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Wind Power '13

Spanish Wind Energy Asociation

The voice of the industry

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Asociación Empresarial Eólica

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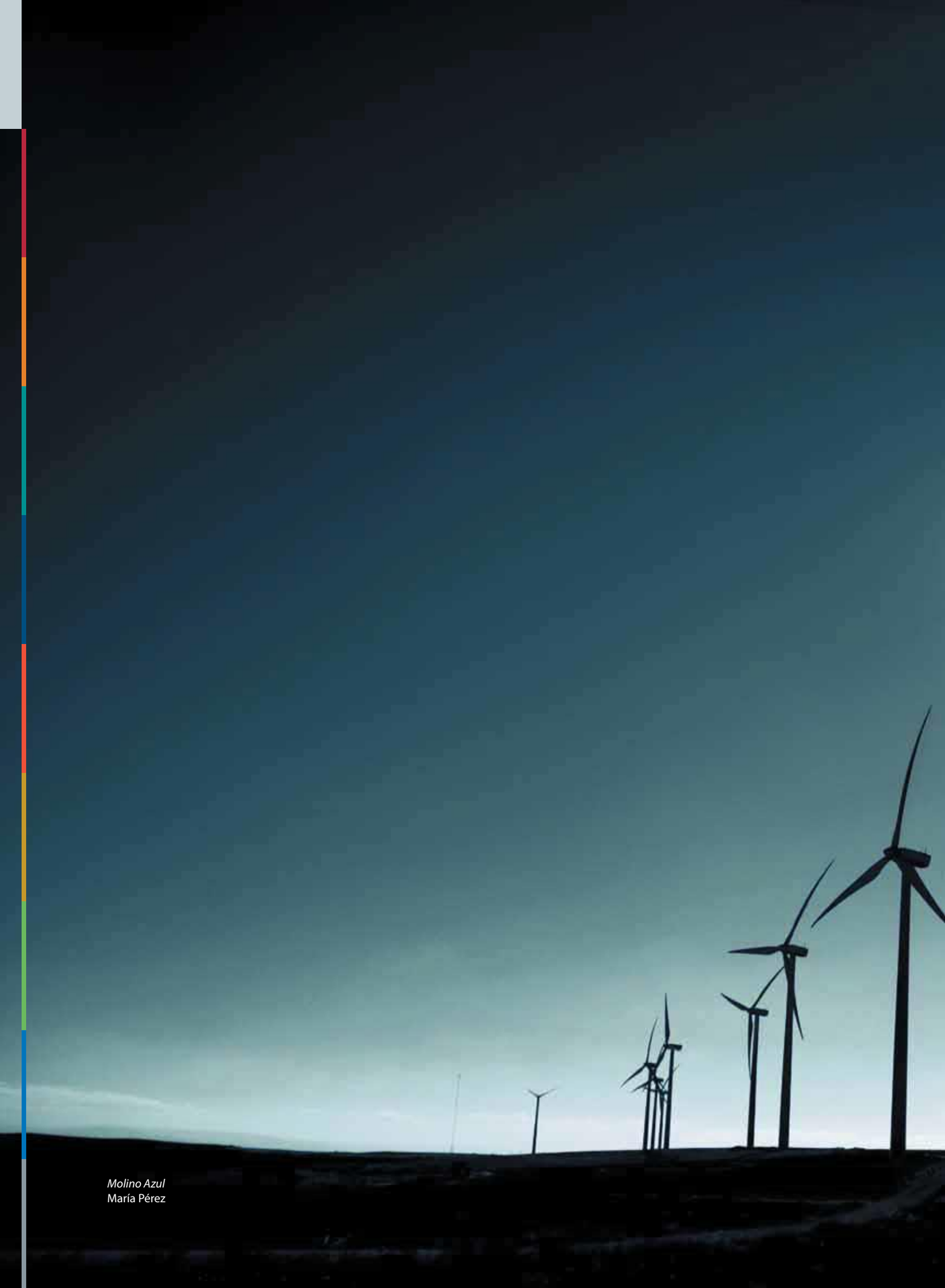


Molino Azul
María Pérez

Chairman´s address

Chairman´s address
A year of uncertainty

Weak global growth in 2012, a dubious outlook for 2013 and, in Spain, uncertainty continues affecting the energy sector.

In 2012, Spain maintained strong energy dependency. Wind power's contribution to the energy mix in our country is undoubtedly important and plays a vital role in reaching CO2 emission reduction targets as well as reduced energy dependency abroad—especially important in today's crisis environment. There can be no doubt regarding the positive impact of wind power in terms of environmental sustainability and there is no doubt, either, regarding its overall contribution to the country's economy.

Wind power contributes to job creation, to GDP growth and to energy security. It generates tax revenue for both the central government and for local authorities. It exercises downward pressure on electricity market prices. It reduces energy dependency abroad and offsets greenhouse gas emissions. In Spain, wind power development has been orderly and in line with the objectives set for it. Nevertheless, 2012 saw a continued lack of certainty regarding new regulation and pay mechanisms for wind power, which now has no stable framework; and that has hit the sector hard.

Regulation and legal security are the key factors determining the future of wind power in our country and both factors now require urgent attention and action. Yet, regulatory changes in 2012 have had a seriously grave impact on the wind sector. First, the passing of Royal Decree-Law 1/2012 froze incentives for generation from new Special Regime installed capacity. Then, following two other decree laws aimed at reducing energy costs, the Law of Fiscal Measures for Energy Sustainability was passed. Far from presenting a route map for the sector and providing the long-term stability needed, it merely introduced new taxation measures, including a fixed tax on all electricity generation.

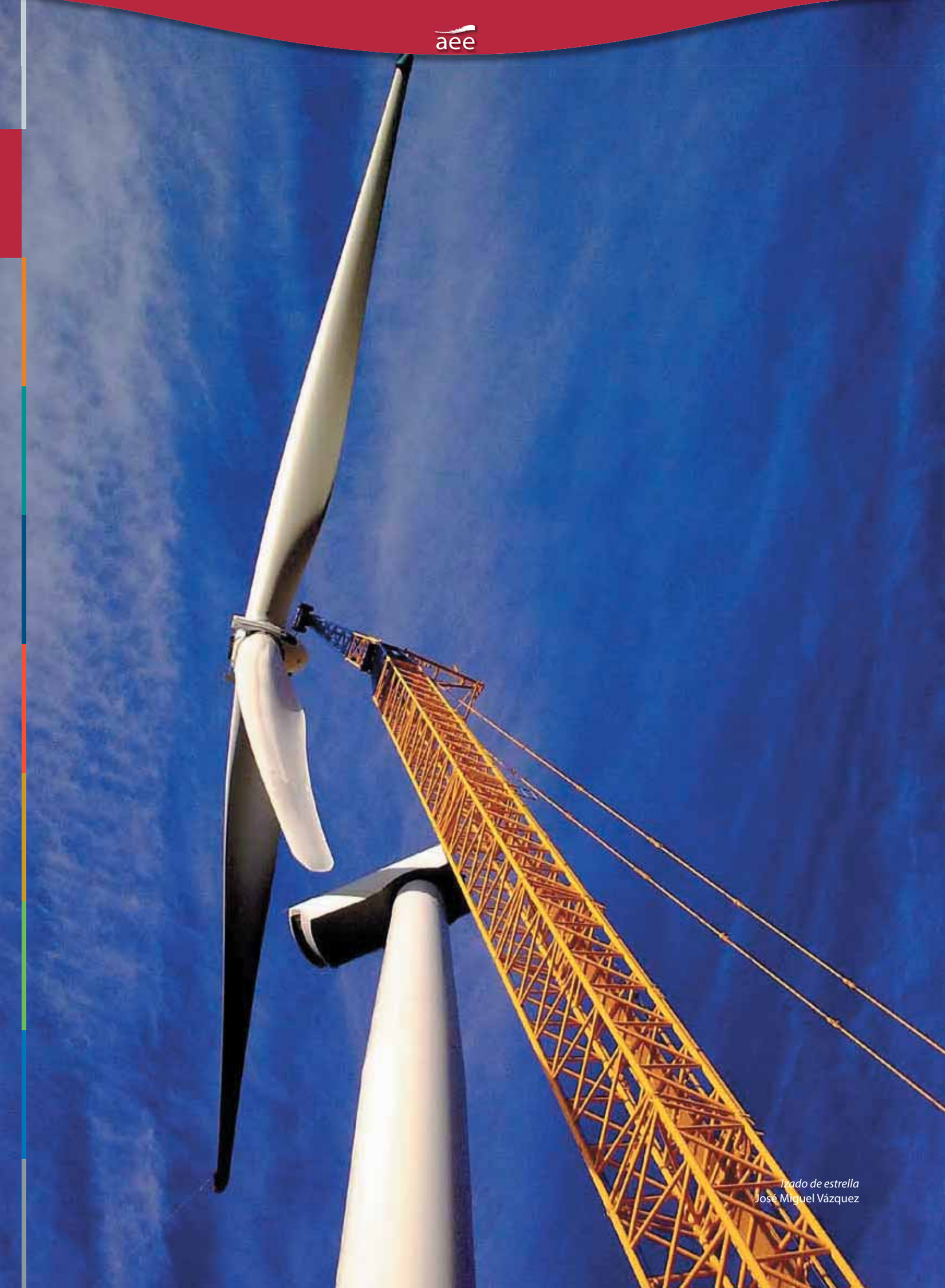
The wind sector is aware of Spain's current economic difficulties and has always shown itself open to constructive dialogue with the government. It has also made it perfectly clear that it is prepared to cooperate in the search for satisfactory solutions, both for the country and the sector; solutions for overcoming the crisis.

Investor trust and confidence requires a stable, long-term regulation framework that respects the basic principle of legal security. Such a framework would take into account that wind power is already a reality within a diversified energy mix, capable of continued development and which brings considerable returns to the national economy, generating local added value and job creation. Regulation should take into account the particular characteristics of wind power, its contribution to the Spanish economy and its ability to create value. Above all, it is important to inform public opinion regarding the benefits of wind power.

Wind power, as an indigenous, CO2-free energy source, will play a key role in our energy future. Wind power is a vital factor in guaranteeing energy security, for reducing energy dependency abroad and for fighting climate change. Windpower has consolidated Spain as a country that has managed to put the brakes on shifting capital abroad by avoiding fossil fuel imports.

Spain needs productive and job-creating sectors now, more than ever, to kick start the shift out of the crisis and to help change the national economic model. Wind power companies can make an important contribution to economic dynamics, reducing energy dependency abroad, improving the balance of payments and producing environmentally friendly energy. The sector is ready and able. But it needs the decisions on regulation.

Rocío Sicre del Rosal
Chairwoman
Asociación Empresarial Eólica



Izado de estrella
José Miguel Vázquez

Chapter I
The regulatory situation

The year 2012 dawned with a renewables moratorium and ended with a new law, called the Law of Fiscal Measures for Energy Sustainability, which clamped further taxes on wind power. The year 2012 was also one in which the sector went out of its way to request dialogue only to meet the government's deaf ear. The year 2012 was the expiry year both of Royal Decree 661/2007 and of the Pre-allocation Register. The year 2012 was an *annus horribilis* for wind power.

"The solution to wind sector continuity in Spain rests in a stable and predictable regulatory framework that incentivises wind generation. Failure to do so will mean the country will lose considerable amounts of investment and employment in coming years," according to consultancy firm Deloitte in its report the *Study of the Macroeconomic Impact of the Wind Power Sector in Spain* in 2011. The report concludes: "The potential for the sector to contribute to the country's economic growth is clearly underexploited." It adds: "This situation has been caused by political decisions that threaten the continued existence of the wind power industry in Spain. An historic opportunity to lead a globally cutting edge industry is being lost."

The short term therefore offers little hope for the wind power sector, given the lack of objectives for 2020 and beyond, the lack of incentives reflecting its positive contribution to the economy and the newly imposed taxes that do not apply to other technologies.

The green moratorium

The year 2012, with a recently elected new government in office, kicked off with an unpleasant surprise for renewables in the shape **of Royal Decree-Law 1/2012, which suspended production incentives** for any capacity not already entered on the Pre-allocation Register. After years imploring the previous government to provide a regulatory framework to end the legislative vacuum after end-2012 (the rules of Real Decreto 661/2007 expired for new installed capacity after December 31), the new government merely imposed a moratorium, leaving the sector in complete darkness.

In 2013, the sector will lose €600 million due to government measures

Turbine manufacturers reacted immediately. They warned that the industry, already working at half capacity, would be hit hard by the moratorium. Given that wind turbine orders are made between one-and-a-half and two years before building, nobody was going to make new orders without knowing what the future holds in store. In 2012, turbine orders for the national market were almost at zero. That freeze follows the less than 100MW ordered in 2011 and the 220MW ordered in 2010; all a far cry from the annual average in previous years which topped 1,500MW.

The wind sector is aware that the government's priority in energy matters is to tackle the tariff deficit and has always shown its predisposition to enter into constructive dialogue and collaborate in the search for satisfactory solutions for both parties. The sector has also repeatedly demonstrated its **disposition to make concessions** to help ease the country's economic difficulties, as long as the measures are fair and negotiated.

For example, in 2010, the tariff deficit was already a very important problem for Spain. With the PSOE government then in office, **AEE** negotiated a temporary cut of 35% in production incentives, in order to help tackle the economic situation and in return for the regulatory stability introduced by Royal Decree 661/2007, which regulated sector activity to end-2012.

Yet, since taking office, the government has changed all the rules half way through the game without consulting the sector at all. In 2013 alone, **the sector will lose €600 million** through the measures adopted by the PP-run government. **AEE** believes those measures should have been negotiated.

Since taking office, the government has made it perfectly clear that, in energy matters, its absolute priority is to end the tariff deficit,

Author: Alberto Pla

Author: Gloria Delgado Nuñez

which, by then, was dangerously close to the €25 billion mark. With that in mind, the regulator, National Energy Commission (Comisión Nacional de la Energía-CNE), carried out a public consultation among the different electricity sector players to compile proposals.

Although wind power had no impact at all on the increase in the tariff deficit in 2011, and although it is the most efficient of the renewable technologies, **AEE** proposed a series of measures. At the same time, it demanded that any adjustment shoud respect investments already made and that they be made over an extended period of time, promoting the most efficient investments.

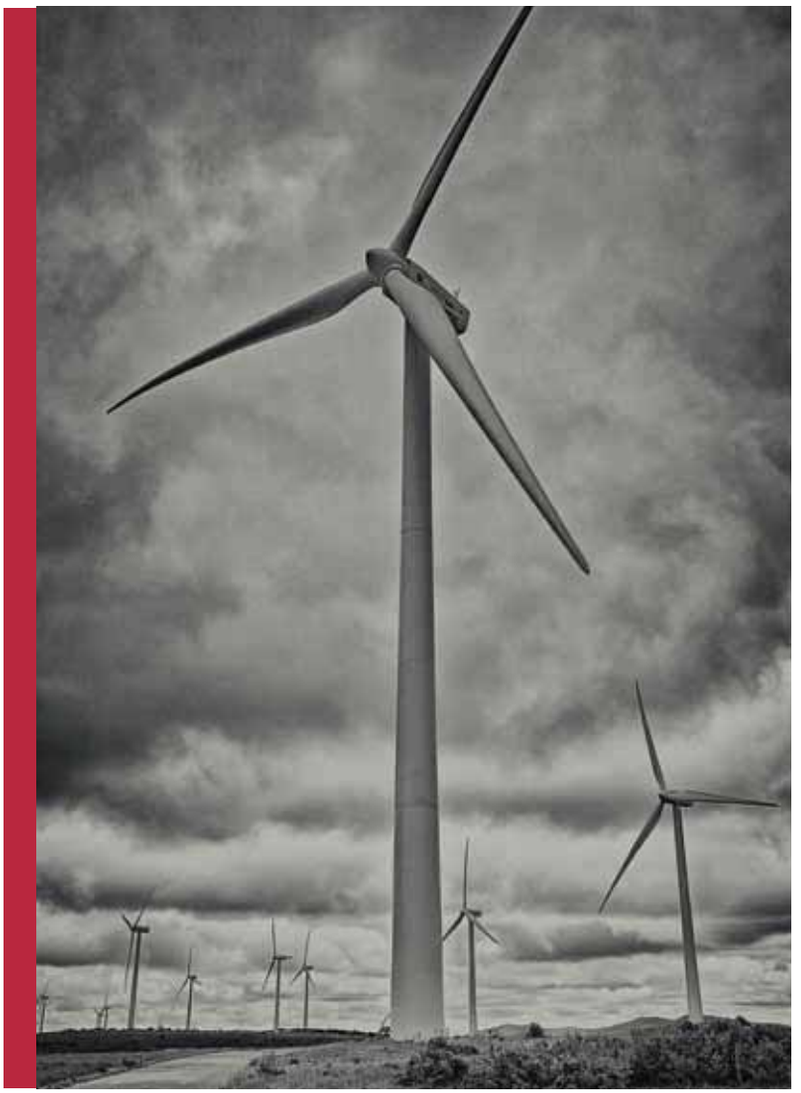
Accordingly, the wind sector defended the creation of the green cent (a tax applied to fossil fuels) and the implementation of CO_2 auctions to finance renewable energies (by which the money raised from selling emission rights go to the sector). The sector also considered it necessary for the non-mainland electricity costs (islands and enclaves) to be transferred from the electricity tariff to the State General Budget (SGB). Furthermore, the sector backed a call for the application of VAT on renewable generation, at a reduced rate of 8%, as is reflected in Article 102 of Directive 2006/112, with the idea of avoiding future hikes in the electricity bill.

Another series of proposals aim at extending electricity market liberalisation and efficiency and favouring those consumers most affected by the crisis. For example, the progressive application of a sliding grid toll that rises in accordance with increased power consumption (so promoting energy efficiency) or the transference of the costs of the electricity discount rate to the State General Budget.

AEE believes there is a series of system mechanisms which, with the passage of time, no longer fulfil the purpose that once justified them and should therefore be abandoned, especially as they still incur system costs. Such is the case of the tax on electricity and the interruptibility system (by which certain industrial consumers receive compensation for accepting interruptions to electricity supply).

Some months later, the CNE published its report. The most worrying aspect for wind power was the message that the moratorium imposed by Royal Decree-Law 1/2012 should last until 2017. The report set four possible scenarios, which went from an indefinite freeze-which would mean that the only new renewable capacity to be installed to 2020 would be that already entered on the Pre-allocation Register to a revision of the route towards the objectives established in the state Renewable Energy Plan, displacing new ca-

Measures negatively affecting capacity already online should not be taken



Author: Carlos Conde

pacity installation until 2017 and then giving priority to "the most economical technology", namely onshore wind power.

The CNE report included measures affecting then existing sector remuneration. The most significant proposal was to reduce the rate applied to updating pay mechanism parameters for wind power, as of April 2012. That would have a cumulative impact affecting the profitability of wind plants already online. The sector reaction was not long in the waiting: **under no circumstances should measures be adopted that affect existing capacity**, as that would throw the country's legal security into doubt and ward off future investment. Nobody expected, therefore, that in 2013 the measures finally adopted would be even more severe than those proposed by the CNE or, even worse, that they would be retroactive.

Law of Fiscal Measures for Energy Sustainability

Throughout the year, the entire energy sector remained in anticipaton of the Energy Reform promised by the government. When it finally arrived, it surprised everybody in that, far from tracing a sector route map, providing stability, it merely posed a series of money raising measures.

The road towards the final version of the Law of Fiscal Measures for Energy Sustainability was arduous. Previous drafts established different taxes on electricity generation for different technologies. In the case of wind power, the proposed tax was set at 11%, well above that of other technologies.

"An 11% tax on the turnover of wind power companies such as that being considered by the government could mark the death stroke for the sector by threatening the viability of a considerable amount of installed wind plants," claimed the **Spanish Wind Energy Association (Asociación Empresarial Eólica-AEE**) in a July press conference. The idea was that **wind would carry the highest tax burden of any generation technology**. That is because, as well as paying taxes common also to other technologies (both at state and municipal level), some autonomous regions also apply levies on wind power. Furthermore, wind power is a sector with very narrow profits, which means that increased fiscal pressure could make it difficult for companies to meet payment obligations, including payback on finance.

AEE argued that such a tax would be legally dubious. The application of a an electricity tax, with a higher rate set indiscriminately for wind power, would be additional to some regional environmental taxes which already tax electricity production. Such a tax would act as a disincentive to investment in new capacity, resulting in the loss of jobs, among other negative impacts.

The proposal, then, went against the Electricity Sector Law, which makes very clear that

Author: Marian Abraldes

the principle of reasonable return must be respected. It also went against legal security as it broke the rules halfway through the game. And it would finally damage national and international investor confidence, increasing Spain's risk rating.

In the end, the cabinet approved a draft bill with tax measures to cut the tariff deficit, including a tax on electricity generation set at 6% for all technologies. In the case of wind power, the impact for the first year's application of the tax is €241 million, according to **AEE** calculations.

As it was a draft bill and not a royal decree, the measures required parliamentary approval. Consequently, **AEE** initiated an intense campaign to inform MPs and senators of its position during the period of drawing up amendments. It insisted that the 6% tax be temporary and that it should be lifted once the tariff deficit was resolved. Furthermore, it proposed an amendment to suppress the regional taxes on wind power plants in order to avoid a double tax in those regions applying supposedly environmental levies on wind power (wind is the only sector to bear such taxes).

But there were still more shocks to come. The PP's own parliamentary group put forward and amendment to **increase the electricity generation tax from 6 to 7%**. The measure meant wind power would pay more than any other sector in absolute terms, with an estimated €300 million in the first year alone; a prohibitive amount for companies already going through serious difficulties. In practice, 15% of incentives go towards paying off this tax.

The sector considers it **unfair and unacceptable** that a tax, born ostensibly of environmental sustainability, should penalise wind power more than any other technology despite the clear environmental and economic benefits it contributes to Spain and despite the fact it is already among the least profitable technologies. Wind is the most competitive renewable generation technology and does not contribute to the tariff deficit. At the same time, it brings down the electricity market pri-

ce. Consequently, since the law was approved, **AEE** has done everything possible at national and European level to prevent its application.

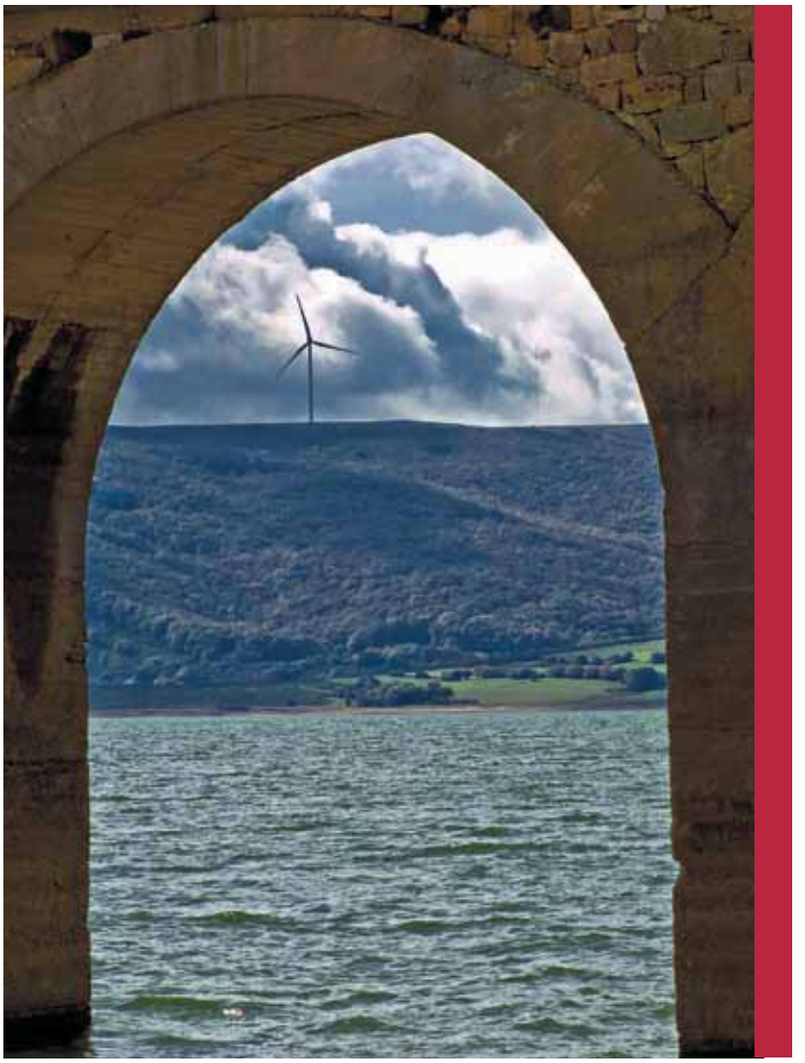
On December 31, 2012, two regulations expired for new installed capacity: the Royal Decree 661/2007, governing the sector, and the Royal Decree-Law 6/2009, which set wind power quotas through the Pre-allocation Register. Also after December 31, wind plants operating under the First Transitional Disposition of Royal Decree RD 661/2007 (i.e. those that opted to remain under the Royal Decree 436/2004 regulation) had to shift to one of the economic regimes established in RD 661). The sector foresaw an income reduction for generation from those plants of around €5/MWh.

On top of all that, the sector still had another disagreeable surprise in store. In February 2013, the Minister of Industry approved Royal Decree-Law 2/2013, which, with retroactive application to January 1, 2013, introduced measures suppressing the mechanism by which wind generation was paid a production incentive additional to the electricity wholesale market price. The decree also modified the system for updating the target price for wind.

Those measures marked the first time the government has modified the conditions for capacity already online. The **economic impact** of the decree on wind power, coupled with the 7% tax on generation, will be **losses of around €6 billion to 2020.**

What kind of energy reform would wind power like?

"The solution to wind sector continuity in Spain rests in a stable and predictable regulatory framework that incentivises wind generation. Failure to do so will mean the country will lose considerable amounts of investment and employment in coming years," according to consultancy firm Deloitte in its report the *Study of the Macroeconomic Impact of the Wind Power Sector in Spain* in 2011. The report estimated those **possible investment losses at €27 billion.**



Author: Nayara Gutierrez

In its conclusions, the report indicates that "the wind industry confirmed its importance to the Spanish economy in 2011 but for the third year running its contribution to GDP was reduced. The potential for the sector to contribute to the country's economic growth is clearly underexploited." It adds: "This situation has been caused by political decisions (the lack of a pay mechanism for new capacity installed after 2012; the moratorium freezing renewables incentives, etc) that threaten the continued existence of the wind power industry in Spain. An historic opportunity to lead a globally cutting edge industry is being lost."

One of the consequences of those political decisions is the **loss of 14,319** jobs since 2008, leaving the sector with 27,119 direct and indirect jobs by end-2011. In that year, 2,085 di-

Author: Antonio García

rect and 1,543 indirect jobs were lost (totalling 3,628). That trend was exacerbated in 2012 by the moratorium on new installed capacity, which continues in 2013 due to Royal Decree-Law 2/2013.

It is important for the government to listen to these and other opinions before finalising its new energy regulation. For wind power, there are three key matters. The first is that the basic principle of legal security be observed in order to guarantee investor trust and confidence. That means not modifying the remuneration of capacity already online.

Second, long-term regulation is needed (currently, the sector does not even have an objective to 2020) and that the sector's particular characteristics and its contribution to the economy be taken into account. The government should understand that, even though wind power will only need incentives for just a few years more, now is not the time to withdraw them; now is the time to focus on a transition providing continuity to the industrial sector. The danger of a brusque change is that the industry will not be able to adapt, thus threatening the existence of one of Spain's few exporting sectors of energy technology; all because of an erroneous energy and industrial policy.

Third, it is important to take into account the downward pressure of wind power on wholesale electricity prices thus moderating electricity bill prices.

Now, more than ever, long-term energy planning is needed, with intermediate milestones and clear economic signals enabling the gradual substitution of imported fossil fuel consumption by indigenous energy sources with reduced costs, such as wind power. Such planning would enable productive sectors to make energy cost savings thus boosting competitivity.

Sin título
Ana Ponce

Chapter II
The figures

The wind sector installed in Spain **1,112 MW in 2012**, marking a 5.13% increase in cumulative capacity. The percentage is similar to that of 2011, the weakest growth year in the Spanish sector's history. Also, 2012 was the final year of the Pre-allocation Register, meaning the capacity from the final quota established for wind power has been commissioned, together with delayed projects hanging over from previous phases. Accordingly, the only projects left to build out are those last ones to enter the Register, with pre-allocation granted after December 31, 2009. Many of those projects will not be able to be built under the current regulation due to problems beyond the control of the developers (delays in planned transmission and distribution line build out, administrative difficulties, etc). Those projects aside, and in the light of the recent regulation changes, **it is hard to foresee how and when more wind power will be installed in Spain.**

Meanwhile, the increase in wind power generation has consolidated its position: month after month wind sits among the electricity system's top technologies contributing to reducing the market price of electricity in a very considerable way.

Weak installed capacity growth

The total installed electricity capacity across the Spanish mainland reached nearly 103 GW by end-2012 according to information published by TSO Red Eléctrica de España (REE) in its Advance on the Spanish Electricity System Report 2012. The majority of new installed capacity was renewable. **Wind power made up practically 21% of total installed capacity.**

In 2012, 1,112 MW of new wind capacity were installed, bringing the end-year cumulative figure to 22,785 MW, a 5.3% increase on the figure for end-2011.

Table II.01. Installed capacity and technologies to 31/12/2012

Technologies	Mainland system (MW)	Island and enclave systems (MW)	National total (MW)	% of total
Large hydro	17,761	1	17,762	16.34%
Nuclear	7,853		7,853	7.22%
Coal [1]	11,620	510	12,130	11.16%
Fuel oil/gas	1,492	2,909	4,401	4.05%
Combined Cycle	25,291	1,854	27,145	24.97%
Total ORDINARY REGIME	64,017	5,274	69,291	63.73%
Small hydro	2,039	0,5	2,040	1.88%
Wind	22,622	164	22,785	20.96%
Solar photovoltaic	4,186	224	4,410	4.06%
Solar thermoelectric	1,878		1,878	1.73%
Thermal, renewable	940	3	943	0.87%
Thermal, non-renovable	7,252	121	7,373	6.78%
Total SPECIAL REGIME	38,917	512	39,429	36.27%
GENERAL TOTAL	102,934	5,786	108,720	100%

Source: REE and AEE

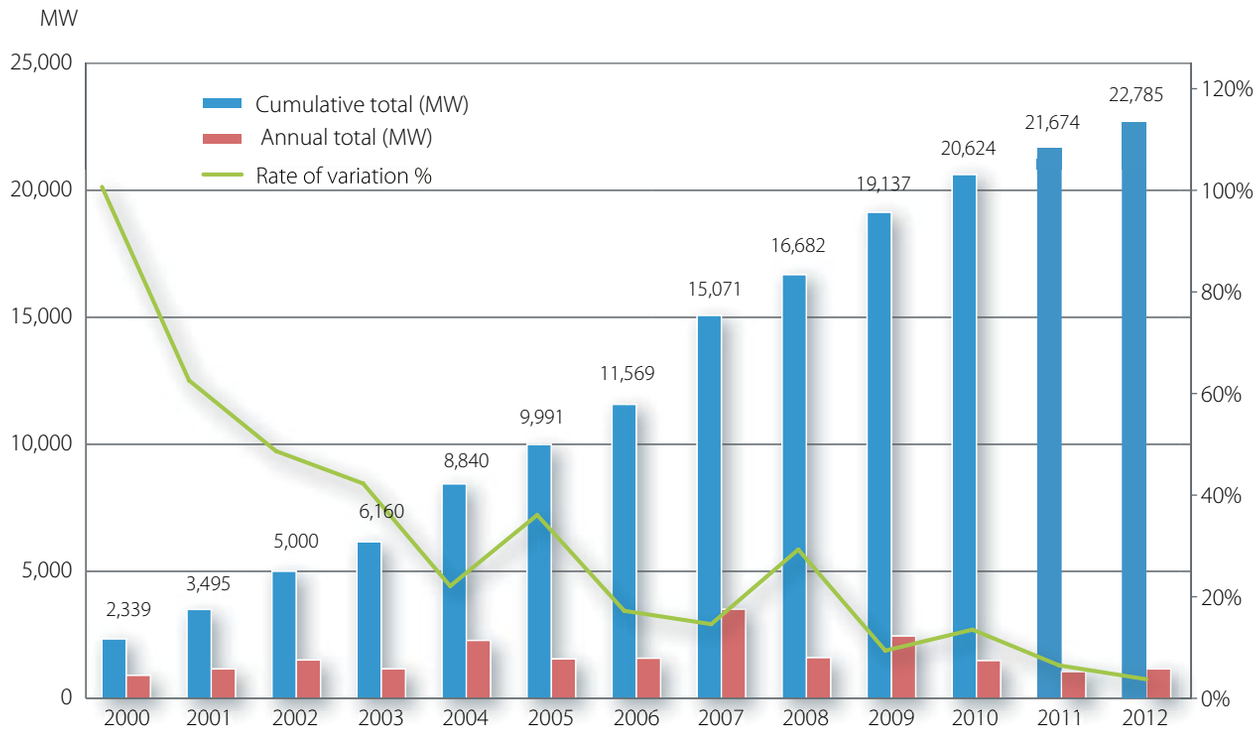
[1] Includes IGCC (Elcogás), as of January 1, 2011

The year 2012 was the final year of the Pre-allocation Register, meaning the capacity from the final quota established for wind power has been commissioned, together with delayed projects hanging over from previous phases. Currently, **there are around 850 MW registered but not yet installed.** Developers have declared they cannot build a large amount of that capacity under the existing regulation due to problems beyond their control (delays in planned transmission and distribution line build out, administrative difficulties, etc).

Consequently, with the green moratorium still in force, the wind capacity left to be installed in Spain under Royal Decree 661/2007 amounts to just **400MW, to be built 2013-2014.** But the installation of even that reduced amount is now in jeopardy because of reduced profitability after the government passed, in February 2013, the Royal Decree-Law 2/2013. That measure forces all capacity that does not opt to sell power directly on the pool market to operate under the fixed feed-in tariff alternative. It also reduces remuneration under the feed-in tariff option by modifying the inflation indexing parameters applicable to it.

Castile and Leon installed 227.5MW of wind capacity in 2012, 25% of new capacity nation-wide, keeping that region at the top of the league. Catalonia, with 256 MW, and Andalusia, with

Graph II.01. New and cumulative annual wind capacity and variation rate in Spain 2000–2012



Fuente: AEE

Note: The criteria used by **AEE** to calculate installed capacity is based on the official commissioning certificate of each plant, which does not always coincide with information published by other sources.

Table II.02. Regional installed wind capacity 2012

Region	Installed in 2012	Percentage of total installed in 2012	Cumulative Capacity to 31/12/2012	% of total	Rate of variation 2012/2011 (%)	Numbers of plants (*)
Castile and Leon	277.5	25.0%	5,510.6	24.18%	5.3%	236
Castile La Mancha	70.8	6.4%	3,806.5	16.71%	1.9%	139
Galicia	31.4	2.8%	3,311.5	14.53%	1.0%	156
Andalusia	196.3	17.7%	3,263.2	14.32%	6.4%	149
Aragón	83.0	7.5%	1,893.3	8.31%	4.6%	87
Catalonia	256.7	23.1%	1,258.1	5.52%	25.6%	45
Valencia	19.0	1.7%	1,189.0	5.22%	1.6%	38
Navarre	3.0	0.3%	979.9	4.30%	0.3%	47
Asturias	84.0	7.6%	512.5	2.25%	19.6%	20
Rioja	0.0	0.0%	446.6	1.96%	0.0%	14
Murcia	72.0	6.5%	262.0	1.15%	37.9%	14
Canary Islands	18.2	1.6%	160.1	0.70%	12.8%	54
Basque Country	0.0	0.0%	153.3	0.67%	0.0%	7
Cantabria	0.0	0.0%	35.3	0.15%	0.0%	3
Balearic Islands	0.0	0.0%	3.7	0.02%	0.0%	46
TOTAL	1,111.8		22,785.5		5.13%	1,055

Source:: AEE

(*) Includes extensions and experimental plan

196 MW, came next in terms of new capacity, according to figures from **AEE**, which monitors all sector companies in Spain and uses full plant commissioning as the criteria for its online statistics.

According to the statistics compiled using **AEE**, criteria, only seven developing companies managed to top the 50MW mark of new installed capacity in 2012: Iberdrola, Eolia Renovables, VAPAT, EDPR, Aldesa Energías Renovables, Acciona Energía and Gamesa Energía.

Table II.03. Company ownership share of new and cumulative wind capacity in 2012

Developer	Capacity installed in 2012 (MW)	Percentage of total installed in 2012	Cumulative Capacity to end 2012 (MW)	Cumulative market share (%)
IBERDROLA	174.04	15.7%	5,512.42	24.2%
ACCIONA ENERGÍA	64.50	5.8%	4,228.82	18.6%
EDPR	90.30	8.1%	2,085.92	9.2%
ENEL GREEN POWER ESPAÑA (*)	21.74	2.0%	1,403.28	6.2%
GAS NATURAL FENOSA RENOVABLES	12.00	1.1%	968.00	4.2%
EOLIA RENOVABLES	135.20	12.2%	512.95	2.3%
EyRA	27.68	2.5%	512.56	2.2%
VAPAT	91.20	8.2%	471.25	2.1%
RWE Innogy Aersa	0.00	0.0%	442.71	1.9%
OLIVENTO	0.00	0.0%	420.79	1.8%
ENERFÍN	0.00	0.0%	400.41	1.8%
E. ON Renovables	0.00	0.0%	380.61	1.7%
BORA WIND ENERGY MANAGEMENT	0.00	0.0%	329.99	1.4%
MEDWIND (*)	1.50	0.1%	246.75	1.1%
RENOVALIA RESERVE	0.00	0.0%	246.10	1.1%
MOLINOS DEL EBRO	0.00	0.0%	234.25	1.0%
GECAL. S.A.	0.00	0.0%	231.41	1.0%
GAMESA ENERGÍA	59.50	5.4%	214.45	0.9%
IBEREÓLICA	19.40	1.7%	194.30	0.9%
EÓLICA DE NAVARRA	0.00	0.0%	164.13	0.7%
ALDESA ENERGÍAS RENOVABLES	80.00	7.2%	164.05	0.7%
FERSA	4.32	0.4%	148.90	0.7%
ELECDEY	0.00	0.0%	140.10	0.6%
OTROS	330.42	29.7%	3,131.34	13.7%
TOTAL	**1,111.8**		**22,785.57**	

Source: AEE

The criterion used by **AEE** to calculate installed capacity is the official certificate of commissioning of each wind plant, which does not always coincide with developer figures

The total figure for each developer represents the sum of its ownership share in the capacity of each wind plant

(*) Padul wind plant in operation in 2012 but accounted for previously using **AEE**'s methodology.

(**) Renomar has a total of 493.5 MW. Acciona controls 50% of that company, which is why the table reflects only the 50% belonging to Medwind .

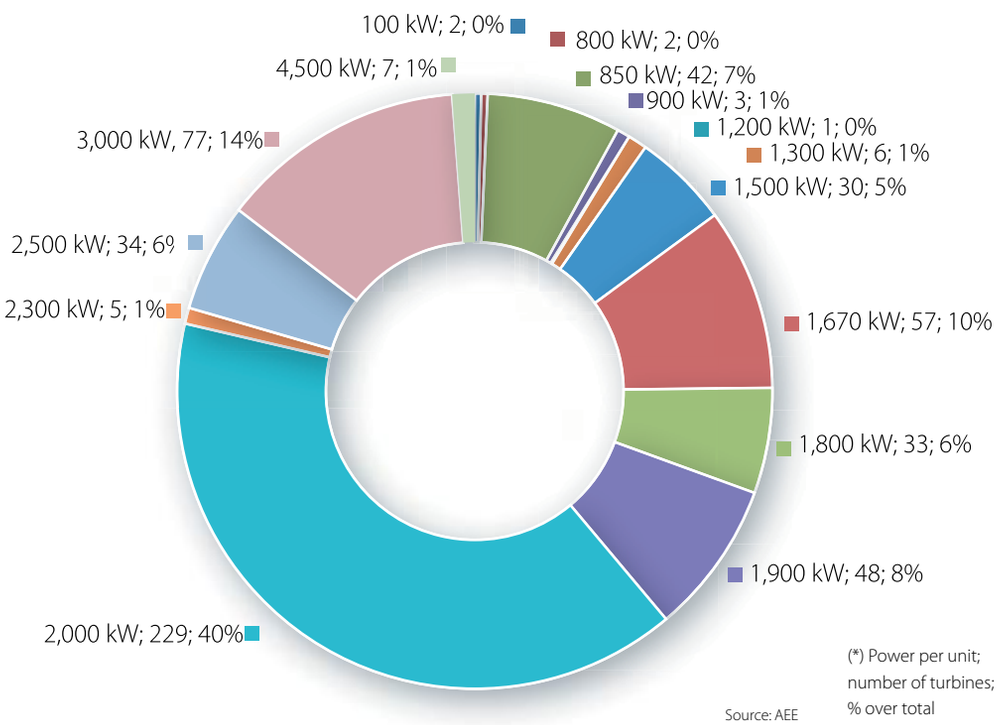
Regarding manufacturers, Gamesa turbines provided the biggest share of capacity (423 MW), followed by Vestas (338 MW).

Table II.04. Manufacturers share in new and cumulative capacity in 2012

Manufacturers	Capacity installed in 2012 (MW)	Percentage of total installed in 2012	Cumulative capacity to end 2012 (MW)	Cumulative market share (%)
GAMESA	423.45	38.1%	11,925.59	52.3%
VESTAS	338.35	30.4%	4,071.99	17.9%
ALSTOM	107	9.6%	1,736.54	7.6%
ACCIONA WIND POWER	102	9.2%	1,658.13	7.3%
GE	48	4.3%	1,414.64	6.2%
SIEMENS	0.0	0.0%	772.30	3.4%
ENERCON	21.1	1.9%	515.05	2.3%
SUZLON	0.0	0.0%	218.00	1.0%
NORDEX	35.7	3.2%	183.38	0.8%
DESA	0.0	0.0%	100.80	0.4%
LAGERWEY	0.0	0.0%	37.50	0.2%
M-TORRES	0.0	0.0%	36.90	0.2%
KENETECH	0.0	0.0%	36.90	0.2%
SINOVEL	36	3.2%	36.00	0.2%
REPOWER	0.0	0.0%	25.00	0.1%
NORVENTO	0.2	0.0%	0.20	0.0%
ELECTRIA WIND	0.0	0.0%	0.15	0.0%
WINDECO	0.0	0.0%	0.05	0.0%
OTROS	0.0	0.0%	16.37	0.1%
TOTAL	1,111.8		22,785.57	

Source: AEE

Graph II.02. Breakdown of the size of turbines installed in 2012



(*) Power per unit; number of turbines; % over total

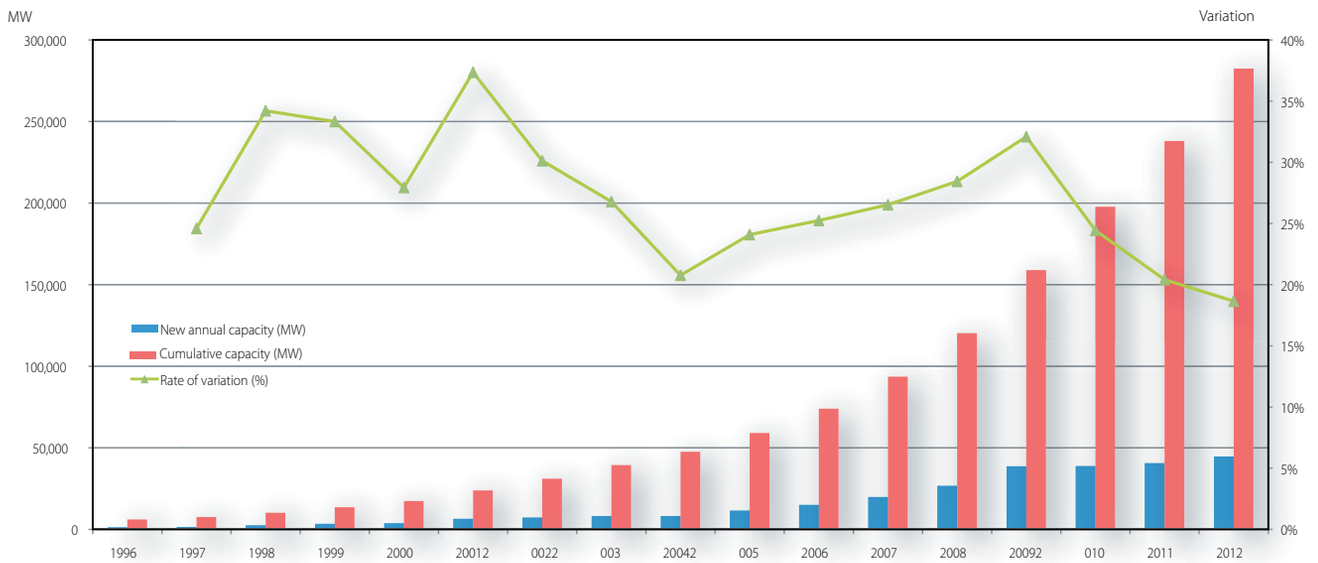
Source: AEE

In 2012, 576 wind turbines were installed in Spain, against 581 in 2011, 827 in 2010 and 1,332 in 2009. By the end of the year **there were 20,190 wind turbines up across the country.**

In line with the trend over recent years, the average unit rating of newly installed turbines increased, reaching nearly 2 MW in 2012. Of the 576 turbines installed throughout the year, more than 61% had a unit capacity above 2 MW.

New global installed wind capacity grew by 44,711 MW in 2012 bringing the cumulative total to 282,482 MW, 18% up on the figure reached by end-2011, according to figures from the Global Wind Energy Council (GWEC). Spain continues to be the fourth largest wind market in the world, behind China, with 75,564 MW (13,200 MW of new capacity installed in 2012), US, with 60,007 MW (13,124 MW new) and Germany, with 31,332 MW (2,439 MW new).

Graph II.03. New and cumulative installed capacity globally (1996-2012))



Source: GWEC, EWEA y **AEE**

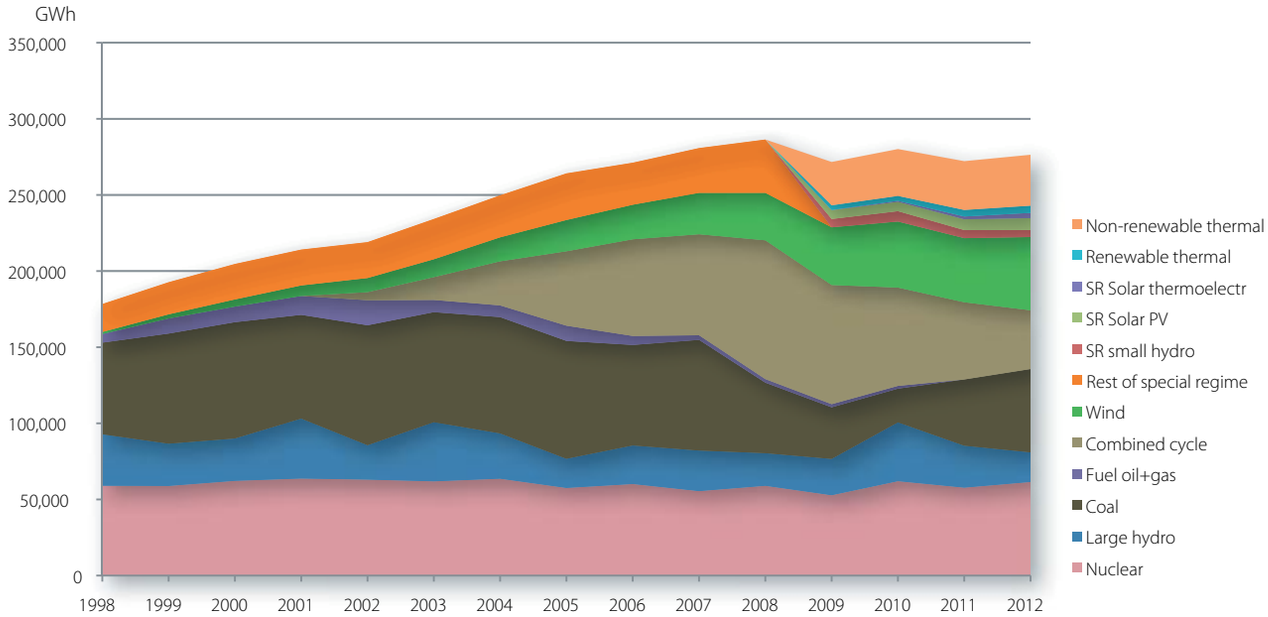
Continued output growth

In line with recent trends, mainland electricity demand fell in 2012 by 2% compared with the previous year (after factoring in and compensating the effects of working hours and temperatures).

Regarding the generation technology mix, large hydro and combined cycle gas experienced a dip against performance in 2011, with output falling 29.4% and 23.9%, respectively. Conversely, nuclear and coal generated 6.5% and 25.8% more, respectively.

Within the special regime, the only technology to register a dip was small hydro, with output falling 12.5%. Wind, solar photovoltaic, solar thermoelectric, renewable thermal and non-renewable thermal power all increased their output.

Graph II.04. Annual output of different technologies 1998-2012



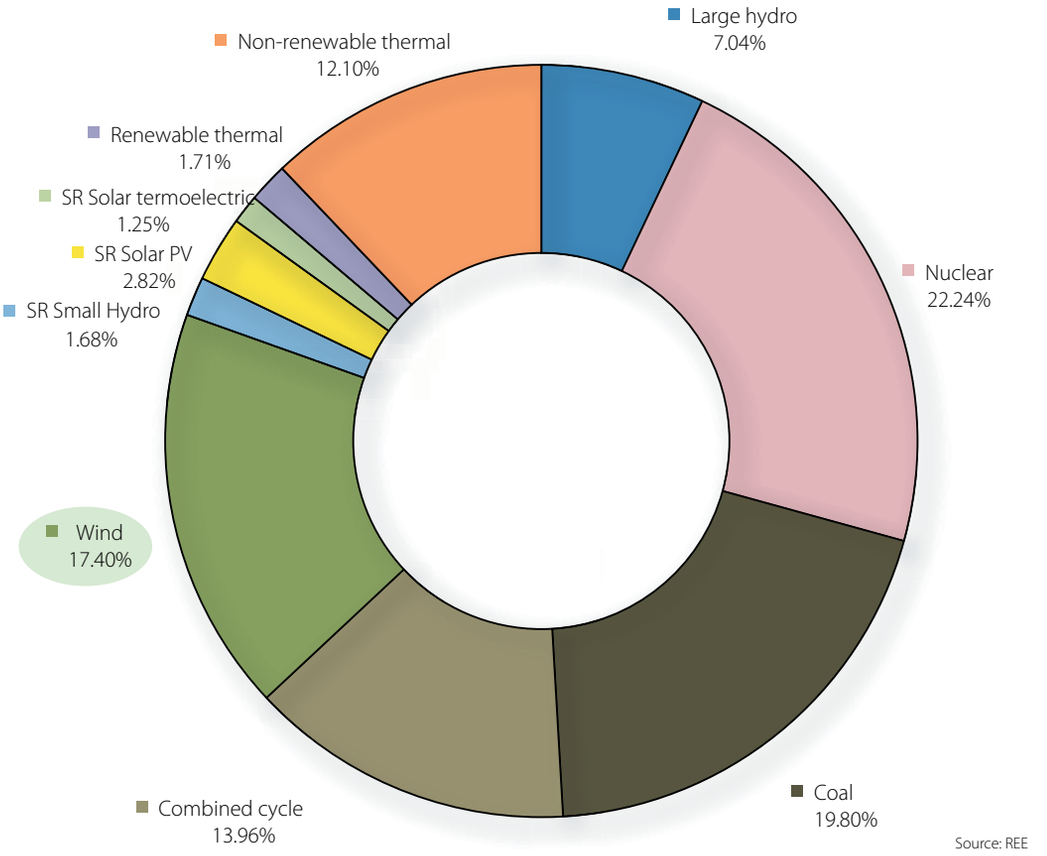
Source: REE

Nuclear remained the top technology in terms of covering demand, providing 22% of the mix (against 21% in 2011), followed by combined cycle gas power, with practically 20% (against 16% in 2011) and wind power, with a market penetration of 17,4% (against 15.5% in 2011). Large hydro and combined cycle's share dipped to 7% and 14%, respectively, against 10% and 19% in 2011.

Overall, **renewable energies covered 32% of total power consumption in 2012**, against 32.5% the year before. The slight drop was due to reduced hydro generation.

Author: José Vila

Graph II.05. Different technologies' share of the mainland generation mix in 2012

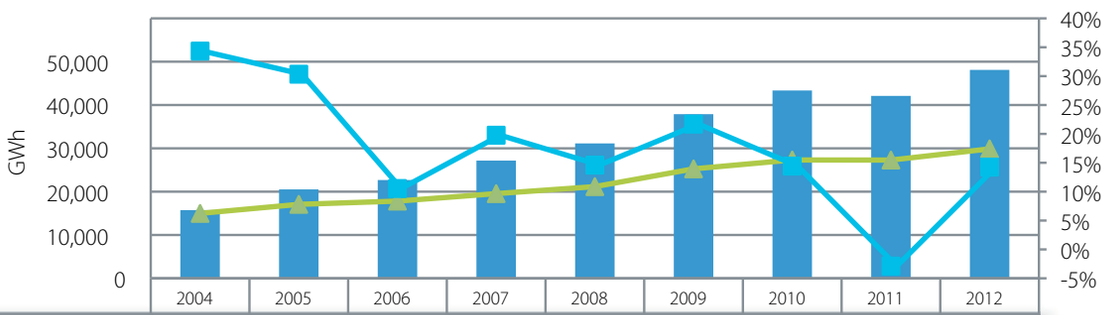


Source: REE

Wind power production totalled 48,106 GWh in 2012, 14,25% more than in 2011, even though installed capacity grew by just 5%.

While 2011 was marked by exceptionally low winds, 2012 can be considered a good year; better even than 2010 (production was 11% up on that year).

Graph II.06. Annual wind generation growth and its share of total power generation 2004-2012



	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wind power	15,744	20,520	22,684	27,169	31,136	37,889	43,355	42,105	48,106
% of total generation	6.2%	7.8%	8.4%	9.7%	10.9%	13.9%	15.5%	15.5%	17.4%
ANNUAL RATE OF VARIATION (%)	34.34%	30.33%	10.55%	19.77%	14.60%	21.69%	14.43%	-2.88%	14.25%

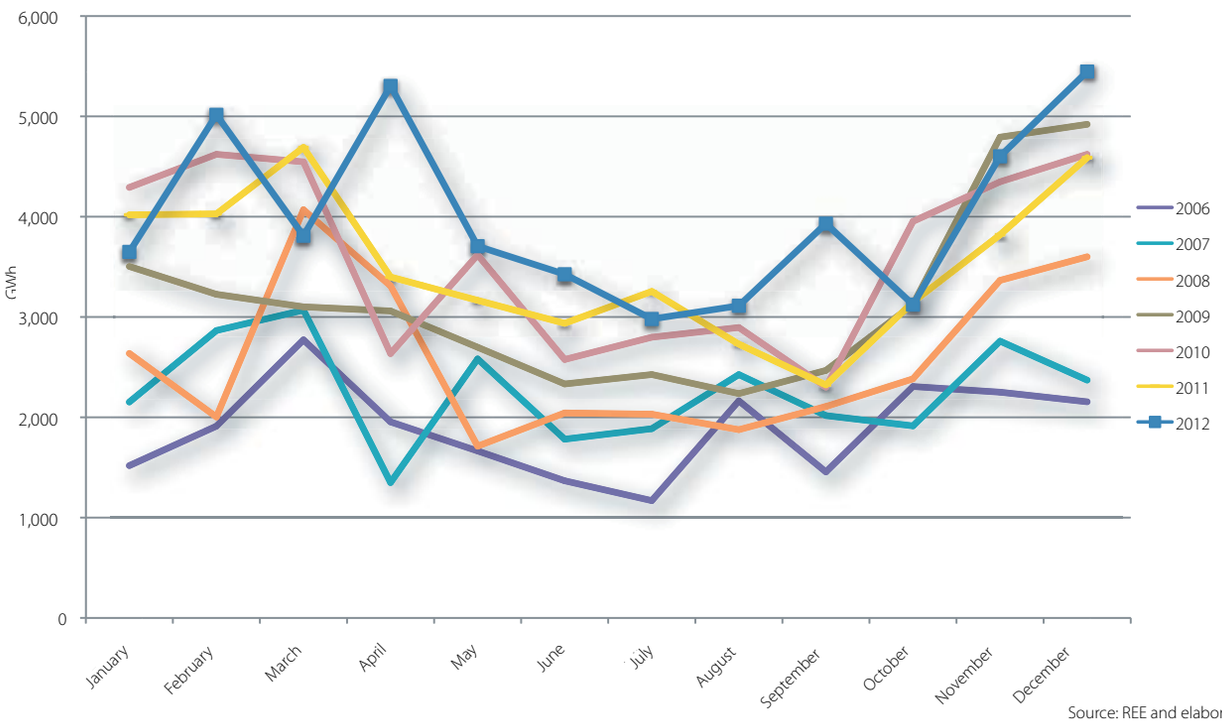
Source: REE

Author: Blas Carrión

In fact, 2012 saw wind power break the maximum production records achieved in previous years. On September 24, at 3.03 hours, spot wind power penetration covered 64% of demand. On April 18, at 16.41 hours, total wind power online reached 16,636 MW. On the same day, new wind power production records were set for hourly output (16,455 MWh) and daily output (334,850 MWh).

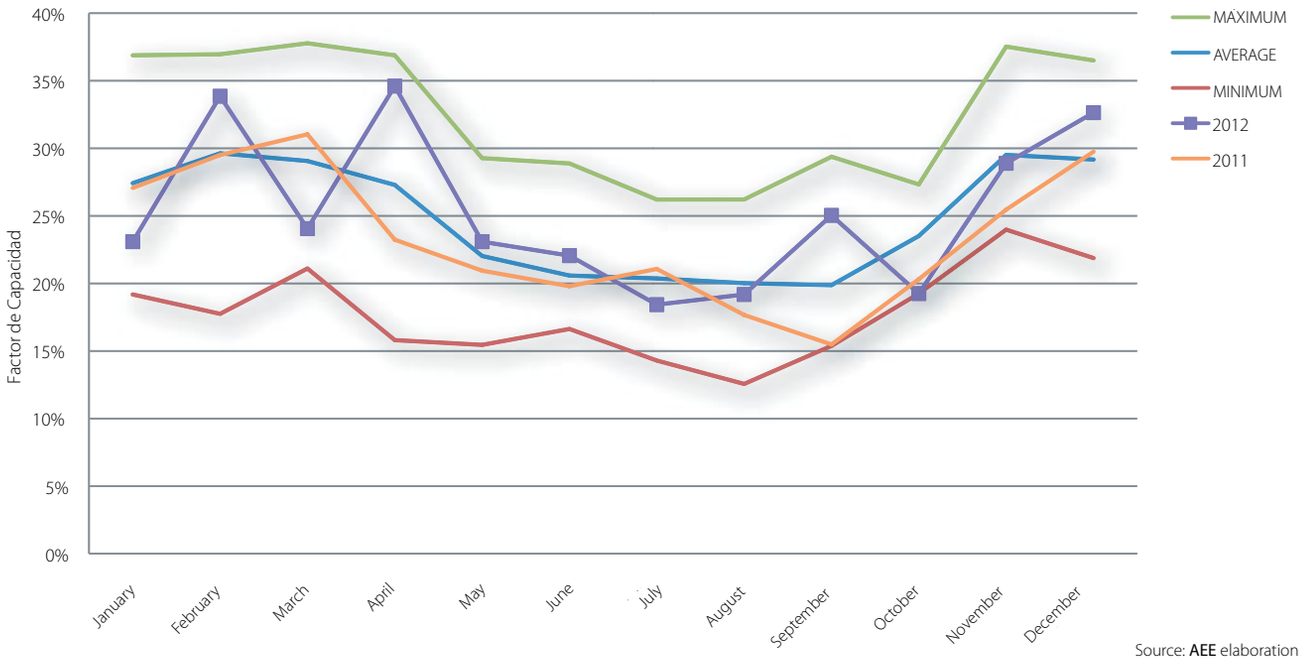
Furthermore, in the months of November and December 2012, wind power was the biggest contributor to the electricity system, out of all technologies, reaching 21% and 23% of the mix, respectively.

Graph II.07. Monthly wind power generation, 2006-2012



Source: REE and elaboration by **AEE**

Graph II.08. Monthly capacity factor. Average, minimum and maximum 1998-2012. Averages in 2011 and 2012

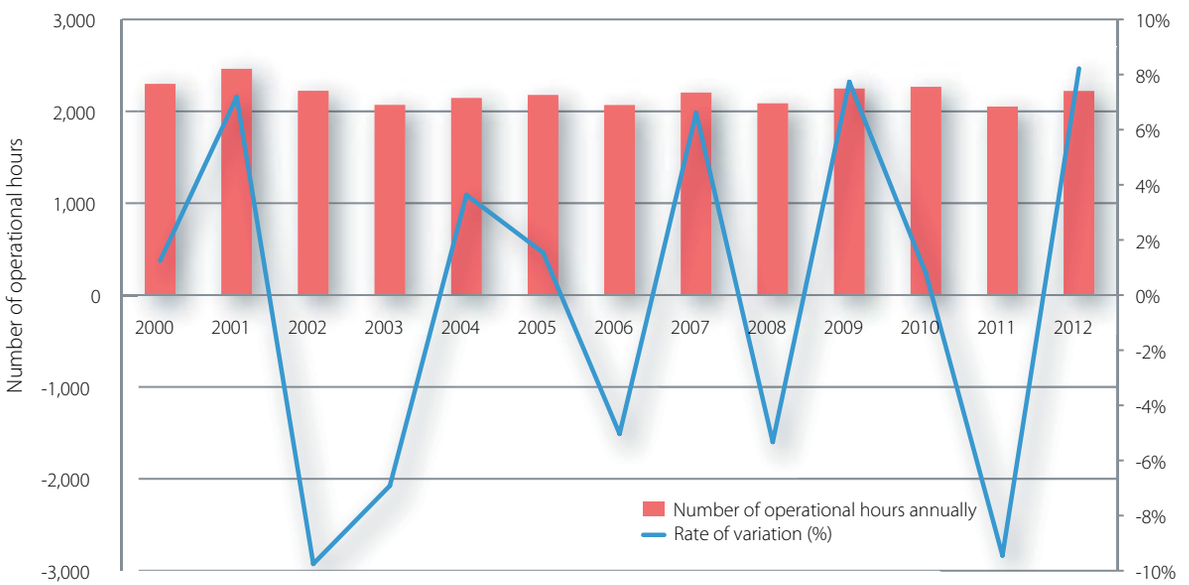


Source: **AEE** elaboration

The average monthly capacity factor throughout 2012 was 25.35%. The monthly maximum, at 35%, was reached in April.

Average plant operational time has increased to 2,200 hours, compared to 2,050 hours in 2011 but below the 2,260 hours of 2010.

Graph II.09. Average annual plant operational hours and rate of variation 2000-2012



Source: **AEE**

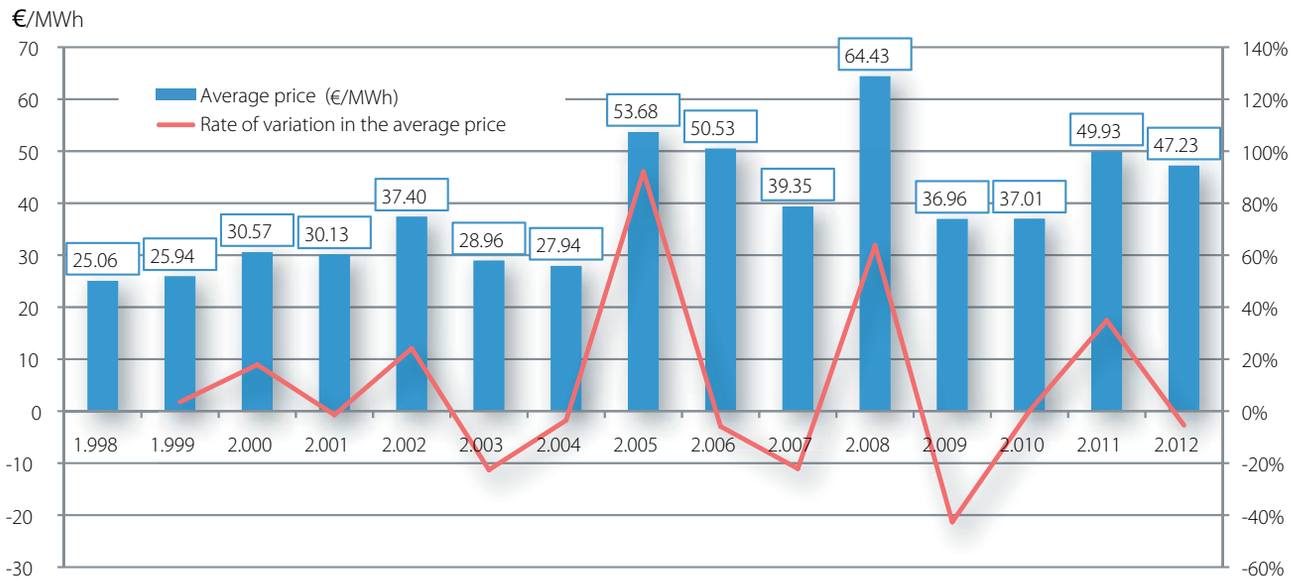
Remuneration: the last year of RD 661/2007

In 2012, and before Royal Decree Law 2/2013 came into force, wind farm owners could sell power through the feed-in tariff option or the wholesale market option. Regardless of the option chosen, the power is first sold on the market. Under the feed-in tariff, offers are made at zero price and the Market Operator carries out the matching process to establish the market price for each hour of the day. That enables the system operator to determine final deviations (both positive and negative).

In 2012, around 25% of installed wind capacity opted for the feed-in tariff. The remaining 75% opted for the wholesale market alternative, with 63.5% listed under the First Transitory Disposition of Royal Decree 661/2007 (14,400 MW) and 9.5%, the later wholesale market option.

The average daily wholesale market price in 2012 was €47.23/MWh, 5% below that of 2011 (€49.93/MWh) but 27.6% above that of 2010 (€37.01/MWh).

Graph II.10. Annual average daily market price and rate of variation, 1998-2012

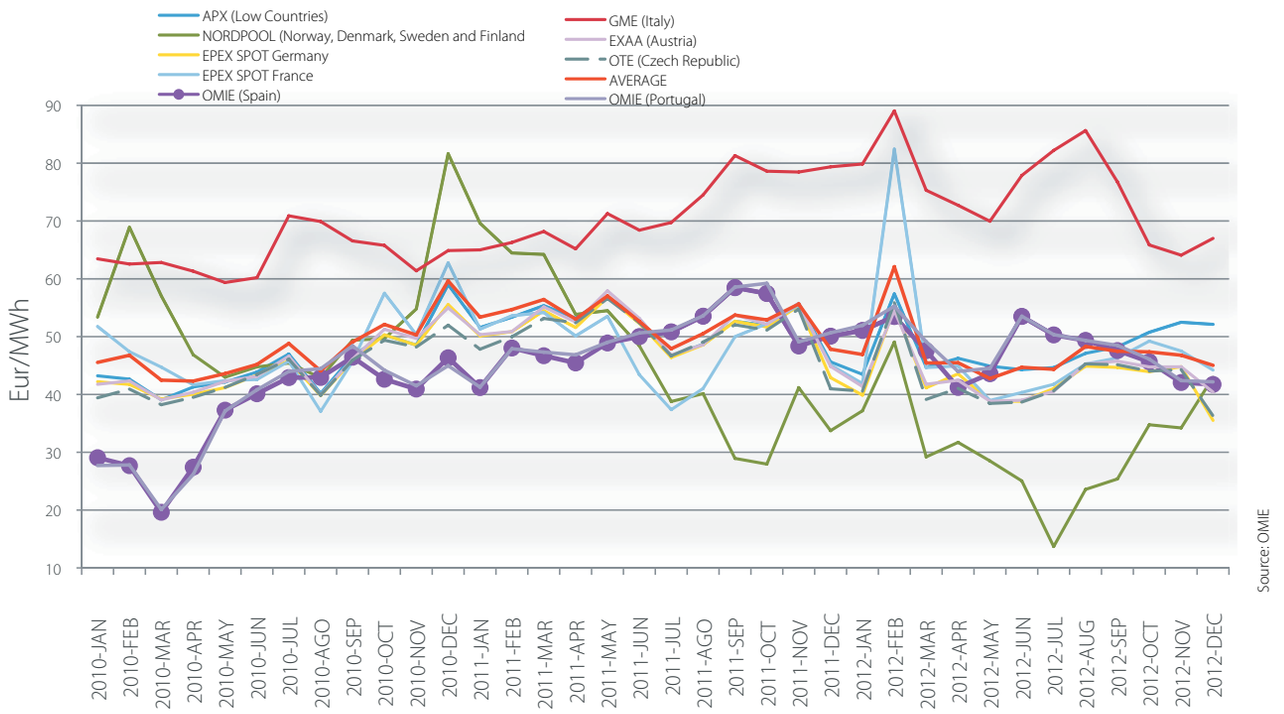


Source: OMIE and **AEE** elaboration

Author: Miriam Mur Abad

The average Spanish market price remained within the average range of the main European national markets, as demonstrated in the following graph.

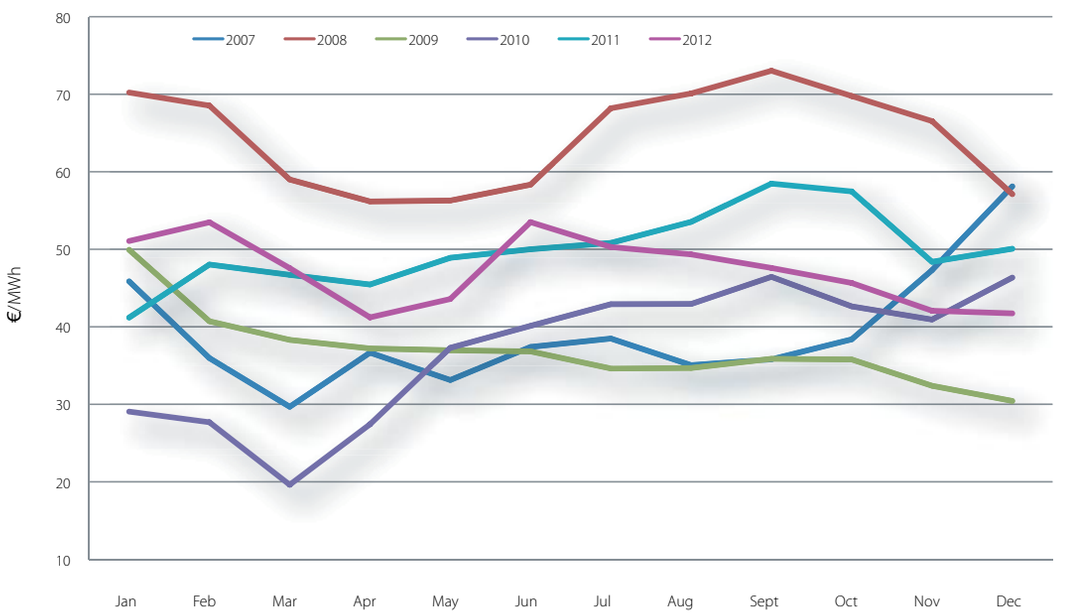
Graph II.11. Comparison of average monthly prices on international markets, 2010-2012



Source: OMIE

The average monthly price in 2012 was within the €41-53.5/MWh range. In the first months of the year, it was above the price reached the year before but, after August, it fell up to 20% below the respective 2011 monthly prices.

Graph II.12. Monthly curve of average price on the daily market, 2007-2012



Source: OMIE and **AEE** elaboration

The levels set for the feed-in tariff, the reference production incentive and the ceiling price and floor price are shown in the table below. Order IET/3586/2011 revised the remuneration for wind power sales in 2012, based on the going price consumer price index (CPI), at 3.014%, minus the 0.25% established in the First Additional Disposition of RD 661/2007.

Royal Decree-Law 2/2013 modified those parameters. Accordingly, for 2013, remuneration is indexed to the 'underlying' inflation rate (the CPI, excluding processed foods and energy) minus 50 basis points, as defined in the First Additional Disposition of RD 661/2007. Furthermore, the maximum and minimum price limits were eliminated and the production incentive was set at zero for 2013.

Author: David García

Table II.05. Parameters for calculating wind power remuneration under Royal Decree 661/2007. 2007 – 2013

Units: €/MWh	2007	2008	2009	2010	2011	2012	2013
Feed-in tariff	73.228	75.681	78.183	77.471	79.084	81.270	81.247
Feed-in tariff from year 21	61.200	63.250	65.341	64.746	66.094	67.921	67.902
Reference production incentive	29.291	30.272	31.273	30.988	31.633	32.508	0
Reduced reference production incentive (Article 5 RD 1614/2010)					20.142	20.142	
Upper limit	84.944	87.790	90.692	89.866	91.737	94.272	-
Lower limit	71.275	73.663	76.098	75.405	76.975	79.102	-
CPI		3.60%	3.56%	-0.66%	2.33%	3.014%	
CPI-CI excluding non-processed foods and energy							0.472%
Factor X		0.25%	0.25%	0.25%	0.25%	0.25%	0.5%
	RD 661/2007	Order ITC 3860/2007, of December 28	Order ITC 3801/2008, of December 26	Order ITC 3519/2009, of December 28	Order ITC 3353/2010, of December 28	Order IET/3586/2011, of December 30	Order IET/221/2013, of February 14

Source: **AEE** elaboration

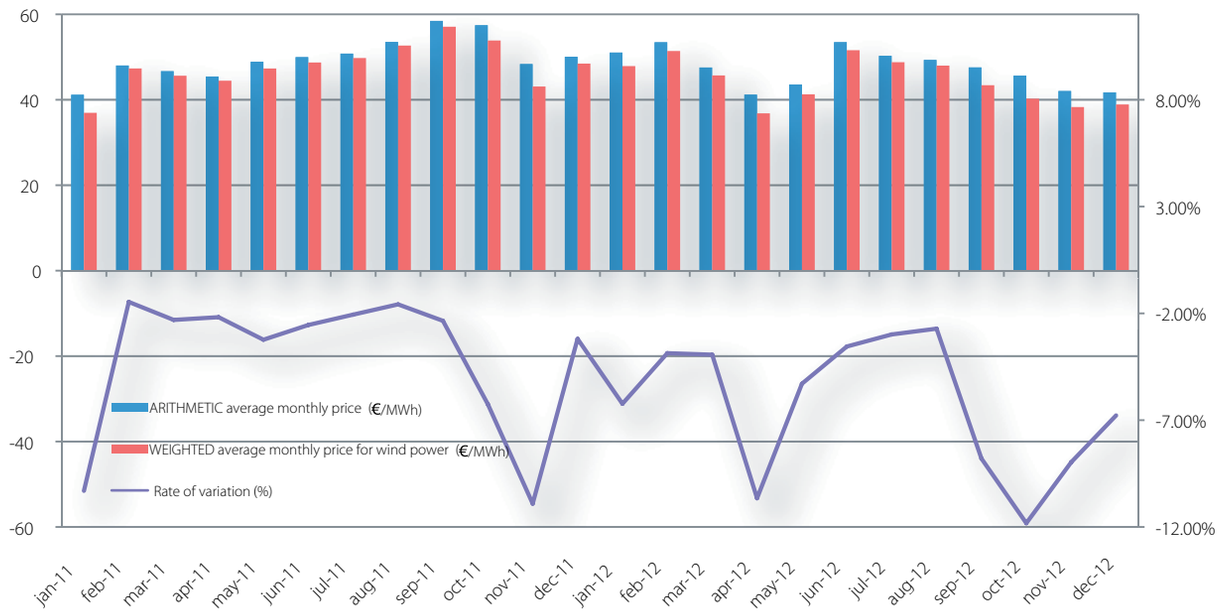
Author: Vicente Guill

In order to analyse wind power remuneration under the market option in 2012, it is necessary to calculate the weighted average price for wind power, which, for that year, was practically 8% below the arithmetic average.

Graph II.14 illustrates remuneration varying in accordance with the market price. The dotted red line shows how remuneration would develop under the market option of Royal Decree 661/2007 if the reference production incentive had not been reduced by 35%, in accordance with article 5 of RD 1614/2010. The blue line shows remuneration under the market option in accordance with market price. And the purple line shows remuneration under the market option within the First Transitory Disposition of RD 661/2007, which expired on December 31, 2012.

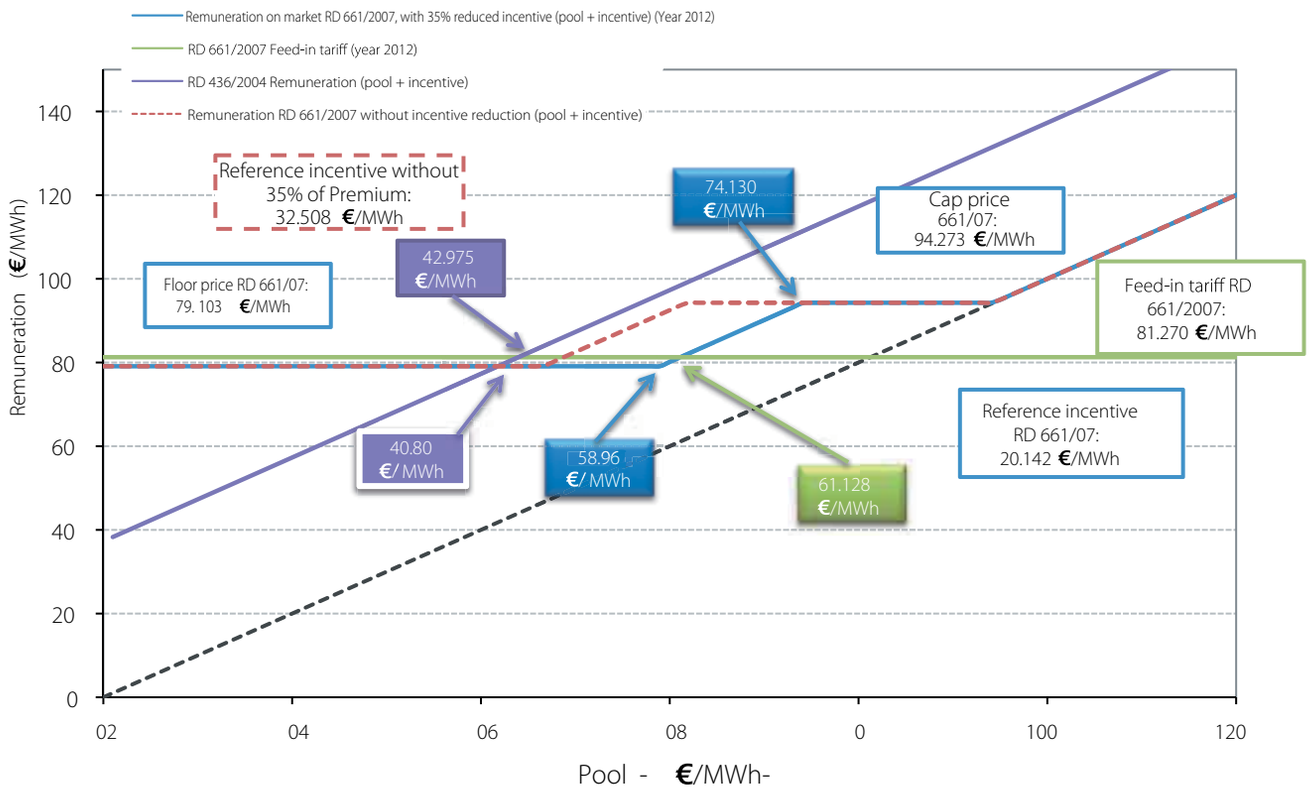
The graph illustrates how, for market prices above €40.8/MWh, the remuneration under the market option of the 1st TD is higher than that under the market option of RD 661/2007. And for market prices above €42.975/MWh, remuneration in the market option of the 1st TD is higher than the feed-in tariff of RD 661/2007 (at €81.270/MWh in 2012). But, for market prices above €61.128/MWh, remuneration under the market option of RD 661/2007 is higher than the feed-in tariff, explaining why most operators opted for it in 2012.

Graph II.13. Monthly arithmetic average and average weighted price for wind power, 2011-2012



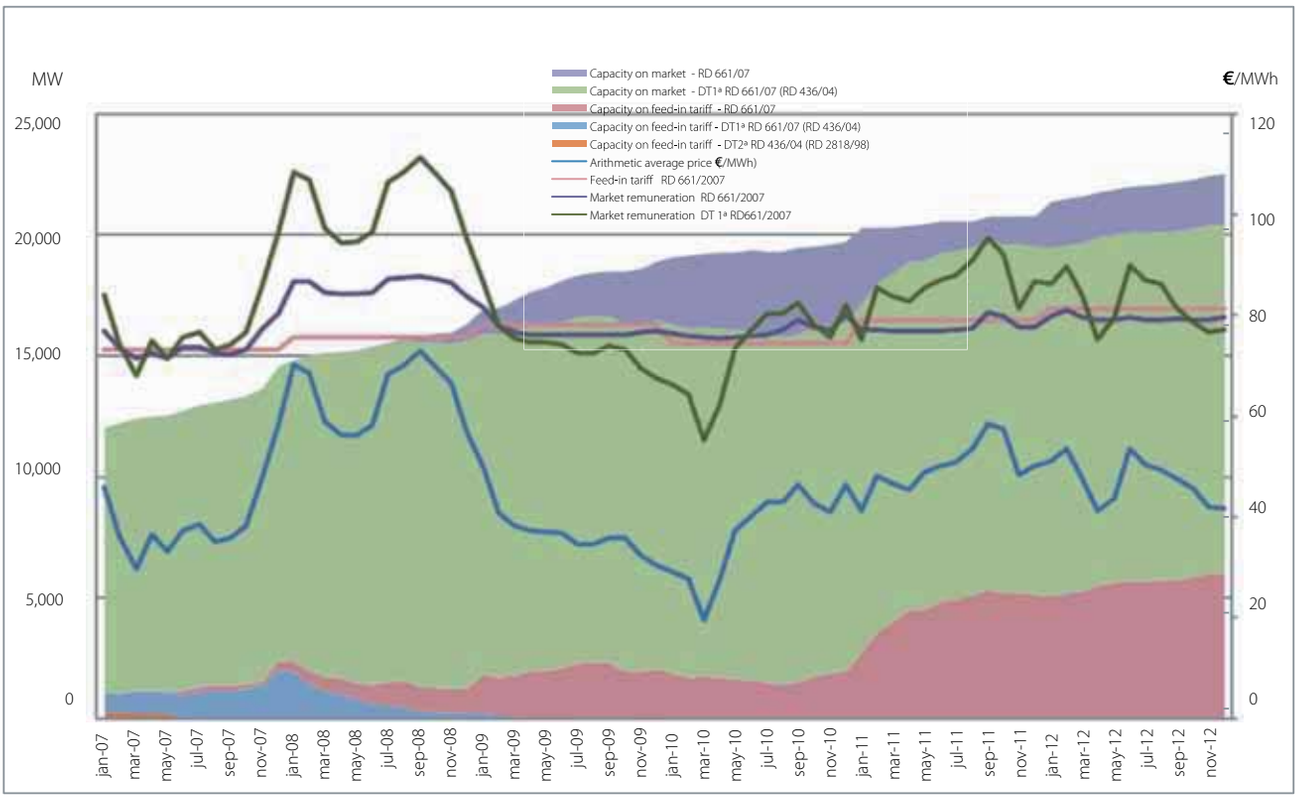
Source: Figures from OMIE and REE, **AEE** elaboration

Graph II.14. Remuneration in accordance with market price in 2012



Source: **AEE** elaboration

Graph II.15. Monthly power sales within each sales mechanism option, 2007-2012



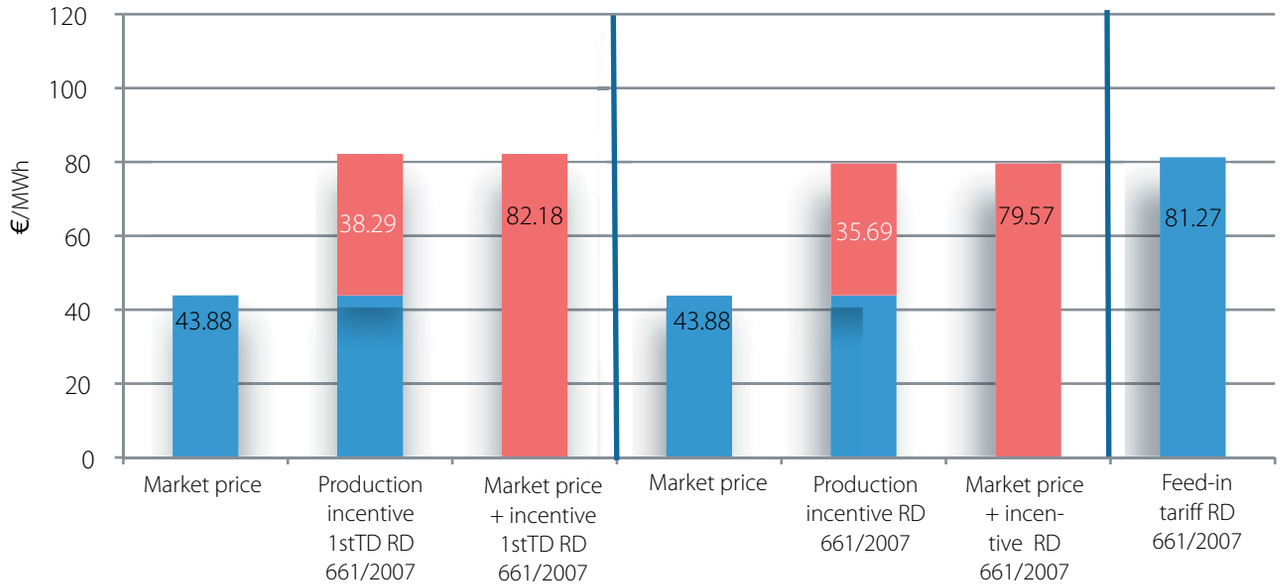
Source: Figures CNE and OMIE. **AEE** elaboration

Graph II. 16 illustrates the average remuneration in 2012 for each of the options. The average remuneration for capacity opting for the First Transitional Disposition (1stTD) of RD 661/2007 was €82.18/MWh, slightly above the others. The feed-in tariff in 2012 was at €81.270/MWh. Finally, capacity operating under the market option of RD 661/2007 received an average of €79.57/MWh (These figures do not include bonuses paid for providing reactive power or for low voltage ride-through capability).

Following publication of RD 661/2007, capacity commissioned before January 1, 2008, could choose before January 1, 2009, whether to opt for the new rules established in RD 661/2007 or to remain under one of the two options of RD 436/2004 (feed-in tariff or market price plus fixed incentive). If operators opted for the feed-in tariff, they could not change the option throughout the plant's useful life. Alternatively, they could remain in the market price plus fixed production incentive option for a transitory period lasting to December 31, 2012, after which they would have to choose between the options defined in RD 661/2007.

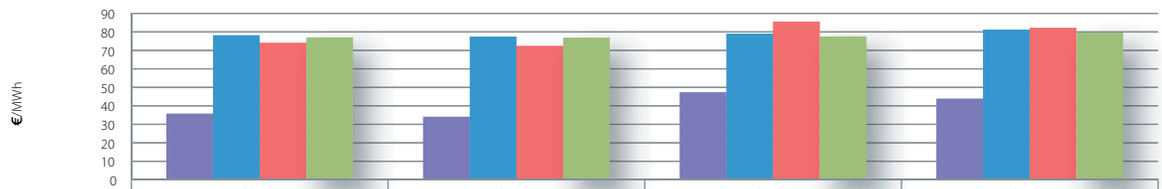
In the end, 14,400 MW opted for the RD 436/2004 market alternative (market price plus a fixed production incentive of €38.295/MWh). Given the low pool market prices of 2009 and 2010, remuneration under that option came out lower than the other two. Nevertheless, in 2011 and 2012 it was higher.

Graph II.16. Average remuneration under different options in 2012



Source: **AEE**

Graph II.17. Average remuneration under different options, 2009-2012



	2009	2010	2011	2012
Weighted market price for wind power	35.78	34.12	47.31	43.88
Fixed feed-in tariff	78.183	77.471	79.084	81.27
Market RD 436/2004	74.07	72.42	85.60	82.18
Market RD 661/2007	77.05	76.89	77.60	79.57

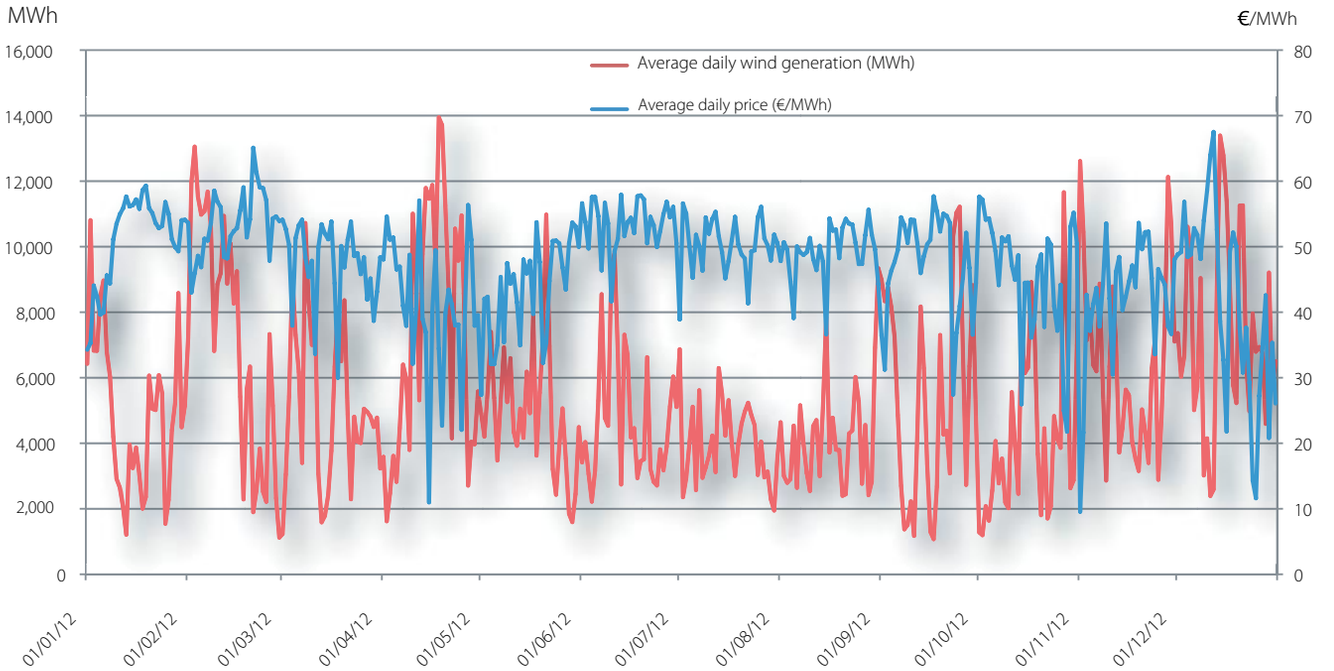
Source: **AEE** elaboration

Wind power reduces the market price

The fact that **integrating wind power into the electricity system reduces the wholesale market price** has been confirmed over the years. While wind reduces the daily market price, it is also true that it does not do so equally throughout all the hours in a year. Among other factors, it depends on the amount of wind power integrated within the system, together with the generation structure and levels of electricity demand at any particular time.

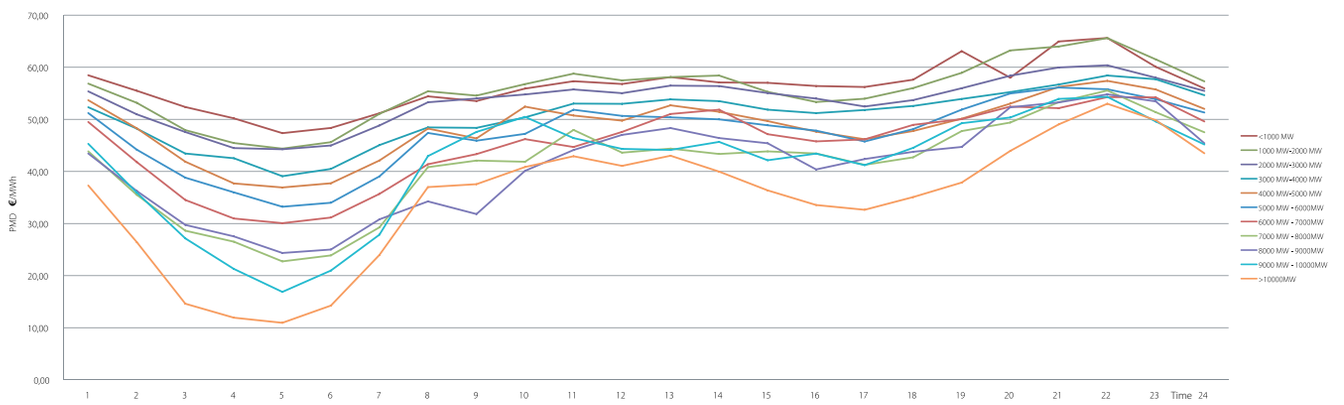
Graph II. 19 illustrates the hourly Average Market Price (AMP or Precio Medio del Mercado—PMD—in its Spanish form) in relation to wind generation.

Graph II.18. Average daily wind generation and average daily prices. 2012



Source: REE and OMIE. **AEE** elaboration

Graph II.19. Hourly prices relative to wind penetration levels in 2012

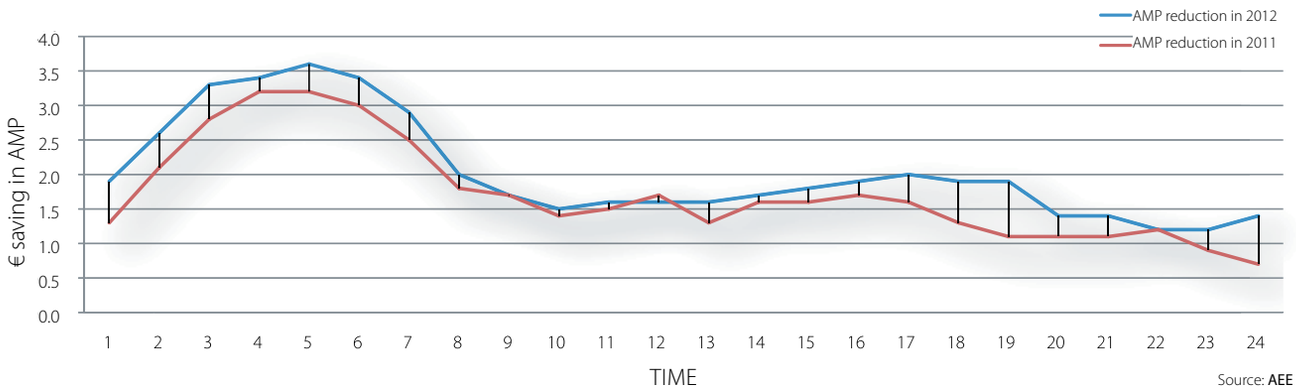


Source: **AEE** elaboration

As can be seen in the graph above, the biggest reduction in the AMP happens around 4.00 hours, with a big difference between generating less than 1,000 MWh and more than 10,000 MWh with wind. Thanks to wind power generation, the total reduction in the electricity market price in 2012 was €1.98 billion. That translates to an average throughout the year of €10-63/MWh (the figure comes from an analysis of the AMP reduction for each hour and each 1,000 MWh of wind power, taking into account the power sold on the daily market, as well as exports and the hourly wind power average).

As shown in the graph below, the reduction in AMP is greater in 2012 than in 2011, when the saving was €1.44 billion. The main reason for the greater saving is because there was simply more wind generation in 2012.

Graph II.20. AMP reduction comparaison, 2011 y 2012



Source: **AEE**

While receiving an incentive through the electricity sector's special access tariffs, wind also pressures down wholesale electricity prices on the pool considerably for not burning fossil fuels; a factor not taken into account by regulators to date. That effect, together with the considerable savings wind makes in offsetting fossil fuel imports, should be taken into consideration in any new electricity sector regulation.

Incentives and payments made

Overall, total incentives paid to the wind sector came **to €2.03 billion in 2012,** of which €1.77 billion was in production incentives and €260.27 million in bonuses for anciliary services (reactive power and low voltage ride-through). Total sector remuneration, including wholesale market sales, was €4.06 billion. Total average remuneration in 2012 came in at €84.77/MWh, including deviations and anciliary bonuses.

Within the Special Regime, total remuneration came to €8.51 billion. Wind power accounted for 24% of the incentives paid and generated 47% of the power.

According to the CNE, 76% of total wind power was sold through the market option and the rest under the feed-in tariff.

Table II.06. Wind power remuneration according to CNE, 2012

	Capacity subject to payment (MW)	Energy sold (GWh)	Number of individual plants	Incentive (Million €)	Anciliary service bonuses (Million €)	Regulated remu-neration (Million €)	Regulated remunera-tion per unit (€/MWh)	Market re-muneration (Million €)	MP Market re-muneration (€/MWh)	Total remu-neration (Million €)	Total remu-neration per unit (€/MWh)
Market	16,503.42	36,394	881	1,378.97	223.24	1,602.20	40.02	1,539.11	42.29	3,141.31	86.31
Tariff	5,664.27	11,556	387	397.76	37.04	434.80	37.63	488.70	42.29	923.50	79.92
TOTAL	**22,167.69**	**47,950**	**1,268**	**1,776.73**	**260.27**	**2,037**	**42.48**	**2,027.81**	**42.29**	**4,064.81**	**84.77**

Source: CNE's

Settlement of equivalent incentive, feed-in tariff, production incentive and bonuses for power producing plants in Special Regime. December 2012

Pasado y presente

Jesús Lozano Oliva

Chapter III
Technical activity

The year 2012 was not a good one for the Spanish wind industry, which embraces practically the entire supply chain (Map III.01), due to the new regulation decisions grinding the domestic market to a halt. Additionally, **funds for R&D&i have also been slashed,** a key blow to a globalised market hinged on generation cost reduction and increased technology reliability.

With the backdrop, **exports have become a lifeline for the Spanish industry.** That is despite the deceleration of the global market due mainly to the financial crisis. The economic environment has restricted access to finance, in what is a capital intensive industry, as well as reducing electricity demand, so creating a situation of excess installed capacity.

Service and supply companies, including measurements and equipment engineering and service firms and providers of maintenance, auditing and environmental studies, are also actively searching new markets for their wide experience and knowhow. The Spanish market has fostered that experience due to its own peculiarities: complex terrain; a range of wind types in terms of intensity and/or turbulence; rich animal life and exemplary grid integration.

With the aim of helping maintain national strengths, **AEE** has continued working towards sector internationalisation—with the collaboration of ICEX—including the fields of labour risk prevention and R&D&i.

Map III.01. Map of industrial facilities

Source: AEE

Offshore initiatives

Since September 2012, the Directorate General for Innovation and Competitiveness, dependant on the Minstry of Economy and Competitiveness (MINECO), in collaboration with the Maritime Technology Platform (Plataforma Tecnológica Marítima Española—PTME) and the Spanish wind sector's technological platform REOLTEC, has been leading an initiative to give a decisive and definitive push to offshore wind power. The move takes into account the strong wind power and naval contribution to the Spanish economy, together with the existence of marine research centres and special offshore wind projects as well as cutting edge research groups (see Map III.02). There has also been a strong financial support base at national and regional level for R&D iniciatives in this field. Furthermore, Spain has offshore wind development potential in the medium term, as well as shorter-term opportunities for its industry in international offshore markets, both for turbines and auxiliary equipment.

Achieving all that requires **coordination to optimise efforts and resources** and to facilitate the best use of technological poten-

Map III.02. Map of Spanish Offshore Energy experiment centres

Source: REOLTEC and PTME

tial. That way we can offer the best opportunities for economic growth and job creation.

The initiative will first focus on the creation of a coordination team whose participants will include public administrations, test centres, sector industrial leaders and the technological platforms. The working group will have the following objectives: to define the research priorities to be included in national R&D support programmes; to strengthen Spanish industry positioning in international markets based on R&D&i carried out in Spain; to involve all those ministries with competencies related to the development and realisation of the coordinated strategy (MINETUR, MAGRAMA, MAEC); and to strengthen collaboration with the autonomous regions.

Author: Josema Montes

The O&M challenge

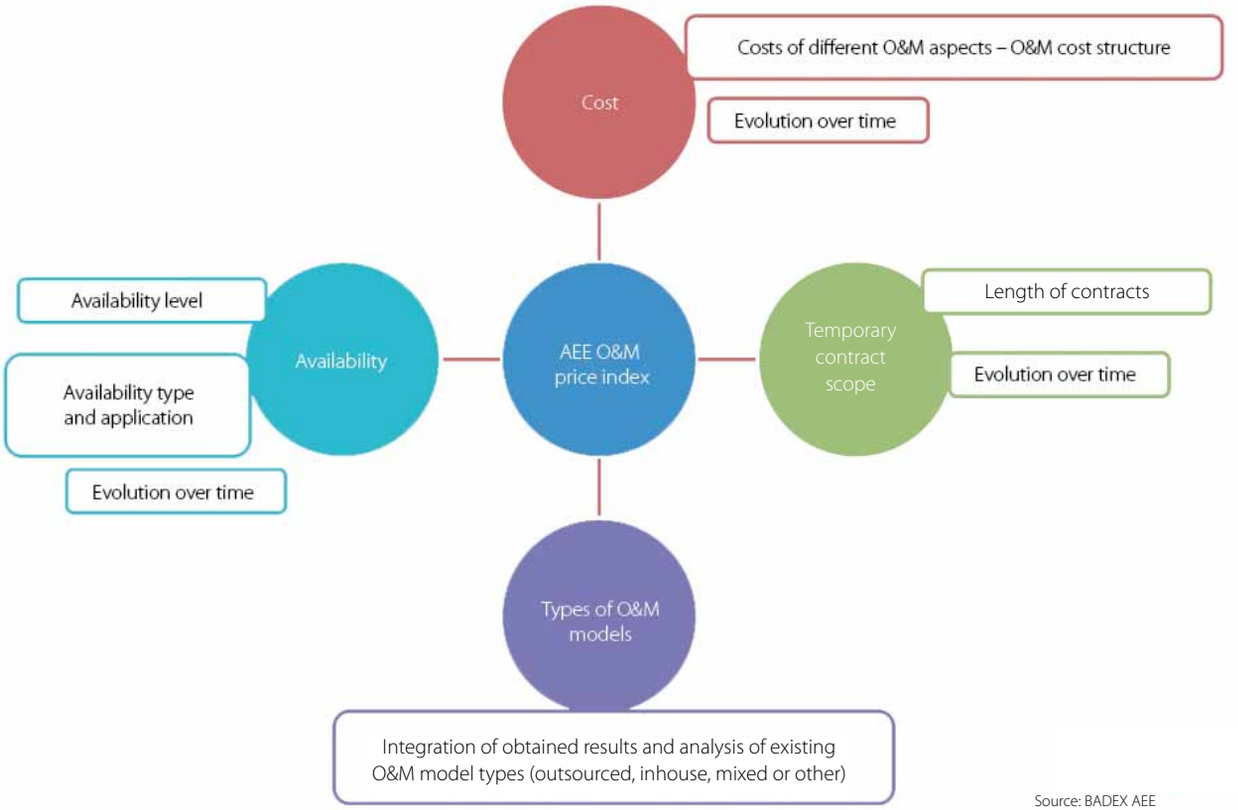
Given the reduced economic returns for wind capacity, **operation and maintenance (O&M) has become a key sector in just a few years** in order to optimise costs and guarantee availability.

With the aim of evaluating maintenance activity in the best possible way, **AEE** is promoting two lines of work through the Maintenance Working Group: the Operations Database and the Maintenance Price Index (Graph III.01).

BADEX groups together wind plant operation data (lists of alarms and work orders). Its objectives are to:

— Extend knowledge of wind plant O&M phases.
— Promote sector collaboration and information exchange.
— Evaluate maintenance systems and identify potential bottlenecks.
— Compile general data enabling companies to evaluate the efficiency of their systems and maintenance.

Graph III.01. Structure of O&M price index project



Source: BADEX AEE

Complimentary to the technical analysis carried out in the BADEX project, **AEE** is launching a study into the main features of O&M contracts, including costs, availability, time period covered and types of organisational models.

The study aims to take another step forward in extending sector knowledge about itself by charting trends and changes in economic and technical data, enabling it to spot possible threats to future competitivity.

Author: Francisco García Clemor

REOLTEC: technological excellence is the key

R&D and Innovation is a key element to future development and to the positioning of the Spanish sector on the international stage. The technological platform REOLTEC (coordinated by **AEE** and supported by MINECO) promotes technological activities by coordinating all the different actors across the sphere of Spanish R&D and Innovation.

The platform's basic activity is centred around three fundamental challenges to the wind sector:

- **The articulation of R&D and Innovation:** identification and updating of R&D priorities and mapping out the capabilities of main players (companies, technological centres and universities).
- **Identification of synergies** with other industrial sectors at national and international level.
- **Promotion of sector participation in solving the big social challenges** laid out in the Spanish Science, Technology and Innovation Strategy.

Furthermore, REOLTEC is proactive in defining new strategies to reinforce the sector's international positioning and to adapt offer to the demands of new markets, as well as to optimise Spanish company scope for specialisation. Those strategies centre around three basic technological objectives: to reduce costs, to improve energy quality and to increase availability.

Some of the platform's most outstanding activity includes:

- **Promoting cooperation at European level**, through REOLTEC's participation in the VII Framework Programme and, in the future, the Horizon 2020 programme (which will manage European R&D grants 2014-2020). REOLTEC also promotes the participation of sector players in European forums such as TPWind (the European Technological Platform), and it actively collaborates with the national public authorities in EWI (European Wind Initiative) and its committees.
- **Participation in ALINNE** (the Alliance for Energy Research and Innovation, or Alianza por la Investigación y la Innovación Energética in its Spanish form), which brings together the sector's biggest companies and the main public and private research bodies. ALINNE aims to provide solutions to the main challenges in the energy field and to contribute to defining a national energy strategy with attention to global positioning.

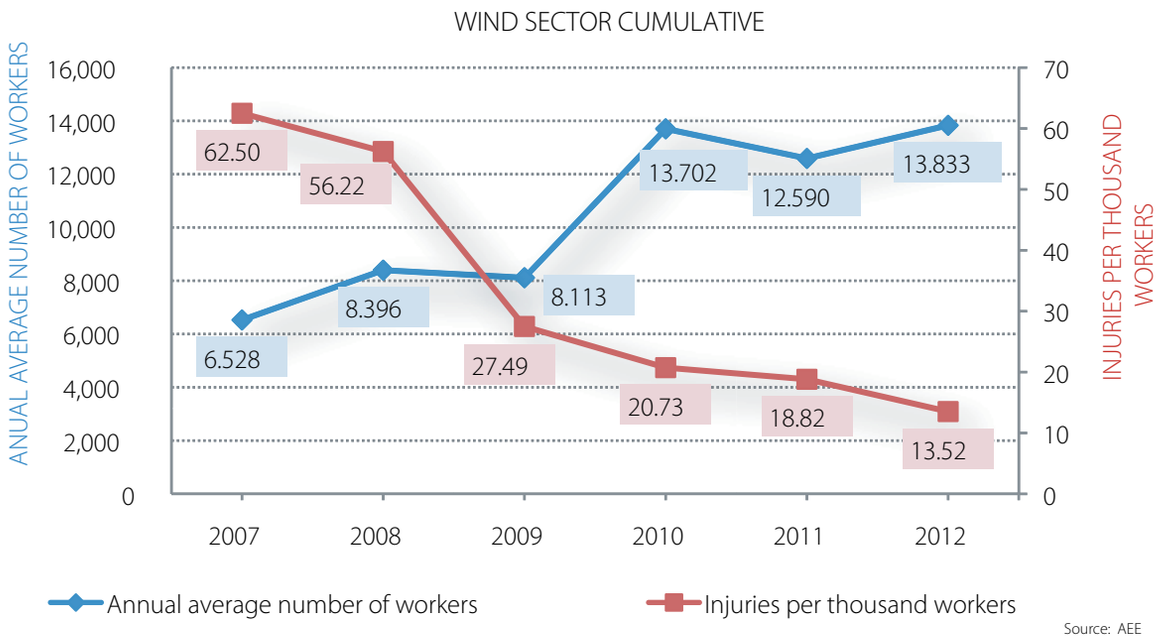
Increased interest in Labour Risk Prevention

Annual injuries at work dropped once again in 2012, when the third report on injuries at work across the sector was drawn up; an **AEE** initiative, stemming from its belief that understanding the main indicators related to injuries can help reducing them. The third report counted on the contribution of 40 companies—21% more than the previous one—which translates to a representative sample of some 13,833 workers, on average.

The principle injury indicators analysed in 2012 included the incidence rate, which was 13.52%, the down time frequency rate through injuries, at 7.38%, and the severity rate, at 0.19%. As in the previous edition, indicators across three broad operation activities were analysed: developing, manufacturing and services.

Graph III.02. illustrates the increase in staff workers for the sample and injury rate per thousand workers

Graph III.02. Wind sector accident rate curve per thousand workers



Source: AEE

Injuries have continued on a downward trend since 2007, which illustrates the growing professionalization of the wind sector in the field of risk prevention.

In accordance with the recommendation of the XVI International Conference of Labour Statisticians of the International Labour Organisation (ILO), the incidence rate is a ratio of the number of injuries causing time off work with the average number of workers exposed to risk. The incidence rate is therefore defined as follows:

$$\text{Incidence Rate} = \frac{\text{Working day injurys causing time off work}}{\text{Annual average of workers}} \times 1{,}000$$

Graph III. 03 illustrates that the wind sector's incidence rate is below that of other sectors.

In response to interest shown by different companies, AEE has launched a new working area in the field of Security Alerts. Those wishing to participate will send Security Alerts (incidences and correcting measures) to AEE, whose mission is to standardise them within a common template to be distributed in Spanish and English.

In November 2012, the *Working in confined spaces: Best practices guide (Blades)* was published, with recommendations for business owners and workers for accessing the blade interior, whatever its location (factory, on-site pending installation or actually installed on the turbine). The guide can be found in Spanish and in English on AEE's website.

Regarding vertical rope work, drafting is underway for the *Guide to access and positioning techniques using ropes (vertical rope work) in the wind power sector,* to be published in 2013. The objective is to put forward criteria determining when it is best to employ access and positioning techniques using ropes in the wind power sector. One novelty introduced in 2012 was the development of software called GEA (Injury Statistic Management or Gestión de Estadísticas de Accidentes in its original Spansh form). GEA enables companies to feed in injury statistics, completely confidentially and simply, and to compare themselves immediately with the sector average. This new system has been greeted enthusiastically.

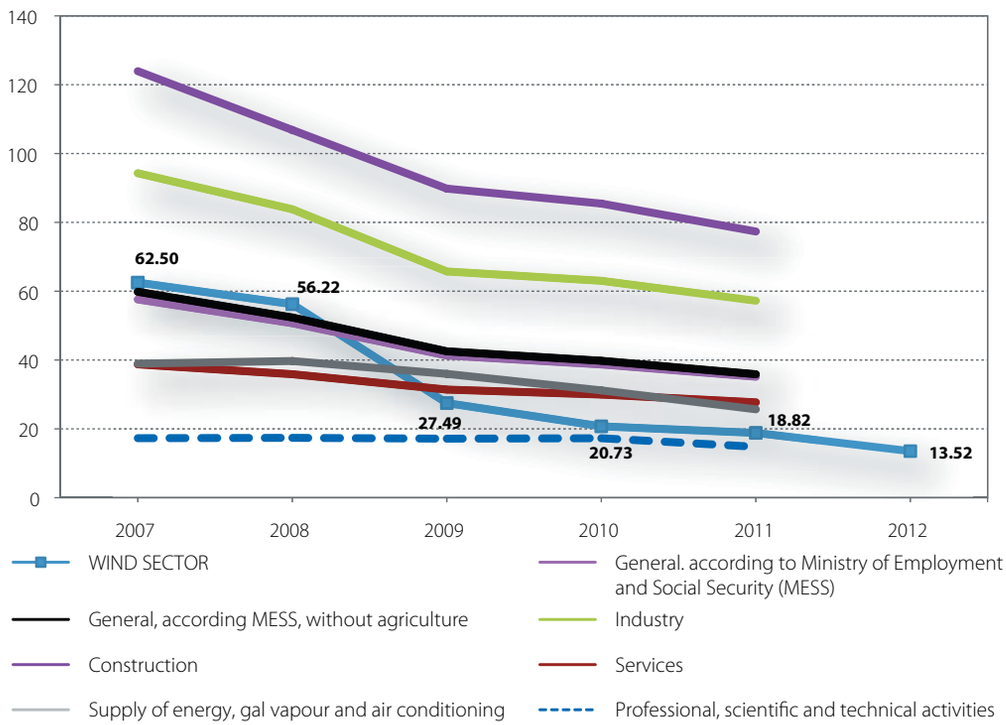
AEE has launched a new line of work on Safety Alerts

Increased curtailment

AEE participates in the different working groups run by system operator Red Eléctrica de España (REE), such as: the Technical Committee for Electricity System Monitoring and Operations; Planning Follow-up; Integration of wind generation in system operations and the Incidence analysis group. Those groups aim to find solutions for integrating as much wind power as possible into the grid.

With a view to the electricity Transmission Network Planning process, Period 2014-2020 (pu-

Graph III.03. Incidence rate



Source: AEE

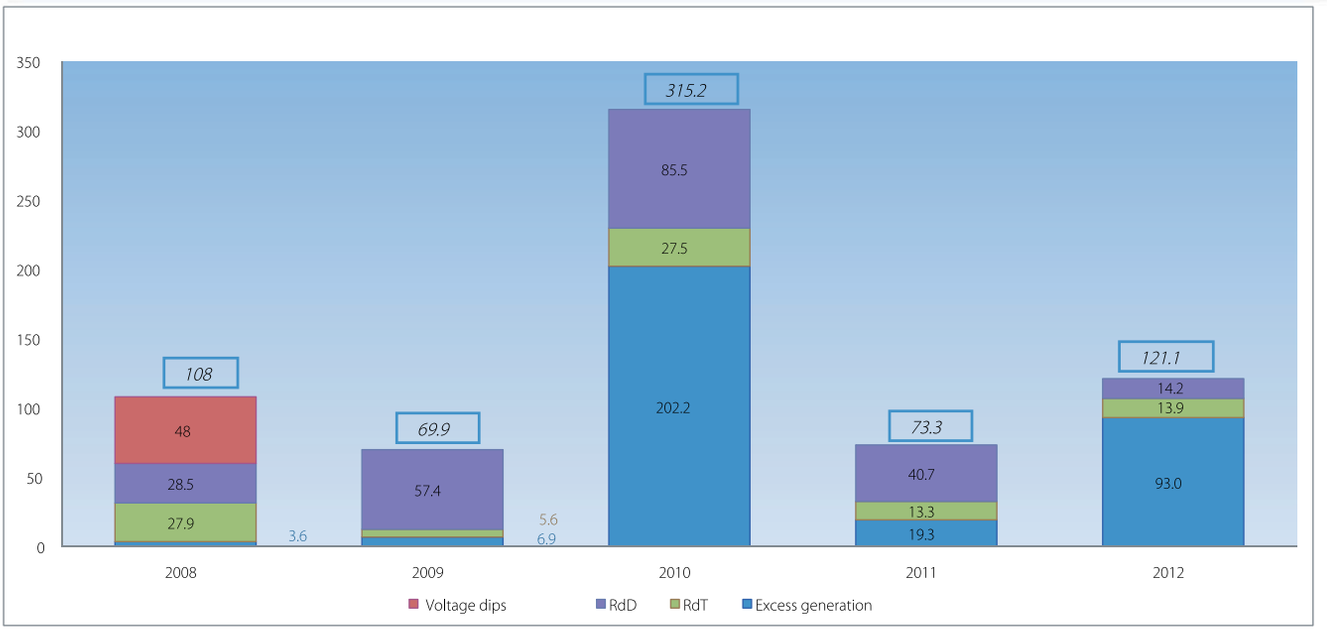
blished in the Official State Bulletin, December 5, 2012), **AEE** obtained information from its associated members to make a joint wind sector proposal.

In 2012, **curtailment on wind power generation reached 0.25%** of total possible generation, above the 0.18% of the previous year. Production control is carried out through the Daily Market's Technical Restrictions Resolution, especially in the Real Time Operations. Apart from hydro reserves, the number of curtailments depends largely on demand.

Medium capacity wind power

The Working Group for medium capacity wind power closely follows the progress made in

Graph III.04. Restrictions to wind power generation (GWh/year)



Source: REE and AEE elaboratiom

the field of distributed generation and self-supply. **AEE** is an active member of the **Platform for Promoting Distributed Generation and Self-Suppy,** which, throughout 2012, has closely monitored developments following the Royal Decree 1699/2011, November 18, which regulates the grid connection of low capacity energy generators. It is also observing the repercussions of the Royal Decree for net metering, with a view to promoting wind power for capacities below 100kW. Furthermore, AEE collaborated in the report *Self-supply with net metering and its socioeconomic impact, 2012-2016.*

Reserve wind capacity

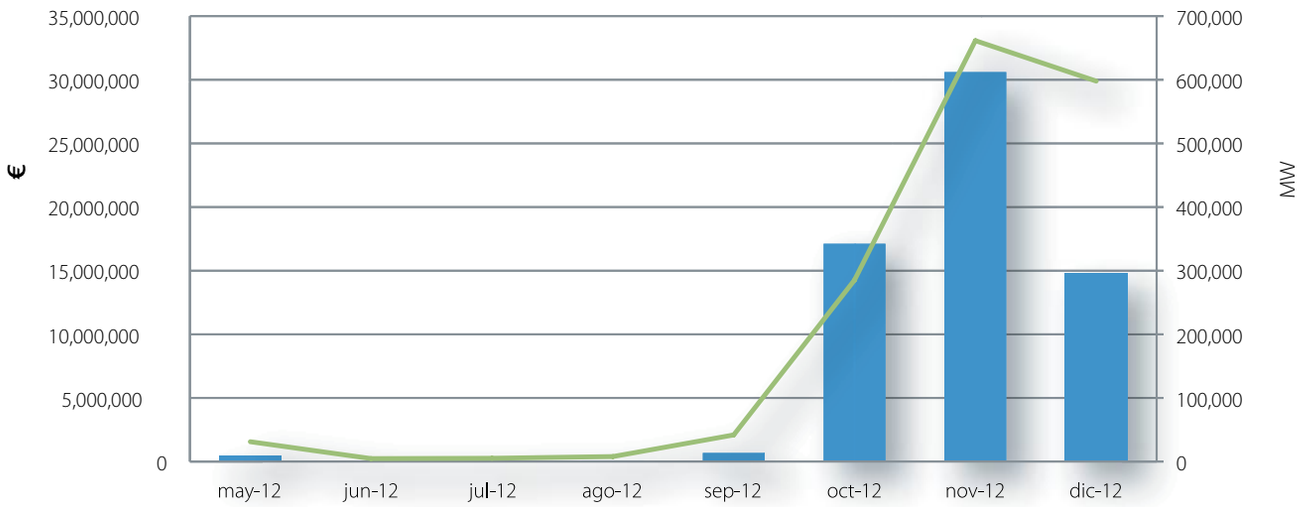
On March 10, 2012, the Official State Bulletin published the Ministerial Resolution of February 24, which approved the operational procedure or grid code P.O.3.9 governing the *Contracting and management of additional, upward-regulation reserve power.* The code aims at guaranteeing adequate reserve power at a reasonable cost, while separating the technical restrictions on output in different zones from the restrictions linked to a grid-wide insufficiency in extra reserve power.

The P.O.3.9 develops a market mechanism for contracting and managing additional reserve power in the system. The procedure guarantees the availability of the power reserves. At the same time, it distinguishes between power programming for technical restrictions in different zones and the restrictions linked to a grid-wide insufficiency in extra reserve power in the system.

The reasons for insufficient reserve power include deviations in demand, thermal power station failure, unavailability within the Base Daily Operating Schedule (PDBF), international interconnections, the sale of imported power without capacity rights and renewables deviations from programmed generation.

From October on, there was a significant increase in both the cost and the power involved in the mechanism for resolving technical restrictions in real time for providing reserve power. In November, the cost was €30 million. In December, it fell by half, to €15 million, with a slightly lower power allocation. The drop in costs could be explained by the change in the mechanism for operators to make offers, avoiding as far as possible all-or-nothing type conditions.

Graph III.05. Monthly allocation of reserve power



	may-12	jun-12	jul-12	ago-12	sep-12	oct-12	nov-12	dec-12
Cost (€)	452,110	17,940	18,375	94,142	686,257	17,124,648	30,614,350	14,784,148
Power (MW)	31,203	4,700	5,219	7,896	41,869	285,361	661,485	597,937

Source: esios-REE and AEE elaboration

Paseo

Iñigo Montoya

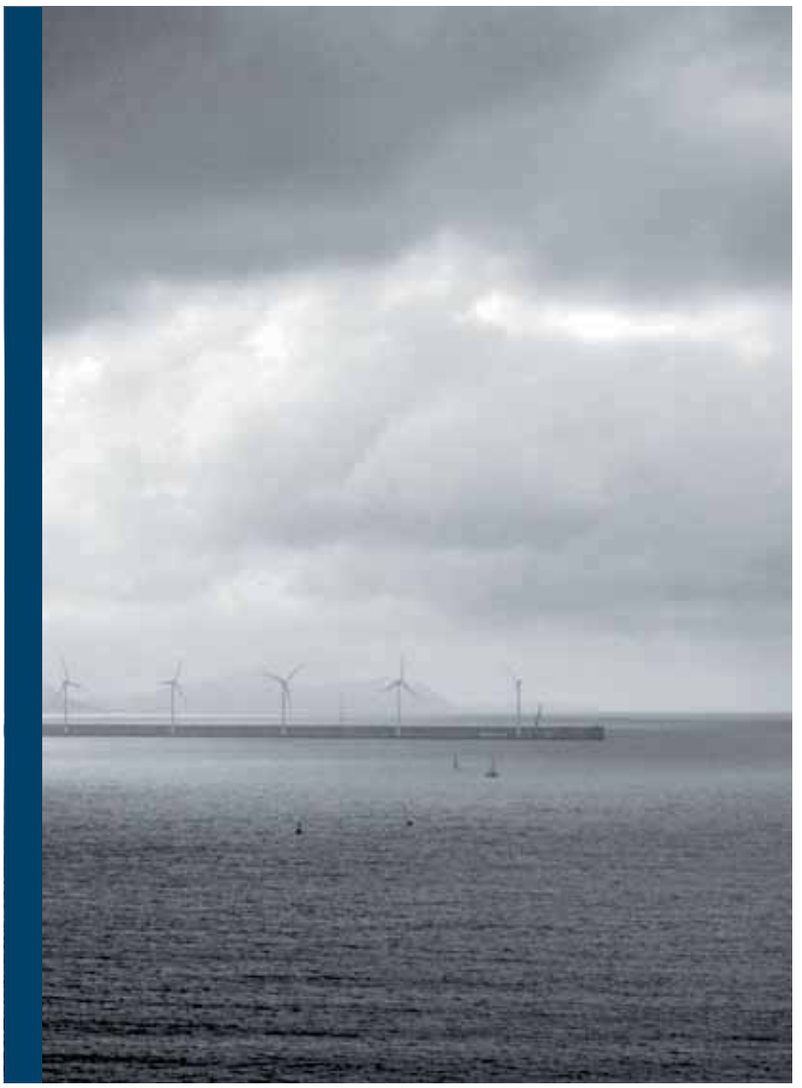
Chapter IV
Wind power and public opinion

AEE started 2012 with the challenge to consolidate favourable public opinion towards the sector and its regulation needs. But it soon became apparent that the task was more difficult than it first seemed. The green moratorium ushered in by the then recently elected PP government coupled with a range of cuts affecting practically all sectors of society. At the same time, voices were rising from numerous fronts accusing renewables of being expensive. Combined, those elements were not going to make it easy to raise sympathy for the wind sector.

From that point of departure, a large part of AEE's efforts have centred around fighting the belief that wind power is the cause of the tariff deficit. That struggle involves highlighting the sector's maturity and pinpointing the differences with other technologies. A lot of effort has gone into convincing the authorities and society in general that Spain stands much more to lose than gain by penalising a sector that is bringing so much to the country in economic, social and environmental terms.

Accordingly, AEE has continued tightening ties with existing allies as well as looking for new ones in its defence of sector interests. It has maintained periodic contacts with the media, holding press conferences whenever it has needed to raise its voice. It has sparked intense debate across the social networks, increasing its follower base. It has held events in which high level sector players have interacted with public authorities and interest groups.

In short, AEE has worked intensely to put across the sector's messages with the highest possible impact, increasing public awareness of the benefits of wind power for Spain in the process.



Author: Arantzazu García

AEE and the media

If **AEE**'s efforts in the first half of 2012 focused on fighting the renewable energies moratorium, the second half centred around preventing the Law of Fiscal Measures for Energy Sustainability and the new generation tax from being more damaging for wind power than for other technologies, which is how it seemed it was going to be in the beginning. **AEE carried out an intense campaign with the press,** promoting interviews and reports, as well as writing its own articles and offering its points of view in different forums.

In the field of communications in 2012, we were also up against the serious crisis affecting the media, now facing unprecedented restructuring due to the drop in newspaper sales, fragmented audiences, the advertising crisis, the surge in digital media, which are not yet profitable, and the dazzling boom in social networks. That all has a strong impact on the way companies and sectors communicate, forcing them to adapt.

One especially striking reaction from **AEE** followers on the social networks came after the moratorium imposed by Royal Decree-Law 1/2012, the PP government's first. The messages of support were particularly pronounced on Twitter, where **AEE**'s **more than 6,000 followers** expressed their diametric opposition to the measure and called for the government to retract it.

Before the Law of Fiscal Measures for Energy Sustainability arrived at Congress, **AEE** doubled its efforts against the most damaging part for the sector: the generation tax, the rate of which was not clear until near the end of the process, when it was finally set at 7%. As well as holding meetings with all parliamentary groups, **AEE** also visited embassies and wind investors in an attempt to unify the stance of all interested parties.

European authorities were also contacted. Philip Lowe, director general of DG Energy at the European Commission, wrote a letter to the Association stating that "more actions are needed to safeguard member states' support mechanisms, with a view to eliminating distortions and efficiently developing renewables, making support systems less vulnerable to government intervention." Furthermore, he assured observers that the Commission was keeping a close eye on what was happening in Spain regarding renewables policies and that he would assess whether it was "necessary or appropriate" to take action from the European Union.

Also at European level, **AEE** forms part of the European Wind Association's (EWEA) Communications Network, which is promoting initiatives for increasing social acceptance of wind power across the entire continent. Social acceptance of wind power has become an im-

portant battlefield across Europe. The situation in Spain is considerably better that in other countries. Nonetheless, aware of the need to maintain society support, **AEE** has continued pushing forward initiatives to bring wind power realities closer to everybody.

Rural Wind Integration Prize

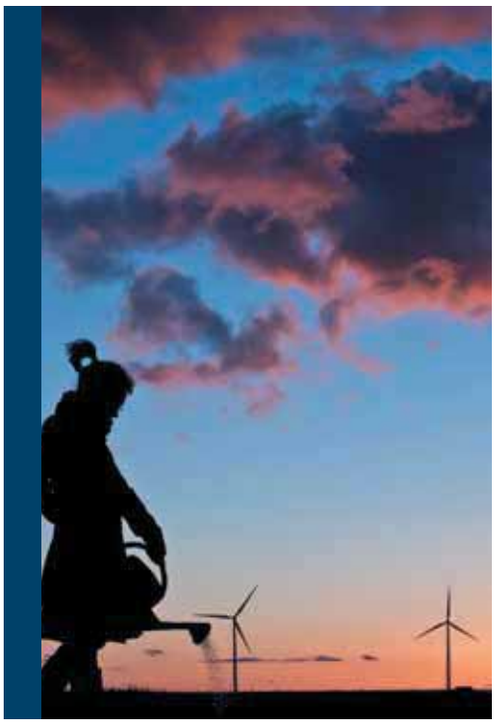
Accordingly, the **Rural Wind Integration Prize** was born in 2012, aimed at highlighting the socioeconomic value of wind power implantation in rural areas. The competition is open to any town, village or area harbouring wind plants that can demonstrate positive socioeconomic spinoffs, such as job creation, the pumping of wind-related revenues into local development, the promotion of ecological tourism, raising awareness regarding the need for increased sustainability in all activities, or any other initiative related to sustainable rural wind integration.

The prize is the recording of a video reflecting the is benefits of wind power in the area.

In 2012, the prize was awarded to the Lubián minicipality of Castile and Leon region, where **AEE** travelled to celebrate **Global Wind Day.** The collaboration of local authorities, together with companies operating wind plants in the municipality and enthusiastic locals, the event made a great success, as reported by the local and regional media. The videos made both for the prize and for Global Wind Day are available on **AEE**'s website as well as on its Youtube channel, where they have received a very considerable amount of hits.

Wind power short stories

Edition I of the **Windpower Short Stories Competition,** which also took place in 2012, was born of the desire to spark the imagination with regard to an energy source—the wind—that is indigenous, clean and eternal. The prize is a visit to a wind farm, with the possibility of going up a wind turbine, weather permitting.



Author: Mario Pereda

The winner of the 2012 edition was **Santiago Avelino Valdés,** for his story *My friend is you* (Mi amigo eres tú).

As part of the effort to bring wind power closer to society, there is also REVE, the Wind Power and Electric Vehicle Magazine (Revista Eólica y del Vehículo Eléctrico), another **AEE** initiative. In 2012, the magazine was redesigned adopting new trends and gaining a more modern appearance. Its architecture was also modified mainly to make its different functions more user-friendly and intuitive. The latest news can be found in REVE, not only about wind power and other renewables in Spain, but also in more that 200 other countries. In its large database, there are **nearly 30,000 news items,** which date back to 2009.

And, naturally, **AEE** continues striving to offer the best possible information to its member through all channels at its disposal, like the daily press service, **AEE** Informs and the Blog Somos Eólicos, among other services.

At the end of 2012, **AEE** held its **Open Day,** inviting all its members to its headquarter to exchange opinions, ideas and suggestions with the Association's team. This initiative will be repeated in the future.

View of the Wind Energy Convention 2012. Author: Manuel Cazorla

Events and publications

The **AEE** events and publications throughout the year have become a point of reference for wind sector companies. The main aim of them is to keep society as a whole informed about wind power.

In 2012, **AEE** took part in the **Genera Fair for Energy and Environment.** The theme that year was the role of wind in self-supply.

The **Wind Power Convention**, the sector's most important event of the year in Spain, coincided with **AEE's tenth anniversary.** As in previous editions, the convention had a decidedly international flavour, with sessions devoted to India, Eastern Europe and Latin America.

The **Sector Dinner** was held in the Casino de Madrid and brought together, yet again, outstanding sector figures both at national and international level. During the dinner, **AEE** awarded its annual prizes, which, apart from those already mentioned, went to: **Luis Atienza**, who received the annual **Special Distinction** for the decisive wind grid integration work he carried out during his time at the helm of Red Eléctrica de España (REE). **Íñigo Etayo Otermín** took the **2012 Eolo Innovation Prize** for his project *Study of wind turbine scattering through mathematic formulae and 3D electromagnetic simulation software*.

The photo *Viento a favor* (Favourable Winds), by **María Sáinz,** won the **2012 Eolo Photography Prize**. And **José Luis Gallego,** journalist and writer, who collaborates with Onda Cero and La 2, among other media, won the **Journalism Prize**.

Given the change of model facing wind power in Spain, **AEE** held a **seminar on regulatory models,** analysing the different models in use around the world and the best options for Spain.

In the **Technical Seminars,** the most relevant subjects were Maintenance, R&D and the new trends and opportunities. For the first time, **AEE** introduced a session on entrepreneurs, in which different companies talked about their experiences.

The **regional and local taxes on wind power** were the centre of a conference held in collaboration with Enerclub in the second half of the year. Speakers denounced the unsustainable situation for wind power created by a myriad of regional levies and local taxes which put the brakes on competitiveness.

REVE is part of the effort to raise social awareness on wind power

As in previous years, **AEE** presented its reference publications: *Eólica 2012* (Wind Power 2012), with all the relevant sector figures for the year, together with the *Macroeconomic Study of the Impact of the Wind Power Sector in Spain*, authored by Deloitte.

Specialist Training by AEE

AEE believes that training wind power workers is increasingly important given the current labour market's complexities and increasingly volatile environment for the sector. For that reason, the Association has deepened its involvement in the systematisation of training. The aim is to use the same criteria in all centres for different training areas and to unify course structure, from university degrees to Professional Training for plant operators.

To that end, **AEE** has launched two courses: **Wind Plant Maintenance and Wind Plant Design and Construction.** Both courses are aimed at covering company needs, providing students with a solid theoretical and practical training enabling them to maintain and manage wind plants. Through a highly qualified teaching staff, course content covers matters ranging from general descriptions of wind and estimating wind potential to all the practical elements that characterise a wind plant.

The teaching team is made up of teachers from different specialities; mainly engineers, physicists and economists who, in most cases, are professionals working with wind sector companies or institutions.

Course content is centred around defining winds, estimating wind potential and other theoretical and practical aspects that characterise wind plants. Later progress in training is related to wind plant corrective and preventive maintenance and class practicals using equipment and components from a Gamesa G80-2.0MW wind turbine.

Luis Atienza received the Annual Distinction award for his work at REE

The sector´s dinner was held at the Casino of Madrid and brought together prominent figures. Author: Manuel Cazorla

Sobrevolando
Aitor Alebicto

Chapter V
AEE, who are we?

Member list according to activity

Associations

- AEOLICAN (Canarian Wind Energy Association)
- AEPA (The Asturias Wind Energy Association)
- APECYL (The Castile and León Association of Wind Power Developers)
- APREAN RENOVABLES (The Andalusian Association of Renewable Energy Developers and Operators)
- THE CANTABRIA WIND ENERGY ASSOCIATION
- EGA (The Galicia Wind Energy Association)
- EOLICCAT (The Catalunya Wind Energy Association)

Component manufacturers

- AEROBLADE, S.A.
- ALSTOM GRID, S.A.
- ASEA BROWN BOVERI, S.A.
- AVANTI WIND SYSTEMS, S.L.
- BACH COMPOSITE ESPAÑA, S.L.
- BALLUF, S.L.
- BASF ESPAÑOLA, S.L.
- BOSCH REXROTH, S.L.
- DANOBAT GROUP S. COOP.
- ECOVENTIA S.A.U.
- ELEVADORES GOIAN, S.L.
- ELTRONIC, A/S
- FUCHS LUBRICANTES, S.A.
- GREEN POWER TECHNOLOGIES, S.L.
- GURIT SPAIN, S.A.
- INDAR ELECTIC, S.L.
- INGETEAM POWER TECHNOLOGY, S.A.
- INNEO TORRES, S.L.
- KINTECH INGENIERÍA, S.L.
- LM WIND POWER
- MANUFACTURAS ELÉCTRICAS, S.A.
- MORGANITE ESPAÑOLA, S.A.
- MOVENTAS SPAIN, S.L.
- ORMAZABAL VELATIA

ROXTEC SISTEMAS PASAMUROS, S.L.

SANTOS MAQUINARIA ELÉCTRICA, S.L.

SCHAEFFLER IBERIA, S.L.U.

SKF ESPAÑOLA, S.A.

SOTAVENTO GALICIA, S.A.

S & C ELECTRIC EUROPE, LTD.

TALLERES LANDALUCE, S.A.

THE SWITCH ENGINEERING OY

TRACTEL IBÉRICA, S.A.

UNEX APARELLAJE ELÉCTRICO, S.L.

WOODWARD KEMPEN GmbH

Wind turbine manufacturers

ALSTOM RENOVABLES ESPAÑA, S.L.

ENERCON GMBH Sucursal en España

GAMESA

GE WIND ENERGY, S.L.

MTORRES OLVEGA INDUSTRIAL, S.A.

NORDEX ENERGY IBÉRICA, S.A.

REPOWER ESPAÑA, S.R.L.

SIEMENS, S.A.

SINOVEL WIND GROUP SPAIN, S.L.

TECNOARANDA, S.L.

VESTAS EÓLICA, S.A.U.

Other entities

CENTRO NACIONAL DE ENERGÍAS RENOVABLES (CENER)

INSTITUTO DE INVESTIGACIÓN DE ENERGÍAS RENOVABLES. UNIV. DE CASTILLA-LA MANCHA

Developers/operators

ABO WIND ESPAÑA, S.A.

ACCIONA GREEN ENERGY, S.L.

ALARDE SOCIEDAD DE ENERGÍA, S.A.

ALDESA ENERGÍAS RENOVABLES, S.A.

ASTURWIND, S.L.

BANCSABADELL INVERSIÓ I DESENVOLUPAMENT

BURGALESA DE GENERACIÓN EÓLICA, S.A.

CALIDAD ENERGÉTICA, S.A.

CANEPA GREEN ENERGY, S.L.

COPCISA ELÉCTRICA, S.L.U.

EDP RENOVÁVEIS

ENEL GREEN POWER ESPAÑA, S.L.

ENERFÍN SOCIEDAD DE ENERGÍA, S.A.

ENERGÍA Y RECURSOS AMBIENTALES, S.A. (EYRA)

EOLIA RENOVABLES DE INVERSIONES, SCR, S.A.

EÓLICA DE NAVARRA, S.L.

EÓLICA DEL CIERZO, S.L.

EÓLICA DEL MONTALT, S.L.

EÓLICA VALLE DE PERALEDA (Grupo AZIERTA)

E.ON RENOVABLES, S.L.U.

FERSA ENERGÍAS RENOVABLES, S.A.

GAMESA

GAS NATURAL FENOSA RENOVABLES, S.L.

GENERA AVANTE, S.L.

GENERAL EÓLICA ARAGONESA

GESTAMP EÓLICA, S.L.

GRUPO ISOLUX CORSAN CONCESIONES, S.A.

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IBERDROLA, S.A.

IBEREÓLICA, S.L.

JORGE, S.L.

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NORVENTO, S.L.

OLIVENTO, S.L. (GRUPO FCC)

PARQUE EÓLICO LA CARRACHA, S.L.

RENOVIS ENERGÍAS, S.L.

RIOS RENOVABLES, S.L.

RPI, S.A.

RWE INNOGY AERSA, S.A.U

SHELL ESPAÑA, S.A.

SOTAVENTO GALICIA, S.A.

Services

360 CORPORATE FINANCE, S.A.

ADVENTIS SOLUTIONS - CÁMARA DECIMAVILLA, S.L.

AGUADO WIND SERVICES, S.L.

ALATEC, S.A.

ALTERTEC RENOVABLES

ALTRAN INNOVACIÓN S.L.

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ASAKEN ROPE ACCESS SOLUTIONS

AVAILON IBERIA, S.L.U.

AWS TRUEPOWER, S.L.U.

AXPO IBERIA, S.L.

BARLOVENTO RECURSOS NATURALES, S.L.

BERGÉ LOGÍSTICA ENERGÉTICA

BORA WIND ENERGY MANAGEMENT, S.L.

BP OIL ESPAÑA, S.A.U.

CAIXABANK, S.A.

CAPITAL SAFETY GROUP

CATALUNYA BANC, S.A.

CEPSA Lubricantes, S.A.

CITIBANK, N.A.

COMANTUR, S.L.

DEWI GMBH

DIAGNÓSTIQA CONSULTORÍA TÉCNICA, S.L.

DIALEC COMUNICACIÓ PER LA SOSTENIBILITAT SCP

ECLAREON, S.L.

EFACEC SISTEMAS DE ESPAÑA, S.L.

ELDU, S.A.

ELECTRIA, S.A.

ELECTRO RAYMA, S.L.

ENERGIEKONTOR III - ENERGÍAS ALTERNATIVAS

ENÉRGYA VM Gestión de Energía, S.L.U.

EREDA, S.L. ENERGIAS RENOVABLES Y DESARROLLOS ALTERNATIVOS

ESTEYCO ENERGÍA, S.L.

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FERIA DE ZARAGOZA

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KINETIK PARTNERS, S.L.

LASO ABNORMAL LOADS

LM WIND POWER SERVICES, S.L.

MAECO EÓLICA, S.L.

MAINTENANCE PARTNERS WALLONIE, S.A.

MASTER DISTANCIA, S.A.

METEOLÓGICA, S.A.

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MTORRES, DESARROLLOS ENERGÉTICOS, S.L.

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NAVACEL, S.A.

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PINILLA

PROCAL CONTROL, S.A.

REINOSO CONSULTORS, S.L.

RONERGY SERVICES, S.L.

SALVAMENTO E CONTRAINCENDIOS, S.L.U. (SALVACON)

SALVORAVENTO, S.L.

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SGS TECNOS, S.A.

SIMECAL, S.L.

SOCIEDAD ESPAÑOLA DE MONTAJES INDUSTRIALES, S.A.

TAIGA MISTRAL SGECR, S.A.

TAMOIN ENERGÍAS RENOVABLES, S.L.

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TESICNOR, S.L.

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TRANSPORTES LASARTE, S.A.

TÜV RHEINLAND IBÉRICA INSPECTION, CERTIFICATION & TESTING, S.A.

VERTICALIA FORMACIÓN, S.L.

VORTEX, S.L.

WIND COMPOSITE SERVICE GROUP EUROPE, S.L.

WIND TO MARKET, S.A.

WIND TO POWER SYSTEM, S.L.

WIND1000 SERVICES, S.L.

WINDAR RENOVABLES, S.L.

WINDBROKERS ESPAÑA, S.L.

WINDTEST IBÉRICA, S.L.

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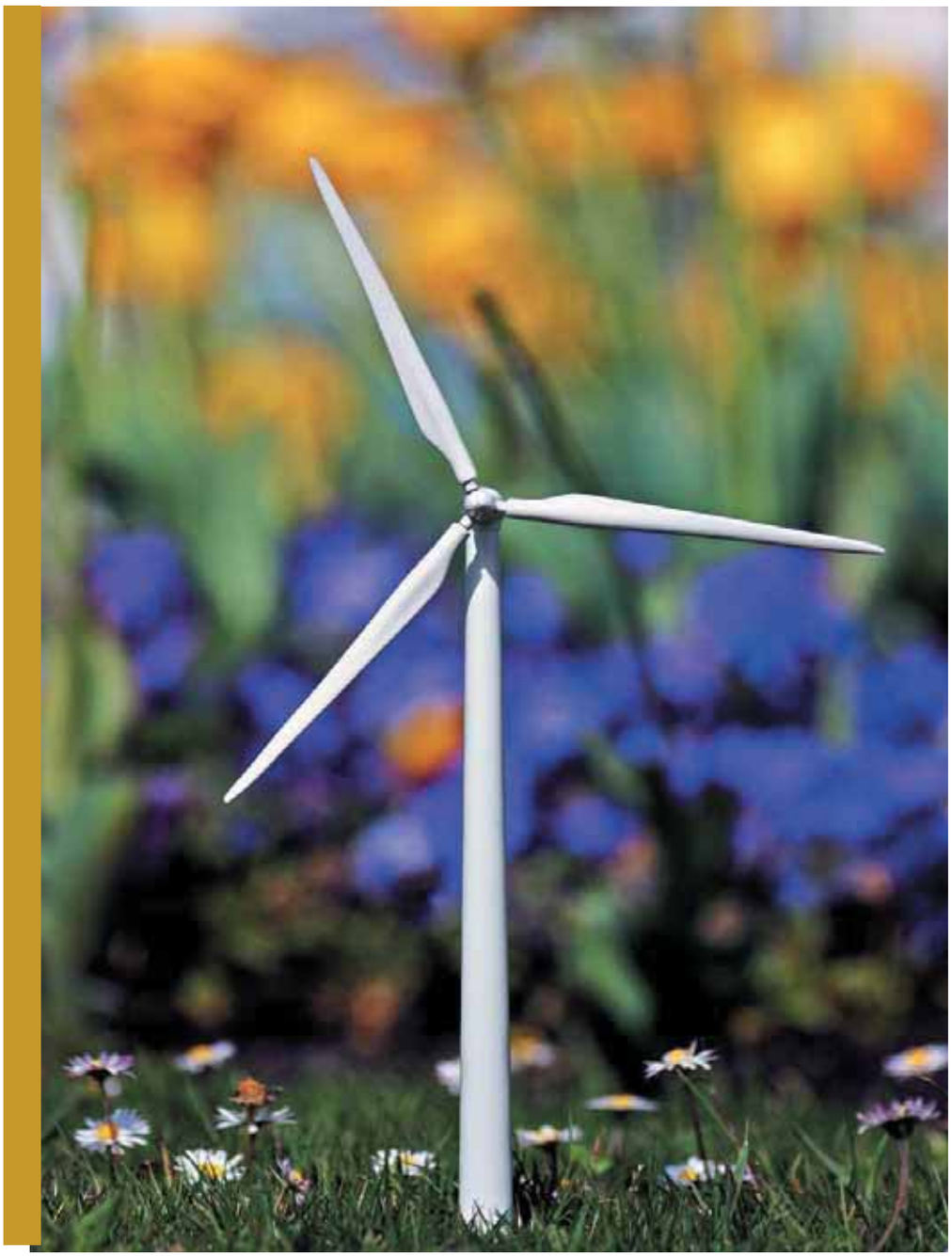
Annex
List of graphs, tables and maps

Chapter II. The figures

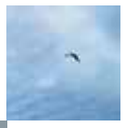
Chapter III. Technical activity



Author: Iris Álvarez

List of industrial sites

	NOMBRE EMPRESA	ACTIVIDAD	CLASIFICACIÓN	TÉRMINO MUNICIPAL	PROVINCIA	CCAA
1	3M ESPAÑA, S.A.	Component manufacturing	Generators, motors and electrical components	Madrid	Madrid	Madrid
2	ACCIONA BLADES	Blades	Blades, control systems and actuators	Lumbier	Navarre	Navarre
3	ACCIONA WIND POWER	Wind turbine manufacturing	Wind turbine assembly and logistics	La Vall d'Uixo	Castellon	Comunidad Valenciana
4	ACCIONA WIND POWER	Wind turbine manufacturing	Wind turbine assembly and logistics	Barasoain	Navarre	Navarre
5	ACCIONA WIND POWER	Wind turbine manufacturing	Wind turbine assembly and logistics	Noain	Navarre	Navarre
6	ADVENTIS O&M SOLUTIONS	Maintenance, corrective maintenance, retrofits, replacement parts	Maintenance	Burgos	Burgos	Castile and Leon
7	AEROBLADE	Blade manufacturing	Blades, control systems and actuators	Vitoria	Alava	Basque Country
8	Aerogeneradores Canarios, S.A. (ACSA)	Wind turbine manufacturing	Wind turbine assembly and logistics	Agüimes	Las Palmas	Canary Islands
9	Aerogeneradores Canarios, S.A. (ACSA)	Engineering and wind turbine maintenance services	Maintenance	Agüimes	Las Palmas	Canary Islands
10	Aguado Wind Services	Integrated turnkey solutions for erection, maintenance and repairs	Maintenance	Leganes	Madrid	Madrid
11	Aguado Wind Services	Integrated turnkey solutions in erection, maintenance and repairs	Assembly and logistics	Leganes	Madrid	Madrid
12	ALSTOM	Tower and turbine manufacturing	Towers and mechanical components	Coreses	Zamora	Castile and Leon
13	ALSTOM	Wind turbine assembly	Wind turbine assembly and logistics	As Somozas	Corunna	Galicia
14	ALSTOM	Wind services unit	Assembly and logistics	Castro (Naron)	Corunna	Galicia
15	ALSTOM	Wind turbine assembly	Assembly and logistics	Buñuel	Navarre	Navarre
16	ALSTOM POWER SERVICE, S.A.	Component manufacturing	Generators, motors and electrical components	Madrid	Madrid	Madrid
17	AREVA T&D IBeRICA, S.A.	Wind turbine assembly and logistics	Generators, motors and electrical components	San Fernando de Henares	Madrid	Madrid
18	ASEA BROWN BOVERI, S.A.	Component manufacturing	Generators, motors and electrical components	Saragossa	Saragossa	Aragon
19	ASEA BROWN BOVERI, S.A.	Component manufacturing	Generators, motors and electrical components	Sant Quirze del Valles	Barcelona	Catalonia
20	ASEA BROWN BOVERI, S.A.	Component manufacturing	Generators, motors and electrical components	Madrid	Madrid	Madrid
21	ASEA BROWN BOVERI, S.A.	Maintenance, corrective maintenance, retrofits, replacement parts	Maintenance	Madrid	Madrid	Madrid
22	ASEA BROWN BOVERI, S.A.	Electrical maintenance (preventative y corrective)	Maintenance	Madrid	Madrid	Madrid
23	ASEA BROWN BOVERI, S.A.	Component manufacturing	Generators, motors and electrical components	Oiartzun	Guipúzcoa	Basque Country
24	ASEA BROWN BOVERI, S.A.	Transformer engineering, repair and maintenance	Maintenance	Trapagaran	Vizcaya	Basque Country
25	AVAILON IBERIA S.L.U.	Wind plant operation and maintenance, supplies and repairs	Maintenance	Almansa	Albacete	Castile La Mancha
26	AVAILON IBERIA S.L.U.	Wind plant operation and maintenance, supplies and repairs	Maintenance	Madrid	Madrid	Madrid
27	AVANTI WIND SYSTEMS, S.L.	Manufacture of wind turbine elevators and stairs	Towers and mechanical components	La Muela	Saragossa	Aragon
28	BACH COMPOSITE	Nacelles	Assembly and logistics	Villadangos del Paramo	Leon	Castile and Leon
29	BOSCH REXROTH, S.L.	Component manufacturing	Blades, control systems and actuators	San Sebastian	Guipúzcoa	Basque Country
30	C.C. JENSEN IBeRICA, S.L.	Component manufacturing	Towers and mechanical components	Barcelona	Barcelona	Catalonia
31	CEPSA LUBRICANTES, S.A.	Wind turbine engineering and maintenance services	Maintenance	Madrid	Madrid	Madrid
32	Coasa	Aeronautical components	Blades, control systems and actuators	San Cibrao Das Viñas	Ourense	Galicia
33	COIPER	Wind turbine tower manufacturing	Towers and mechanical components	Ponferrada	Leon	Castile and Leon
34	COMANTUR S.L.	Maintenance	Blades, control systems and actuators	Carcar	Navarre	Navarre
35	COMPAÑIA EOLICA TIERRAS ALTAS S.A.	Full wind plant maintenance	Maintenance	San Pedro manrique	Soria	Castile and Leon
36	Coruñesa de Composites, S.L.	Nacelles	Assembly and logistics	Arteixo	Corunna	Galicia
37	Danigal	Blades	Blades, control systems and actuators	As Pontes	Corunna	Galicia
38	DANOBATGROUP S. COOP.	Machinery manufacturing	Towers and mechanical components	Elgoibar	Guipúzcoa	Basque Country
39	DIMECO	Bolt manufacturing	Towers and mechanical components	AlcalA de Henares	Madrid	Madrid
40	ECOVENTIA	Prefabricated concrete towers	Towers and mechanical components	Quintanar de la Orden	Toledo	Castile La Mancha
41	ECOVENTIA	Prefabricated concrete towers	Towers and mechanical components	Buñol	Valencia	Comunidad Valenciana
42	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Sevilla	Sevilla	Andalusia
43	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	La Puebla de Alfinden	Saragossa	Aragon
44	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Tarancon	Cuenca	Castile La Mancha
45	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Merida	Badajoz	Extremadura
46	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Madrid	Madrid	Madrid
47	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Los Alcazares	Murcia	Murcia
48	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Multiva Baja	Navarre	Navarre
49	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Bilbao	Vizcaya	Basque Country
50	Eldu	Electrical maintenance (preventative and corrective)	Maintenance	Beniparrel	Valencia	Comunidad Valenciana
51	ELEVADORES GOIAN	Manufacturing of elevators and tower internals	Towers and mechanical components	Salvatierra	Alava	Basque Country
52	ELEVADORES GOIAN	Design, manufacturing, installation and maintenanceof elevators and tower internals	Maintenance	Salvatierra	Alava	Basque Country
53	ELEVADORES GOIAN	Elevator manufacturing	Towers and mechanical components	Lazkao	Guipúzcoa	Basque Country
54	ELEVADORES GOIAN	Design, manufacturing, installation and maintenanceof elevators and tower internals	Maintenance	Lazkao	Guipúzcoa	Basque Country
55	ELIMCO SOLUCIONES INTEGRALES, SA.	Wind plant operation and maintenance services	Maintenance	La Rinconada	Sevilla	Andalusia
56	Emesa	Wind turbine tower manufacturing	Towers and mechanical components	Coiros	Corunna	Galicia
57	Energea	Plant operation and maintenance services	Generators, motors and electrical components	Mazaricos	Corunna	Galicia
58	Energea	Plant operation and maintenance services	Generators, motors and electrical components	Ferreira do Valadouro	Lugo	Galicia
59	Energea	Plant operation and maintenance services	Generators, motors and electrical components	A Cañiza	Pontevedra	Galicia
60	ENFLO WINTEC IBeRICA	Small wind turbine manufacturing	Assembly and logistics	Orcoyen	Navarre	Navarre
61	EOZEN	Wind turbine manufacturing	Assembly and logistics	Ferreira	Granada	Andalusia
62	EOZEN	Blade manufacturing	Blades, control systems and actuators	Ferreira	Granada	Andalusia
63	FELGUERA MELT (GRUPO DURO FELGUERA)	Component manufacturing	Towers and mechanical components	La Felguera	Asturias	Asturias



	NOMBRE EMPRESA	ACTIVIDAD	CLASIFICACIÓN	TÉRMINO MUNICIPAL	PROVINCIA	CCAA
64	Fiberblade Norte II	Wind turbine tower manufacturing	Towers and mechanical components	As Somozas	Corunna	Galicia
65	FLUITECNIK	Component manufacturing	Towers and mechanical components	Orcoyen	Navarre	Navarre
66	FLUITECNIK	Machining centre	Towers and mechanical components	Noain	Navarre	Navarre
67	FUCHS LUBRICANTES S.A.U.	Oils, greases, and lubricating pastes and support services for predictive maintenance	Maintenance	Castellbisbal	Barcelona	Catalonia
68	GALOL, S.A.	Coating and coverings for parts	Towers and mechanical components	Olleira	Valencia	Comunidad Valenciana
69	GAMESA	Wind turbine tower manufacturing	Towers and mechanical components	Linares	Jaen	Andalusia
70	GAMESA	Nacelle assembly	Assembly and logistics	Tauste	Saragossa	Aragon
71	GAMESA	Wind turbine tower manufacturing	Towers and mechanical components	Aviles	Asturias	Asturias
72	GAMESA	Electrical equipment manufacturing	Generators, motors and electrical components	Reinosa	Cantabria	Cantabria
73	GAMESA	Blades	Blades, control systems and actuators	Albacete	Albacete	Castile La Mancha
74	GAMESA	Blade root joints	Blades, control systems and actuators	Cuenca	Cuenca	Castile La Mancha
75	GAMESA	Gearbox manufacturing	Gearboxes	Burgos	Burgos	Castile and Leon
76	GAMESA	Gearbox manufacturing	Gearboxes	Lerma	Burgos	Castile and Leon
77	GAMESA	Blades	Blades, control systems and actuators	Miranda del Ebro	Burgos	Castile and Leon
78	GAMESA	Nacelle assembly	Assembly and logistics	Agreda	Soria	Castile and Leon
79	GAMESA	Electrical equipment manufacturing	Generators, motors and electrical components	Benisano	Valencia	Comunidad Valenciana
80	GAMESA	Blades	Blades, control systems and actuators	Somozas	Corunna	Galicia
81	GAMESA	Electrical equipment manufacturing	Generators, motors and electrical components	Coslada	Madrid	Madrid
82	GAMESA	Blade molds	Blades, control systems and actuators	Imarcoain	Navarre	Navarre
83	GAMESA	Blades	Blades, control systems and actuators	Aoiz	Navarre	Navarre
84	GAMESA	Blades	Blades, control systems and actuators	Tudela	Navarre	Navarre
85	GAMESA	Wind turbine tower manufacturing	Towers and mechanical components	Olazagutia	Navarre	Navarre
86	GAMESA	Gearbox manufacturing	Gearboxes	Asteasu	Guipúzcoa	Basque Country
87	GAMESA	Gearbox manufacturing	Gearboxes	Mungia	Vizcaya	Basque Country
88	GANOMAGOGA	Towers	Towers and mechanical components	Ponteareas	Pontevedra	Galicia
89	GE Wind Energy S.L.	Wind turbine assembly	Assembly and logistics	Noblejas	Toledo	Castile La Mancha
90	GLUAL HIDRAULICA	Component manufacturing	Blades, control systems and actuators	Azpeitia	Guipúzcoa	Basque Country
91	GPTECH (GREENPOWER)	Electronic components (hueco de tensión, etc.)	Blades, control systems and actuators	Bollullos de la Mitacion	Sevilla	Andalusia
92	Grupo Eymosa-Ventogal	Nacelles	Assembly and logistics	Naron	Corunna	Galicia
93	GRUPO INERZIA	Engineering and manufacturing of lifting devices	Towers and mechanical components	Orcoyen	Navarre	Navarre
94	GRUPO INERZIA	Protection and security for rope work	Towers and mechanical components	Mutilva Baja	Navarre	Navarre
95	GRUPO INERZIA	Wind plant operation and maintenance services	Maintenance	Orcoyen	Navarre	Navarre
96	GRI Renewable Industries	Towers	Towers and mechanical components	Carballino	Ourense	Galicia
97	Forjas de Iraeta	Flanges	Towers and mechanical components	Zestoa	Guipúzcoa	Basque Country
98	HORTA COSLADA	Towers	Towers and mechanical components	Arcos de Jalon	Soria	Castile and Leon
99	IDPSA Engineering & Robotics	Automation of blade finishing and tower painting	Towers and mechanical components	San Fernando de Henares	Madrid	Madrid
100	IM FUTURE, S.L.	Blade repair. Wind plant operation and maintenance.	Blades, control systems and actuators	Noia	Corunna	Galicia
101	INDAR ELECTRIC, S.L.	Component manufacturing	Generators, motors and electrical components	Beasain	Guipúzcoa	Basque Country
102	INDRA SISTEMAS	Wind turbine maintenance services	Assembly and logistics	El Puerto de Santa Maria	Cadiz	Andalusia
103	INDRA SISTEMAS	Renewable energies logistic systems centre	Assembly and logistics	San Roman de Bembibre	Leon	Castile and Leon
104	INDRA SISTEMAS	"Wind turbine maintenance services.	Predictive maintenance systems"	Assembly and logistics	El Ferrol	Corunna Galicia
105	INDRA SISTEMAS	Wind turbine engineering and maintenance services	Assembly and logistics	Aranjuez	Madrid	Madrid
106	INDRA SISTEMAS	"Predictive maintenance systems	Measuring equipment engineering"	Assembly and logistics	San Fernando de Henares	Madrid
107	INGETEAM PANELES, S.A.	Electrical equipment manufacturing	Generators, motors and electrical components	Sesma	Navarre	Navarre
108	INGETEAM SERVICE, S.A.	Wind plant operation and maintenance services	Maintenance	Albacete	Albacete	Castile La Mancha
109	INGETEAM SERVICE, S.A.	Wind plant operation and maintenance services	Maintenance	Vilalba	Lugo	Galicia
110	INNEO TORRES	Prefabricated concrete towers	Towers and mechanical components	Talavera de la Reina	Toledo	Castile La Mancha
111	INTORD S.A.	Bolts	Towers and mechanical components	Leganes	Madrid	Madrid
112	ISOTROL, S.A.	Support services for wind plant operation and maintenance	Maintenance	Sevilla	Sevilla	Andalusia
113	ISOTROL, S.A.	Support services for wind plant operation and maintenance	Maintenance	Barcelona	Barcelona	Catalonia
114	JIMeNEZ BELINCHÓN, S.A.	Metalic structure manufacturing	Towers and mechanical components	Santa Cruz de la Zarza	Toledo	Castile La Mancha
115	KINTECH INGENIERIA, S.L.	Data loggers	Generators, motors and electrical components	Saragossa	Saragossa	Aragon
116	LASO Abnormal Loads S.A.	Specialised transport	Assembly and logistics	Badajoz	Badajoz	Extremadura
117	LM WINDPOWER BLADES CASTELLON, S.A.	Blade manufacturing	Blades, control systems and actuators	Les Coves de Vinroma	Castellon	Comunidad Valenciana
118	LM WINDPOWER BLADES PONFERRADA, S.A.	Blade manufacturing	Blades, control systems and actuators	Ponferrada	Leon	Castile and Leon
119	M.Torres Olvega Industrial (MTOI)	Montaje y Wind turbine manufacturing	Assembly and logistics	Ólvega	Soria	Castile and Leon
120	M.Torres Olvega Industrial (MTOI)	Wind turbine installation and manufacturing	Generators, motors and electrical components	Ólvega	Soria	Castile and Leon
121	M.Torres Olvega Industrial (MTOI)	Wind plant operation and maintenance services	Maintenance	Artica	Navarre	Navarre
122	MAECO EOLICA	Maintenance, corrective maintenance, retrofit, part replacement	Maintenance	Las Navas del Marques	Avila	Castile and Leon
123	MAECO EOLICA	Maintenance, corrective maintenance, retrofit, part replacement	Maintenance	Soria	Soria	Castile and Leon
124	MAECO EOLICA	Maintenance, corrective maintenance, retrofit, part replacement	Maintenance	As Pontes	Lugo	Galicia
125	MAECO EOLICA	Maintenance, corrective maintenance, retrofit, part replacement	Maintenance	Arnedo	Rioja	Rioja
126	MATZ-ERREKA S. COOP.	Bolt manufacturing	Towers and mechanical components	Antzuola	Guipúzcoa	Basque Country
127	Mechanical Linkage Solutions, S.L.	MLS Intelligent Control Dynamics	Blades, control systems and actuators	Villanubla	Valladolid	Castile and Leon
128	MESA - Manufacturas Electricas, S.A.U.	Component manufacturing	Generators, motors and electrical components	Mungia	Vizcaya	Basque Country

	NOMBRE EMPRESA	ACTIVIDAD	CLASIFICACIÓN	TÉRMINO MUNICIPAL	PROVINCIA	CCAA
129	Montajes del Atlántico	Wind turbine tower manufacturing	Towers and mechanical components	Ferrol	Corunna	Galicia
130	Montajes del Atlántico	Wind turbine tower manufacturing	Towers and mechanical components	Mugardos	Corunna	Galicia
131	NAVACEL	Towers, foundations and generator bodies	Towers and mechanical components	DULANTZI	Alava	Basque Country
132	NAVACEL	Offshore towers, foundations and generator bodies	Towers and mechanical components	Puerto de Bilbao - Erandio	Vizcaya	Basque Country
133	NAVACEL	Towers, foundations and generator bodies	Towers and mechanical components	Bilbao - Trapaga	Vizcaya	Basque Country
134	NAVANTIA	Machining and assembly	Assembly and logistics	Ferrol	Corunna	Galicia
135	NORVENTO NED FACTORY, S.L.	Wind turbine assembly	Assembly and logistics	Villalba	Lugo	Galicia
136	NORVENTO NED FACTORY, S.L.	Blade manufacturing	Blades, control systems and actuators	Villalba	Lugo	Galicia
137	NORVENTO OPERACIÓN Y Maintenance, SL	Wind plant operation and maintenance services	Maintenance	Villalba	Lugo	Galicia
138	PINILLA	Engineering and manufacturing of equipment for mounting blades, rotor rotation, raising cables, etc.	Assembly and logistics	Saragossa	Saragossa	
139	RONAUTICA RENOVABLES	Blade repair	Blades, control systems and actuators	Tui	Pontevedra	Galicia
140	RONERGY SERVICE	Blade repair	Blades, control systems and actuators	Tui	Pontevedra	Galicia
141	SÁLVORAVENTO, S.L.	Maintenance, consultancy and expertise on wind turbine blades	Blades, control systems and actuators	Culleredo	Corunna	Galicia
142	SÁLVORAVENTO, S.L.	Maintenance, consultancy and expertise on wind turbine blades	Blades, control systems and actuators	Culleredo	Corunna	Galicia
143	SANTOS MAQUINARIA ELeCTRICA, S.L.	Generator winding and repair	Maintenance	Getafe	Madrid	Madrid
144	SANTOS MAQUINARIA ELeCTRICA, S.L.	Gearbox repair and maintenance	Maintenance	Getafe	Madrid	Madrid
145	SANTOS MAQUINARIA ELeCTRICA, S.L.	Component and parts supply	Maintenance	Getafe	Madrid	Madrid
146	SOGECAM	Electronic components (voltage dips, etc.)	Blades, control systems and actuators	Campanillas	Málaga	Andalusia
147	SOLVENTO	Maintenance, corrective maintenance, retrofit, part replacement	Maintenance	Saragossa	Saragossa	Aragon
148	SOLVENTO	Maintenance, corrective maintenance, retrofit, part replacement	Maintenance	Santiago de Compostela	Corunna	GALICIA
149	TAMOIN, S.L.	Wind plant operation and full maintenance, large equipment corrective maintenance, replacement parts, retrofits, blade inspection and repair, commissioning supervision, auditing Maintenance		Albacete	Albacete	Castile La Mancha
150	TAMOIN, S.L.	Wind plant operation and full maintenance, large equipment corrective maintenance, replacement parts, retrofits, blade inspection and repair, commissioning supervision, auditing Maintenance		Orense	Ourense	Galicia
151	TAMOIN, S.L.	Wind plant operation and full maintenance, large equipment corrective maintenance, replacement parts, retrofits, blade inspection and repair, commissioning supervision, auditing Maintenance		Bilbao	Vizcaya	Basque Country
152	TECNOARANDA	Wind turbine tower manufacturing	Towers and mechanical components	Aranda de Duero	Burgos	Castile and Leon
	TESICNOR, S.L.	Component engineering and manufacturing	Towers and mechanical components	Noain	Navarre	Navarre
	TRACTEL IBeRICA, S.A.	Elevator manufacturing	Towers and mechanical components	Huesca	Huesca	Aragon
	TRACTEL IBeRICA, S.A.	Elevator manufacturing	Towers and mechanical components	Hospitalet de Llobregat	Barcelona	Catalonia
156	VESTAS BLADES SPAIN, S.L.U.	Blade manufacturing	Blades, control systems and actuators	Daimiel	Ciudad Real	Castile La Mancha
157	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Medina Sidonia	Cadiz	Andalusia
158	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Granada	Granada	Andalusia
159	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Sevilla	Sevilla	Andalusia
160	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	La Muela	Saragossa	Aragon
161	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Albacete	Albacete	Castile La Mancha
162	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Burgos	Burgos	Castile and Leon
163	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Bembibre	Leon	Castile and Leon
164	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Olvega	Soria	Castile and Leon
165	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Zaratan	Valladolid	Castile and Leon
166	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Flix	Tarragona	Catalonia
167	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Bergondo	Corunna	Galicia
168	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Villalba	Lugo	Galicia
169	VESTAS EOLICA, S.L.U.	Wind turbine maintenance service centre	Maintenance	Silleda	Pontevedra	Galicia
170	VESTAS NACELLES SPAIN, S.A.U.	Wind turbine assembly	Assembly and logistics	Villadangos del Paramo	Leon	Castile and Leon
171	VESTAS NACELLES SPAIN, S.A.U.	Wind turbine assembly	Assembly and logistics	Viveiro	Lugo	Galicia
172	VESTAS SPARE PARTS & REPAIR SPAIN SL	Product management & customer service, engineering, continuous improvement and quality	Maintenance	Vilafranca	Barcelona	Catalonia
173	VOITH TURBO, S.A.	Pumps	Towers and mechanical components	Coslada	Madrid	Madrid
174	ZETECO	Wind turbine assembly	Assembly and logistics	Malaga	Malaga	Andalusia
175	ZF SERVICES ESPAÑA, S.A.U.	Gearbox maintenance	Gearboxes	San Fernando de Henares	Madrid	Madrid

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