

Wind Power Industry Development (report)

Vėjo energetikos pramonės plėtra



Miguel Diez Hernández

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1. Report content

This report contains the analyze about how the development of the wind power industry in Spain is being slowing down because of the economic crisis and the lack of a regulatory framework.

During the report we can see how these problems had affected to different size spanish companies along these last years (from 2007 to 2012).

During this report I will present data of different companies, from the largest company in Spain and number one in the worldwide as Iberdrola, to some other smaller companies as El Pedregoso or Eólica La Brújula, showing how the economic crisis and the lack of a framework affected them more or less in the same way.

In order to collect all the data, I sent questionnaire to more than 50 different companies in Spain which activitie is focused in wind energy.

Once I got all the data that needed, I went on analyzing all of them through a correlation and regression analysis which we will be able to determinate how the different variables are realed between them.

Finally, to concllude the report, I will try to summarize the main conclusions that I could get after this work about how the development of the Wind Power Industry in Spain is slowing down because of the economic crisis and the lack of a regulatory framework from 2013 and I will suggest some solutions for these problems.

2. Main text of the report

After sent this questionnaire to more than 50 different companies in Spain, I could get data from 5 of them:

- **IBERDROLA:** It is a business group dedicated to the production, distribution and energy, especially electricity. Iberdrola has experienced in the last decade enormous changes that has allowed to move up to become the leading energy group, the world leader in wind energy and one of the largest Electrical World.
- **GAMESA:** is a multinational of new technologies applying them in emerging activities: robotics, microelectronics, environmental or composites. Since 2006 Gamesa focuses on sustainable energy technologies, mainly wind power.
A leader in Spain and is positioned among the wind turbine manufacturers worldwide.
- **EL PEDREGOS:** His main activity is the contruction and and operation facilities dedicated to energy production in special regime as set out in royal decree 2366/94. It was born 12 years ago.
- **EOLICA LA BRUJULA:** The goal of this company is the wind power production and also the survey, the promotion, construction and operation of wind farms and all his works, and additional facilities. It was built in 2000.
- **FERCOM EOLICA:** this company has as the main activity the realization of all types of events and disposal business, management, farm, construction and maintenance of all kinds of buildings and facilities production, distribution and wind power consuming

Once I got all the data that I needed from these 4 companies, I proceded to analyse all of them by sector:

WIND SECTOR EMPLOYEES in SPAIN

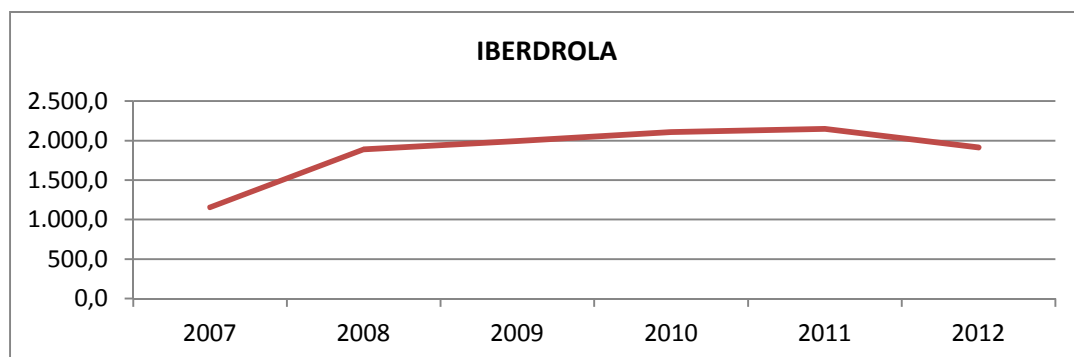


Fig 3. Wind sector employees in Spain of Iberdrola

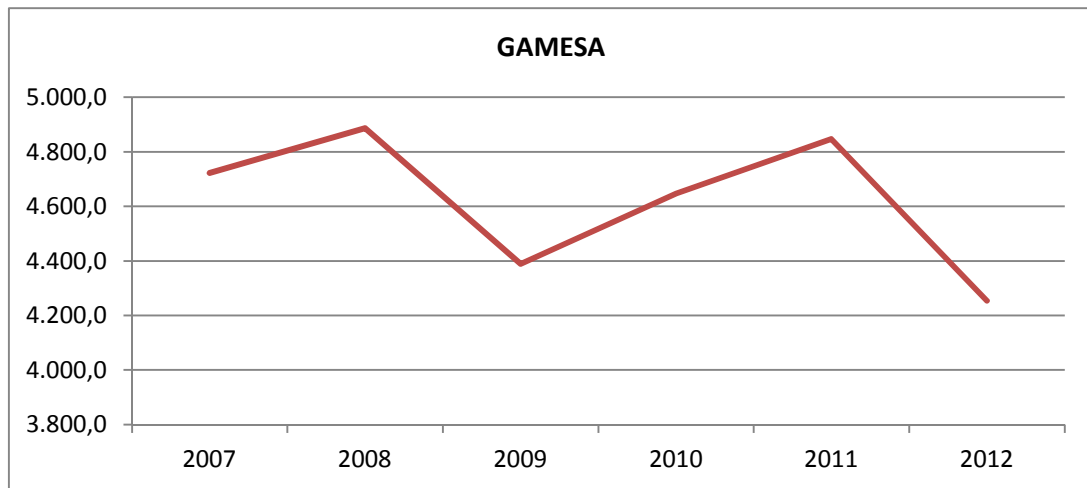


Fig 4. Wind sector employees in Spain of Gamesa

POWER INSTALLED

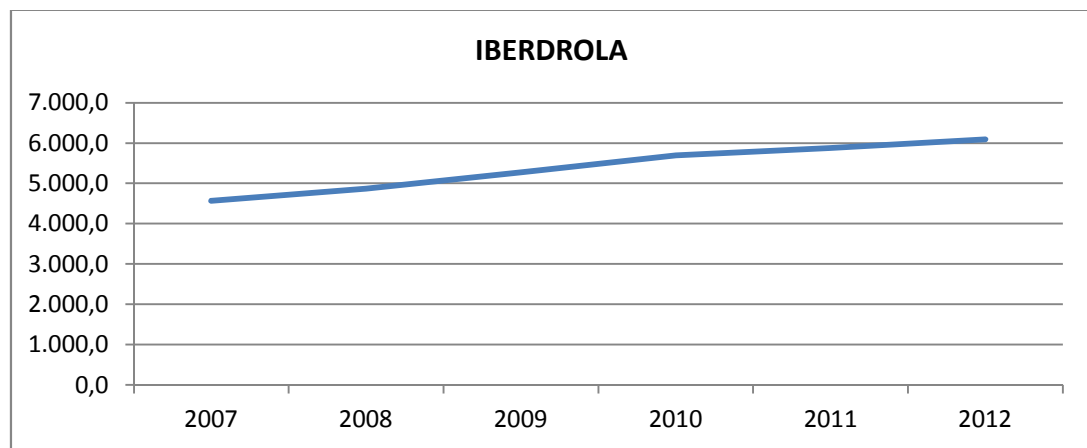


Fig 5. Power installed of Iberdrola

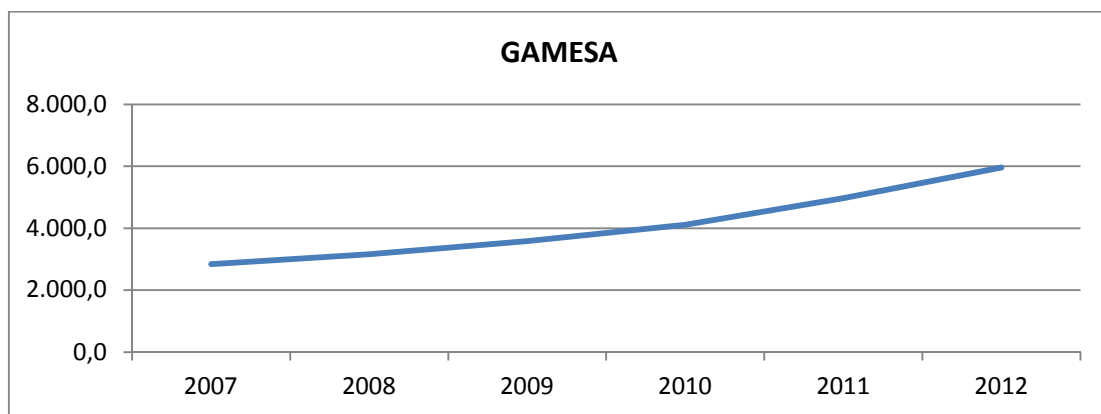


Fig 6. Power installed of Gamesa

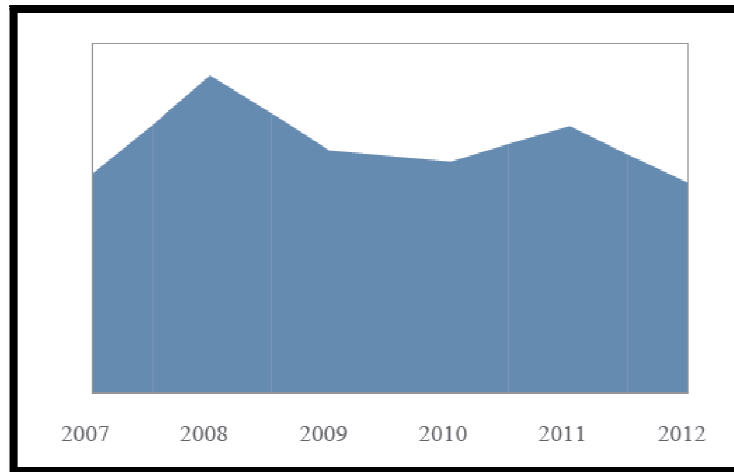


Fig 12. Evolution of the sales

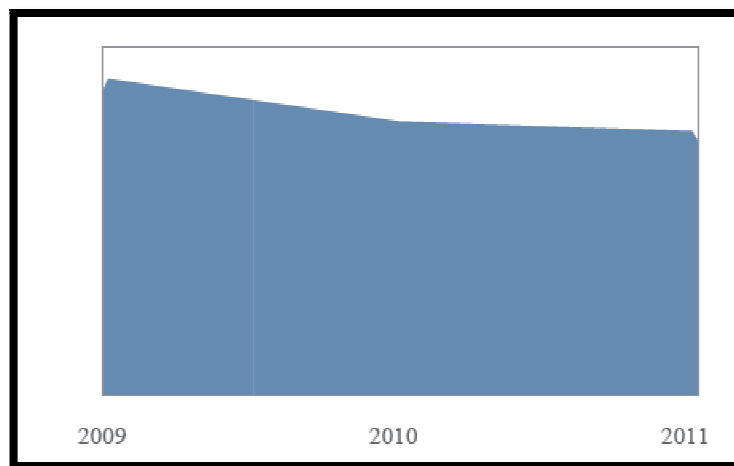


Fig 13. Evolution of the sales

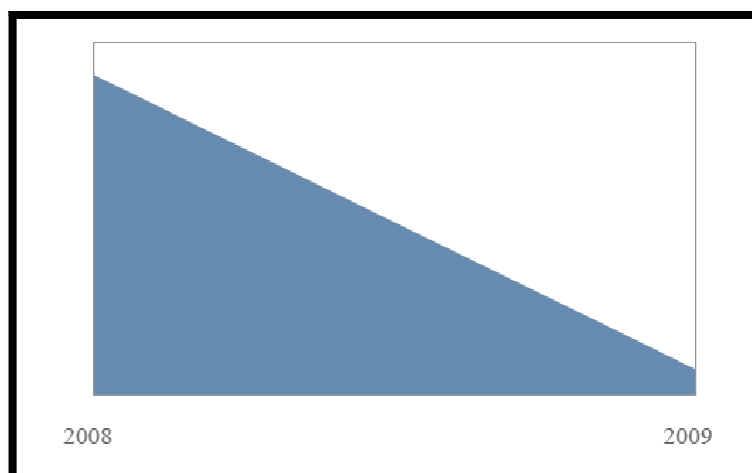


Fig 14. Evolution of the sales

How we can see in the graphics above, the result for the different companies are quite variables in function if the company to analyze is a huge international company as IBERDROLA, or if the company is a small national company as EOLICA LA BRUJULA.

In order to analyze the economic crisis and the lack of the framework after 2012, companies not so huge suffer these problems deeply than larger companies, due that this big

companies can face these problems easily if they focus their activity in different countries, with the purpose of not have huge losses in the company or trying to fix problems in Spain.

After I got all the data, I went on analysing all the them through a correlation and regression analysis

Correlation analysis for obtained data

During the correlation analysis I will try to see if there is a relationship between the employees in the company and the power installed during each year of the economic crisis.

I will do a correlation analysis for the two big companies of this research, Iberdrola and Gamesa.

To make the correlation analysis I will follow next steps and will use next formulas:

$$\sum dx^2 = \sum x^2 - \frac{(\sum x)^2}{n} \quad (1)$$

$$\sum dy^2 = \sum y^2 - \frac{(\sum y)^2}{n} \quad (2)$$

$$\sum dxdy = \sum xy - \frac{\sum x \sum y}{n} \quad (3)$$

$$r = \frac{\sum dxdy}{\sqrt{(\sum dx^2 \sum dy^2)}} \quad (4)$$

In the Iberdrola case I got an $r = 0,74$ and if we look into the correlation table for 5 df, I could conclude that the employee and the power installed in Iberdrola case are positively correlated.

However for Gamesa case, the coefficient r is to small, if we look to the r in the correlation table we can see that this value is not higher than the tabulated value, so we can concluce that for Gamesa there is no a relationship between the employees adn power installed.

Regression analysis for obtained data

It would be tempting to try to fit a line to the data we have just analysed.

$$\sum dx^2 = \sum x^2 - \frac{(\sum x)^2}{n} \quad (1)$$

$$\sum dy^2 = \sum y^2 - \frac{(\sum y)^2}{n} \quad (2)$$

$$\sum dxdy = \sum xy - \frac{\sum x \sum y}{n} \quad (3)$$

The regression equation for y on x is: $y = bx + a$ for a linear relationship where b is the slope and a is the intercept (the point where the line crosses the y axis)

We calculate b as:

$$b = \frac{\sum dxdy}{\sum dx^2} \quad (4)$$

We calculate a as:

$$a = \bar{y} - b\bar{x} \quad (5)$$

For my data, I will use the number of employees and the power installed during last six years in order to fit the regression line.

IBERDROLA

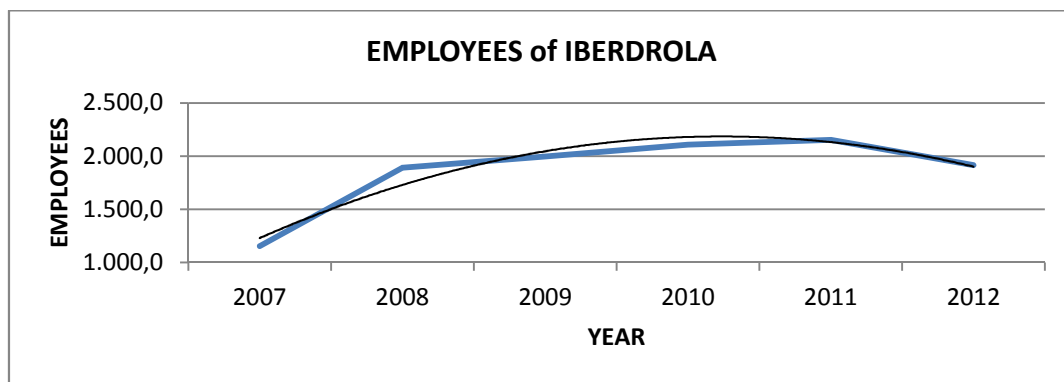


Fig 16. Relationship between year and employees

For the employees of Iberdrola, I can not make a linear regression analysis, that is why I made an exponential analysis using excel, and the values that I can get for my data are:

$$y = -91,286x^2 + 773,29x + 547$$

$$R^2 = 0,9402$$

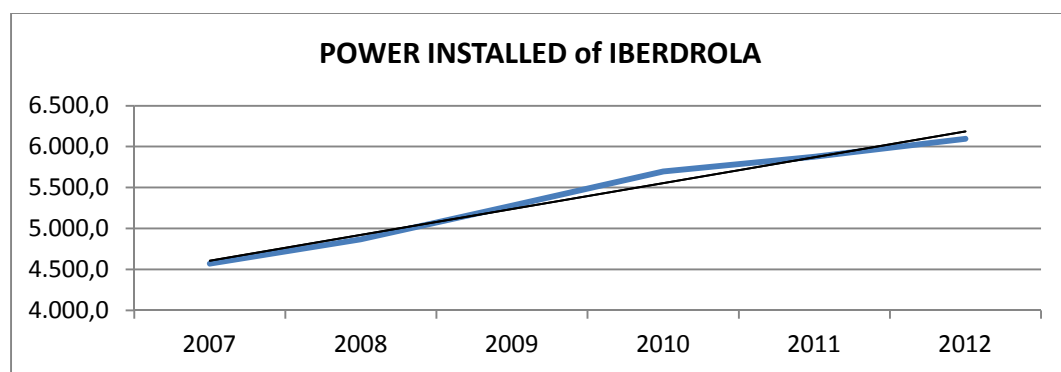


Fig 17. Relationship between year and power installed

In this case, we can see a linear relationship between the power installed and the years

$$y = 316,03x + 4290,4$$

$$R^2 = 0,9807$$

For Gamesa, I could not make a regression analysis for the employees due that the data that I got, makes it impossible to predict a line, however, this is possible for the power installed.

In this case I made two analysis, one as a linear analysis and second one as exponential; as we can see below, both of them are quite good and we can get a line that fit almos perfectly.

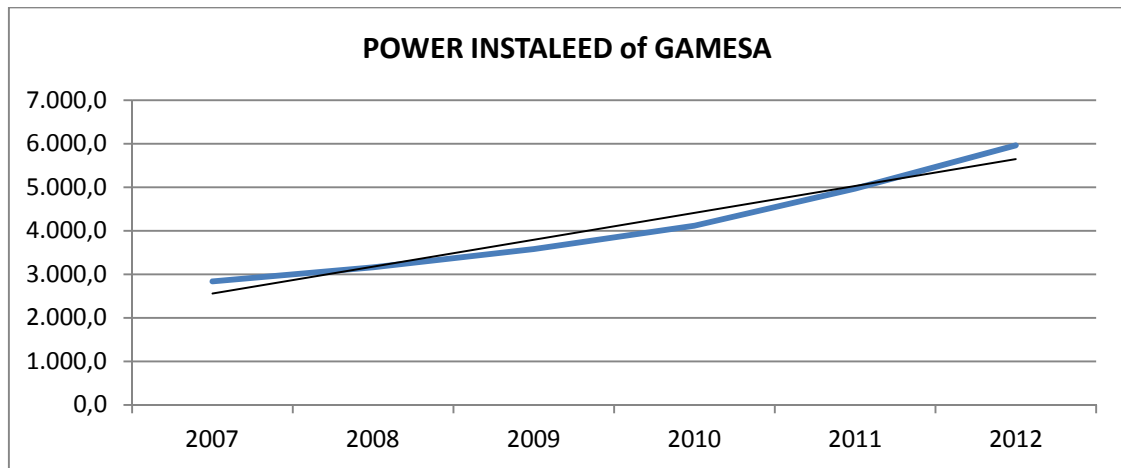


Fig 18. Relationship between year and power installed

$$y = 617,26x + 1943,9$$

$$R^2 = 0,9547$$

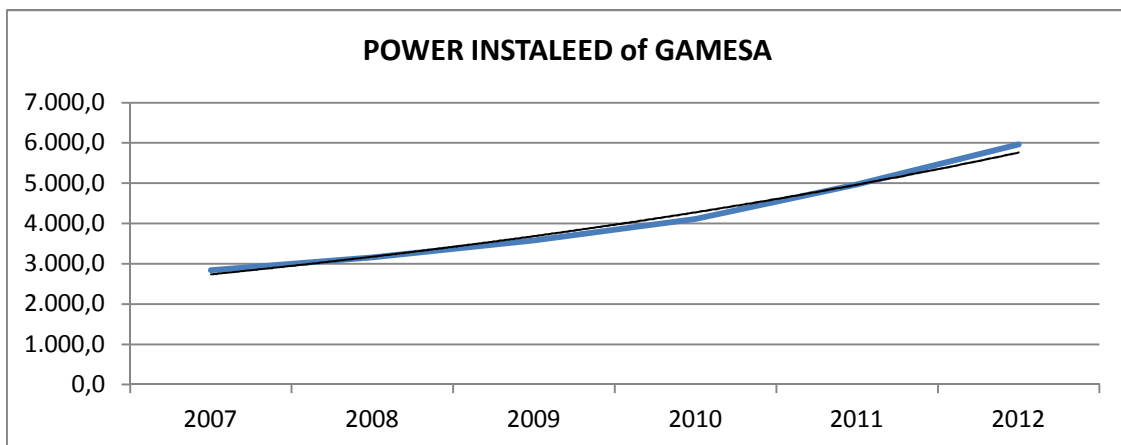


Fig 19. Relationship between year and power installed

$$y = 2357e0,149x$$

$$R^2 = 0,9875$$

3. Description

a) what was done

During the Final Work III, I had to do 4 different tasks:

- 1) To do empirical research, also to present research methodology and process.
- 2) To make analysis and visualization of empirical research data.
- 3) To present research conclusions and identify how received results are important for pending problem solution.
- 4) Based on theoretical (Final Work II) and empirical researches to present suggestions for pending problem solution.

4. Conclusions and suggestion

The development of renewable energies in Spain began to get positive results in the 90's, the result of a strategic policy of promoting and supporting renewable energy, achieving a remarkable growth in the second half of the last decade, especially in wind energy technology.

For being indigenous energy sources, the introduction of renewable energy supply improves security by reducing imports of petroleum and petroleum products and natural gas energy resources that Spain does not have, or carbon, energy source which indigenous resource features.

The share of renewables in primary energy consumption has nearly doubled since 2004 to reach 11.3% by the end of 2010 and have made Spain one of the leading countries in renewable energy

However, since the economic crisis reach the most critical point in 2010 and the companies started to notice the lack of the framework after 2012, things started to slow down and get worse.

Some of the conclusions that we can get after this work and the recopilation of the data for real companies of Spain are:

1. Definitely the economic crisis and the lack of the framework after 2012 have slowed down the development of the wind industry in Spain.

Because of the economic crisis all the country is having problems, and these are making that this kind of new energetic industries can not grow up properly, denying them or decreasing the help that they need, even when these companies are becoming in one of the main resource of the country and one of the best industry all over the world.

2. Second clear conclusion that we can get is that, well is known that all the companies are suffering the effect of the economic crisis plus the lack of the framework, but more over the small companies, as we saw in companies as El Pedregoso, or FERCOM, and this is due to larger companies can cover the losses with the activity that they make in other

countries, however smaller companies must survive without this, and it made that a lot of them had to close down.

3. The third conclusion is that how we can see, Spanish companies are working hard in the wind power energy industry, being one of the best in the world, trying to develop this section in the electrical companies, however, without the support of the government due to the crisis, is making this a really hard work; so as conclusion we can say that the Spanish companies want to develop the wind industry but they need the government support.
4. Last conclusion will be about power installed. Looking to the graphics and focus in the regression line, we can say that although the crisis and the lack of the framework is affecting the companies hardly, at least, they are still increasing the power installed, although this growth is not so huge during last years, and it has been slowed down, at least large companies could increase the power in Spain.

After analyse the problems that are affecting in a negative way for developing the wind power industry in Spain I can make some suggestions which could help to solve some of the problems.

The current situation that stretches across the world and the Spanish economy and the need for the energy system must integrate economically sustainable manner, advised renewable energy set a framework after 2012, in order to keep the development of the wind industry in Spain, with some goals that allow to the companies to have the confidence enough to work in this section and also to help to the economic situation in the country.

One of the suggestion that some specialist made is that the participation of the renewable energy share in 2020 was 20%.

The associated investment plan over the period 2012-2020 amounted to 62,797 M €, 89% engaged in the generation of electricity. To promote such investment, the plan provides for the administration costs of 1,259 M € for the whole period, both public support for investment and execution of various activities of information dissemination, education, etc., Such as credit lines public.

However, most of the costs come from the private sector, mainly associated premiums special regime electricity generation, with a running total in the period of 23,426 M €.

It continues to focus on onshore wind technology, very close to competitiveness with conventional power generation, with a target of 35 GW.

Achieving energy goals set by the plan for 2020 and prepare the way for an increased role of renewable energies beyond this year requires significant efforts in R & D energy in our country.

It must involve public and private sectors, within a framework promotion that will ensure adequate financial support to the technical development of each area commercial and every project, from basic research to the commercial stage.

Only in this way, wind industry could development and keep growing during following years.

A framework of this type can give many advantages, which include the economic, social and environmental factors that must be taken into account for a proper balance of the effects of the plan.

There are some advantages that have direct economic effects that are quantifiable savings for the country that involve reducing imports of natural gas, diesel or gasoline or reducing CO2 emissions.

Looking to the data of previous year, we can say that assessment of these effects reaches up from 29,000M€.

The direct economic benefits for the country associated with the achievement of the targets set for a plan from 2012 to 2020 over 4,000 M € accumulated in this period.

There are other beneficial socioeconomic impacts resulting from the implementation of the plan more difficult to quantify but it will certainly be very important. For example, the creation of wealth accumulated by increases in GDP contribution of the sector of renewable energy that are evaluated in more than 33,000M € over 8 years.

It is very important also the benefit derived from the total job creation linked to renewable energies by 2020 is estimated at more than 300,000 direct and indirect jobs.

Another effect is difficult to quantify but certainly very important is the rebalancing of the balance of payments due to technology exports derived from the leadership position in wind sector.

Spanish companies are in a good position abroad, it means that they are doing a great job not only in Spain, also in other countries and Government should not slow down the development, they must support the wind power industry.

Companies need some assurance for following years that make them to be sure about their situation without being in a potential risk of shutting down and having some support by the Government.