



**Governing Growing Wind Power: Policy Coherence of
Wind Power Expansion and Environmental Considerations
in Sweden, with Comparative Examples from Norway**

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ENGLISH-SWEDISH GLOSSARY

Association for Swedish Landscape Protection – Föreningen Svenskt Landskapsskydd
County Environmental Appeal Delegation (CEAD) - Länsstyrelsens miljöprövningsdelegation
Directorate for Nature Management (DN) – Direktoratet for naturforvaltning
Directorate for Cultural Heritage (DCH) – Riksantikvaren
Environmental Impact Assessment (EIA) - Miljökonsekvensbeskrivning
Environment Protection Agency (EPA) - Naturvårdsverket
Energy Markets Inspectorate (EI) – Energimarknadsinspektionen
Geological Survey of Sweden – Sveriges Geologiska Undersökning
Land and Environment Court – Mark- och miljödomstolen
Land and Environment Court of Appeal – Mark- och miljööverdomstolen
Legal, Financial and Administrative Services Agency (LFASA) – Kammarkollegiet
Local Plan (municipal) – Detaljplan (kommunal)
Master plan (municipal) – Översiktsplan (kommunal)
Norwegian Ministry of the Environment – Miljøverndepartementet
Norwegian Ministry of Petroleum and Oil (MoPE) – Olje og energidepartementet
Norwegian Water Resources and Energy Directorate (NVE) – Norges vassdrags og energidirektorat
Planning and Building Act (PBA) - Plan- och bygglagen
Swedish Association of Local Authorities and Regions (SALAR) – Sveriges Kommuner och Landsting
Swedish Armed Forces – Försvarsmakten
Swedish Bird Association (SBA) – Sveriges ornitologiska förening
Swedish Energy Agency (SEA) – Energimyndigheten
Swedish Environmental Code (SEC) – Miljöbalken
Swedish Ministry of Enterprise – Näringsdepartementet
Swedish National Land Survey - Lantmäteriet
Swedish Society for Nature Conservation – Naturskyddsföreningen
Swedish Wind Energy (SWE) – Svensk vindenergi
The Nature Diversity Act – Naturmangfoldloven

1 INTRODUCTION

To meet the goals and requirements of the EU's Renewable Energy Directive (RES), the Swedish government has embarked on an ambitious project to expand the country's renewable energy production. Sweden's commitment to the RES is that by 2020, 49% of total energy consumption will be supplied by energy generated from renewable sources. Wind power is the renewable energy source that is currently expanding most rapidly in Sweden, and the government has prioritized its expansion above other sources of renewable energy, although other sources will contribute to achieving Sweden's RES goal.

Under current conditions, and given that land-based wind power is more profitable than off-shore wind power (Elforsk 2008), it is expected that at least two-thirds of the expansion of wind power will take place on land. In 2011, 96.5% of all turbines were on land and 92% of the electricity produced by wind power came from land-based turbines (Energimyndigheten 2012). There are no signs that this trend will alter in the near future. For instance, no off-shore turbines were developed in either 2010 or 2011 (Energimyndigheten 2012). This report therefore focuses on land-based wind power.

The expansion of renewable energy production in the EU, including wind power, achieves various political objectives, such as security of energy supply, innovation and employment. It is also, together with increased energy efficiency and energy saving, seen as a necessary component in the reduction of greenhouse gas (GHG) emissions in Europe (EU 2009). In Sweden the goal of expanding wind energy production was part of the Climate and Energy Bill of 2009. The totality of measures in the bill was intended to pave the way for a rapid exit from a fossil fuel-based society and lead to important reductions in emissions of GHGs (Regeringskansliet 2008). The expansion of wind power is therefore one of several measures intended to reduce emissions in order to limit climate change. At the same time, however, wind power developments often have negative impacts on the landscape and biodiversity, and cause noise pollution. To a certain degree, the expansion of wind power implies a dual environmental challenge in that it is seen as a necessary component in reducing GHG emissions and climate change, at the same time as it negatively affects other environmental objectives, such as the preservation of landscapes and biodiversity.

To ensure policy coherence and minimize conflicts in implementation in order to achieve different societal

goals, such considerations should ideally be balanced in governance arrangements for implementation and goal achievement. The main purposes of this report are to examine the policies and institutional framework that guide the ongoing expansion of land-based wind power in Sweden, and to assess the extent to which it is coherent with environmental considerations. This report has been produced by the GOVREP project to gain a better understanding of renewable energy policy in Norway and Sweden. The findings on Sweden are therefore contrasted with Norway. By studying public documents and the use of interviews this report:

- reviews the current framework, ambitions and progress of wind power expansion in Sweden
- reviews the state of knowledge on the environmental effects of wind power development
- analyses how environmental considerations are addressed in the concession process under the current framework.

Policy coherence centres on the outputs, implementation and outcomes of different policies and the way these interact. Analysing the policy coherence of environmental policy is similar to environmental policy integration, but there are some differences. Environmental policy integration focuses mainly on the integration of environmental protection into policies and activities with a view to promoting sustainable development. This should be carried out by inserting environmental requirements into policymaking and policy implementation (Jordan and Lenschow 2008, Lafferty and Hovden 2003, Lenschow 2002, Nilsson and Eckerberg 2007).¹ The focus of policy integration is thus mainly on the process of policymaking, while policy coherence analyses the measures used to implement various sets of policy objectives and their outcomes. A useful definition of policy coherence is "the property of two or more sets of policy objectives, instruments and implementation practices being free from contradiction, having logical order, clarity and intelligibility" (Nilsson et al. 2010). Given that this report has been produced by a project hosted by the Norwegian Centre for Environmental Design of Renewable Energy (CEDREN),² its focus is limited to environmental considerations, which

1 Definition taken from article 6 of the EC treaty

2 Further details on CEDREN can be found at: <http://cedren.no/>

is in line with the focus of the GOVREP project. Environmental considerations are defined as the protection of biodiversity (the variety of life forms), landscapes (landscape types and protected areas) and humans from pollution (noise, visual and emissions). A number of other issues and topics relevant to the

development of wind power are either not or only partially analysed in this report. These include the protection of cultural heritage, the rights of indigenous groups, farming, forestry, property rights, outdoor and leisure activities, air and sea traffic and military interests.



Storrún wind farm © larsfl/flickr

2 THE FRAMEWORK GUIDING THE EXPANSION OF WIND POWER IN SWEDEN

2.1 AMBITION AND PROGRESS

According to the RES, the EU must obtain 20% of its energy from renewable sources by 2020. The RES requires EU member states to submit national action plans on renewable energy, which are intended to work as roadmaps for how they intend to reach their legally binding national targets on renewable energy as a share of total energy consumption by 2020. Sweden's national action plan, which it submitted in 2010, states as its goal a sustainable and resource-efficient energy supply by 2050, which is to be guided by reconciling sustainability, competitiveness and security of supply (Government of Sweden 2010). As is noted above, Sweden's commitment to the RES is a 49% share of total energy consumption for renewable energy by 2020.

The Swedish government has initiated several processes in order to reach its renewable energy targets. These include further development of the electricity certificate scheme, a revision of its previous targets for renewable electricity (from an increase of 17 TWh between 2002 and 2016 to an increase of 25 TWh by 2020), and a planning framework for the building of 30 TWh of new wind power by 2020 (Government of Sweden 2010). The Swedish government aims to create a third major source of electricity production that reduces dependency on hydropower and nuclear power. The security of the energy supply is to be strengthened through the use of combined heat and power plants, wind power and other renewable sources. This is clearly stated in a government bill on an integrated energy and climate policy, which was adopted four years before the RES (Prop, 2008/09:163). There is also broad political agreement on the need for an expansion of wind power as a key step towards transforming the sustainability of the Swedish electricity system (Props 2005/06:143, 2008/09:146, 2008/09:163).

Several initiatives followed to fuel the expansion of wind power. In addition to the government bills mentioned above, there have been bills to facilitate the grid connection of new renewable energy production units (Prop, 2009/10:51) and to simplify the concession granting process for new wind power facilities (Prop, 2008/09: 146). Wind power developers are also given access to tools to facilitate the development of new wind farms, e.g. a planning tool has been put in place for wind power developers (Vindbrukskollen) (see www.vindlov.se). The Ministry of Enterprise

has appointed four wind power coordinators to work as a link and improve coordination between wind power developers, the authorities and other actors at the national, regional and local levels, and since 2008 it has invested sek 20 million a year in a network of wind power producers (Nätverket för vindbruk)³ led by the Swedish Energy Agency (Energimyndigheten 2011). In the period 2008–2012, sek 350 million was administered by the Swedish Energy Agency to set up pilot projects that aim to support the technical development of wind power in Sweden (Government of Sweden 2010). A wind strength model has been developed by Uppsala University for use by developers to identify suitable locations for turbines, based on wind strength and persistence (Bergström 2009). The Swedish Energy Agency has developed a map of areas of national interest for wind power. The main criterion of the mapping was to identify areas with an average wind speed of 6.5 m/s or more at a height of 71 metres (Energimyndigheten 2008:17). This is considered a reasonable threshold at which wind turbine construction is profitable, although the decreasing cost of building wind farms and varying costs for grid connections mean that wind turbines can be profitable in locations with lower average speeds than 6.5 m/s. Until the end of 2010, financial support was also made available to municipalities to adapt their master plans to cater for wind farms in line with the map of areas of national interest (Boverket 2011).

The areas of national interest are currently being revised. A proposal for 391 areas for land-based wind power and 25 areas for off-shore wind power has been referred to consultative bodies for consideration and a decision is expected by the summer of 2013 (Energimyndigheten 2013).

The high level of ambition and the number of initiatives for the expansion of wind power mean that wind power electricity generation is rising sharply in Sweden. Figure 2 shows that the increase in production and in the installed effect has been especially sharp in the past five years. At the start of 2012 the installed effect was 2769 MW (Energimyndigheten 2012).

3 Further details can be found at <http://www.natverketforvindbruk.se/>

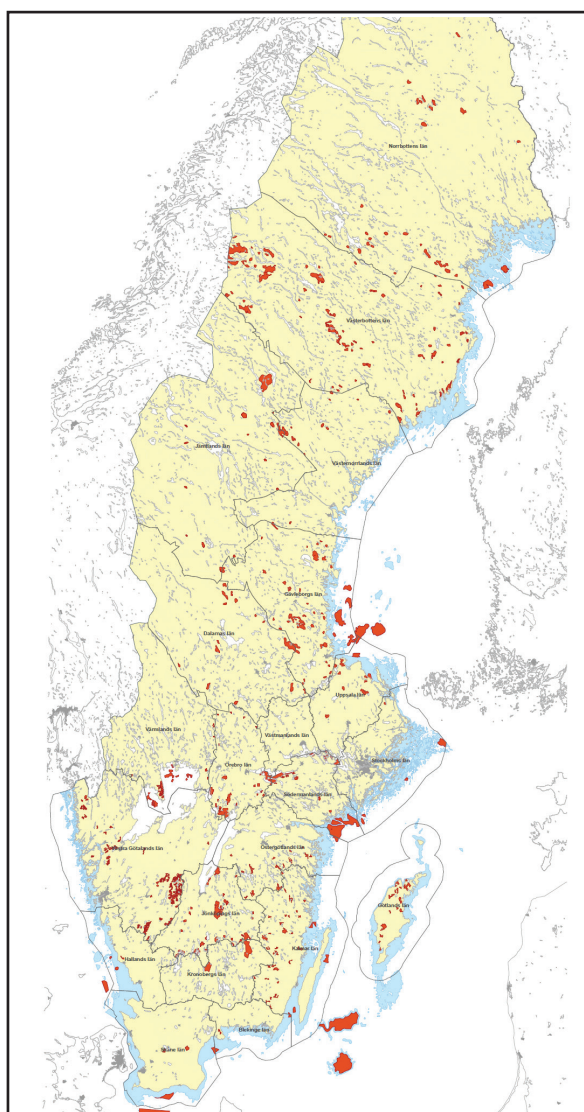





Figure 1: Map of areas of national interest for wind power in Sweden

Source: Energimyndigheten (2008:17)

Areas of national interest for wind power

On land	5886km ²
Coast and lakes (within county border in water)	1906km ²
Within Swedish economic zone	1948km ²
TOTAL	9742km²

	National interest for wind power
	Sea depth up to 30m
	County border

Swedish wind power generated 6.1 TWh of electricity in 2011 (4.2% of the total electricity production of 145 TWh), which represented a 74% increase on 2010 and an 871% increase on 2003 (Energimyndigheten 2012). Statistics on the share of wind power (see table 1 below) are affected by fluctuations in the annual production of other energy sources, and hydropower and nuclear power produced less than usual during 2009, 2010 and 2011. Even so, wind power has seen a steady increase. In comparison, expansion in Norway has resulted in an installed effect of approximately 704 MW and production of 1.6 TWh in 2012 (Norges vassdrag- og energidirektorat 2013).

In Sweden, 765 MW of wind power was installed across 380 wind farms in 2011 alone, and there are signs of a strong continuing expansion in the years to come (Nätverket för Vindbruk 2011, Energimyndigheten 2012).

2.2 LEGAL FRAMEWORK AND POLICIES

A legal and institutional framework guides the achievement of the goal of reducing GHG emissions in Sweden in general and the expansion of renewable energy in particular, formalizing the ambitions of the Swedish government. Sweden has a relatively long history of using policy instruments to reduce carbon dioxide emissions. The first *carbon dioxide tax*, which is still in force, was introduced in 1991, and is levied on emissions from all fuels except biofuels and peat (Energimyndigheten 2009a). Sweden also participates in the *EU emission trading scheme* (ETS), which is a climate policy instrument within the EU's European Climate Change Programme that aims to achieve the emission reduction commitments set out in the Kyoto Protocol. In Sweden, about 35% of GHG emissions are covered by the EU ETS (Energimyndigheten 2009a).

A third policy instrument is the *Renewable Electricity Certificate System*, which is a market-based support system to incentivize the expansion of renewable energy generation in Sweden. The Renewable Electricity Certificate System is one of the most important tools for reaching Sweden's commitment to the RES (Energimyndigheten 2009b). A certificate system was introduced in Sweden in 2003, and in 2010 the Swedish and Norwegian governments agreed to create a common market for Renewable Electricity Certificates. This was agreed even though modelling indicated that it would result in Sweden having a slightly smaller expansion of renewable energy production than would be the case in a purely national market (Energimyndigheten 2010a). It also means, however, that Swedish and Norwegian certificates

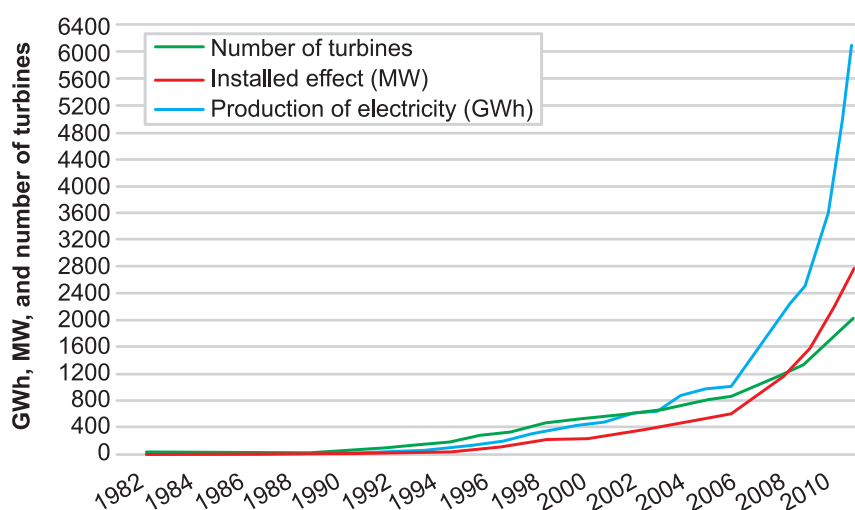


Figure 2: Development of wind power in Sweden, 1982–2011. Number of turbines, installed effect and electricity production

Source: Energimyndigheten (2012)

compete in the same market and cross-border, which is expected to lead to a more cost-effective expansion of renewable electricity production.

The common market has been in effect since 1 January 2012. In brief, electricity producers receive certificates corresponding to the MWh of electricity they produce from renewable resources. They can then sell their certificates to electricity suppliers, which are obliged to submit a certain quota of certificates to the Norwegian or Swedish state. The law introducing the Renewable Electricity Certificate System (SFS 2003:113) and the ensuing regulations from the Swedish Energy Agency (STEMFS 2009:3) specify the type of facilities that can receive renewable electricity certificates and under what conditions. After submission, the quota is cancelled

and demand is created for new certificates. The quota for certificates as a percentage of total electricity sales should reach a maximum of 17% and decrease to 4% in 2035 once a market for renewable energy has been established. The common goal for Norway and Sweden is an increase of 26.4 TWh in the amount of renewable electricity generated by 2020 compared to 2012 levels (Energimyndigheten 2010). This in essence doubles Sweden's original goal for the Renewable Electricity Certificate System. Modelling and analysis by the Swedish Energy Agency calculate that the common market will lead to an increase in hydropower production in Norway, while in Sweden it will mainly lead to increased production from combined heat and power plants. It is assumed that wind power will develop in a similar way in both countries (Energimyndigheten 2010).

Table 1: Percentage share of total net electricity production, 2003–2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Hydropower	40.1	40.4	46.6	43.8	45.2	46.1	48.6	46.1	45.3
Nuclear power	49.5	50.4	45.0	46.6	44.3	42.6	37.6	38.2	39.8
Combined heat and power	6.0	5.6	4.7	5.2	5.4	5.6	7.4	8.6	6.7
Industrial back pressure power	3.6	3.1	3.0	3.6	3.9	4.2	4.4	4.4	3.9
Wind power	0.5	0.6	0.6	0.7	1.0	1.4	1.9	2.4	4.2
Cold condensing power	0.4	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1

Source: Energimyndigheten, 2012

The *Swedish Environmental Code (SEC)* (Swedish law SFS, 1998:808) sets out the legal framework for large wind farms. Chapter 1 describes the overarching goal of the legislation: to ensure sustainable development by which current and future generations can enjoy a healthy and good environment. This includes ensuring the protection of human health and the environment, the protection of biodiversity and the long-term management of the use of natural resources. The chapter provides guidance on how the provisions of the law should be interpreted.

Chapter 2 establishes the general rules of consideration for an operator proposing or engaged in an enterprise that requires a concession. The “precautionary principle” and the “polluter pays principle”, as well as principles of product choice, resource management and recycling are outlined. A rule referred to as the “locality rule” states that the most suitable location, which minimizes disturbances to human health and the environment, should be selected for a given activity. The chapter also specifies the need for balance to ensure that the general rules of consideration in the SEC do not put an unreasonable burden on operators. Such discretionary space, however, does not exist for measures to ensure that the *Environmental Quality Norms*, which should not be confused with the non-binding Environmental Quality Objectives, are met. The Environmental Quality Norms are the legally binding norms specified in chapter 5 of the SEC. These norms were introduced to mitigate environmental impacts from diffuse sources and are different from earlier environmental regulations in that they specify a certain state of the environment rather than regulating the human activities that affect the environment. There are environmental quality norms for air quality, water quality and noise.

Chapter 3 sets out how land and water should be used for the purposes for which an area is best suited in the light of its natural attributes and location. The code also gives specified areas special protection linked to their natural or cultural value, and lists areas where special consideration must be given to the interests of tourism and outdoor recreation. The specific rules of the concession granting process and concession hearings for wind power are specified in chapter 9 of the SEC, which deals with environmentally hazardous activities.

The *Planning and Building Act (PBA)* (SFS 2010:900) regulates the use of areas of land and water, and is particularly important for agreeing the location of small and medium-sized wind farms. The municipality grants or denies a construction permit for these turbines in accordance with the PBA. The resource

management principle of the SEC should also be applied in processes regulated by the PBA. The PBA further stipulates that all municipalities must have an up-to-date master plan that sets out general guidelines for the use of land and water resources and future developments in the municipality. This master plan should also specify how the municipality means to comply with the Environmental Quality Norms and satisfy areas of different national interest. The municipality can also specify which areas are suitable or unsuitable for wind power developments. Swedish municipalities have strong planning powers and a right to veto large wind farms in their area. This makes the master plan a key planning document for the siting of and issuing of permits for wind farms, even though it is not a legally binding document.

The *Swedish Environmental Quality Objectives (EQO)* form the overarching framework of Swedish environmental policy. They are political goals that are legally non-binding. They consist of 16 environmental objectives, the majority of which are intended to be reached by 2020. The goals range from “Natural Acidification Only” to “Sustainable Forests”, and are to be achieved through voluntary initiatives, economic and educational instruments and, as a last resort, legislation. There is, however, no mechanism for achieving them, or any mention of the EQOs in the SEC (EEC 92; Dalhammar 2008). The implementation processes for the EQOs is therefore unclear and incomplete, as is clearly shown by the latest evaluation of their progress which concludes that 14 of the 16 goals will not be met within the set timeframe (Naturvårdsverket 2012). The EQOs most relevant to wind power are: “Reduced Climate Impact” (no.1); “A Magnificent Mountain Landscape” (no.14); “A Good Built Environment” (no.15); and “A Rich Diversity of Plant and Animal Life” (no.16). Progress on the Environmental Quality Objectives is assessed using a number of indicators. Wind power is relevant as either one of the indicators or a factor that can influence an indicator. However, the EQOs are only given general consideration in the municipalities’ master plans and have little direct impact on the planning of wind power (Boverket 2007).

EU legislation also influences the development of wind power, e.g. through its nature conservation policies such as its Birds and Habitats Directives (EEC 92/43; EC 2009/147). The Natura 2000 network of protected sites and the strict system of species protection are the two keystones of the directives, protecting 200 typical European habitat types, such as special types of forests, wetlands and meadows, as well as 1000 animal and plant species. There are

as yet few examples of wind power developments in or near Natura 2000 sites in Sweden, but such concessions have been granted (Bondön and Gråsjön) as well as denied (Eksjöberget) which shows that the implementation of EU legislation can be a factor (Naturvårdsverket 2013).

2.3 THE CONCESSION PROCESS

The location and development of wind farms is largely regulated by the PBA and the SEC. *Small wind turbines* of a height between 20 and 50 metres require a building permit according to the PBA, which is granted by the municipality concerned. *Medium-sized wind farms* are defined as either a wind turbine of a height greater than 50 metres, or two or more wind turbines standing together. These wind farms must be reported according to the SEC and require a building permit under the PBA, applications for which are in both cases heard by the municipality concerned. The municipality can ask for an Environmental Impact Assessment to be conducted before approving the project. *Large wind farms* are defined as two or more wind turbines located together, where each of the turbines, including blades, is taller than 150 metres; or a group of seven or more turbines of a height, including blades, above 120 metres. These wind farms require a permit according to the SEC, granted by the County Environmental Appeal Delegation (CEAD) of the County Administrative Board. During the application process, the municipality must give its approval to the project – and it has a right of veto. A decision by the CEAD can be appealed to the Land and Environment Court (LEC). A decision by the Land and Environment Court can be appealed to the Land and Environment Court of Appeal (LECA), but only if the LECA has granted leave for such an appeal.

As is noted above, simplifications to the concession process have been announced as one government initiative to fuel wind power expansion. This was also part of the government's formal obligations under the EU RES, which aims to reduce barriers to development. Methods to simplify the concession granting process for wind power installations were part of the recommendations of the Government Commission of Inquiry on Environmental Processes (SOU 2008:86). Large wind power installations were previously subject to “double jeopardy”, involving both a hearing by the CEAD according to the SEC and a municipal planning hearing according to the PBA and the municipality's local plan. Since the revision of the concession process in 2009, large wind farms have only been subject to a single hearing, heard by the CEAD according to the SEC (Prop 2008/09:146).

In this sense, the revisions worked to speed up the process, which was one of their main aims.

Removing the requirement for a concession process under the PBA decreased the influence of municipalities over the licensing process for large wind farms. As compensation for this loss of influence, however, the municipalities were granted a right to veto wind power developments in their area (SEC, 16 chapter 4§). Consequently, a concession for a large wind farm cannot be granted without the consent of the municipality concerned. Municipalities do not have to give reasons for their decision and it is not specified at what stage of the process the municipality must announce its decision. The veto cannot be appealed, but citizens of the municipality concerned can demand a judicial review, and can therefore appeal the decision based on the legality of the process (i.e. based on questioning the process of decision-making but not on factual matters) (Energimyndigheten 2010b). The government also needs the consent of the municipality to allow wind power developments in areas of national interest, as these areas put national claims on land within municipal boundaries. Municipalities are obliged to take account of national interests in their comprehensive planning, and the County Administrative Board must ensure that they do so. In addition, chapter 17 of the SEC leaves it open for the government to overrule the municipal veto and allow a development if it is deemed exceptionally urgent from a national perspective and there is no other suitable location.⁴ Although this revision of the concession process reduced administrative processes by eliminating double jeopardy, the introduction of the veto has been criticized by some actors for counteracting the speeding up of the concession process that was supposed to result.

Actors and their roles

Several actors are involved in the development of wind power in Sweden, either in choosing between policy options (decision makers) or influencing decisions or contributing information (consultative bodies). Figure 5 depicts the main organizations that intervene in a concession process. The wind turbine operator initiates the concession process, while the Swedish Environmental Protection Agency (EPA) and the Legal, Financial and Administrative Services Agency (LFASA) are the main agencies that intervene to protect the public and environmental interests. The municipality, the County Administrative Board and

⁴ To the authors' knowledge a municipal veto has never been overruled. Given the strong tradition of municipal control over its land and the legal meaning of “exceptionally urgent” it would probably be politically challenging to invoke the use of chapter 17 of the SEC.

Example of a concession application process for a large wind farm

The planning approval process for large wind farms often starts with the operator discussing the scope of the Environmental Impact Assessment (EIA) with the County Administrative Board concerned. Consultation material is sent out to concerned stakeholders, which specifies the extent, location, design and expected environmental impact of the planned activity. If the activity is expected to result in a significant environmental impact, the operator must consult a larger group of stakeholders including governmental agencies, municipalities and NGOs. Notes of the consultation are gathered in an account of the consultation and

the CEAD of the County Administrative Board decides the extent and scope of the EIA required. The operator must then produce the EIA, apply to the CEAD for a permit asking for statements of opinion from consultative bodies and stakeholders, and hold a hearing if deemed appropriate. The CEAD then makes its decision, which, if it is in the affirmative, requires the approval of the municipality. The CEAD decision can be appealed to the LEC. If the case has specific characteristics, such as being of general interest in the application of the law, the LECA can also grant leave to appeal, and hear the specific case. Only a limited number of

cases are granted leave to appeal in the LECA. It is the parties involved in the concession application process, such as the wind power company, participating public agencies and NGOs that can appeal a decision. The municipal right to veto remains, however, and in practice cannot be appealed.

If connection to the electricity grid requires a power line across another person's land, a concession can be applied for according to the wire right law (SFS 1973:1144). The general rule is that the benefits of the new electricity power line should exceed the costs for third parties.

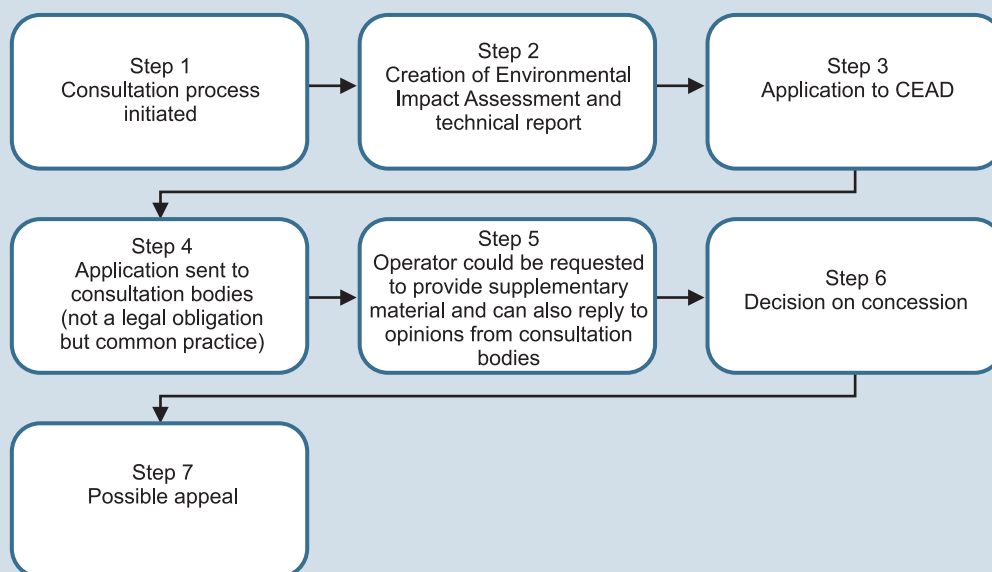


Figure 3: Usual steps in the concession process for large wind farms on land (not close to densely populated areas.)

Source: <http://www.vindlov.se/>

some NGOs also intervene, and the municipality has a possible veto. The entities shown in Figure 5 are commonly involved, but do not represent a complete list of actors and consultative bodies – and their involvement depends on the specifics of each case.

As is noted in Figure 4, the CEAD of the *County Administrative Board* is the decision-making body of first instance for granting permits for large wind power

installations. Another, organizationally separate, part of the County Administrative Board is the supervising authority for large wind power installations. A decision by the CEAD can be appealed to the *Land and Environment Court* and in the final instance to the *Land and Environment Court of Appeal*.

The *municipalities* have a major influence over all types of wind power development, either as a

consultative body or as the final decision maker. The *municipalities* are the main public authority for granting permits and the supervision of small and medium-sized installations, and a municipality has the right to veto the development of any large wind farms in its area. Municipalities should, where appropriate, cater for wind power developments in their master plan by specifying suitable locations.

The *Energy Markets Inspectorate* hears applications for and has the power to grant the net concession for new wind power plants. This hearing is separate from the main concession process which is why the Energy Market Inspectorate is not shown in Figure 5.

The *Swedish Environment Protection Agency* is the agency responsible for providing guidance on the

supervision of wind power. The EPA can intervene in applications for concessions granted according to the SEC. Furthermore, one of its main responsibilities is to ensure that proper consideration is given to the environment in the establishment of wind power installations. The EPA has also been asked by the government to promote the expansion of wind power, which it does by providing guidance documents on wind power development and funding studies on wind power.

The *Legal, Financial and Administrative Services Agency* can act in the concession hearing process to protect general environmental and public interests.

The *County Administrative Board* can intervene in hearings on the development of large wind farms. The part of the Board that intervenes is organizationally

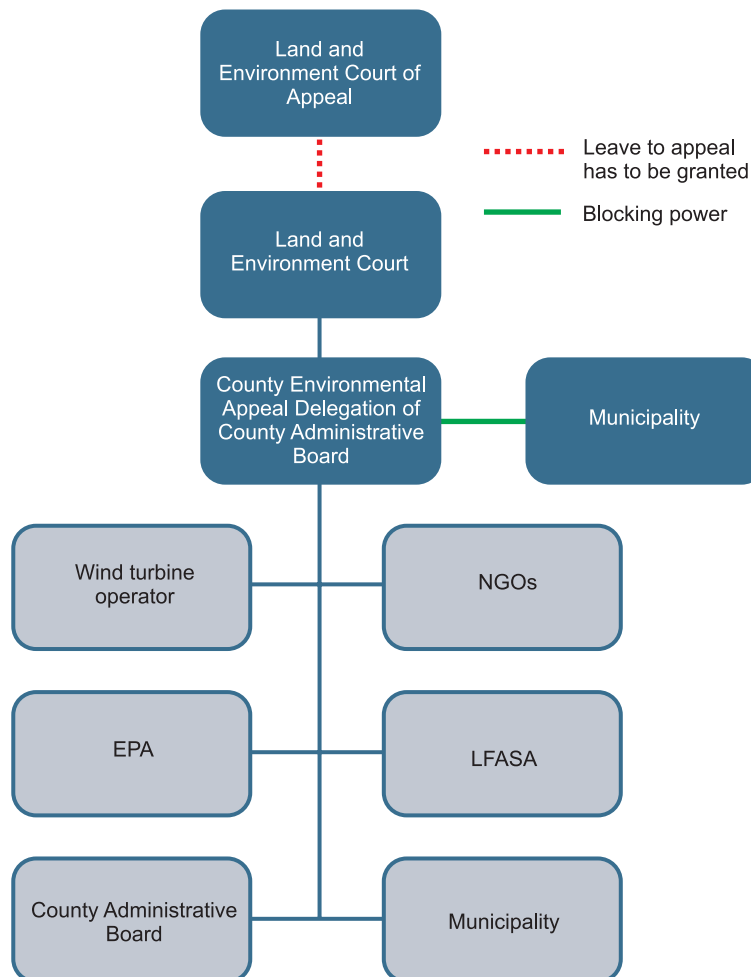


Figure 4: Decision-making power in the concession procedure, Sweden

Decision-making power is marked in dark blue, and consultative bodies without decision-making power in light blue. The municipality is marked as both a consultative body and a decision-making body since it has the ability to block large wind power developments but does not have the power to approve projects.

separate from the CEAD. Any responsible *municipal committee*, such as one with environmental interests, can also intervene in this way.

The SEC makes the *Swedish Armed Forces* a consultative body on concession processes. In addition, *any agency* can be invited by the court to provide information on a specific case, if a wind power development has an influence on an area of potential concern or within its general responsibility. This includes the *Geological Survey of Sweden* and the *Swedish Energy Agency*.

Any NGO with more than 100 members that has been in existence for more than three years can act as a consultative body in a hearing (EC, 1367/2006/EG). Stakeholder organizations active in the debate over and governance of Swedish wind power include *Swedish Wind Energy (SWE)*, which is the main trade organization for large wind power providers. Most environmental NGOs, such as the *Swedish Society for Nature Conservation* and the *Swedish Bird Association (SBA)*, are generally in favour of wind power but actively work to ensure that wind turbines are put in suitable locations that minimize the negative impacts on the environment and birds. The main NGO working against wind power development is the *Association for Swedish Landscape Protection*.

Among academic actors, with no formal role in the concession process, there is an ongoing debate on the need for and desirable extent of wind power in Sweden. The Royal Swedish Academy of Science has argued that a desirable limit for wind power generation would be 10 TWh/year, and that the expansion of wind power is an inefficient way to reduce GHG emissions (Bengtsson, Hedberg and Frank 2012). Scientists from the Swedish Royal Institute of Technology, however, have questioned many of these conclusions and the scientific assumptions on which they were made (Söder 2005).

2.4 COMMENTS ON THE INSTITUTIONAL FRAMEWORK

The decision to grant municipalities a right of veto and to strengthen their influence over the development of wind power has been much criticized by wind power developers, among others, in Sweden, who perceive it as a large risk factor in the expansion of wind power. SWE estimated in 2010 that the veto had stopped the development of at least 380 wind farms, with a total capacity of 1000MW. Ten of these projects were in areas which the municipality had identified

as suitable for wind power (Swedish Wind Energy 2010). The Swedish Energy Agency carried out a review in 2009, after the veto had been operating for one year. It concluded that the new rules had made the concession process more difficult, and questioned whether the due process of the law was being followed. The agency recommended that the municipal veto be revised or removed. The Swedish Association of Local Authorities and Regions (SALAR) argued for the preservation of the municipal veto while requesting further resources for municipalities to help them cater for wind power developments (SKL 2011). Parliament considered removing the municipal veto in 2011, but a motion to that effect failed and it remains in place at the time of writing (2010/11: MJU23 2011).

The Swedish tradition of strong municipal control over physical planning can be contrasted with the Norwegian case, where formal municipal and county influence is less. It is clear from Figure 6 that decision-making is much less decentralized in Norway.

In Norway, municipalities are the executive authority for wind farms that generate less than 1000V, which should be in accordance with municipal master plans. If, however, a municipality has not catered for wind power in its plan, the Ministry of Petroleum and Energy (MoPE) can overrule the decision of that municipality. Unlike Sweden, the first instance authority for granting permits for large wind farms is at the national level – the Norwegian Water Resources and Energy Directorate (NVE). Municipalities cannot veto projects in their area. Hearing and granting concession applications is therefore centralized to a larger extent in Norway, and municipalities are given much less formal influence.

The main planning tools for situating wind power in Sweden – the map of areas of national interest and the municipal master plans – represent the perspectives of the national and the local levels. During the development of their master plans, municipalities must identify areas that are appropriate for wind power developments. The master plan however must balance a range of national and municipal concerns and interests and the development of wind power is only one of several. The municipal veto means that municipal master plans, despite the fact that they are not legal documents, and the general attitude to wind power development in a municipality are likely to be deciding factors in the development and location of wind farms. Therefore, the map of areas of national interest, on the other hand, identifies areas that are deemed appropriate for wind power developments from a national perspective.

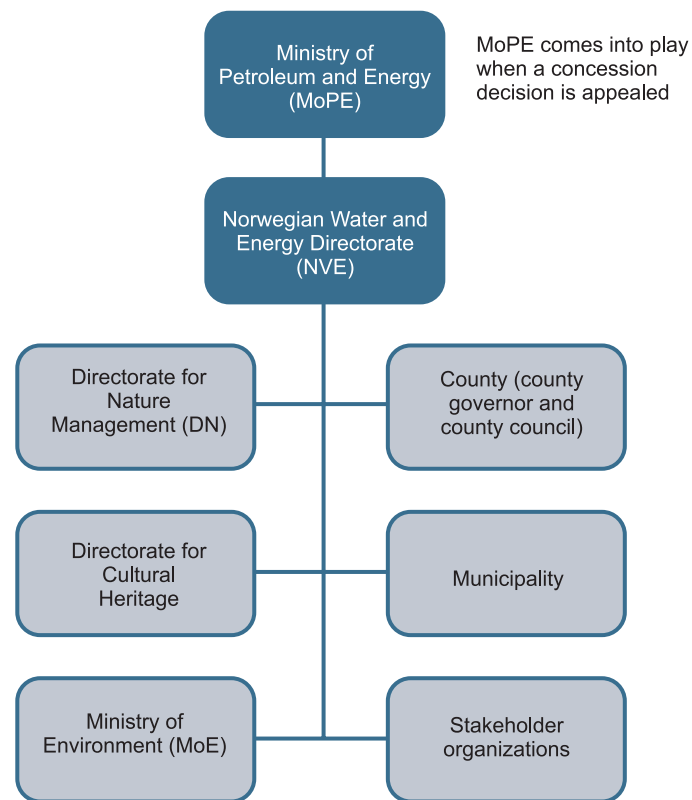


Figure 5: Decision-making power in the concession procedure, Norway

Note: Decision makers are shown in dark blue; consultative bodies without direct decision-making power are shown in light blue. Power of Decision lies with the NVE and, if the project is appealed, with the MoPE

Norway has taken steps to develop regional plans (NVE 2007), but there is no national map of areas of interest for wind power. Several Norwegian actors, including the Directorate for Nature Management (DN) and the right wing Progress Party, have more than once asked for a national planning tool to be devised for wind power (Energi- og miljøkomiteen 2009, Stortinget 2007). Parliament has rejected these requests, arguing that drawing up a national plan would be too time-consuming and too costly. DN points out, however, that a national plan would be useful for steering developers and the NVE away from the most controversial projects, thereby saving resources for both the industry and the authorities.

Since 2005, thematic conflict assessments have been conducted with regard to reindeer management, nature and environmental⁵ considerations, and defence interests (NVE 2009). DN and the Directorate

for Cultural Heritage together grade the natural environment, the cultural environment and the landscape. These assessments result in a grade from A to E, where A represents little or no conflict with regard to national environmental goals, while E represents a major conflict in which it would not be possible for mitigating measures to reduce the conflict level. Category D represents high conflict with regard to national environmental goals, where a reduction in the conflict level would only be possible through extensive modifications to the project. Nonetheless, as figure 6 illustrates, the final decision on individual projects lies with the NVE or, in the final instance, the MoPE.

It is therefore the NVE that assesses the input from the thematic conflict assessments and ultimately weighs it against other factors. Of the 57 projects that had required a thematic conflict assessment at the application phase, and had been dealt with by the NVE by the end of 2011, 25 were given a D classification. Of these, 10 projects were granted a concession and only three were rejected. Of the 12 projects that received an E classification, four projects were granted

⁵ This category is divided into three subcategories that are given an overall grade: 'natural environment', 'cultural environment' and 'landscape'.

a concession and three were rejected. DN argues that E-grade projects should under no circumstances be granted a concession, and it should be very difficult to make changes that will result in a D-grade project becoming acceptable. The results from the concession process in Norway therefore indicate that different national agencies prioritize and value different aspects of wind power development very differently, and that projects that are deemed unsuitable under any circumstances by the environmental authorities have been granted concessions by the NVE.

In the Swedish system, the national tool for identifying suitable areas for wind power (areas of national interest) is only a guidance tool, which leaves the final decision and the reconciliation of conflicting views to be carried out at the lower, county and municipal levels in the first instance. On the other hand, the strong municipal influence in Sweden has been heavily criticized for hindering the expansion of wind power. A report published as part of the LETS⁶ research programme suggested that a strengthening of central decision-making through changes to the planning framework would be needed to overcome the governance challenges exposed by attempts to develop wind power in Sweden (Khan, Hildingsson and Klintman 2011). Such changes, however, were not deemed feasible given the strong tradition of municipal control.

The experience of Norway, which has a centralized system for granting wind power concessions, demonstrates the challenges associated with centralized decision-making. Moreover, wind power is expanding faster in Sweden than in Norway. In Sweden, wind power projects are often developed in areas with dense populations, while in Norway almost all applications are appealed (Buan, Eikeland & Inderberg 2010:39). Part of the explanation for this may lie in Sweden's more decentralized system, as it is commonly argued that decentralized decision-making increases acceptance and reduces conflict, but part also in the fact that leave to appeal has to be granted in Sweden.

Strengthening methods to encourage municipalities to plan for wind power, using sticks and carrots, was another, more feasible suggestion made by the LETS programme. Carrots could include stronger economic incentives for municipalities to host wind power projects. Today, the certificate system creates incentives for wind power developers in Sweden and Norway, but municipalities could benefit to a greater extent from the economic profits of wind power exploitation. The issue of compensation has been debated to a greater extent in Norway than in Sweden, perhaps because projects can be forced on municipalities in Norway. In addition, in Norway the hydropower sector generates significant economic benefits for host municipalities, which encourages municipalities hosting wind power to seek similar benefits (Knudsen and Ruud 2011).

6 Governing transitions towards Low-Carbon Energy and Transport Systems for 2050 (LETS) was an interdisciplinary research programme run at Lund University in 2009–2012.

3 WIND POWER AND ENVIRONMENTAL CONSIDERATIONS

As wind power expands, wind farms will become a more common feature of the Swedish landscape. Their impact will affect a larger segment of the population and of the environment. Commissioning wind power implies a trade-off between different objectives, since the framework that guides the expansion of wind power seeks to increase the share of renewable energy and avoid negative impacts on the environment, e.g. on the landscape or biodiversity. Wind power expansion in Sweden also has a national-local dimension as a national policy is implemented in a local context in a system where local levels of government have strong decision-making powers. The governance challenges are further complicated by the high level of complexity in the institutional framework and the multiplicity of actors involved. The governance challenges span several areas, some of which relate to the institutional framework discussed above.

In order to understand the challenges and balance conflicting goals, knowledge of the environmental impacts of wind power is crucial. The Swedish government initiated two research programmes – Vindren and Vindval – to increase the knowledge base on the environmental impacts of wind power and how these can be mitigated.

Vindren was a common research project, which ran between 2009 and 2010, of the SWE and the Swedish national Sami organization. It targeted wind power developers and Sami villagers to find sustainable solutions for the coexistence of reindeer herding and wind farms in northern Sweden, and to improve understanding and knowledge-sharing among stakeholders. The project resulted in the development of guidelines for the construction and management of wind farms in reindeer herding areas, which were published on the SWE's homepage (Vindren, 2010). The guidelines are primarily intended to be used by developers and Sami villagers to balance the interests of both parties, provide advice on how and when wind power is to be developed, and support decision makers in the concession process. The guidelines, however, are voluntary recommendations and not legally binding.

Vindval was a larger research programme run jointly by the Swedish Energy Agency and the EPA until July 2013. It focused on the effects of wind power on human interests, birds, bats, marine life and land mammals. Findings and conclusions from Vindval can be used in environmental impact assessments and in planning and concession processes, but there is no

obligation to do so. Between 2006 and 2010, 15 reports were published by the programme. Research on the effects on human interests focused on noise from the wind turbines, the wind power development process and the effects on the landscape (Vindval 2011). In the research on the development process, the focus was on attitudes, participation, planning, and communication between the applicants, the authorities and the people directly affected. Work on the effects of wind power on the landscape focused on cultural landscapes, open landscapes and general research on how individuals assess and value landscapes.

Because the guidelines resulting from Vindren and Vindval are voluntary, their influence depends on their adoption by the CEADs and Land and Environment Courts. Even though the programmes lack a formal role, the results from Vindval have been used in decision-making and have helped to improve the integration of environmental concerns into the concession process (VEM Konsult 2011).

Vindforsk, a third research programme undertaking applied wind power research, is funded by the Swedish Energy Agency and private sector wind power developers. It has no formal role in the concession system, but its overarching goal is to strengthen the preconditions for wind power, and it focuses especially on technical aspects. Vindforsk does not explicitly assess environmental impacts but deals with them to some extent, e.g. around the issue of noise.

3.1 THE KNOWLEDGE BASE ON THE ENVIRONMENTAL EFFECTS OF WIND POWER

Environmental impacts from wind farms occur during construction, installation, running and dismantling. Impacts during installation and dismantling are linked to the use of heavy transport, the reinforcement or construction of roads, digging up land for groundworks and cables, and the noise related to these activities. During use, visual and physical impacts on the landscape occur, as well as what can be perceived as disturbing noise, shadows and reflections of light. Birds and bats also risk colliding with the wind turbines.

Much of the research on these impacts is ongoing. Most of the published results that relate to land-based wind power and human interests cover the planning process and perceptions of the sound from the wind

turbines. The general conclusion on the latter is that the perceived disturbance increases if the wind turbine is within sight, and that there are health-related problems if the noise disturbs sleep (Naturvårdsverket 2010). Results from research on the planning and development process divide wind power project development into four categories in relation to the affected local communities: “anchorage”, “resignation”, “different obstacles” and “conflict and discontinuation”. Anchorage is the preferred process by which local communities participate in a wind power project, influence the process, and as a result are positive about the further development of wind power in their area once the project is finalized. In the case of resignation and conflict and discontinuation, the process is managed in such a way that the local community remains sceptical about it, which jeopardizes future development in the area. In the case of discontinuation, protests are so strong that the wind power project cannot be completed. In the case of different obstacles, the local community favours the wind power project but other reasons prevent the project from progressing. A report by the Swedish EPA gives advice on how to improve the chances of local acceptance (Naturvårdsverket 2008). The Network for Wind Power (Nätverket för vindbruk) was also established in part to support local acceptance and knowledge dissemination.

The impact of wind farms on birds and bats has also been investigated. The research has focused on the effect on migratory birds, the impact on the habitat and mating of the golden eagle, the effect on mountain and forest birds’ fauna, and the risk of bat collision with off-shore wind turbines. The majority

of research is ongoing and it is only in relation to migratory birds and bats that some results have been produced. The research on migratory birds provides advice and a methodology for observing migratory birds using radar to calculate the risk of collision (Naturvårdsverket, 2006). The SBA has also published recommendations that specify the minimum distance from bird nesting sites that wind power turbines should be established (SOF 2009). Research on bats shows that they are most active in winds below 5 m/s, and that they do not avoid wind turbines but instead focus their activity around them since insects gather around the turbines. One recommendation based on this research is not to use wind turbines at wind speeds below 5 m/s. This would not result in large energy losses, since electricity production is marginal at these wind speeds (Naturvårdsverket 2007). The researcher responsible has said that wind power developers have received the results positively, mainly because energy losses would be marginal and it could allow developments in areas where wind power is currently restricted due to a large population of bats. Whether these recommendations become guidance depends on whether the CEADs consider them in future concession decisions.

In general, the research carried out so far has looked at the effects of relatively small wind farms and wind turbines. Concern has been expressed by an official at the Swedish EPA that the structural and environmental effects of the largest wind farms, currently in the planning phase, have not been investigated and could be very different from those experienced from smaller wind farms (SR 2011).

4 POLICY COHERENCE THROUGHOUT THE CONCESSION PROCESS

By applying the legal and policy framework to individual wind project proposals, the concession process becomes the main decision-making body where the environmental impacts that could follow are assessed and regulated. It is therefore a useful point of departure for assessing policy coherence and how environmental considerations are balanced with the need to increase the production of renewable energy from wind power. This section assesses the framework by looking primarily at three aspects: the policy's reference to environmental concerns, whether the environmental objective is represented by a stakeholder (consultative body) in the concession process and whether the environmental objective is a factor in the concession hearing.

The renewable electricity certificate scheme is the most significant tool for expanding wind power production in Sweden, but neither the agreement between Sweden and Norway nor the rules for the allocation of the certificates make any reference to environmental criteria. The coherence of the renewable electricity certificates with other environmental policies at various scales can therefore – at best – be described as neutral. The Directorate for Nature Management in Norway has been critical of the fact that climate impacts and the impact on nature were not discussed in the proposal for a new act on certificates (Direktoratet for Naturforvaltning 2011). The fact that the main tool for wind power expansion does not include environmental considerations only underlines the importance of the concession process for balancing the two aspects.

The *Swedish Environmental Code* is the main legislation regulating how environmental concerns are to be included in the concession process. It sets out the rules and principles, the Environmental Quality Norms and the procedure for the concession process. The SEC explicitly aims to foster sustainable development, and states that nature has a value and that human use and its impacts come with a strong responsibility to protect. Assessing wind power developments according to the SEC should thus allow a significant role for environmental considerations. Citing the EQNs, which municipalities are obliged to consider in their planning, the SEC also applies environmental considerations to municipal decisions on wind power. According to the SEC, municipal master plans are also subject to environmental assessment, as are the local plans in certain situations. Given that the master plan is a major planning tool for wind power, the extent to which it considers the environment is crucial. *The Planning*

and Building Act stipulates that municipalities must state in their master plans how they intend to comply with the EQNs, which areas are suitable or not suitable for wind power and how they will deal with areas of national interest.

The Map of areas of national interest for wind power is another major planning tool. While the main criterion of the mapping is to highlight suitable areas for wind power, the map gives consideration to environmental interests by stipulating exceptions to the wind speed criterion. The map excludes: land identified as national parks, according to SEC 7, chap. 2§ and 4 chap. § 7; land identified as uninterrupted mountains, according to SEC 4 chap. 5§; and areas identified as built areas in the National Land Survey's "terrain map", with a buffer area of 400 metres. The selection criteria for the map is thus to some extent coordinated with other environmental and societal goals. Excluding land close to human dwellings in order to reduce the noise from and visual impacts of the wind turbines is in line with EQO 15. Excluding land identified as uninterrupted mountains is in line with EQOs 14 and 16, since it removes some of the mountainous regions from the wind power development map. National parks are generally areas of high biodiversity, and excluding them from the wind power development map therefore increases coordination with EQO 16. Even though there is some coherence between the map and the *Swedish Environmental Objectives*, the objectives are understood as having little direct effect on the planning of wind power. They are political goals with a clear environmental focus, but non-binding. Nonetheless, municipalities can be seen to be contributing to their achievement in the long run through the binding Environmental Quality Norms, which strive to realize the objectives.

With regard to *EU legislation*, *Natura 2000* and the *Birds and Habitats Directives* are seen as most relevant to the expansion of wind power. There is no direct reference to Natura 2000 areas in the selection criteria for areas of national interest for wind power, but these often coincide with the Swedish national parks and are thus still protected through other legislation. From concession decisions it appears that a precedent has been set to refuse wind power developments that can have a significant negative effect on Natura 2000 areas, and the legislation thus appears to be a factor in the development of wind power (Naturvårdsverket 2013). Since Natura 2000 areas are established geographical areas it is generally relatively easy to assess the

probable impacts of wind power, such as noise and habitat fragmentation. With regard to species protected by the Birds and Habitat Directives, where the establishment of a Natura 2000 area is one measure, the effect is harder to establish. A number of issues need to be investigated to establish that a protected species resides in the affected area and the extent to which it will be disturbed by the proposed wind farms. The *Vindval* research programme contributes to improving the knowledge base for such decisions. In individual concession cases the knowledge base is a key question in relation to what the required protection for birds and wildlife should be.

A review by consultants in 2011 showed that references to *Vindval* were made during several concession hearings, demonstrating that their outputs are a factor in decision-making (VEM Konsult 2011). In addition, the LEC and the LECA have made reference to research results from *Vindval* in at least nine concession decisions to date (Hydén 2011). For example, its recommendations on the golden eagle were tested in the cases of Stamåsen and Björkhöjden-Björkvattnet, where the local branch of the SBA appealed the decision of the CEAD to the LEC, and the LECA ruled there should be a minimum protection zone of 2 km around a golden eagle nest (Miljödomstolen 2010). This ruling could set a precedent for wind power developments close to golden eagle nests.

Rulings of the LECA demonstrate coordination between national and municipal planning documents and specific concession rulings. In the Mästermyr case (M 8344-11) the court made reference to research conclusions from *Vindval* and the presence of sea eagles and golden eagles in the chosen location to reject a proposed wind power development in the area. The court found that the wind power operator had not established that the chosen site was the most suitable location, as required by the SEC. In this case, the site's value as a bird habitat outweighed the fact that the area had been identified as a suitable area for wind power in both the national wind power plan and the municipal master plan. In the case of Glötesvålen (M 10316-09), however, the court concluded that the wider interest of increased production of renewable energy, and the fact that the chosen location had been specified as suitable for wind power and the municipality had given its consent provided grounds to allow the application. Permission was therefore granted despite the area's high geological value and the fact that it is specified as an area of national interest for reindeer herding. These cases show how various environmental and energy interests must be balanced in individual cases under the current legal and policy framework in Sweden.

Although research programmes in Sweden such as *Vindval* contribute to strengthening the *knowledge base*, there is still a knowledge gap. The research carried out so far has not included the most extensive wind power parks, one example of which is Markbygden Vind AB, where 1101 wind turbines are planned in an area of 500 square km (Energinytt 2009). The structural and environmental effects of such a massive wind farm could be different from those experienced from existing, more moderately sized large wind farms (SR 2011). An improved knowledge base is crucial not least for environmental impact assessments, which are mandatory for large wind farms in Sweden and all projects in Norway with an installed effect above 10MW. Lack of knowledge reduces certainty in impact assessments and the foundation on which environmental impacts are considered in the concession process.

Our review of the concession process shows that how environmental considerations are treated seems to facilitate coherence between national, municipal, renewable energy and environmental considerations. Nonetheless, the involvement or absence of different actors in the concession process can also influence the decision. The strong legal controls granted to municipalities can give heavy weight to local interests or local opinion in Sweden. A survey by SWE of project developers shows that they believe the main reason for the use of the veto by municipalities is out of consideration for local opinion, and that increasing local participation could reduce the use of the veto (Swedish Wind Energy 2010).

If local opinion is represented by a preference for the natural landscape or current built environment over new wind power developments, the main potential problem is to guarantee that municipalities cater for the national objective of expanding wind power. As is noted above, local acceptance and the anchorage of projects are important for future development. At the personal level, the conflicting interests of local and global environmental impacts are in part a matter of balancing between risks and opportunities. There are examples of wind power development processes where the debate has shifted away from the perception of wind power as a threat to local interests to regard it as a possible opportunity to contribute to gains at the global level. In one case, wind power developers gained strong support using "think global: act local" arguments (Naturvårdsverket 2008).

Although the representation of voice has not been studied for this report, the concession framework appears to allow broad engagement and opportunities for many actors to participate. Among the actors most

commonly involved, few are explicitly against wind power and most aim to facilitate expansion while ensuring the environment is properly considered. The Swedish National Board of Housing, SEA, the EPA and the County Administrative Boards have all been given directives and a mandate to incentivize and support the expansion of wind power. The Swedish Armed Forces are also mandated to contribute to achieving the national goal for wind power, but they were identified in a motion in the Swedish Parliament (2012/13:Fö223) as one of the biggest obstacles to continued expansion (Government of Sweden 2012). Often vaguely motivated by secrecy, the Swedish

Armed Forces have prevented the development of several wind farms (Government of Sweden 2008). By representing a superior national interest the attitude of the Swedish Armed Forces works as a veto, even though it is just one interested party among others.

Balancing between impacts and benefits at different levels is obviously a challenging task, but the dual responsibilities of the Swedish EPA show that the expansion of wind power and ensuring proper consideration of the environment in wind power developments are not inherently conflicting objectives, at least not in the view of the Swedish government.

5 CONCLUSIONS AND POLICY IMPLICATIONS

Judging from the positive trends for wind power expansion in Sweden, the current framework appears to support the intended goal and Sweden seems to be on track to achieve its targets under the RES. Furthermore, this expansion does not seem to contradict the framework for environmental protection. It is clear, however, that the municipal veto adds uncertainty and risks counteracting attempts to speed up the concession process and wind power expansion. If the institutional framework is sometimes criticized for making it challenging for new wind power developments, the strong push for wind power, clearly supported by the government and the political parties in parliament, works in the opposite direction. Policies such as the renewable electricity certificate strongly incentivize the expansion of wind power in Sweden. The main debate relates to how, where and to what extent wind power should be established in order to increase its benefits to and reduce its negative impact on the environment.

This report raises two main policy challenges: how to balance environmental interests at different levels in a decentralized system; and how to use knowledge and include consideration of non-binding goals in the concession process.

The granting of a municipal veto has been very high profile in Sweden, and either removing it or revising it to allow for other means of municipal influence has been much debated. Acceptance and the anchorage of projects are essential to a successful expansion of wind power and the veto is one solution to ensuring municipal influence over the concession process. The veto also strengthens operators' responsiveness to municipal interests as municipalities listen to citizens' opinions. A veto may not be necessary to ensure local influence, but strong local influence in the concession process probably is. The veto is unlikely to be removed, however, and focus is perhaps better directed to strengthening incentives for municipalities to give their consent to projects and to cater for the nationally agreed objective of wind power expansion.

In Sweden, master plans play a big role, but mainly because of the veto. Ensuring – through means other than the veto – that master plans are considered and respected in the concession process is therefore one possible way to reduce the use of the veto. Another is to translate national or global benefits and goals into local benefits. Making the link between local and global impacts more explicit could help to change attitudes,

which could reduce the use of the municipal veto without compromising municipal influence. Another way could be to use economic incentives.

Economic compensation for hosting wind power projects has been debated in Norway, but to a lesser extent in Sweden. Compensation could strengthen local acceptance of wind power projects of national (or even global) interest by letting the local level share the national or global benefits of wind power expansion, or at least compensating it for any losses development might imply. In Norway, a municipality gains income from property taxes and the potential creation of new jobs and activity in the area by hosting a wind power project. Hydropower projects, on the other hand, are compensated for to a greater extent – through a hydropower tax, a development fund (the size of which is determined by the NVE) and in some cases subsidies for electricity produced by the power plant (Knudsen & Ruud 2011). In Sweden there is no direct monetary compensation for wind power developments. It is expected that all municipalities will cater for national goals in their respective areas. The veto is one possible explanation for the smaller interest in compensation in Sweden – as municipalities have given their consent to host a project – but the history of compensation for energy production is also different in Sweden, where compensation for energy production from other sources, including hydropower, has not been commonly used. If the veto is removed or revised there may be a stronger case for compensation in Sweden, but in the meantime it could also work to motivate municipalities to give their consent to projects within their territory.

There seems to be potential to improve decision-making through the use of voluntary guidelines linked to research findings. Although the legal framework appears to ensure that environmental impacts are considered, non-binding goals such as the Swedish Environmental Quality Objectives are not given much consideration in concession processes. Non-binding guidelines such as Vindval's are considered on an ad hoc basis, but lack a formal place in the concession process. Their use in these processes is important because it establishes case precedent, which can work as a guide for future decision-making. Given that the EQOs are central to Swedish environmental policymaking, and that the availability of knowledge is the basis for fairly assessing whether a planned project is appropriate, improved consideration of non-binding environmental targets and guidelines could further strengthen coherence and help to avoid conflicting goals.

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