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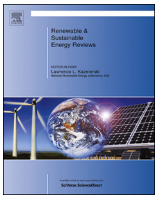

A review of regulatory framework for wind energy in European Union countries: Current state and expected developments

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ABSTRACT

This paper presents an overview of the regulatory framework for wind energy in European Union Member States. The analysis covers three main aspects of regulatory framework: support schemes, electrical grid issues and potential barriers for wind power deployment. The aim is not just to provide an updated picture of current (early-2015) regulatory framework, but also to analyse the past evolution and trends (in order to achieve the targets of renewable energy share set for 2020). Each country implements a specific regulatory framework driven by several factors: their own renewable energy targets, local availability of renewable resources, energy mix structure, existing infrastructures as well as other factors such as public perception or geographical distribution of electricity generation and consumption points.

The results presented in this paper show a trend for increasing the market exposure of wind generators; feed-in premiums and competitive bidding procedures to establish the support level are gaining prominence in the last few years. In relation to grid issues, it is a common practice that new wind generators only bear the grid extension costs to the closest connection point; priority or guaranteed access is granted in most Member States and wind generators are usually not demanded to meet balancing requirements (this is expected to change in the next few years following the new guidelines provided by the European Commission). The analysis of potential barriers for wind energy deployment shows that the stability of regulatory framework is one of the most important concerns for investors. Finally, actual deployment over the last few years has been linked with evolution of regulatory frameworks. This analysis shows that some Member States have shown a strong commitment supporting wind energy; however, in other countries the support has not been enough to stimulate the desired level of investment.

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1. Introduction

The Renewable Energy Directive 2009/28/EC [1] established a European framework to promote renewable energy by setting mandatory national targets in order to achieve at least a 20% renewable energy share in final energy by 2020. Each Member State (MS) was required, by June 2010, to set out the sectoral targets by their National Renewable Energy Action Plans (NREAPs). Each individual plan defined the technology mix scenario, the trajectory to be followed and the measures and reforms to overcome barriers and ensure the developing of renewable energy. According to the plan defined in the NREAPs, wind energy has a significant role in order to achieve the 2020 renewable energy targets: expected installed capacity by 2020 in the European Union (EU) is 209.6 GW (165.6 GW onshore and 43.9 GW offshore). These figures would account for a 43.1%[1] of renewable electricity technologies installed by 2020 (34.0% corresponds to onshore and 9.1% to offshore wind energy).

Under these circumstances the regulatory framework has a vital role in order to attract new investors and achieve a proper level of deployment. Not only the additional income provided by support schemes is important but also other aspects — as regulatory stability, non-complex permitting and connection procedure, market structure or absence of other potential barriers — are also vital drivers to promote the installation of new wind farms.

The existing literature about regulatory framework to promote the deployment of renewable energy sources is extensive. In 2010 Hiroux and Saguan [2] discussed how electricity markets could be designed in order to host a significant amount of wind energy, concluding that wind power producers should be exposed to market signals. To this end, a feed-in premium (FiP) seems to be a suitable option, since the risk for producers is controlled to some extent and renewable generators are exposed to market signals. In 2012 Couture and Gagnon [3] presented the advantages and disadvantages of different design options for feed-in tariffs (FiTs) and FiPs. Specific features such as inflation adjustment, degression rate (predefined tariff decrease with time for new installations) and floor or ceiling price are analysed by identifying the impact on risk for investors, and overall cost of renewable energy deployment. The evolution of support schemes during 2000–2011 was analysed by Kitzing et al. [4], concluding that a slight tendency is observed for a bottom-up convergence of regulatory frameworks in EU MSs.

Lemming [5] studied in 2003 the risk implications by analysing how the higher risk associated to tradable green certificates (TGCs) markets — compared with FiTs — results in higher income required by investors. A similar conclusion on the relationship between risk and return requirements by investors was drawn by Held et al. [6] in 2006. Also in 2006 Dinica [7] focused on the perspective of investors and concluded that it is necessary to take into account factors other than the financing and economic obstacles. Klessmann et al. [6] in 2008 analysed the consequences of market risk exposure in Germany, Spain and the United Kingdom, analysing both price and forecasting/balancing risks. If wind generators are responsible for balancing, there is an incentive for producers to minimise imbalance costs with the consequent benefits for the grid. Conversely, this approach would lead to higher risk premiums (especially for the case of small producers, since the forecasting quality improves for aggregated generators). This fact may also lead to a market concentration of larger players. Furthermore, as the predictability of wind is limited, liquid intraday and balancing markets are necessary for efficient integration of wind generators in the electricity market. Klessmann et al. [8] showed in 2013 that risk-sensitive policies are crucial for attracting investors by: (i) reducing financing costs, (ii) decreasing project development costs and (iii) increasing market revenues. The authors remarked that policy and administrative risks can be reduced at low cost, since exposing projects to this kind of risk does not produce any positive effect from a macro-economic point of view. In 2007 Breukers and Wolsink [9] analysed the conditions that affected the local planning contexts and social acceptance in the Netherlands, England, and the German state of North Rhine Westphalia. The authors pointed out that facilitating local ownership and institutionalising in project planning can help to a higher local social acceptance. This study was later expanded in 2008 [10], by analysing in detail certain social and institutional aspects (namely, planning, local ownership, landscape and financial support) which also affected wind energy deployment in six European countries: Denmark, Spain, Germany, Scotland, the Netherlands, and England/Wales. This study concluded that, despite different approaches implemented, planning policies in the analysed countries/regions favoured wind energy deployment. However, strength of landscape protection organisations as well as local ownership patterns varied considerably among the studied countries.

In 2011, Klessmann et al. [11] evaluated the status of renewable energy deployment in the EU by means of the effectiveness indicator presented in [12]. The results showed that during the period 2003–2009 the highest average policy effectiveness was reached for onshore wind (4.2%), followed by biofuels (3.6%) biomass electricity (2.7%), biogas (1.6%) and photovoltaic (1.5%). Germany was the country with the highest effectiveness indicator for onshore wind (10.2%), followed by Spain (7.4%) and Portugal (7.1%). Haas et al. [13] also argued that FiTs provide higher deployment and at lower costs than TGCs systems, and suggested that the better performance of FiTs is mainly because (i) FiTs are easy to implement and can be revised to account for new capacities in a very short time; (ii) administration costs are lower than in case of trading schemes and (iii) FiTs can be easily tailored to each specific technology.

The influence of grid issues on the deployment of wind energy has also been an issue studied in detail in the scientific literature. In 2008, Barth et al. [14] described the different approaches for connection costs allocation. The research remarks that grid connection costs are clearly attributable to renewable generators but grid reinforcement costs cannot be attributed solely to one source. However, it is also stated that performing a fair distribution of these costs is not easy. The authors remark that deep (or semi-deep) connection charges can be used to address the specific needs in a certain location of the grid by taking into account the generation/consumption profile. This kind of grid connection charges incentivises investors to place new generators in regions with scarce electricity supply, rather than to put them in regions with already abundant generation. Swider et al. [15] compared the grid connection conditions and costs in selected European countries (Germany, the Netherlands, the United Kingdom, Sweden, Austria, Lithuania and Slovenia); the research concludes that the allocation of connection costs can be an important barrier for renewable energy installations if the developer has to bear all of them. The implications of connection cost sharing for offshore wind energy were discussed by Weißensteiner et al. [16] who found that offshore installations passing the grid connection costs to grid operators result in lower surplus for the producers and, hence, lower transfer costs for final consumers.

The factors influencing energy curtailment were analysed in 2007 by Porter et al. [17]. Flexibility of generating mix, existence of well-functioning electricity markets, geographical distribution of the wind resource, capacity of transmission and size of the control

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[1] In this calculation Czech Republic and Estonia are not considered since total renewable energy capacity to be installed by 2020 is not specified in the NREAP. Nevertheless, Czech Republic defines 743 MW of onshore wind by 2020 and Estonia 650 MW (400 MW onshore and 250 offshore).