ESADE

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CASE

THE FUERTES VIENTOS WIND FARM

At the beginning of autumn 2006, Josep Martí gazed out at the falling leaves from his Barcelona office window, and reflected on how the Fuertes Vientos Wind Farm project had begun. The wind farm was located in the Catalan province of Lérida, Spain, near the neighbouring region of Aragón. The project was mostly financed by a large construction company that had been seeking to expand its renewable energy division since mid 2004. The construction company's investment had reduced the equity stake of the founding group significantly. They lost their majority control over the wind farm, though this investment also reduced the project's financial risk, guaranteeing the wind farm's complete financing until it reached the breakeven point.

Josep Martí had recently heard talk about venture capital and other types of financing such as business angels and equity loans. As he watched the leaves flutter past his window, he wondered who the final shareholders might have been had they not accepted all the capital from the construction company at the very beginning. Stage financing would have led to a better global valuation of the wind farm and, as such, the founding team would have been able to retain control, as compared to the 25% share it currently held. But would it have been possible to finance the Fuertes Vientos wind farm in stages? What amounts of money would have been needed, and when?

The opportunity

Josep Martí, along with three experienced professionals in the energy industry, saw an opportunity to set up a wind farm between Aragón and Catalonia in 2003. The four had taken an engineering degree together at *Universidad Politécnica de Cataluña* and had stayed friends ever since. When they finished their studies in 1993, they all began working in the energy sector: two for the electricity company, *Unión Fenosa*; one for the leading utility company, *Endesa*; and Josep himself joined *Gas Natural*, the leading Spanish gas provider.

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They often discussed the evolution of the energy sector in Spain and Europe during their weekend conversations. Their major concern was the significant rise in domestic energy consumption, as well as the extremely negative effects this implied for the environment. With the Kyoto Protocol and EU directives establishing that 12% of energy consumed should be produced via renewable energy sources by 2010, the four friends were convinced that the future would imply a significant increase in renewable energy production; in particular, wind power. This is how they saw the opportunity and why they decided to explore the possibilities of developing a wind farm.

The first important decision was the wind farm's location. The four decided on Catalonia given that its generating capacity in January 2004 was low compared to the rest of Spain (see Annex 1). Catalonia was one of the country's most advanced regions, however in wind generating capacity ranked in tenth place. After spending several months studying the areas with the strongest winds and presenting their project to local Public Administrations, they identified an area in the province of Lérida, bordering the neighbouring province of Aragón, which seemed to have good orographic and climatological conditions for building a wind farm. They prepared the preliminary project at weekends, a project that they called Fuertes Vientos.[1]

On 1st July 2004, each of the four entrepreneurs contributed €60,000 to the incorporation of the company and the launch of the project. The first expenses were soon produced, including a preliminary study to determine the wind farm's viability. The study analysed wind behaviour, the layout of the land and other items relevant to the project, and represented an investment of €120,000. 50% of this investment was paid upon signing the contract for the study and the remaining 50% was paid upon its completion, on 1st September 2004.

The viability study determined that Fuertes Vientos could deliver a capacity of 42.5 megawatts (MW) which would increase Catalonia's current wind-power capacity by 50%. In addition, the study estimated that the wind farm could be operational approximately 2,510 hours annually, and that this would be spread out evenly throughout the year.

Investments needed

The business looked promising. As such, the entrepreneurs decided to prepare a detailed Business Plan with a special focus on the Financial Plan, as capital expenditure was key to this type of projects. Marketing was unnecessary and, once the wind farm was up and running, operations were quite straightforward.

The first step towards launching Fuertes Vientos was to obtain the necessary licences and pay the corresponding taxes, which totalled €1,000,000. Along with the viability study, this was considered as an investment in the project.

To reach the 42.5 MW level, they decided that they needed 50 wind turbines, 850-kilowatt (KW) each, (see Annex 2 and 3 for further information on these generators).

[1] Fuertes Vientos means Strong Winds.

Given the information they had received from the different suppliers, the unit price for each turbine was €600,000 and included transportation and installation costs.

In addition, they needed to invest in civil works to adapt the land, €3,500,000, and to connect the wind farm to the nearest substation in order to distribute the energy produced €2,000,000. The expenses required in launching the company (licences and taxes) were paid at the beginning, on 1st January 2005, while fixed asset costs (wind turbines, civil works projects, connection to the national grid) were paid in two stages, 30% of total in 2005 and the remaining in 2006. The depreciation period for the fixed asset investments and expenses associated to the firm's launch were 20 and 5 years, respectively. Depreciation started once the wind farm went into production.

After obtaining the necessary permits, the construction phase of the wind farm began in January 2005 and was scheduled to take two years to reach complete. Assuming no delays in construction, operations were forecast to begin in January 2007, and the wind farm would have a 40-year lifespan and licence.

Nevertheless, to avoid asset decapitalisation, additional investments in fixed assets would be necessary after the fourth year of operations, once the fixed assets warranty period had expired in 2010. The amount of this additional investment was equivalent to the depreciation amounts for the same fiscal year. As such, net fixed assets, investment minus the accumulated depreciation, would remain constant.

Fuertes Vientos wind farm income and operating expenses

According to Spanish legislation passed in 2004 (see Annex 4), wind-power producers had the right to sell the energy they produced, measured in megawatts per hour, to the power distribution companies at a set rate equivalent to a percentage point of the regulated rate. In 2004, this percentage was 90% of the Regulated Average Rate (RAR) established by the Spanish Government at the beginning of each year (for fiscal year 2006 the rate was set at €76.59/MWh).[2] It was forecast that this rate would continue to grow with inflation, estimated at 3% per year.

Once the wind farm was up and running, the majority of operating expenses corresponded to the maintenance of the wind turbines. This service was outsourced to another company which charged €6 per MWh produced during the first year of production. The price was inflation adjusted every year thereafter.

In addition, they would pay an annual lease for the land on which the wind farm was built, a total of €150,000 in 2005, later adjusted for inflation, and which would be payable at the beginning of each quarter, that is, in January, April, July and October.

Fixed costs, such as personnel, administration, IT supplies and other expenses were €120,000 per year during the two years of the construction phase. Once operational in 2007, these costs would rise to €500,000 per year, increasing by 3% every year thereafter.

[2] Royal Decree 436/2004, which regulates the legal and economic system for special energy production (in which wind power is included), establishes a system of rates and a more complex system of incentives which has not been taken into account to simplify this case study.

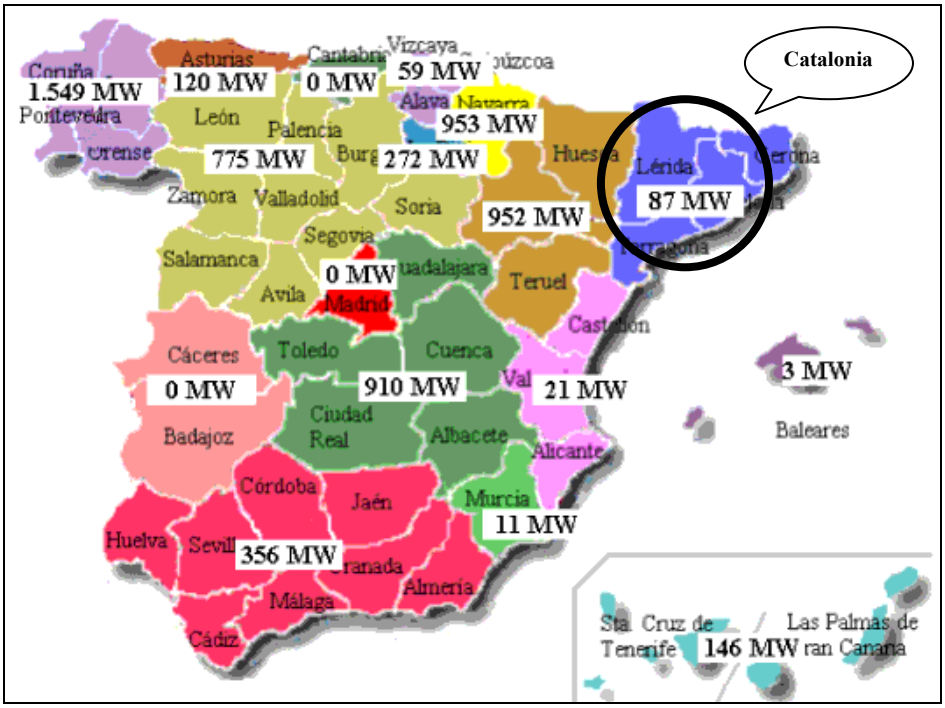
On average, variable operational expenses would be paid in 30 days. Payment for the power sold to the national grid would be received at an average of 45 days. The applicable corporate income tax rate was 30%.

The search for financing

Given the breadth of the project, Josep and his team decided that they needed a financial partner from the outset. The initial administrative requirements (permits, licences, etc.) already implied a significant outflow of cash which, unfortunately, none of the entrepreneurs had. Given that renewable energy was a hot market, and thanks to the founding team's experience in the sector, they came up with the required financing in November 2004, allowing them to launch the project and to keep to the timeline they had established. The construction company invested €10 million in exchange for an 80% equity stake in Fuertes Vientos. In addition to the funds invested in equity, having the capital and a strong partner made it easier to get approval for a €30 million loan from a well-known local savings bank at the beginning of 2005. The loan was received as follows: €10 million at approval and the remaining at the beginning of 2006. The negotiated conditions included a 7% annual interest rate, a grace period until the end of 2006, with no repayment of principal, and a loan repayment period of 10 years.

Josep was happy. It was October 2006, nearly all of the wind turbines had been fully installed, and the wind was growing stronger in Catalonia. Thanks to the investors' capital, raised in just a few months, his dream was finally coming true. However, he continued to turn a single question over and over in his head. He could not help wondering if the financing they had received, all at once and from a single shareholder, had been the best option for the founding team and the future of the company.

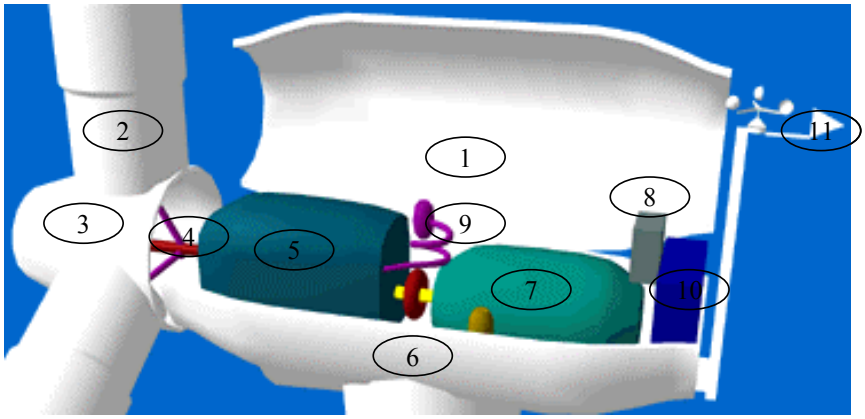
Annex 1: Power Capacity in Spain by Autonomous Community (January 2004)



		Power capacity
1	GALICIA	1,549,045
2	NAVARRA	952,900
3	ARAGÓN	951,810
4	CASTILLA LA MANCHA	910,216
5	CASTILLA LEÓN	774,820
6	ANDALUSIA	356,165
7	LA RIOJA	271,870
8	CANARY ISLANDS	146,620
9	ASTURIAS	120,560
10	CATALONIA	86,725
11	BASQUE COUNTRY	59,270
12	C. VALENCIANA	20,490
13	MURCIA	11,220
14	BALEARIC ISLANDS	0
15	CANTABRIA	0
16	EXTREMADURA	0
17	MADRID	0
		6,211,711

Annex 2: Example of Wind Farm Installations

Annex 3: Wind Turbine Components



1. The nacelle contains the wind turbine's key components, including the gearbox and electrical generator. Service personnel can access the nacelle from the wind turbine tower. To the left of the nacelle we see the turbine's rotor, that is, the blades and hub.
2. The rotor blades capture the wind and send power to the hub. In a modern 1000 kW wind turbine, each blade measures approximately 27 meters in length, and its design is similar to a plane's wing.
3. The hub is attached to the wind turbine's low speed shaft.
4. The turbine's low speed shaft connects the rotor's hub to the gearbox. In a modern 600 kW wind turbine, the rotor turns fairly slowly, between 19 and 30 revolutions per minute (RPM). This shaft contains hydraulic system conduits permitting the aerodynamic brakes to work.
5. To the left of the gearbox is the low speed shaft. The gearbox enables the high speed shaft to its right to turn 50 times faster than the low speed shaft.
6. The high speed shaft allows for approximately 1,500 revolutions per minute (RPM), thus allowing the electrical generator to function. The mechanical brake is used in case of aerodynamic brake failure. It comes equipped with an emergency mechanical disc brake. The mechanical brake is used in case of aerodynamic brake failure or while maintenance is being carried out on the turbine.
7. The electrical generator is also commonly referred to as an asynchronous or induction generator. In a modern wind turbine, maximum power tends to be between 500 and 3000 kilowatts (kW).
8. The electronic controller consists of a computer which constantly keeps track of the wind turbine's conditions and controls the yaw mechanism. In the event of a malfunction (for example, if the gearbox or generator overheats), the controller stops the turbine and calls the technician in charge via a modem-enabled phone link.
9. The hydraulics system is used to restore the aerodynamic brakes in the wind turbine.
10. The cooling unit consists of an electrical fan used to cool the generator. In addition, it also includes an oil cooling unit for the gearbox. Some turbines use water-based cooling units.
11. The anemometer and wind vane are used to measure the wind's speed and direction. The electronic signals sent by the anemometer are used by the controller to connect the turbine when wind speed reaches 5 meters per second. The computer switches off the turbine automatically if wind speed exceeds 25 meters per second to protect the turbine and its surroundings. The signals sent by the wind vane are used to turn the turbine against the wind by means of the yaw mechanism.

Source: Danish Wind Industry Association (www.windpower.org)

Annex 4: Royal Decree 436/2004 Regarding the Regulation of Special Energy Production

CHAPTER I: OBJECTIVE AND AREA OF APPLICATION

Article 1. Objective

The objective of this Royal Decree is to:

1. Update, systematise and redefine the regulatory dispositions dictated regarding the development of norms in the legal system pertaining to special energy production as outlined in Law 54/1997, dated 27 November, on the energy industry.
2. The establishment of a durable economic system for installations included in the special energy power category, based on an objective and transparent method of calculation to determine a system of retribution compatible with the method used to approve or modify the average or reference power rate as regulated by Royal Decree 1432/2002, dated 27 December.
3. The establishment of respective temporary economic mechanisms, both for installations included in Royal Decree 2366/1994, dated 9 December, regarding energy production sources whether through hydraulic, combined or other sources of renewable energy, and for installations included in Royal Decree 2818/1998, dated 23 December, regarding electrical energy production via installations supplied by renewable, waste or combined energy sources.
4. The establishment of a complementary premium for those installations greater than 50 MW, in accordance with that established in Article 30.5 of Law 54/1997, dated 27 November.

Article 2. Area of Application

1. Those energy power installations meeting the conditions established in Article 27.1 of Law 54/1997, dated 27 November, may benefit from the special system established in this Royal Decree. These installations are classified into the following categories, groups or sub-groups depending on the primary energy sources used, the production technologies used and the energy production obtained:

(...)

- Category B: Installations that use renewable, non-consumable, bio-mass or any other types of bio fuels as their primary source of energy, provided that the installation owner does not produce energy by means of the standard system.

(...)

  - Group B.2 Installations that only use wind power as their primary source of energy. Said group is divided into the following two sub-groups:

    - Sub-group B.2.1 Wind-power installations built on land.
    - Sub-group B.2.2 Wind-power installations built in open waters.

(...)

CHAPTER IV: ECONOMIC SYSTEM

Article 22. Retribution Mechanisms for Energy Produced in the Special Category

1. To sell the energy produced or any excess energy, the owners of the installations in question to whom this Royal Decree applies must choose one of the following two options:

- **a.** Cede the electricity generated to the power distribution company. In this case, the sale price for said power will be defined as a regulated rate, applicable to all programming periods, expressed in cents (Euro) per kilowatt-hour.
- **b.** Freely sell the electricity on the market through a bidding system managed by the market operator, through a bilateral contracting system, through instalments or through a combination of all the above. In this case, the sales price shall be that available in the market or the price freely agreed to between the installation owner or representative, in addition to an incentive or premium, both expressed in cents (Euro) per kilowatt-hour.

(...)

Article 23. Regulated Rate

1. The regulated rate referred to in Article 22.1.a consists of a percentage of the average or reference power rate each year as defined in Article 2 of Royal Decree 1432/2002, dated 27 December, and published in the Royal Decree establishing said rate.

2. For installations included in Category B within Article 2.1, the percentage referred to in the previous clause shall be within the 80% to 90% range, both inclusive.

(...)

Article 24. Premium

1. The premium referred to in Article 22.1.b will consist of a percentage of the average or reference power rate each year as defined in Article 2 of Royal Decree 1432/2002, dated 27 December, and published in the Royal Decree establishing said rate.

2. This premium will be established based on the group and sub-group that the installation pertains to as well as to its power capacity.

3. This premium will be invoiced to and paid by the power Distribution Company in accordance with that established in Articles 17 and 27 of this Royal Decree.

(...)

Article 25. Incentive to Participate in the Market

1. The incentive to participate in the market referred to in Article 22.1.b will consist of a percentage of the average or reference rate each year as defined in Article 2 of Royal Decree 1432/2002, dated 27 December, and published in the Royal Decree determining the rate.

2. This premium will be established based on the group and sub-group that the installation pertains to as well as to its power capacity.

3. This premium will be invoiced to and paid by the power distribution company in accordance with that established in Articles 17 and 27 of this Royal Decree.

(...)

Article 34. Rates, Premiums and Incentives for Category b, Group b.2 Wind-Power Installations

1. Sub-group b.2.1 installations with no more than 5 MW power capacity:

- Rate: 90% during the first 15 years after its launch and 80% thereafter.
- Premium: 40%.
- Incentive: 10%.

2. Remaining installations in Sub-group b.2.1:

- Rate: 90% during the first five years after its launch, 85% the following 10 years and 80% thereafter.
- Premium: 40%.
- Incentive: 10%.