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## REFORMING WIND POWER PLANNING AND POLICY: EXPERIENCES FROM THE NORDIC COUNTRIES

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### Introduction

Investments in new wind power often face a number of economic and institutional obstacles. In the past most research attention has been paid to the design and impact of specific financial support schemes (e.g., green certificate schemes, feed-in tariffs etc.), while fewer studies have addressed the legal permitting procedures and planning systems that underpin renewable energy policy and practice (Toke et al. 2008; Buen 2006). This paper analyzes and compares some important institutional and legal preconditions for wind power development in three Nordic countries: Denmark, Norway and Sweden. In doing so, we also comment on recent regulatory reforms of the relevant legislation.

The electricity markets in Europe are becoming increasingly international in scope, but the planning and permitting conditions are still heavily influenced by national legislation and legal cultures. The Danish, Norwegian and Swedish electricity systems are well-integrated and essentially form one common Nordic electricity market, but even in these otherwise politically homogenous countries the legal preconditions for investments in wind power and other power-generating plants differ in important ways. For this reason, the strength and the design of the various public support schemes can only provide some insight on important inter-country differences in domestic wind power penetration rates.

An important aspect of the national regulations for wind power concerns the issue of how formal political power is allocated between national, regional and local decision-makers. In legal systems that grant local authorities substantial discretion in influencing planning processes, it can be difficult to invest in wind power projects unless the local economy can benefit from this investment. For this reason decentralised systems often induce both investors and government authorities to design strategies that aim at increasing the local acceptance of wind power projects (e.g., compensation mechanisms, facilitating local ownership, etc.).<sup>1</sup> Denmark, Norway and Sweden all have fairly decentralized planning systems, but they differ in the sense that it remains more or less difficult for the local levels in the respective countries to override national energy policy goals.

### Wind power development and policy in the Nordic countries

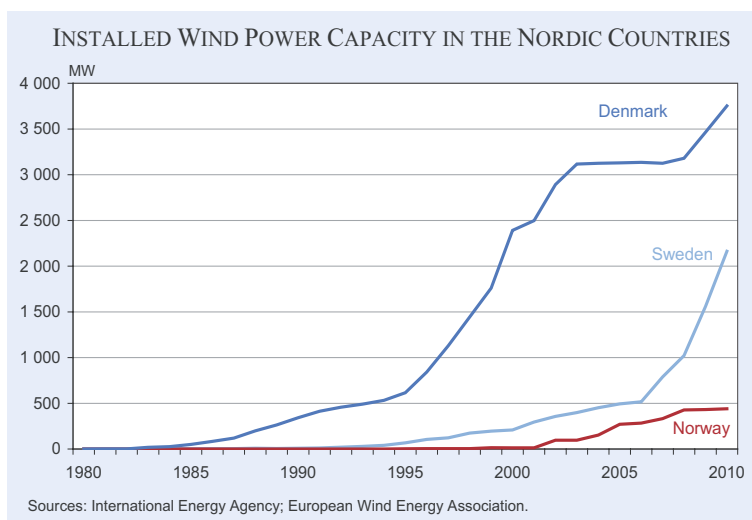
The Figure shows the development of the total installed onshore and offshore wind power capacity in Denmark, Norway and Sweden during the last 30 years. In Denmark the expansion in wind power took off during the mid-1980s. The introduction of wind power in Sweden and Norway became noteworthy only in the late 1990s, and in Sweden the annual growth in capacity has been significant during the last five years.

The differences in wind power capacity can be explained by a variety of factors. On a general level it may be noted that, in part due to the lack of domestic energy sources (e.g., hydropower), the Danish electricity system has largely been organized in a bottom-up manner with cooperative organizations and municipalities as owners of distribution utilities and power stations (Thue 1995). The Swedish and Norwegian electricity regimes have instead been

<sup>1</sup> There are several examples of how countries have reformed their permitting procedures for new power plants during recent years. In some of these countries (e.g., Italy) the reforms have led to a more centralized process (IEA 2007), while others instead have implemented, for instance, compensation mechanisms to increase local support (e.g., Spain).

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Figure



more hierarchical and expert-dependent. For instance, in Sweden there has been a lack of historical experience with extensive investment activities in small-scale power plants. The past has instead been dominated by large state-supported hydropower and nuclear energy projects. In Norway hydropower has dominated the country's power generation sector, but the role of direct state involvement in the sector has been less prevalent compared with Sweden (Pettersson et al. 2010). Norwegian power generation has been local, due primarily to the favorable locations of the country's hydropower sources (and the associated varied sizes of the water falls).

It is probably fair to assert that the Danish tradition of explicitly acknowledging local interests and participation in the planning system facilitated the expansion of wind power during the 1980s and the 1990s.<sup>2</sup> The strong interdependence between wind power establishments on the one hand, and rural and local interests on the other has existed in Denmark since the early 1900s, and there were even government-funded R&D projects focusing on wind power during the Second World War (Jorgensen and Karnoe 1992).

The strength and the design of the policy support for wind power have played a clear role in influencing wind power penetration rates. The low rate of wind power expansion in Sweden up to the beginning of the 2000s was a result of significant policy uncertainties; policy support (e.g., investment subsidies) was

altered from one year to the next and thus offered investors few guarantees of sustained support over the lifetime of the project. In Denmark explicit production support (per kWh generated electricity) was introduced already in the mid-1980s; it was guaranteed by means of fixed-price contracts (feed-in tariffs) over a longer period (often 10 years), resulting in a more stable investment environment for wind power. In Norway the policy interest in wind power was more or less non-existent during the 1990s, but increased somewhat after the turn of the century.

Since 2008 Norwegian wind power developers have been provided a fixed feed-in tariff over a fifteen-year-period, although this financial support has been considered too low to stimulate a significant expansion of wind power in the country.

In Sweden a green certificate system for renewable energy was introduced in 2003, and since 2006 the producers of renewable electricity have been able to issue new certificates over a time period of 15 years. This system represents a much more stable financial support to wind power developers compared with the earlier support schemes in Sweden. The green certificate system provides a relatively generous support per kWh generated and has been a key behind the rapid expansion of onshore wind power from 2006 and onwards. Recently the Swedish and the Norwegian governments have agreed to establish a joint green certificate market by the year 2012.

The relatively modest development of Danish wind power during the last decade can be explained by the fact that the generous feed-in tariffs that were in place during the 1990s were replaced by lower financial support for new onshore projects. Danish energy policy has instead begun to pay more and more attention to offshore wind power development, and since 2004 a tendering system for offshore installations has been in use. The companies that win the opening bids are guaranteed a fixed amount – in effect a feed-in tariff – for a future production equivalent to 50,000 full load hours (in practice a subsidy over a 12-year time period). An important feature of the Danish offshore tendering system is that the sites have been pre-selected by the Danish government. This new offshore policy has led to the increase in wind power capacity since 2006, including the con-

<sup>2</sup> For instance, already in 1979 it was made possible for small, private investors in Denmark to attain public economic support for wind mill investments, and studies show that people who own shares in wind turbines are more likely to be positive towards wind power compared with people who are not economically involved in the wind power sector. Private investors in Sweden were granted the same possibility in 1992.

struction of the two large offshore wind farms, Horns Rev II (2009) and Nysted II (2010).

In Sweden and Norway there is currently no targeted subsidy solely for offshore wind power, and the existing support levels (e.g., in the Swedish green certificate system) are generally too low to promote the more expensive offshore investments. Still, a few investments have taken place in both countries (Söderholm and Pettersson 2011).

### **Territorial planning regulations: a comparison**

The most significant differences between the relevant legislation in the three Nordic countries concern the role and the nature of the planning systems, and this section highlights some key components of these. First it should be emphasized that in Denmark the establishment of new wind mills is regulated almost without exception within the legal framework of physical planning, implying, for instance, that localization issues are entirely integrated into the planning process. In Norway and Sweden, however, other types of laws also concern wind power development (see below).

The Swedish physical planning system has a significant influence on the potential for a broad implementation of wind power, and compared with its Nordic counterparts, it stands out as the most decentralized. In cases where the competition for land is intense, the municipalities in Sweden must in some way assent to (i.e., plan for) the establishment of wind mills in order for the installation to actually take place. In more remote areas this so-called detailed plan is not required, but as of 2008 Swedish municipalities have been given an explicit right of veto with respect to wind power development. This means that no wind power development takes place without municipal consent, and the new veto has even been applied retroactively to pending cases.

The planning process in Sweden involves the balancing of different interests, but the balancing principles are vague and leave substantial room for discretion on the part of the local governments (see below). The attitudes of local governments towards wind power development have also differed markedly, and these may often determine the outcome of the planning process. In municipalities where there is a political will to promote wind power and thus to integrate efficiently the diffusion of wind mills into the plan-

ning process, the planning requirements have typically been flexible and simple. Important drawbacks of this approach, though, are that it may not promote an efficient location of wind mills, and it tends to limit the role of the citizen and stakeholder participation. Thus, while successful in the short run, a planning approach of this sort may, in the long term, create suspicion towards wind power projects. In municipalities where politicians and officials are more reluctant to actively promote wind power, the planning requirements are stricter and citizen participation more extensive. As a result, the installed capacity of wind mills is low in these municipalities (although wind conditions can be very favourable; Khan 2003).

The Danish and Norwegian planning systems both have a more hierarchical structure (Pettersson et al. 2010). In Denmark the planning system that prevailed during the most rapid expansion period for wind power in the country, comprised three authoritative levels (national, regional and municipal) and four different types of physical plans (national, regional, municipal and local).<sup>3</sup> The national planning authorities deal with overarching planning issues and the implementation of national planning objectives, whereas the regional and municipal planning authorities handle the planning of the open land and the town areas, respectively. The functioning of this hierarchical system has been built upon two, closely related, characteristics.

The first (the so-called “rammestyrning”) implies a framework of rules to guide individual decisions. Each level of planning provides the framework within which the lower level planning may be conducted. For instance, the regional planning authorities must respect the framework outlined in the national directives, and the municipal plans must comply with the regional planning guidelines. In other words, the different plans are essentially vertically integrated, and areas designated for windmill installations in the regional plan shall thus be appointed for the same purpose in the municipal plan. The second characteristic of the planning system is the “strive for” provisions obliging the planning authorities to strive to implement the plans or planning guidelines that they have adopted when exercising authority in accordance with the Danish planning legislation.

<sup>3</sup> In 2007 the Danish planning system was partly reformed with a slightly different role for the regional planning level (e.g., Pettersson 2008). However, the most central mechanisms governing the establishment of wind power have remained more or less unaltered.

In 1999 a Danish wind power planning directive was issued to secure the implementation of renewable energy resources, and this directive has been implemented by means of regional and municipal planning. It stipulates that areas suitable for windmill establishments should be designated and included in the regional planning guidelines. The directive also stipulates detailed guidelines for the establishment of wind mills, such as the distance to residential areas and a requirement to install the mills in groups. Municipal and local plans for windmill installations may only be established for areas already designated for this purpose in the regional planning guidelines.

In Norway there are also three levels of planning: national, regional and municipal. In contrast to the Swedish system – and much more in line with the Danish one – Norway has a vertically integrated planning system. In other words, there is a national planning level which sets out general planning objectives that the minister should strive to implement at the regional and municipal planning levels. Similar to the Danish case, areas for windmill exploitation in Norway are assigned in the regional plans, based on, among other things, wind resources, the presence of opposite interests, etc. The regional plans should then “provide direction” for the municipal as well as the national planning, and they function thus as a link between the latter levels of planning, both in terms of objectives and actual implementation. The above points towards a more binding planning system than in Sweden, the latter essentially lacking any type of regional planning (or at least this level does not de facto carry any enforcement mechanisms). Under the amended Norwegian planning and building act, regulation plans (local plans) are no longer a requirement for windmill installations, and it is possible for the licensing decision to be made solely within the realms of a national plan.

In sum, on a general level the different wind power planning processes are seemingly comparable across the three Nordic countries. They are decentralized in terms of far-reaching distribution of competence among several planning levels, but our analysis suggests some important differences in the implementation process. The Danish system, in combination with the option to adopt partly mandatory planning directives, implies that national level policy objectives cannot be overlooked, neither in the planning process or in the implementation of an adopted plan. A similar system exists in Norway.

Sweden’s experience illustrates in turn that the strong municipal position leaves substantial room for discretion and de facto ignoring of national policy objectives. In Sweden the most significant growth in wind power is currently taking place in the remote areas of the country (e.g., northern Sweden), where large forest-based wind farms are being built. In these areas there are fewer conflicts of interest, and the municipalities typically experience high unemployment and out-migration rates.

### **Environmental concession and public participation**

In Sweden the rules on physical planning represent essentially only one out of two major components in the relevant legal process. The second component is the Environmental Code, which states that wind power stations of a certain height can only be permitted if they are in compliance with specific environmental requirements. For instance, the so-called basic resource management provisions include general provisions for the weighting between different land-use interests but also legal “protection” for areas related to certain public interests. The weighting provisions are, however, vaguely formulated and thus provide substantial scope for different interpretations of how they should be applied. At best, areas may be designated “of national interest” for wind power production. Still, if an area is of national interest for other purposes as well (e.g., nature conservation), the legal rules provide very little guidance and leave the decision-makers with substantial discretion. Analyses of Swedish case law confirm that the prerequisites for wind power development provided by the basic resource management provisions are unpredictable both regarding the possibilities for averting obstructive activities as well as for explicitly promoting wind power (Petterson 2008).

Wind power development in Sweden is also subject to the so-called localization rule, under which requirements regarding the selection of sites can be brought upon operators. Similar localization requirements do not exist in Norway and Denmark, and in Sweden it has occasionally provided an obstacle to wind power in selected cases. Most notably, sites must be selected so that the purpose of the activity is achieved with “a minimum of damage or detriment to the environment”. In controversial cases, the latter requirement obliges the operator to undertake an objective assessment of alternative sites. This may in some cases imply a very stringent – and even inef-

ficient – obstacle towards installation. The wind mill owner may not have access to any other site than the chosen one, but if another site is more suitable for achieving the purpose of the activity from an environmental point of view, a permit cannot be issued unless the costs for altering the location are found unreasonable.

The legal process for wind power permitting in Norway has overall a greater resemblance to the Danish system, i.e., it relies heavily on the planning system to deal with localization issues. Still, there are also complementary laws such as the Norwegian Energy Act of 1991, which, for instance, sets out the rules for so-called installation and area concessions. The installation concession is granted for a specific construction, e.g., a wind mill or an entire wind farm. The Norwegian government has also laid down guidelines for the planning and location of windmill installations. These are not legally binding, but even so they do facilitate compliance with the national objectives. The level of detail concerning the nature of the conflicts that may arise as a result of the installations as well as ways to solve conflicts, etc., combined with the fact that the relevant government authorities actively promote the use of these guidelines, supports this conclusion. The final – and decisive – assessment is however made by the competent concession authority, namely, the Norwegian Water Resources and Energy Directorate (NVE). Overall the more precise regulations and specified prerequisites in the Danish laws and bylaws as well as the Norwegian guidelines leave the administrative authorities in these countries with less room for discretion than is typically the case in Sweden.

The different forms of legislation in all three Nordic countries provide for – and encourage – stakeholders to participate in the decision-making process, but particularly in Sweden and Norway local environmental opposition has occasionally been a major obstacle against wind power development. This problem is accentuated by the sometimes extensive appeal possibilities (at least in Sweden) and by the overlap of the permit and planning systems. Our analysis of Danish case law (e.g., Pettersson 2008) also suggests that in order to voice any negative attitudes towards planned wind mill projects in Denmark it is important to get involved early in the decision-making process, while it is easier in Sweden to prevent the installation of wind mills at later stages. The reason for this is that the Danish system relies more extensively on pre-determined regulations such as

standards for noise pollution and distances to residential areas, etc., while the Swedish legislation only offers vague guidelines for how different opposing interests should be assessed.

The legal rules in Sweden thus allow for “negotiations”, court rulings, etc., and therefore generate stronger incentives to appeal since the prospects for successfully hampering wind power projects are greater than the corresponding prospects in Denmark. Moreover, since the only formally binding legal source – the legal text – does not outline in any precise way how to value and balance the interests involved, it is often inevitable that stakeholders’ attitudes gain significant weight in the decisions made by Swedish courts. More recent Swedish court cases, though, indicate a change in the legal perception of wind power. In earlier court cases, wind power often suffered defeat in the battle with, for instance, nature conservation objectives, whereas in more recent cases the outcome has been reversed. The (environmental) benefits of wind power have also outweighed strong protective interests (e.g., the presence of golden eagles; Pettersson 2011). Examples like this confirm that Swedish legislation leaves considerable room for discretion in the application of the law.

For the above reasons the average lead times for wind power project developers have, in general, been higher in Sweden compared with both Norway and Denmark, and the principal administrative cause of delay is typically linked to the territorial planning provisions. In Europe average lead times for wind power projects range between 1.5 and 4.5 years (Neuhoff 2005), while they may often exceed four years in Sweden and typically range between two and four years in Norway. The reasons for the shorter observed lead times for wind power in Norway include both the above-mentioned guidelines for the planning and location of wind mills but also the fact that Norwegian authorities are expected to comply with time limits in preparing decisions on concession.

While these long lead times do not imply that projects are denied the necessary permits, they may exacerbate investment risks and thus lead to higher rate-of-return requirements on the part of investors. This is largely because the future revenues of wind power generation are largely policy-determined. The capital costs involved in wind power development form a sizeable part of the total lifetime cost of a typical project, and the higher the uncertainties are about the future rate-of-return on the investment, the less competitive wind power becomes.

### Regulatory reform and the move offshore

The legal and institutional obstacles facing onshore wind power have created an increased interest in offshore investments. Many countries – not the least Denmark and the UK – have presented ambitious expansion plans for offshore wind power and have partly redesigned their support systems and legislation to realize these plans. In Sweden and Norway (both with extensive coastlines) there is significant potential for future expansion of offshore wind power, and Denmark (together with the UK) is already at the forefront of offshore wind development in Europe (Söderholm and Pettersson 2011). In 2009 Denmark accounted for about 30 percent of total European offshore capacity, while the corresponding figures for Sweden and Norway were 8 and 0.1 percent, respectively (EWEA 2010).

The Danes have designed a streamlined permitting process for offshore projects. The right to exploit wind energy within the Danish territorial waters and the economic zone belongs to the Danish government, which grants user rights according to a tendering procedure. The actual development requires only one permit (and a special environmental impact assessment for electric installations offshore), all prepared and granted by the government. In practice the Danish Energy Authority coordinates the interdepartmental planning and permitting process with the intention to offer a “one-stop-shop” (Markard and Petersen 2009). As was noted above, the new offshore wind policy has facilitated the expansion of wind power in the country.

In Norway, a new law outlining the legal framework for offshore wind power was adopted in 2009 (the Ocean Energy Act). The purpose of the legislation is to facilitate development of offshore renewable energy while ensuring control of the use of natural resources as well as over production and transmission facilities. The Act regulates the planning, operation and closure of offshore facilities and enables the designation of areas suitable for wind power, for instance, with the aim of granting concessions later on. In addition to the license application, the operator must also submit a detailed development plan. The new Norwegian Act implies a significant and perhaps also necessary simplification compared with the previous rather complicated and extensive permitting procedures. The fact that the final consent for Norway’s first offshore wind farm (Havslut I) was granted by the Ministry of Oil and Energy as early as September 2010 is an indication of this.

In Sweden, the law presents less of an obstacle with respect to offshore (compared with onshore) wind power development outside Swedish territory.<sup>4</sup> Installations within the Swedish economic zone call only for one permit, and this is granted by the government (in the case of installations of cables, etc., an additional permit is required). Also this permitting process includes an assessment according to resource management provisions and the general consideration rules in the Environmental Code, but the assessment is fairly straightforward compared with onshore installations, mainly as a result of the fewer interests involved. A court case from 2008 is a clear example of this: the case concerned the installation of a wind farm offshore in a designated area of national interest for wind power but also a special protection area in accordance with the EU Habitats Directive (habitat for dolphins). Despite the rather strong protection that this regulation implies, the government decided that the wind farm best utilized the area’s natural resources. The permit was granted on the condition that the required consultations and investigations be carried out.

### Concluding remarks

This paper has addressed some important institutional and legal differences in wind power planning and permitting across three Nordic countries. Our analysis suggests that although public economic support for wind power is necessary to promote its diffusion in the electricity system, similar policy instruments – in terms of both size and design – can induce significantly different developments depending on the legal preconditions for the location and environmental assessment of wind mills. The success and failure stories of technology support policies can thus not easily be transferred across country borders.

An important conclusion is that compared to Sweden the planning systems in both Denmark and Norway provide greater scope for implementing a national wind power policy at the local level. For instance, the Danish planning system is vertically integrated and involves a designation of areas for wind power purposes in local plans, while the municipalities in Sweden must in some way assent to the establishment of wind mills at a certain location. The ex-

<sup>4</sup> The territory of Sweden extends twelve nautical miles off the coastline and wind power facilities in water areas (i.e., lakes, streams, ditches, etc.) on Swedish territory are subject to virtually the same legal procedure as land-based facilities

pansion of wind power in Sweden can therefore be explained primarily by the existence of a relatively generous support scheme and the fact that most investments take place in remote and sparsely populated parts of the country.

Furthermore, in Sweden legislation only offers weak guidance on how to balance different interests against each other in specific cases, and it is difficult for investors to anticipate which issues will determine the legal outcome. Recent applications of Swedish law, though, reveal a more positive stance towards wind power in general. Compared to its competitors, wind power is one of the power-generating technologies that tends to have the most to lose from legal uncertainty. Overall this has been less of a problem in Denmark and Norway, where pre-determined standards or detailed guidelines on how conflicts of interest should be addressed exist, although in these countries the financial policy support needs to be strengthened in order to encourage additional wind power investment.

The increased interest in offshore wind power is spurred by the favourable wind conditions at sea but also by the existing obstacles to onshore developments. The Nordic countries offer rather favourable legal conditions for offshore wind power, e.g., in comparison to the United Kingdom, where several permits are necessary. The regulatory reforms for offshore projects in Denmark and Norway are likely to facilitate future expansions provided that the necessary financial support is put in place.

## References

- Buen, J. (2006), "Danish and Norwegian Wind Industry: The Relationship between Policy Instruments, Innovation and Diffusion", *Energy Policy* 34, 3887–897.
- European Wind Energy Association (EWEA) (2010), *The European Offshore Wind Industry – Key Trends and Statistics 2009*, Available at [www.ewea.org](http://www.ewea.org)
- International Energy Agency (IEA) (2007), *Tackling Investment Challenges in Power Generation in IEA Countries*, OECD, Paris.
- Jorgensen, U. and P. Karnoe (1992), "The Danish Wind-Turbine Story: Technical Solutions to Political Visions", in: A. Rip, T. J. Misa, and J. Schot, eds., *Managing Technology in Society: The Approach of Constructive Technology Assessment*, Pinter Publishers, 57–82.
- Khan, J. (2003), "Wind Power Planning in Three Swedish Municipalities," *Journal of Environmental Planning and Management* 46, 563–81.
- Markard, J. and R. Petersen (2009), "The Offshore Trend: Structural Changes in the Wind Power Sector", *Energy Policy* 37, 3545–556.
- Neuhoff, K. (2005), "Large Scale Deployment of Renewables for Electricity Generation", *Oxford Review of Economic Policy* 21, 88–110.

Pettersson, M. (2008), *Renewable Energy Development and the Function of Law: A Comparative Study of Legal Rules Related to the Planning, Installation and Operation of Wind-mills*, doctoral thesis 65, Jurisprudence Unit, Luleå University of Technology, Sweden.

Pettersson, M. (2011), "Path Dependence in the Legal System: Implications for the Development of Wind power", *Nordic Environmental Law Journal*, in press.

Pettersson, M., K. Ek, K. Söderholm and P. Söderholm (2010), "Wind Power Planning and Permitting: Comparative Perspectives from the Nordic Countries", *Renewable and Sustainable Energy Reviews* 14, 3116–123.

Söderholm, P. and M. Pettersson (2011), "Offshore Wind Power Policy and Planning in Sweden", *Energy Policy* 39, 518–25.

Thue, L. (1995), "Electricity Rules – The Formation and Development of the Nordic Electricity Regimes", in: A. Kaijser and M. Hedin, eds., *Nordic Energy Systems: Historical Perspectives and Current Issues*, Canton, Massachusetts, 11–30.

Toke, D., S. Breukers and M. Wolsink (2008), "Wind Power Deployment Outcomes: How Can We Account for the Differences?" *Renewable and Sustainable Energy Reviews* 12, 1129–47.