Impact Assessment (EIA) of the administrative authorisation process and should as such be done in parallel to the EIA.

The permission according to the Swedish Exclusive Economic Zone Act (1992:1140) and Act on the Continental Shelf (1966:314) need to be applied for in parallel to the EIA of the administrative authorisation process for installations located outside of the Swedish territorial waters at sea.

The application for grid connection, called 'concession', is not strictly interconnected with the administrative authorisation process but cannot be applied for unless the exact level of connected power for concession is known. As this is an outcome of the administrative authorisation process, the grid connection permit may sometimes only be started after the administrative authorisation process is finished. The corporate-legal-fiscal process of applying for electricity certificates and guarantees of origin can be done once the plant is in operation, and they are not covered by this report.

Geothermal heat pumps

The process flow for small heat pump installations is rather simple: firstly, the applicants need to familiarise themselves with the local regulations set by the municipality in which the installation would be located. Some municipalities require only a notification of the construction, whereas others expect an action permit to be applied. In general, no building permits are needed for small geothermal (ground source) heat pumps. When the

permit has been obtained, the installation can take place – within the legal limits for noise and other interference.

2.1.1. Site selection

Process flow

Wind power

When deciding upon site for a new wind power project, the project developer is advised to consult the municipality regarding their general willingness to have wind power in the area, and if positive, which areas would be the most suitable for it. In the event of a larger installation or if the municipality lacks an overview, the county administrative board's regional plan may provide the necessary information. Furthermore, the developer is advised to investigate the proximity to the electricity grid and its distributional capacity. The project developer may then proceed to acquiring the legal rights to the land area needed for the wind power installation and all the surrounding infrastructure (Swedish Energy Agency, 2019a).

In Sweden, it is possible to construct a wind park without specifying the exact location of the wind turbines during the permitting procedure, but only later, during the construction phase. The system is called the 'box model' and it allows the developer to have more flexibility in the placement of the turbines and the technology used (Schmid, 2019). However, the box model cannot be applied for all wind power projects.

Since objects that exceed 20m of height outside of densely populated areas. or 45m inside densely populated areas risk affecting national interests of the Swedish Armed Forces, wind projects exceeding these values need to receive referral from the Swedish Armed Forces (Chapter 3 §9 Environmental Code). The Swedish Armed Forces offer an early consultation on whether a proposed project may interfere with national interests. However, the consultation outcome is only preliminary and the Armed Forces can, in theory, provide a different opinion at a later stage, i.e., in the environmental permitting and building permitting (if required) process consultations (Swedish Armed Forces, n.d). Most wind power developers consult the Ministry of Defence prior entering into the permitting process since there is no sense in applying for a permit for a wind park that can never be realised due Defence Forces opposition (Newell, 2020). In theory, it is possible to apply straight for relevant permits without consulting the Ministry of Defence but that can lead to considerable economic losses if the project comes to a halt due to Defence Forces opposition later. There is a spatial planning team in the Ministry of Defence that also responds to queries about the suitability of planned areas for wind power production. The interviewed experts did not communicate delays in their work.

All processes related to site selection are rather transparent except for the consultation with the Ministry of Defence to some extent. The Defence Forces have a defined onshore area where wind power development is not possible, but some of the information regarding sea areas is not publicly known (Newell, 2020). For example, almost the entire Swedish East coast is considered as an unsuitable location for wind power production due to national security interests.

In Sweden, the government does not have a coordinated plan of where wind power will be developed, either on land or offshore. Regional level spatial plans or marine plans may identify suitable sites, but these plans serve more as recommendations than any binding guidelines. The most important authority responsible for spatial planning in Sweden is

the municipality, which prepares and adopts the comprehensive plan for the municipality as a whole, as well as development plans for residential areas (Schmid, 2019).

Geothermal heat pumps

When it comes to small and medium-sized ambient heat installations, site selection is not a highly relevant process step. Most areas are suitable for the installations, with the exception of ground-source heat pumps in ground water reservoirs.

Deadlines

There is a spatial planning team in the Ministry of Defence that also responds to queries about the suitability of planned areas for wind power production. As this is a consultation, not an authorisation, there are no deadlines that apply to the responding of queries. The interviewed experts did not comment on the speed of the Ministry's responsiveness.

Detected barriers

Military resistance too broad and not well communicated. The Swedish Armed Forces have the right to require the county administrative board and municipalities to withdraw a granted administrative authorisation permission (i.e., an environmental permit and a building permit when required) for a wind power plant even a long period of time after it has been granted. Wind turbines are questioned especially in southern Sweden as they can interfere with important radio communications during major accidents (e.g., serious nuclear accident). This is particularly difficult for the Swedish energy system as most wind power production is located in the North whereas most consumption and export take place in and from the Southern parts of the country. Therefore, the Swedish Armed Forces have restricted certain areas for the development of wind power. The restricted area was expanded in 2017 and this military involvement creates uncertainty for investors in and developers of wind power in Sweden (RNP, 2020). Another area where wind power development is significantly impacted is the Eastern coast and the seas surrounding it.

Identified good practice

No good practice related to this process was identified.

2.1.2. Administrative authorisation

Process flow

Environmental permit

Wind power (general guidelines)

In Sweden, the environmental permit procedure entails several elements that are often processed as separate permitting procedures, e.g., EIA, building permit, environmental permit and consultation of stakeholders. Therefore, in a way, the environmental permit can be interpreted as a step towards a one-stop-shop permitting procedure. The environmental permit is the single most important permitting procedure for large onshore wind power projects, together with the grid connection permit. Other permits or assessments may be necessary, too, and they are described briefly in the Section 2.1.4. of this report.

The legal basis for the environmental permit is established in Chapter 9 of the Environmental Code (1998:808), which also applies to wind power installations. The

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environmental permit process includes conducting an EIA, which is codified in more detail in the Chapter 6 of the Environmental Code (1998:808).

An environmental permit is needed when:

- two or more wind turbines are located together and each of them have a total height over 150m;
- one wind turbine has a total height over 150m and is located in such a constellation as previously mentioned; or
- a wind turbine has a total height over 150m and is located together with another such wind turbine, if its operation starts later than the operation of another wind (ibid.).

The competent authority for environmental permits is usually the county administrative board but in case of projects with fewer than 2 wind turbines under 150m or fewer than 7 wind turbines under 120m, the planning authority is the municipality in which the project would be located (ibid.).

EIA is included in the environmental permitting process and entails large consultations with stakeholders, such as governmental authorities, municipalities, general public and non-governmental organisations (NGOs), potentially impacted by the planned project. The consultation period must exceed 3 weeks (Schmid, 2019). The consultation with citizens takes place through a consultation meeting ('samråd'), the invitation to which must be sent at least 3 weeks in advance, and after the consultation, citizens have 3 weeks to comment on the project (12:6 Environmental Code).

A specific environmental assessment means that the one intending to carry out the activity specified in Chapter 9 of the Environmental Code (1998:808), including wind power mainly due to its light and noise impact, shall:

- consult how an EIA is delimited,
- conduct such an EIA,
- submit said EIA to the permission-granting instance (county administrative board).

Once the developer submits the EIA to the county administrative board, the application and EIA will be made available to the public (public consultation) and will often be sent to the relevant authorities for review and a supplementing round of comments (SWEA, 2019a).

The application can only be approved by the competent authority if approved by the municipality, in which the project would be located. However, if there is significant urgency from a national point of view, the Government can approve the activity in accordance with Chapter 17 § 6 of the Environmental Code (1998:808).

Since 2009, municipalities have been able to veto a wind power project, which the county administrative board otherwise would have approved. The municipalities do not need to specify the reason behind their decision and there is no possibility to appeal against the municipal veto. Furthermore, there is no statutory deadline for the municipalities to respond. Under normal circumstances, a decision can be expected within 3 months. However, when local elections are approaching (6 months before), the politicians tend to postpone the decision until after election day. As such, the processing time for municipal approval may be longer every fourth year, which is the length of an election cycle (Schmid, 2019).

The Swedish Energy Agency and the Swedish Environmental Protection Agency have issued a guide for municipal approval (Swedish Energy Agency, 2015).

Small wind power projects are exempt from the environmental permit procedure. Some of them, still, require a building permit, which is described later in this section. According to the Swedish Energy Agency (2019a), a notification (but not a permit) according to the Environmental Code (1998:808) is required when the total height of the wind turbine exceeds 50m, two or more wind turbines are placed together or a wind turbine is located next to another wind turbine, if its operation starts later than the operation of another wind turbine.

Simplified procedures are available for smaller wind power installations. The Environmental Code does not require installations to apply for an environmental permit but to submit a notification to the county administrative board in the following cases: if the total height of the wind turbine exceeds 50m, two or more wind turbines are placed together or a wind turbine is located next to another wind turbine, if its operation starts later than the operation of another wind turbine (SWEA, 2019a). In exceptional cases, small and middle-sized installations may still be subject to the environmental permit application regardless of the above mentioned criteria. In general, very small installations are not required to apply for neither an environmental permit nor a building permit, and middle-sized installations are usually exempt from the environmental permit process but subject to obtaining a building permit (ibid.)

Another simplified feature available for wind power projects is the '**box model**', which allows the developer to apply for an environmental permit without determining the exact location of each turbine of the wind farm (Swedish Energy Agency, 2020). The idea behind the box model is to ensure flexibility in the exact technologies used as well as in turbine placement to ensure the highest possible energy production. The 'box model' attracted interest and attention in 2014–2018 as it was seen as a possibility to considerably lighten the administrative load in permitting procedures, leading to shorter permitting process duration (Darpö, 2020). However, the Land and Environmental Court has not applied the model to as many projects as initially thought, as the unclear placement of turbines complicates environmental impact assessment and nature conservation. In practice, developers applying for a 'box permit' also provide an alternative application with the exact turbine coordinates in case the 'box model' cannot be applied (ibid.). It is easier to get the wind power project approved within the 'box model' if the wind park area and the number of turbines are relatively small (ibid.).

Usually, environmental permits include provisions about the time frame in which the project has to become operational (Schmid, 2019). If the environmental permit expires, there is no possibility to extend the validity of an already issued permit: the applicant has to submit a new permit application and the long procedure starts over from the beginning (Andersson et al., 2020).

The same issue arises when repowering an old installation. Questions about repowering have emerged in the recent years as the oldest wind parks in Sweden are reaching the end of their life cycle. However, they are located on a site with ideal wind conditions that could be harnessed in the future, as well. Repowering may result in considerable changes in the wind park infrastructure as old, smaller turbines can be replaced with fewer but higher turbines (Andersson et al., 2020). Therefore, the owner of the existing wind power plant has to consult the county administrative board whether the current permit can be amended, or if a new permit will be necessary (ibid.). For repowering a smaller installation, a valid building permit and a notification to the municipality or the county administrative board (depending on the size of the installation) in line with the Swedish Environmental Code may be enough (ibid.).

Environmental permits usually cover also the decommissioning phase of the wind turbine's life cycle, and thus no new environmental permit is necessary for decommissioning (Andersson et al., 2020).

Nearshore wind

Nearshore wind turbines are permitted in a similar manner as onshore turbines if they are located less than 12 nautical miles from the coast, in the Swedish territorial waters (Newell, 2020). In other words, the environmental permit is the most important permitting procedure for nearshore wind farms and installations, and they are also subject to the municipal veto, which is a built-in feature of the procedure, as described earlier in this section. In addition, water-based permits and a permit according to the Continental Shelf Act are necessary for all installations located on sea (see more about offshore permits in Section 2.1.4.)

Building permit

Wind power

Not all RES installations are required to obtain a building permit, but most small or medium-sized wind turbines that do not require a separate environmental permit are. Very small installations or the use of existing construction infrastructure for repowering without making significant changes can be exempt from it. Regarding onshore and offshore wind power, a building permit is only required when the total height of the construction, including wind turbine, exceeds 20m. So called 'mini-installations' with the maximum height of 20m and maximum rotor diameter of 3m may be exempted from a building permit if they are not located on a building or are not closer than their own height to a building (SWEA, 2019a). The second category of small installations, 'yard installations' are wind turbines between 20m and 50m of height and/or have rotors with a diameter of more than 3m. They are required to obtain a building permit but are usually exempt from the environmental permit (ibid.). Wind power projects larger than the limits for 'yard installations' are required to obtain the environmental permit, and the procedure integrates also the building permit process (ibid.). Thus, separate building permits are not required for large wind turbines and wind parks. The competent authority for applying for a building permit is the Building Committee of the local municipality (Chapter 9 section 20, Planning and Building Act).

The building permit procedure includes a hearing of neighbours or other locals that would be directly affected by the planned installation. The building permit also contains information on the period of validity of the permit and the authority in charge of possible inspections (Chapter 9, section 40 Planning and Building Act). The permit decision must also be made available to the public (Chapter 9, section 41 Planning and Building Act).

Permits for small and medium-sized heat pumps

Most heat pumps are not subject to any permitting procedures, with the exception of geothermal heat pumps that require a certain amount of drilling. They are subject to the Ordinance 1998:899, which states that all heat pump installations extracting heat from the ground, surface water or groundwater are required to either report their activity or apply for a permit. The installer is also required to report on the conducted drilling activity to the Geological Survey of Sweden. The minimum requirement is that the installations are reported to the municipality, in which they are located (art. 17, Ordinance 1998:899). The municipality also has the right to require the installations to acquire a 'drilling permit' (names vary in different municipalities) (ordinance 2013:251; ordinance 1998:899). The municipality can decide for itself how the permit is applied for and what is required for an application (e.g., public consultation, impact assessments) (Willis, 2020). In densely populated areas such as the city of Stockholm, the permit

procedure tends to be more extensive than in others. For example, in Stockholm, the process entails hearing of neighbours. In addition, the installer is required to report on the conducted drilling activity to the Geological Survey of Sweden (Willis, 2020). During the drilling, the legal noise levels have to be complied with, naturally.

Small heat pumps (less than 10 MW) that draw heat from earth or water do not need to apply for an environmental permit (SEPA, 2020). Small aerothermal heat pumps do not need to be reported.

Demolition permit

Sometimes, a permit is required for decommissioning of an old RES plant or installation, including also wind power plants. The need for demolition permit can be assessed through a consultation with the municipal Building Committee. The legal framework for the demolition permit is codified in Chapter 9 Section 10 of the Planning and Building Act.

Regarding the transparency of all of the above mentioned processes, the interviewed experts were, in general, pleased with the quality of assessments conducted during the environmental permitting process. Environmental impact assessment is done thoroughly and in communication with stakeholders.

Deadlines

Building and demolition permits

According to the Planning and Building Act (Chapter 9 section 27), the municipal Building Committee is required to announce its decision on the permit in hand within 10 weeks from when the application was received or when the additional necessary documents were added to the application. If the permit process proves to be complicated, the handling period can be extended by another 10 weeks.

Environmental permit

There are no clear deadlines related to the environmental permit procedure for onshore and offshore wind. The procedure is complicated and consists of multiple stages, and entails several stakeholder hearings and impact assessments. Therefore, it is not possible to provide universal guidelines for the process altogether but each individual project is assessed in its own terms.

Geothermal heat pumps

Municipalities are in charge of deciding on the permitting timeline and deadline. No clear deadlines have been communicated by any municipalities to the expert's knowledge but in Stockholm, the authorities publish an estimate of how it will take for the application to get into the review phase (Willis, 2020).

Detected barriers

Municipal veto and related issues. The right of veto is codified in the Environmental Code (Chapter 16, art 4.). Wind power project developers have to obtain an EIA, which includes consultation with the municipality and other interested parties, such as community associations and groups, often resistance groups. The competent authority for the environmental permit, county administrative board, can grant the construction permission only after the municipality has approved the project (municipal veto described above). Additionally, the municipality has the right at any time to stop the project without any justification. Even more, such a decision cannot be appealed against (RNP, 2020).

Many stakeholders and experts regard the municipal veto as one of the most significant, if not the most remarkable, barrier to wind power development in the country for various reasons. The mechanism was initially created in order to smooth permitting process and improve municipality's right for participation, but as it stands, municipal vetoes are responsible for approximately 40% of wind power project rejections (Newell, 2020). Swedish Energy Agency and the Swedish Environmental Protection Agency have acknowledged the barrier by saying that the establishment of wind power would be easier and legally secure if the municipal veto was removed (Swedish Wind Power Association, 2019). The Swedish Wind Power association regards the municipal veto as a severe barrier to 'simplified and shortened permit processes' as well as an instability factor present in the whole permitting process (SWEA, 2019a). Even if the veto was removed, municipalities would still have influence in where wind power is developed through spatial planning processes (ibid.).

The Swedish government, too, has admitted that the current veto system is dysfunctional, and has appointed a special investigator to look into the possible ways to change it. Especially the justification and the lack of time limit have received criticism and will be critically examined. A report on the topic will be delivered by the end of June, 2021 (Swedish Government, 2020).

All in all, none of the interviewed experts are opposed to the municipality's right to have a say about wind power development in its area, but they regard the current system as too unpredictable and broad, causing uncertainty to everyone involved as well as delays in wind power development. Below is a more detailed description of the issues connected to the current municipal veto system, and some suggestions on how to modify it.

No time limit and appeal possibility. The municipality, in which the planned wind park would be located, has the right to veto the project at any point of the environmental permit process. Usually, the developers attempt to get the municipality's approval at an early stage, but it is possible and legally allowed for the municipality to change their mind at any given time before the permit decision has been issued (Newell, 2020; Schmid, 2019; Lindahl, 2020). The legality of the veto procedure has also been questioned as there is no legal right to appeal the municipality's decision.

Vetoes made on political basis. A municipality can reject a wind power project on completely political basis, and not based on e.g., assessments of the impacts on local population or biodiversity (Newell, 2020; Lindahl, 2020; Östman, 2020). A barrier of growing importance is the local opposition to wind power plants. Public opposition is not strong (RNP, 2020). Some politicians or parties are simply opposed to wind power development out of principle. One possible explanation to the high number of municipal vetoes is the lack of economic gain from the wind park to the municipality as in Sweden, property taxes are paid to the state and not to the region or municipality where the construction or installation is located (Lindahl, 2020). It is also possible for a municipal government to approve a plan, and then reject it again if the composition of the government has changed in the municipal election (Newell, 2020) before the permit has been granted. In order to mitigate such U-turns, it has been suggested municipal approval to be granted at the initial stage of the environmental permitting process and to make it legally binding (Newell, 2020). In addition, municipalities sometimes wait unnecessarily long with their notice, for example when a local election is being held within six months. In such events, the municipality usually postpones the decision until after the election has taken place (Schmid, 2019).

Side effects for site selection. If wind power projects are rejected in the locations with the most suitable wind conditions or infrastructure due to municipal vetoes and Defence

Forces interests, projects are being increasingly pushed in areas with high biodiversity values (Östman, 2020). This poses a severe threat from the viewpoint of environmental protection and nature conservation. In principle, both two large environmentalist organisations interviewed for this report are in favour of extensive wind power development in Sweden, given the fact that the selected site does not pose a risk to a biologically sensitive area (Östman, 2020; Lindahl, 2020). Both of them are in favour of limiting the existing municipal veto rights, for example in the way that municipalities could only exercise their veto right in ecologically sensitive areas (Östman, 2020; Lindahl, 2020).

Grid connection and environmental permits are separate processes. It is not possible to conduct the environmental permitting and the grid connection processes in a harmonised manner: they are processed by different authorities, and different assessments are needed for each even though similar issues arise in both processes (e.g., concerns on species protection). Whereas the environmental permit looks at the effects of the wind turbine itself and its construction, the grid connection permit focuses on the impacts of the cable and other electricity distribution infrastructure and their construction works. The processes can run parallel to each other and run at the same time, and typically, it takes longer to obtain the environmental permit (Newell, 2020). It is possible for the project to obtain one of the permits and to get the other one rejected – most rejections take place in the environmental permitting process due to municipal vetoes (Newell, 2020). Engaging with two somewhat similar but administratively separate procedures can cause issues with timing and finances to developers (offshore developer, 2020).

Numerous uncoordinated permits for offshore wind. According to an offshore developer, there are approximately 10 different permits necessary for an offshore wind park, such as environmental permit, different Natura permits, water permit, and so on (offshore developer, 2020). Some of the permits are dealt with by the same authorities but through a different process, whereas others are addressed by completely different authorities through separate procedures. As the authorities are still rather inexperienced with offshore wind permitting and permitting processes are separate from each other, there is mismatch in the permit requirements; the requirements can even be counter-productive with each other (offshore developer, 2020). The decisions may point at different directions that the project should be directed. As a result, the whole offshore wind permitting process is inefficient, time-consuming and resource-heavy for both the developers and authorities.

Long processes lead to expiration of technology and other permits. Environmental permit and grid connection (concession) processes for wind farms can last for years, and in worse case, they are followed by several years spent in different court instances due to appealed decisions (SWEA, 2020a). Wind power technology, both onshore and offshore, develops so fast that if permitting takes a decade, the intended technology is already outdated. Another issue related to delayed permitting is the possible expiration of another permit: for example, the interviewed wind power developer mentioned that it took over 10 years for them to acquire grid connection permit, in which time the environmental permit was already expiring (offshore developer, 2020). Developers try to mitigate this issue by not identifying the exact technology or wind turbine models they intend to use in the application, which can also be problematic as authorities would like to receive as detailed information as possible in order to assess the impacts in detail, too (ibid.).

Lack of public interest and information. The public participation mechanisms related to environmental permitting are generally deemed as sufficient by the interviewed experts but it is still difficult to get citizens involved. On the one hand, some developers may simply see the obligation to early-stage public consultation as a box to be checked, and do not pay enough attention to gathering substantial feedback from the participants of the 'samråd' (Lindahl, 2020). On the other hand, the citizens and groups opposing local wind power projects do not necessarily participate in the legal public participation mechanisms such as the 'samråd' but voice their opinion after the consultation has already taken place or outside of the public participation channels (Lindahl, 2020; Östman, 2020). It may be difficult for citizens to find out what processes are ongoing in their area, and how to participate in them.

Unclear and complicated regulations for repowering. There are no recent examples of how the environmental permit procedure for repowering should be conducted. It is unclear when an adjustment to the existing permit is enough, or whether a new permit is needed (Andersson et al., 2020). In addition to the lack of a definitive instructions, if a new environmental permit is needed for repowering, the procedure does not comply with the revised RED II directive, as the directive does not allow for such a long and complicated permitting procedure as it stands in the current Swedish legislation. In order to speed up the procedure, changes should be made to the Swedish legislation. The Swedish Environmental Protection Agency (SEPA) has proposed changes to the legislation in connection to the RED II directive, which needs to be implemented by June 2021, but no decision have yet been made (SEPA, 2020).

Conservative application of the 'box model'. The Swedish Wind Energy Association has criticised the national authorities for not applying the 'box model' more widely, which is making it difficult to reach the national target of 100% renewable electricity by 2040 (SWEA, 2019a). The association calls for more flexibility in turbine placement and technology in order to accelerate permitting processes and ensure the construction of the most efficient technology in wind farms. The box model was regarded as a promising way of wind power permitting as it was initially introduced in Sweden but it has not lived up to its potential, yet.

Narrow governmental understanding of the RED II contents. Several governmental agencies and authorities will have to use significant resources to plan, establish and uphold a one-stop-shop service (SEPA, 2020). The Environmental Protection Agency's report claims that significant actors, such as developers of large RES-E projects, are experienced with permitting procedures and already possess the capacity to file high-quality applications. On a brighter note, the one-stop-shop could lead to better applications, which would decrease the workload of permitting authorities (SEPA, 2020). SEPA's suggestion on how to apply the RED II directive in Sweden is rather broad as it views environmental permit and grid connection permit procedures as separate processes, each of which could take two years. Furthermore, SEPA does not identify which authority should serve as the one-stop-shop, and regards it as an online solution, potentially (SEPA, 2020). SWEA criticises the SEPA's interpretation of one-stop-shop, stating that the new solution would introduce 'more, not less authorities' into the process (SWEA, 2020b). SWEA would also like to see a joint permitting procedure for the current grid connection and environmental permits, including a joint information point (ibid.).

Opposition to heat pump installations in densely populated areas. The number of permit-regulated heat pumps is steadily increasing in Sweden, and so is their opposition in densely populated areas, such as the Stockholm area (Willis, 2020). Most of the current resistance originates from other stakeholders that have interests in establishing

underground infrastructure, such as electricity cables. Small and medium-sized heat pumps face the most serious competition from district heating operators. The more heat pumps are installed, the less demand there will be for district heating, which are losing customers due to the increasing popularity of heat pumps. As there virtually no electricity or heating are produced with fossil fuels in Sweden, conflicts of interests occur between heat pumps and district heating, which is a unique setting in Europe (Willis, 2020). The interviewed heat pumps expert also complained that district heating operators affecting the drilling permitting process are biased since they are defending their own interests in stakeholder consultations.

Identified good practice

Thorough and high-quality environmental assessments. Environmental impact assessment processes are perhaps on the longer side but they are described as thorough and comprehensive (Östman, 2020; Newell, 2020). As a result, the decisions are rarely appealed on basis of ecological reasons. The Swedish Society for Nature Conservation has appealed a permitting decision regarding wind power 10 times in the recent years, and half of their appeals have been rejected, which sends a message of the initial EIA job well done in the course of permitting process (Östman, 2020). This feedback was received both from an environmental organisation and a representative of a state authority, which amplifies the message.

Simple and efficient heat pump permitting. A large factor behind the Swedish heat pumps success story is the smooth and relatively straight-forward permitting procedure (in the cases where a permit is needed). Other countries are in general more restrictive when it comes to drilling. In the past, the Swedish government had a slightly skeptical attitude towards drilling, as well, but as authorities have gained information about heat pumps and experience with permitting them, the procedure has developed and eased (Willis, 2020). Today, most Swedish municipalities have an established system for permitting, and the authorities are familiar with the technologies. According to the interviewed expert, the simple and efficient permitting procedure is one of the keys to the success of heat pumps: if the installation process proves too difficult, people will not bother to install one (Willis, 2020).

2.1.3. Grid connection permit

Process flow

When connecting a new electricity-producing installation or power plant to high-voltage power lines, a grid connection permission ('concession') is necessary according to the Electricity Act (1997:857). This permission is granted by the Swedish Energy Markets Inspectorate. Out of the three technologies addressed in this report, the concession procedure is applicable to onshore and offshore wind power. Small and medium-sized heat pumps are usually subject to much simpler procedures: often only reporting on the new installation is sufficient (Willis, 2020).

There are two different types of concession: for an individual transmission line or for a geographical area. Primarily, the former is relevant for wind power development. The application for concession shall, according to § 5 of the Ordinance on Electricity (2013:208) include an EIA and information on the following:

- The necessary transmission capacity
- The voltage of the transmission line

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- The reason of the application, if the voltage does not exceed the maximum allowed voltage for the areas covered by the transmission line
- How the general rules of consideration of Chapter 2 of the Environmental Code (1998:808) shall be considered
- Alternative transmission routes that the applicant has considered.

The Swedish Energy Markets Inspectorate then assesses the application and usually asks for additional information before sending it to referral authorities for consultation. When the consultation is completed, the Swedish Energy Markets Inspectorate examines if, based on the comments from the referral authorities, any additional information is needed. The project developer may then react to the comments of involved authorities and submit supplementary information before the final assessment by the Swedish Energy Markets Inspectorate is taken (Swedish Energy Markets Inspectorate, 2017).

The TSO, Svenska kraftnät, appears to be under a significant pressure to develop and expand the national grid (SWEA, 2020; offshore developer, 2020). This issue is mostly caused by the ambiguous political framework and not staffing issues (offshore developer, 2020).

Deadlines

The decision regarding a grid connection application is made by the Swedish Energy Markets Inspectorate within three years of the receipt of a complete application by the Inspectorate (Chapter 2 § 1 Electricity Act). If the matter is to be decided by the Government, a decision shall be made within five years from the receipt of complete application by the grid authority (§ 10 Ordinance on Electricity). In practise, the process is often delayed. According to a project developer, the above mentioned schedules can be doubled to reflect the reality better (offshore developer, 2020).

Detected barriers

Incompatible concession and environmental permits. The Swedish Wind Energy Association (SWEA) has included various major issues related to the concession in its comprehensive 2040 report (SWEA, 2019a). As concession and environmental permit are two separate permits processed by two different authorities, they are not very compatible with each other. For example, in the concession application, 'requirements for technical details are high and [...] difficult to predict before the environmental permit has been passed' (ibid.). Usually, the developer applies for both concession and environmental permit at least partly simultaneously, and the environmental permit process tends to take longer (Newell, 2020). However, in case concession is significantly delayed, there is the risk of the environmental permit expiring before the project can become operational (offshore developer, 2020). The longest waiting times are experienced by offshore wind projects, which can take up to 10 years to acquire the concession (ibid.).

Lack of coordinated policies for developing the national grid. Unlike other European member states leaning strongly towards wind power in their energy mix in the future, Sweden has left it up to the market to decide on the technologies to be deployed (technology neutral approach). The lack of a coordinated governmental plan on where wind power should be produced and how it should be connected to the grid has left the TSO (Svenska kraftnät, SK) in the dark about how to develop and expand the national grid (offshore developer, 2020; SWEA, 2020b). As a result, the TSO may receive numerous applications regarding the same intended production site (offshore developer, 2020). Furthermore, it is difficult for SK to forecast how to develop the grid in the future.

Creating national plans on wind power development would also be welcomed from the perspective of nature and biodiversity protection (Östman, 2020; Lindahl, 2020).

Identified good practice

No good practice related to this process was identified.

2.1.4. Other

Process flow

Heritage conservation

Any wind power developer needs to consider The Heritage Conservation Act (1988:950), which protects antiquities, churches, and certain buildings. As such, a wind power project needs approval from the county administrative board, which states that the construction does not interfere heritage conservation. In accordance with Chapter 2 of the Heritage Conservation Act (1998:950), the county administrative board may decide on an archaeological investigation at the relevant location to determine whether there is a conflict of interest with heritage conservation. The wind power developer is therefore advised to contact the county administrative board early in the process to determine the need for such an archaeological investigation.

Natura 2000

If the project is located on a Natura 2000 area or near one, the impacts of the project and its construction to the local environment and its protected species have to be assessed according to the EU law. Natura 2000 assessments are often required for onshore and offshore wind projects, prior to they enter into the environmental permitting procedure (offshore developer, 2020; SEPA, 2011).

Special permits for offshore wind development

In addition to the permits needed for all large wind farms (environmental permit and concession), offshore wind power projects are required to apply for a number of offshore activity specific permits. As mentioned before, nearshore wind installations (closer than 12 nautical miles from the coast) are permitted in a similar fashion as onshore wind.

Continental shelf permit

All infrastructure placed in the sea located on the continental shelf area also require permission according to the Act on the Continental Shelf (1966:314) for an assessment of the seabed and to put down transmission lines, both in 'public water' and Sweden's exclusive economic zone. The application for the continental shelf permit needs to be submitted to the Ministry of Enterprise and Innovation (offshore developer, 2020).

Exclusive Economic Zone (EEZ) permit

Any commercial activity in Sweden's economic area require permission from the Swedish Government according to § 5 of The Swedish Exclusive Economic Zone Act (1992:1140). This applies to cables, pipelines or constructions, and thus, is applicable to, for example, offshore wind turbines. The permit is requested from the Swedish Ministry of the Environment (offshore developer, 2020).

Water activity permit

All power stations, such as hydropower dams or tidal energy infrastructure, installed in sweet water areas are required to apply for a water permit according to the Chapter 11

of the Environmental Code. The competent authority for water permits is the Land and Environmental Court.

Marine Natura 2000

There are almost 300 Natura 2000 areas in the Swedish waters or in the Swedish EEZ, and in order to establish an offshore wind park in or near those areas, the project developer has to obtain the approval of the Land and Environmental Court (SEPA, 2011).

Deadlines

There are no clear schedules for processing the offshore wind specific permits as they are processed on individual basis.

Detected barriers

Authorities hesitant about offshore permitting. The competent authorities (ministries and other government offices) dealing with offshore wind are not very familiar with the technology, which has resulted in delays with permitting (offshore developer, 2020). Sometimes, the application is sent around from an authority to another, and sometimes the authorities do not know which documents or assessments would be needed for the permit, and how to conduct them as the legal framework does not offer straight-forward guidelines for offshore wind development. It is also possible that authorities are hesitant to issue the first permitting decisions, which would set precedence for the future. Therefore, it is very difficult for developers to estimate how much time will be needed for each permitting procedure (offshore developer, 2020).

Dysfunctional mechanisms for Sámi participation. A large number of (mostly onshore) wind power project developed in the Northern parts of Sweden affects the local indigenous population, the Sámis, in various ways. Establishing infrastructure in Sámi territory may endanger the reindeer herding livelihood (Act 1971:437), Sámi cultural landscapes or cultural practises (Act 1988:950). Furthermore, even if the Sámi are consulted, there is no guarantee their views will be taken into account in the permitting (Östman, 2020). The Swedish Sámi parliament Sametinget does not oppose wind power development *per se* but calls for respect for the already endangered Sámi culture and ways of life, as well as protection of the traditional Sámi lands (Sametinget, n.d.). The Sámi and their lands have already suffered significant interference due to the construction of massive hydropower plants in the past, which can be regarded as green colonialism (ibid.).

Identified good practice

No good practice related to this process was identified.

3. Use of IT systems

'Drilling permit' for ground source heat pumps

In some municipalities, it is possible to apply for the permit online and according to the expert, the system seems to be working well (Willis, 2020).

Concession

The Swedish Energy Inspectorate accepts submissions in a digital format, either with all files on a USB, a CD-disc or through the website www.sprend.com.

The website at the Swedish Energy Markets Inspectorate was created in December 2017, but no information on when the function was introduced could be found, nor did the interviewed experts comment on the functioning of the application system.

No information is available regarding other permitting procedures.

4. Complaint procedure

In principle, appeals against decisions are submitted to a higher authority, i.e., one instance above the authority that made the contested decision.

- Appeals against municipal decisions may be submitted to the county administrative boards within 30 days of issuing the decision.
- Appeals against decisions by the county administrative board is done to The Land and Environmental Court within 30 days of issuing the original decision. If the case is of 'particular significance' for the Swedish Armed Forces or other national interests, the court may need to transfer the case for a governmental review (Chapter 13, Section 5 Planning and Building Act).
- Appeals against decisions by the Land and Environmental Court is done to the Superior Environmental Court.
- The final court of appeal is the Supreme Court (Schmid, 2019).

It depends on the permitting procedure, which stakeholders have the right to express their opinion about the project during the permitting procedure, but also to appeal against the decision. As a rule of thumb, municipal-level processes tend to grant these rights to those directly affected (e.g., owners of neighbouring properties), whereas the environmental permitting procedure also grants civil society actors, such as environmentalist organisations, the right to have a say (Lindahl, 2020).

With regard to the appeal against the environmental permit decision, the interviewed expert stated that the complainant usually compiles all possible objections in the appeal (Lindahl, 2020). In theory, it is possible for the same person to lodge another appeal based on a different reason than the first one as long as they comply with the given deadlines for appeals (ibid.).

Concession

Both the applicant and other interested parties can appeal the decision to approve or reject the grid connection permit made by the Swedish Energy Markets Inspectorate to the Land and Environmental Court within three-weeks of when notification of the decision was received. The decision of the Land and Environmental Court can be appealed against in a similar manner as described above regarding environmental permits.

5. Specific features to ease administrative procedure

Table 2 below provides information on the existing specific features to ease administrative procedures in Sweden.

Table 2: Specific features to ease administrative procedures

Specific feature	Existing	Short description
Simultaneous procedures	yes	In theory, it is possible for an onshore wind power developer to apply for the environmental permit and the concession simultaneously. In a similar manner, developers usually apply for offshore permits at the same time (offshore developer,

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		<p>2020). However, sometimes information from an already finished previous permitting process is needed for another permit (e.g., geoscience procedure has to be completed before moving on to the environmental permit) (offshore developer, 2020).</p> <p>Two main factors make parallel permitting processes difficult in Sweden: (1) not knowing the exact amount of electricity procured for the concession application until the environmental permit has been granted and (2) the large economic risks to apply for concession before acquiring the environmental permit. Requirements for technical details are high and often difficult to predict before the environmental permit has been passed. Furthermore, the speed of technological progress means the technology approved in a permit rapidly becomes obsolete.</p>
National contact points and one-stop-shops	no	There is no one-stop-shop in Sweden yet. However, the environmental permit for onshore wind entails several elements that can be found as separate permitting procedures in other countries (e.g., environmental permit, EIA, building permit).
Application of 2+1 and 1+1 rules	yes	The SEPA interprets the 2+1 and 1+1 rules in a following manner: the duration of the application process begins from the moment when the competent authorities have received the complete application, and ends with issuing a decision. Appeals or other judicial processes are not included in the duration and the duration is calculated separately for every permitting procedure (SEPA, 2020).
Simple notification procedure	no	
Pre-planning	yes	Pre-planning is not an official part of any application procedure, but it is carried out by most developers when they attempt to inquire about the suitability of the area for wind power production from the Ministry of the Defence and the relevant municipality.
Pre-application consultation	no	
Project acceptance measures	no	
Measures to streamline litigation by third parties	no	
Other	no	

6. Indicators to measure the performance of the overall process

Table 3 below provides information on the indicators to measure the performance of the overall administrative and grid connection process in Sweden.

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Table 3: Performance indicators to assess administrative and grid connection processes

Performance indicator	Description
Average response time by the competent authorities and TSO/DSO for grid connection procedures	The Electricity Act states that the decision shall be made by the grid authority (Swedish Energy Markets Inspectorate) within three years from when a complete application was received by the authority. If the matter is to be decided by the Government, a decision shall be made within five years from when a complete application was received by the grid authority (§ 10 Ordinance on Electricity (2013:208)). An interviewed developer estimates that in reality, these schedules can be doubled (offshore developer, 2020).
Process duration	According to the SWEA, it usually takes 7-8 years to realise a larger wind park (SWEA, 2020). The interviewed representative of the heat pump industry stated that sometimes, the 'drilling permit' process can take up to a year, which is a considerable amount of time for such a small installation (Willis, 2020).
Project approval rates	Onshore and nearshore wind: In a study concerning all wind power projects in Sweden between years 2015 and 2018, 76% of all projects were rejected (SWEA, 2019a). No further details related to project approval rates are available.
Costs of administrative processes	N.A.
Share of permits that are legally challenged	N.A.
Share of legal challenges that are overruled	N.A.
Stakeholder interests	Citizens as well as other stakeholders have wide participation rights regarding permitting and spatial planning procedures in Sweden. Depending on the permit, also other stakeholders, such as NGOs, can participate in the consultation process. Their participation is described in more detail in Section 4 of this report. In principle, various stakeholders can have their say at the initial stage of the project, as well as at the very end when they can appeal the decision issued by competent authorities. The consultation part of the environmental permit process ('samråd') is initiated by the project developer, who is also responsible for informing the stakeholders about the project and gather their feedback.

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