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The relevance of legal stability for developing renewable energies. The case of the Galician wind sector

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The energy sector depends strongly on public regulation and needs/requires/entails a minimum remuneration, because of its capital-intensive condition. Renewable energies sources are not an exception and they could also make easier the industrial diversification and job creation. Hence, the stability of the regulation framework, especially in the case of new energy sources, is essential due to its positive impact on the emergence and consolidation phases. As several studies show, instability could cause a reduction, or even a shutdown, in their development and economic contribution. Then, it is crucial to quantify the socioeconomic costs of common changes in regulation. The main aim of this paper consists of analysing the economic impact of wind energy regulation instability on Galicia. The wind energy sector was one of the most important drivers in the regional economy, but there are no quantitative studies focused on this issue. Galicia is a Spanish north-west region with the third highest wind energy installed capacity, roughly 3.300 on-shore MW in 2012, but in a steady state from 2008 due to a legislative shutdown. Wind energy and hydroelectric power represent the main renewable sources. This paper underlines the importance of long-term policies and clear guidelines in the development of wind energy in terms of its economic impact. Concerning the theoretical framework, it is based on the systemic approach of the Innovation System (IS). The main results show significant negative effects on the macroeconomic variables during the period when the instability in the regulation framework became more evident.

Poverty, Wind energy, Regulation stability, Economic impact, Galicia

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Introduction

Legal stability constitutes a necessary condition in order to make easier the emergence and development of a capital-intensive sector as the case of wind energy. This kind of processes triggers industrial diversification, the possible creation of industrial agglomerations as well as the emergence of new technological paths. However, instability could cause temporal disruptions and even a permanent shutdown with crucial effects on the regional economy, mainly, in some cases with a significant amount of accumulative installed capacity. Thus, it is important to analyse and quantify the stability phenomenon from the economic and regional perspectives. The main aim of this paper is to analyse the economic impact of wind energy regulation instability on the Galician economy. Galicia is a Spanish regional leader in terms of wind energy and hydropower installed capacity. Then, renewable energies would play a role of economic driver with essential positive socioeconomic effects on the whole economy. However, legal framework constitutes a continuous concern since 2007.

The theoretical approach is based on the systemic perspective of Innovation Systems (IS) and the analysis of the wind energy value chains. It should be outlined due to the different underlying dynamics. Hence, we are able to analyse more accurately the impact of the legal instability on the sector. Concerning the structure, first of all, we analyse the role of institutions and, especially, the legal framework, in the emergence and consolidation phases of the wind energy sector. Later, we describe briefly the main characteristics of the wind energy sector in Galicia at the present. Afterwards, we show the estimation of the wind energy sector in terms of the regional GDP within the period 2000-2010 and the impact on this trend of the legal shutdown.

1 The role of institutional framework in the emergence and consolidation of wind energy

The emergence of new sectors is not an automatic process in which a combination of market-led forces as well as public-led forces should collaborate in order to build a comprehensive structure. Some kinds of externalities, related to the "self-discovery" (information externalities) and the need of simultaneous investments in different sectors (coordination externalities), do not enable an automatic emergence based only on market-led forces (Haussman & Rodrik, 2003; Rodrik, 2004). For these reasons, background and pre-emergence conditions are crucial because of their effects on the initial inertias, critical mass and interactions.

Concerning the emergence and consolidation phases of new sectors, innovation constitutes a key factor in the process of creation and diffusion of new knowledge and techniques. The concept of innovation is closely related to the set of stakeholders and institutions which play an active role in the sector maturation. At that point, the concept of National System of Innovation (SNI) arises; this refers to a combination of "elements and relationships which interact in the production, diffusion and use of new and economically useful knowledge" (Lundvall, 2010, p. 2). A systemic approach should emphasize the role played by institutions in a broad sense, that is, a set of formal (legislation, standards and so on) as well as informal institutions, such as habits or routines. These institutions are playing an essential role in the creation and diffusion of innovation (Edquist, 1997; Edquist & Hommen, 2008). Public sector plays gradually an active and central role, not only as a supplier of formal institutions; but also as a source of new policies and strategies (Sánchez, 2007; Gregersen & Jonhson, 2008; Gregersen, 2010).

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Concerning its role in the innovation process of renewable energies, public policies could be horizontal market-friendly programs without specifying any sector, or targeted programs which are focused on a particular sector or technology (Avnimelech & Teubal, 2007, 2008). Both kinds of programs could enhance the renewable energy development by means of science support or demand (del Río, 2007). Science support polices (technology push) are mainly concentrated on the technological infrastructure. These programs involve basic and applied research, demonstrations activities as well as diffusion issues. Energy legislation constitutes an essential tool in order to boost the diffusion through several instruments like feed-in tariffs schemes, green certificates, or quotas (Couture & Gagnon, 2010; Söderholm, 2008; Campos & Klagge, 2013)[i]. The main aim of these instruments is to increase the installed capacity and, therefore, a unit cost reduction because of a progressive movement in the learning curve. Nowadays, the final goals refer to environmental issues, industrial diversification, national energy security and economic growth. Albeit, diffusion could be foster through demand side policies, such as direct financial promotion of private demand (Edler, 2006). Additionally, feed-in tariffs, quotas and green certificates could be classified as demand side policies (Lewis & Wiser, 2007; Campos & Klagge, 2013), because they are also considered as indirect subsidies which enhance the consumption of energy from these sources by means of a reduction in prices. Then, these policies also increase the market size.

Other kinds of supply policies are the local content requirements (nowadays widespread in Europe, China and Latin America), quality certification or the implementation of standards in the manufacturing or installation processes (Campos & Klagge, 2013).

A good example of standards implementation in wind energy is the Risø National Laboratory (Technical University of Denmark). The implementation of standards from the public sector or private sectorial organizations is crucial due to its positive effects on triggering incremental innovations.

Demand-side support policies (demand pull) depend on learning by doing processes within the value chain, with suppliers, customers or competitors; and the role of environmental standards and mandatory renewable energy targets. Financial and tax incentives represent essential support mechanisms in the wind energy deployment (Campos & Klagge, 2013). We also add the aforementioned case of the feed-in tariffs scheme and green certificates.

Given the central role of institutions and public sector in the innovation process and the emergence of renewable energies, it should not be underestimated the importance of institutional stability (Pavitt, 1984). This stability combined with clear guidelines and institutional learning processes constitutes a key factor to enhance public policy design (Gregersen & Jonhson, 2008).

The learning policy process refers to a conscious evolutionary progression in which policy makers and experts develop competences, called direct policy learning, and another indirect way linked to “learning by doing” or “learning by accident” (Ib.). Then, it is necessary a minimum level of institutional capability as well as a long-term definition of policy goals in order to provide enough financial support and stability, especially in wind energy in which there are high fixed costs (EWEA, 2009).

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Long-term policies which foster renewable energy diffusion by means of financial support and the creation of market demand are essential to reduce the level of uncertainty and increase the financial turnover especially throughout the early steps of development.

Some successful development lessons in wind energy show us the importance of defining and implementing clear guidelines and social consensus over time (Christensen, 2010). The lack of institutional stability causes important shutdowns in the deployment of industrial agglomerations, such as peripheral clusters (Gorenstein & Moltoni, 2011). In those kinds of agglomerations, the macroeconomic and institutional volatility, in a broad sense, and the shortage of critical mass, technological and human capital capabilities hinder the emergence and consolidation of the cluster. In these development steps, public policies make easier to overcome initial inertias and barriers. Some dynamics in peripheral clusters represent vicious cycles, in which there is a lack of regulation and also a wrong design.

The uncertainty about future trends hampers innovation processes and the creation of interactions and critical mass. In addition, these negative effects have significant impact on the regional economy through the decrease of the final demand (decline in investment, consultancy, financial and maintenance services and so on).

They reduce the economic impact in terms of production, backward and forward linkages or employment as well as energy and industrial diversification. Thus, there is a direct relationship between legal instability and economic impact, mainly when one single region has a significant amount of renewable energy production.

2 The Galician wind energy sector: evolution and current situation

In Spain, the power of legislative development and implementation of the special regimen[ii] of electrical production were assumed gradually by the Autonomous Communities (Spanish regions). Central Administration is in charge of the competencies related to the coordination and planning of energy policies and the basic legislation of agreements and administrative authorisations. Likewise, the central government has the legislative power over remuneration models (Bacigalupo, 2010). The regional government is in charge of the regulation competency of the electricity power installations, transport and distribution set in Galicia. In this sense, the regional government is also in charge of spatial planning of wind energy, organisation and solution of controversial issues about wind energy and the approval of new installations. Besides, regional governments could also implement local content requirement policies through industrial plans.

The commercial development of wind energy in Galicia began around the mid-90s, when large conglomerates, such as Endesa, were interested on using the existent wind resources. Nevertheless, this exploitation was previous to the first Galician Wind Energy Sectorial Plan (PESG), which was approved in 1997.

In spite of that normative delay, wind energy developed in Galicia significantly from 2000 until 2008, turning into the Spanish region with more installed capacity, shows two completely different trends between 2000 and 2012 in Galicia. The first one goes from 2000 until 2008, characterised by a continuous growth of installed capacity, higher than 50% in some years.

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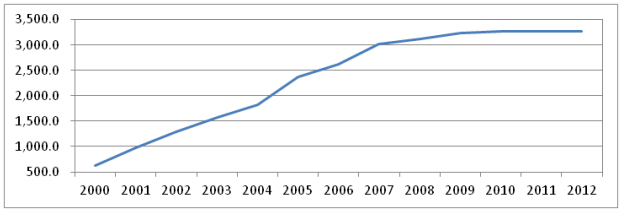
In 2008, normative instability increased due to the fact that the government tendering was appealed and there were several regulatory decrees in the sector. The economic crisis and the gradual reduction of premiums to renewable energies of the special regimen also triggered a strong reduction in the installation of new capacity, characterising a new phase of slow growth.

Nowadays, Spain does not allow register new installations in the special regimen, then wind farms owners do not have right to perceive a premiums by the electrical production generated.



Graph 1

Table 1 shows the main regional legislations and government tendering in Galicia. The first decree (1995) introduces the concept of industrial plans and the local content requirements.

The main aim was to enhance an industrial sector related to wind energy, but the lack of administrative control hampers this goal (Simón et al, 2010). In the next regulation (2001), the figure of the singular wind farms arises.

This kind of installations enables local stakeholders (such as municipalities, landowners and so on) to participate in wind farms. However, the success was really limited in terms of the number of stakeholders and power capacity.

	Main characteristics	Duration
Decree 205/1995	Most important legislation in terms of power capacity installed[iii]. Industrial plans and local content requirements.	1995-2001
Decree 302/2001	Singular wind farms.	2001-2007
Decree 242/2007	Public sector participation in wind farms. Environmental protection of special areas.	2007-2009
Government tendering	Allocation of 2325 MW. Government tendering appealed.	2008
Law 8/2009	No chance of public sector participation in wind farms. New taxes per wind turbine. Environmental Compensation Fund.	2009-at present
Government tendering	New stakeholders. Allocation of 2325 MW. No progression.	2010- at present

Table 1

The aforementioned instability arose after several radical changes in the regional legislation. In fact,

Table 1 shows that between 2007 and 2010, there were two complete different legislations and two government tenderings. The former decree (2007) highlights the public interest in wind energy which enables public sector to participate in the wind energy development. There was also a government tendering linked to this decree, but it was appealed in 2008. The new regional government developed another legal framework in 2009 which gave up the idea of public participation in wind energy farms.

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Albeit, one of the most crucial factor which makes easier the shutdown was the total change of stakeholders between the two goverment tenderings.

The role played by public administrations in order to regulate Galician wind energy sector and foster its development was focused only on increasing the installed capacity, setting aside industrial or environmental aims such as the protection of special green areas (Simón et al., 2010; Varela & Sánchez, 2014). Likewise, the lack of administrative control of the fulfilment of the industrial plans and environmental controls reduced substantially the positive impact of the wind energy development on the socioeconomic framework (Ib.).

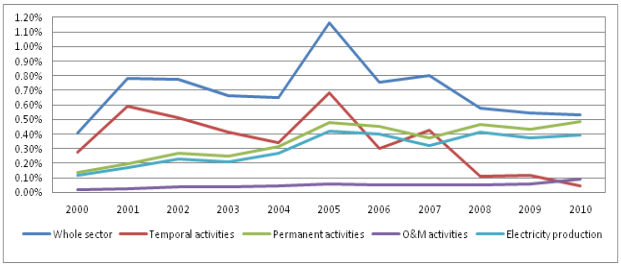
3 Impact of legal stability on wind energy development and regional economy

The empirical methodology is based on the input-output approach and the analysis of the wind energy value chains (Varela et al., 2013; Varela & Sánchez, 2014a).

The economic impact diagnosis has to keep in mind the regional special features as well as the distinctive characteristics of value chains (Llera et al., 2010). This paper focuses only on the relation between legal stability and the Galician wind energy sector, omitting the methodological explanations[iv]. Concerning the estimation of the sector, we make a breakdown in order to undertake a more accurate analysis because of the different sectorial as well as temporal underlying dynamics in both kinds of activities. In this sense, we differentiate between temporal activities and permanent ones. The former constitute the investment related to the installation of wind farms such as the wind turbine components, grid connection, civil work or consultancy activities.

The flow of this kind of activities is volatile because it depends on the annual installed capacity in the region. Permanent activities refer to operation and maintenance tasks (O&M) and the electricity production, and they depend on the cumulative installed capacity.

Graph 2 shows the weight of the wind energy sector and of each of its different components in the regional economy. This quantification is crucial in order to measure the size of the sector in relation to the whole economy. It also emphasises the importance of public policies which boost the sector, as well as its potentialities. Equally, it can check the impact of the economic cycle and normative changes on the sector. Besides, the breakdown based on the value chain stands out the relative importance of each subsector.



Graph 2

The weight of the wind energy sector in the Galician economy changes substantially over time. In 2005 reached the highest value (1,16% of the GDP) due to the installation of new wind farms (supposed almost 0,69%) and the electricity production (0,42%). That year constituted the moment with more new installed capacity, with 540 MW. However, it also reached lower figures, such as at the beginning and at the end of the decade (0,40 and 0,54%, respectively). Between 2001 and 2007, the contribution to the economy was above 0,70%.

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It should be also emphasised the contribution of the installation of new wind farms to the GDP until 2007. During this year, it was always above 0,3%, therefore, it constitutes the main driver in the wind energy sector and with an essential additional output increase in the economy.

This evolution reflects the large sector peak, with installed capacity annual growth rates higher than 10% and even reaching 57% in 2001. Since 2007, there were two complete different sectorial legislations with opposite guidelines and the shutdown of the wind energy appeal in 2008. Likewise, it is necessary to emphasise current changes in the remuneration regimen and the new context of economic crisis. The result was a crucial shutdown in the installation of new capacity, which blocked the sectorial development. The dependence on the installation of new capacity highlights the harmful effects that the paralysis of wind energy appeals triggered in the Galician economy.

At the end of the decade permanent activities play a palliative role in contrast to the unfavourable evolution of the annual installed capacity, because their contribution to the GDP has increased. This fact is mainly justified by the contribution of the electricity production with the exception of meteorologically bad years. The special regimen has preference in the energy market; therefore, it is not affected by the fluctuations of the energy market. Likewise, the contribution of operation and maintenance activities is insignificant (underneath 0,1% of the GDP). Consequently, it does not constitute an economic driver. Hence, there is no sufficient wind turbines stock in order to reach an important contribution to the economy. The permanent component of the sector has not still significant size to sustain a repair market.

Given the current sectorial stagnation and its capital-intensive feature, a positive development would go through a growth in the onshore or offshore installed capacity, or by repowering the current wind farms. In this last case, it is necessary a legislative reform, especially in the remuneration regimen[v], in order to increase the expected profitability.

4 Conclusions

Legal stability constitutes a key factor to provide financial security as well as it plays a role of enhancing innovative processes. This stability is essential, mainly, in the case of emerging sectors which have to face technological and institutional inertias and barriers. Experience shows us the necessity of implementing clear and long-term guidelines which make easier the emergence and consolidation of any new sector. These policies should combine supply-side as well as demand-side measures in order to take into account the systemic features of innovation processes. Then, instability has an important impact on both the sectorial development and the economy through the investment and production channels.

In some wind energy peripheral clusters, instability hinders the sectorial development and the potential chance of industrial diversification mainly in the case of regions with high level of wind energy installed capacity.

In these situations, the economic quantification of instability is crucial due to its effect in terms of linkages, output as well as the measure of its potentialities. The analysis of the Galician wind energy sector, by means of the value chain approach the input-output analyses, shows us an important loss of total output (as a sum of direct and indirect effects) because of a decisive legal shutdown in 2008. This shutdown was a consequence of two totally

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different legal contexts within two years and the paralysation of the government tendering. In fact, we could quantify this loss in more than 0,5% of GDP within its peak reached in 2005 and 2008. The economic crisis also sharpens that trend.

This legal instability affects seriously the wind energy sector because it is a capital-intensive sector and it needs more than 1 million of euros per onshore MW.

The role played by legal framework is due to the sectorial dependency on new installed capacity. Temporal activities were the most important in the wind energy value chain and for this reason, the sector is very sensitive to normative changes.

Thus, there are few options available and all of them go through repowering wind farms or installing new onshore or offshore capacity.

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