CATÓLICA LISBON
SCHOOL OF BUSINESS & ECONOMICS

Generg

Which renewable technology for the next decade

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Abstract

Title: Generg – Which renewable technology for the next decade

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Generg, a Portuguese based company and a promoter of renewable energies, has been operating for over 25 years. During its first decade of activity, it started by exploring small hydric power plants, and then diversified into wind power. It subsequently expanded once more, in terms of employed technologies, with the construction of two solar power parks. Generg's current portfolio comprises a total of 487.6 MW of clean power, distributed by 436.4 MW of wind capacity, 33.2 MW of hydro capacity and 18 MW of solar capacity. Nowadays, after several years without new investment, an opportunity to invest in a new renewable park appeared. The company holds a license to explore wind energy, with a total of 20 MW of power generation capacity, which can be converted to solar energy, due to the smaller environmental impact of this alter.

The present case analyzes the evolution of the company over time, as well as the strategy it followed. It also contemplates an overview of the renewable energy industry in Portugal and the global panorama.

The main objective of the case is to put the reader in the position of making a decision, concerning this new investment opportunity, contemplating immediate advantages, for both technologies, with long term concerns and expectations. Should Generg maintain the license for wind technology? Or should it converted it for solar?

Key words: renewable energy, electricity industry, regulated prices

Resumo

Título: Generg – A tecnologia renovável para a próxima década

Autor: Eduardo Marta

A Generg, uma empresa portuguesa, promotora de energias renováveis, tem vindo a desenvolver a sua actividade há 25 anos. Começou com o desenvolvimento e exploração de centrais mini hídricas, durante a sua primeira década de actividade, passando então para a energia eólica. Expandiu, uma vez mais, o seu portfólio, com a construção de dois parques solares. O portfólio actual da Generg é de 487.6 MW de potência, distribuídos em 436.4 MW de potência eólica, 33.2 MW de potência hídrica e 18 MW de potência solar. Actualmente, e após vários anos sem investimentos, surgiu a oportunidade de financiar um novo parque renovável. A Generg tem uma licença de exploração em tecnologia eólica, num total de 20 MW de capacidade. Esta licença pode ser alterada para energia solar, uma vez que esta alternativa apresenta menor impacto ambiental.

O presente caso, analisa, de forma detalhada, a evolução da empresa ao longo do tempo, bem como a estratégia por ela seguida. Contemplando também uma analise à industria das energias renováveis nacional, assim como o panorama internacional.

O objectivo primordial do caso é colocar o leitor na posição de tomada de decisão sobre a nova oportunidade de investimento, contemplando tanto vantagens imediatas, como preocupações e expectativas futuras. Deve a Generg manter a licença de exploração eólia? Ou deve mudar para energia solar?

Palavras-chave: energia renovável, mercado eléctrico, preços regulados

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Generg: Which renewable technology for the next decade

Introduction

It has passed a long time since Generg, a Portuguese based company and a project promoter in the renewable energy industry, has seen its portfolio of projects increase. Since 2009, the group has not undertaken a single significant investment like it used to happen regularly before the economic and financial crisis that has impacted the Portuguese economy over the last few years. The deterioration of the financing conditions offered by commercial banks, deeply affected the company, as they were the main funding source. The banks were no longer in condition to finance new renewable power installation, which are characterized by significant upfront investments.

Now, after five years of near stagnation, Generg has finally a reliable opportunity to expand its portfolio. The company managed to raise the necessary funds for a new project with 20 MW of power generation capacity in Castelo Branco, in the center of Portugal. The renewable production license was initially obtained to explore wind power, but now the company is considering the possibility of changing it for solar power, since it presents a smaller environmental impact. With that in mind, the CEO organized a meeting with the board to examine both possibilities, evaluating immediate benefits and considering long-term concerns and expectations.

Overview of the Renewable Energy Industry

Electricity is a first need product and a commodity, which, in case of lacking, reduces dramatically the quality of live. It's production through clean and renewable sources, which do not dilapidate natural resources, began more than a century ago. It started with hydroelectric plants, transforming water motion and gravity, into electricity. But only recently, did clean energies become a major concern for governments and society, mainly, but not exclusively, in developed countries [Exhibit 1]. Political leaders are worried about climate change, caused by an abusive use of natural resources, resulting in excessive CO_2 emissions. Renewable energies, such as hydro, wind, solar or biomass, among others, have been one of the answers to the escalating problem of over usage of planet's non-renewable resources and the excess production of pollution. Moreover, by investing in these virtually unlimited sources of energy, each country would be able to reduce its energy dependence on fossil fuels.

The European Union was the one first major economic region to take serious action towards a clean and more sustainable world [Exhibit 3]. Already in 2001 it introduced the Renewable Directive (2001/77/EC), which set a target, for the 15 EU members at the time, of 12% gross energy consumption from renewable sources, by 2010. More recently, in 2008, it approved an ambitious climate and energy program, known as the "20-20-20 initiative". The targets are: 20% reduction of greenhouse gas emission from 1990 levels, 20% share of energy consumption from renewable resources and 20% improvement in EU's energetic efficiency. All three targets should be met by 2020. With this initiative, the EU, as well as its member states, made a strong commitment to pursue and invest in eco friendly sources of energy. Alongside several incentives, like mandatory preference for renewable energy and financial subsidies to renewable projects, the Euro group introduced a system of CO_2 tariffs to further stimulate the renewable industry. These measures changed substantially the energy policy, making increasingly less attractive producing energy through conventional plants, mainly thermal and nuclear power stations. Nowadays, Europe is the most important geographic area in the world in the renewable sector [Exhibit 2].

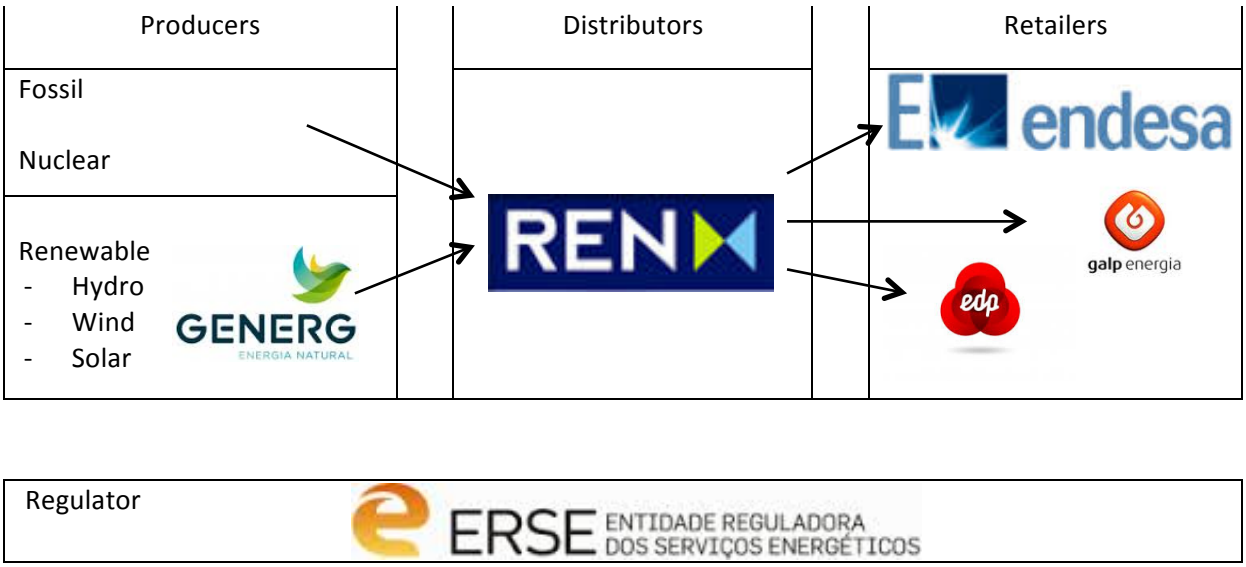
The renewable energy industry is characterize by the cutting edge technology it employees, as well as the massive infrastructure equipment it requires. For instance, the height of a wind turbine can achieve 100 meters, with blades over 60 meters. Solar parks need, on average, 5 hectares for each megawatt deployed. These types of equipment require an intensive need of capital, making financial institutions a crucial part in the industry dynamic.

Another challenge faced by this industry is the technical inability to store electricity and to stock the renewable resource itself, except for dams. Unfortunately, the current technology does not have an effective solution to store electricity. Batteries can only maintain a limited amount of energy, being far away from the storage capacity necessary to supply even a small city, in case of an interruption of natural resources. This leads to a back-up cost, which is the cost associated with an immediate need of electricity that has to be met with conventional processes. The back-up cost is the cost of having a fully functional thermal power plant, not working, waiting until is necessary to balance supply and demand.

As a consequence of not being stored, the consumption has to meet the production in real time. If the demand and production are unbalanced, the entire electric system can blackout, by an excess of demand, or there is waste of electricity, in case of excess of production. Most of the demand occurs during daylight, starting early in the morning, with the first demand peak when people wake-up and go to work. It is also when factories start operating. The second peak happens after lunchtime and

the third, and the biggest, occurs in the afternoon, when people go home to cook, watch TV, do the laundry, etc. During the night, when people are sleeping, with almost every electric device turned off and factories closed, the need for electricity decreases substantially [Exhibit 4].

Figure 1 – Diagram of the electricity industry (Portuguese companies)



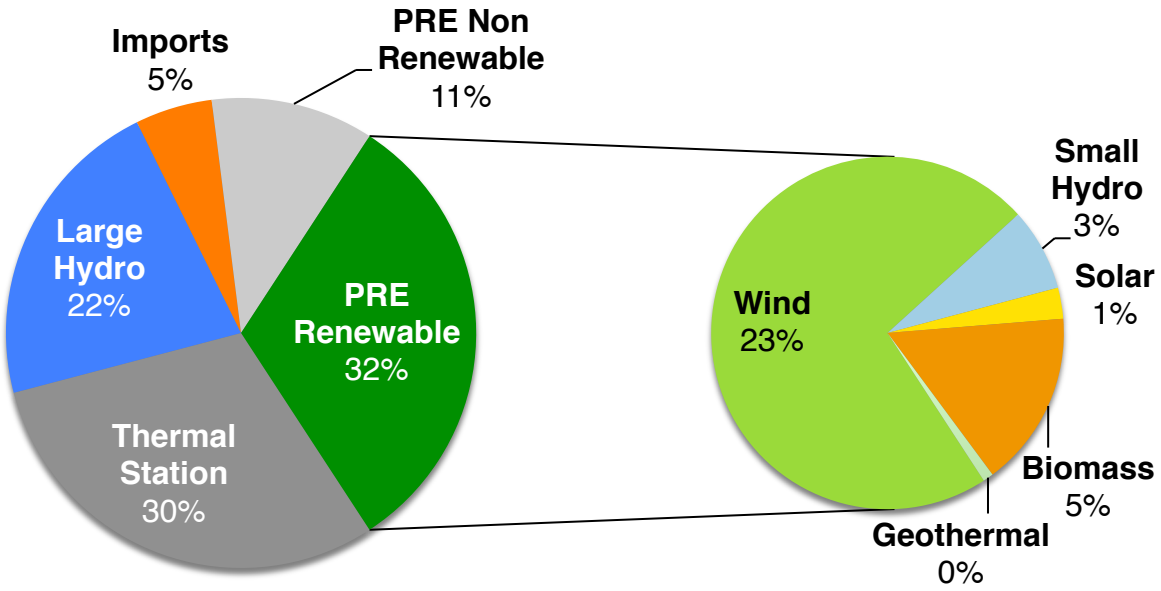
The electricity industry, in which renewables are included as a producer, is highly regulated. The price that each producer sells electricity to the distributor depends on the technology used. It is more attractive for the renewable due to the positive externalities and to compensate the higher investment. The distributor is the responsible for the transportation and for the maintenance of the grid. The distributor provides the electricity to the retailer, which is the responsible to commercialize the electricity to the end user.

Renewables in Portugal

One of the countries that invested the most in alternative energy production has been Portugal. Behind the early investment is the huge potential in term of natural conditions that the country has. It has large windy areas throughout the country, a wide hydrographic network and one of the sunniest areas of all Europe, Alentejo. On top of that, Portugal has the third largest Economic Exclusive Zone (EEZ) of the European Union and the tenth in the World. This huge maritime resource will play an important role when offshore wind and wave power reach a more mature stage of

development. This investment may occurred to early, according to the ex-Secretary of State for the Energy, Henrique Gomes "*We invested too much in a technology that, not only was not mature enough, as it also was not developed nationally*".

Figure 2 – Electricity production by source, 2013



Source – APREN – Associação de Energia Renováveis (Renewable Energy Association)

Matching the early investments with the great and diversified resource portfolio has allowed to become one of leading countries in the renewable industry, with one of the highest percentage of renewable energy in the consumption mix [Exhibit 5] and also with one of the highest levels of renewable production per capita. From all the natural resources, the one that registered the superior growth in terms of installed capacity has been the wind. It flourished from 1,236 MW in 2005 to 4,726 MW in 2013. Considering the evolution in new licenses, the wind power was the second higher, only behind big hydro power plants [Exhibit 6].

This enormous progress in the renewable energy industry came to an end in Portugal mainly for two reasons, lack of new licenses and higher financing costs. The first is a consequence of a new national energy policy. Since 2012, new licenses do not benefit from regulated prices. Companies that want to produce electricity, from renewable resources, with a license acquired after the new law are now subject to market prices. Even though the adversity presented by the new policy, licenses obtained

before the 2012 policy, still enjoy price benefits if the development process still is in the defined timeframe. The second reason is consequence of the financial and economic crisis, which affected the access to capital, increasing the associated cost.

Prior to 2012, a company in the renewable energy industry, to expand the portfolio had two major options, it could either take the initiative and request to develop and explore a renewable park, or it could wait and bid in public tender created by the government. Either ways, the company would always benefit from incentives.

There are companies across several industries exploring renewable parks in Portugal, like Generg, Iberwind, EDP Renewable, a subsidiary of EDP, the biggest electricity company in Portugal. As it used to be state owned and due its dimension, EDP is the responsible to operate big hydro power plant, being, therefore, responsible for the largest share of renewable energy produced nationally. But there also companies like Galp, which has its core business in the petroleum industry or Martifer, which operates in the construction industry. All of them can apply for a license or compete in public tender.

Whoever wins a license of exploration guarantees a pre-establish power generation capacity at a taken price, to deploy and operate the infrastructure. But new licenses can differ a lot and do not always have to have one a single winning company. When the amount of power generation capacity is not extensive, the entire capacity is attributed to a single company. There are cases, mainly in public tenders, where there is so much power at stake that companies unite to form an alliance to beat the competition. In Portugal, the Government launched two major tenders, for wind energy, in 2005-2006, one for a total power of 1,200 MW and other for 400 MW. The first one was won by ENEOP, a consortium created specifically for the tender. VentiVeste, another consortium, won the second.

ENEOP

ENEOP is a consortium especially created to bid for the largest of these public tenders, made by the Portuguese Government, for exploration of renewable energies. Generg was part of this consortium, with an investment of 20% of the total capital. EDP Renewable and ENEL, an energy company from Italy provided equally the remaining capital, 40% each. By the end of 2012, ENEOP had managed to build almost 1,000 MW, being responsible for 21% of the entire installed wind power capacity in Portugal [Exhibit 7].

With the creation of ENEOP an important step was made towards the development of Portugal in term of technology capacity. Enercon, a German based company, the second biggest company operating in the wind industry as a technologic supplier, created an investigation campus in the North of Portugal. Viana do Castelo has been widely known for being a region skilled in metallurgic quality and innovation. It was there that, with Enercon technology, all the materials needed for the wind turbines of ENOP were built. With ENEOP and with the creation of this campus, the Portuguese government addressed the national problem of technology dependence from foreign companies, using the expertise not only to supply another national projects, but also to export.

The objectives behind ENEOP, set by the Government, were an excellent reflection of the ambitions for the future renewable power capacity as well as for the independence in terms of technology. Unfortunately, VentiVeste, a consortium led by Galp, did not copy the success obtained by ENEOP. In 2012, after several years since the approval of the tender, VentiVeste had not even reached 10% of the total power capacity that was adjudicated.

The Price

Production of energy in Portugal is divided in two main categories; Special Regime Production (PRE) and Ordinary Regime Production (PRO).

Table 1 – Production regimes

	Renewable		Not Renewable	
PRE	Small Hydro Wind Solar Geothermal	Waves Biomass Biogas MSW	Cogeneration	
PRO	Large Hydro		Thermal	Gas Coal

The Ordinary Regime comprises thermal power and the large dimension hydro stations. The thermal power consists in energy from fossils resources, mainly in coal and natural gas, for the Portuguese case. For the thermal energy there is also a subdivision; Acquisition Energy Contracts (CAE) and Cost of Maintenance of Contracts Equilibrium (CMEC).

Every single type of energy enumerated previously has a different price, defined by the Government. The price utilized for the PREs is set to be attractive for the companies to produce clean energy, to cover high production costs, resulting from infrastructure and technology investments.

Table 2 – Price scheme for renewable technologies

Decree-Law nº 225/2007, 31 of May

Technology	Average Tariffs (€/MWh)	Coefficient Z
Wind	74-75	4.6
Hydro < 10 MW	75-77	4.5
Solar PV > 5 kW	310-317	35
Solar PV <= 5 kW	450	52
Biomass forest	107-109	8.2
Biomass animal	102-104	7.5
Waves < 4 MW	260	28.4

Decree-Law nº 126/2010, 23 of November

Technology	Average Tariffs (€/MWh)	Coefficient Z
Hydro < 10 MW	91 - 95	6.6

Decree-Law nº 132-a/2010, 21 of December

Technology	Average Tariffs (€/MWh)	Coefficient Z
Solar PV	257	27.2

Source – DGEG – Direção-Geral de Energia e Geologia (Directore-General of Energy and Geology)

As a consequence of having an instable production, consequence of the volatile availability of resources, the back-up cost appears as the major negative externality for the renewable energy. This is the additional cost of having thermal power stations available, and most important, ready to work, without producing, whenever renewable resources cannot generate the amount of electricity needed. It is most likely that this back-up power necessity occurs during peak hours, but it can also happen at any time of the day.

Energetic Consumption

Being energy the fuel of economic process and growth it is not strange to observe that the overall consumption in Portugal, as well as in Europe, decreased in the past years. This reduction in the consumption is a direct consequence of the crisis, being more noticeable, in the Portuguese case, after the memorandum of understanding with Troika. Government buildings, alone, reduced, from 2010 to 2012, almost 1 Terawatt/hour of electric consumption, representing a decrease of more than 30%.

However, in 2014, the economical indicators point in the direction of the end of the crisis, with a generalized growth in consumption and spending, an overall increase in the industrial activity.

Table 3 – Evolution of consumption (1000 TWh)

	Total	Domestic	Not Domestic	Industry	Public Buildings	Other
1995	29.2	7.6	5.5	13.4	1.2	1.6
2000	38.9	10.1	8.5	16.5	1.7	2.2
2005	47	13.2	10.5	17.9	2.5	2.9
2010	50.6	14.5	11.9	18.2	2.8	3.2
2011	49.1	13.8	12	17.7	2.7	3.1
2012	47.1	12.9	12.4	17.1	1.9	2.9

Source – Pordata

Moreover is important to notice that electric cars are becoming more popular as they register better performances and becoming more accessible, monetarily. The massification of electric cars would disrupt the current pattern of consumption. The night electric needs would boost, as it would be the preferable time to recharge the batteries. It would also decrease substantially the fuel dependence.

Generg's strategy over time

Generg as is known today, was founded in 1988, after the privatization of a state owned company held by IPE. Before the privatization, the core activities developed by Generg were essentially dedicated to obtain license to explore small hydro station. It had two major investor, the majority of the capital belonged to the Portuguese Government, the remaining part to a Belgium energy group. After the privatization, the foreign group had the opportunity to buy the majority, but did not use it. Instead a Portuguese fund, Lusenerg, bought the government share, being until now 53%-47%. Lusenerg belongs to Novenergia, a European investment fund, created initially in Portugal, holding energy companies in several countries throughout Europe, from Spain and France, to Poland and Romania. Meanwhile, GDF-Suez, a French electric company and one of the largest producer of electricity in the world, bought the Belgium group[1]. After the privatization, Generg finally put to use all the work that had developed so far, initiating the construction of its first renewable facility.

The mentor of this strategic change was João Bártolo the CEO at the time. His perspective on sustainability, the impact of human activity in the world and its resources and for generations to come, was the driver that pushed the company towards a more proactive attitude. Being a man from the Beiras region, the center of Portugal, it is not strange to observe that the majority of the company's portfolio is distributed in that area [Exhibit 9].

[1] GDF-Suez sold, in the beginning of 2014, its shares to a Japanese based company to Marubeni. GDF-Suez are still co-administrating these renewable activities

In 25 years of activity, Generg went from a small company, to a well-structured group. During the second decade of activity, the company had to restructured itself to better face the upcoming challenges. The group had, in its pipeline of projects, major developments that required intensive capital. To overcome this problem, Generg, as every company in the industry, resorted to a financial mechanism called "Project Finance". This financial instrument isolates the risk of a specific project from the company's risk, being the finance paid through the cash flows of the project. With the creation of new companies to administrate each project, Generg became a group holding several companies.

Hydro

The group started the exploration of clean energy by building mini hydro plants, transforming water motion into electricity. These mini hydro stations use the power of rivers' currents. This system is very different form the usual dams and reservoirs, mainly in the power capacity and ability to hold inventories of resources and power capacity. A reservoir, an artificial lake, can be used to control the level of water, by opening or closing the dam. This control over the amount of resources is particularly important to avoid the fluctuations of production, avoiding production in excess and reducing the back-up cost. But dams and reservoirs are always huge infrastructure with astronomic investments and a lot of location constrains. These two factors are much more favorable for the mini hydro stations. Being a derivative of a mature technology, mini hydro stations proliferated while other technologies, like the wind, were still in a developing stage.

For a small and recent company it would be impossible to invest in such a complex and demanding project like a dam. So, the first decade of Generg was characterized by the investment exclusively dedicated to mini hydro power stations. In that period, the company managed to build a portfolio of nine facilities producing 33,2 MW. These nine facilities were built in the north of Portugal, were the river's network is more intense and where the hydraulicity and precipitation are more advantageous. The total power capacity, in this type of installations, has not changed since 2000, with the construction of the hydroelectric plant of Manteigas. Since then, the company has been managing the operations of the plants, assuring the maximum efficiency of the available power production. In 2013, Generg achieved 107,5 GWh, avoiding 43,000 tons of CO_2. This value of production has varied along the years, being the main reason the Mediterranean climate that characterizes Portugal, being subject to drought periods, but also to heavily rainy periods.

After ten year of existence, already with some knowledge of the renewable market, new technologies appeared, with a lot of potential and a possibility to diversify the portfolio, reducing the fluctuation in production. Wind was the response gave by Generg for the upcoming decade.

Wind

The decision to start exploring this new resource, with all the money, expertise and technology that it requires, was a long-term call. Between hydric and wind production there were not any technologic similarity. The company had to restructure itself to better face the upcoming financial and skill based challenges, creating subsidiaries companies to run the different projects

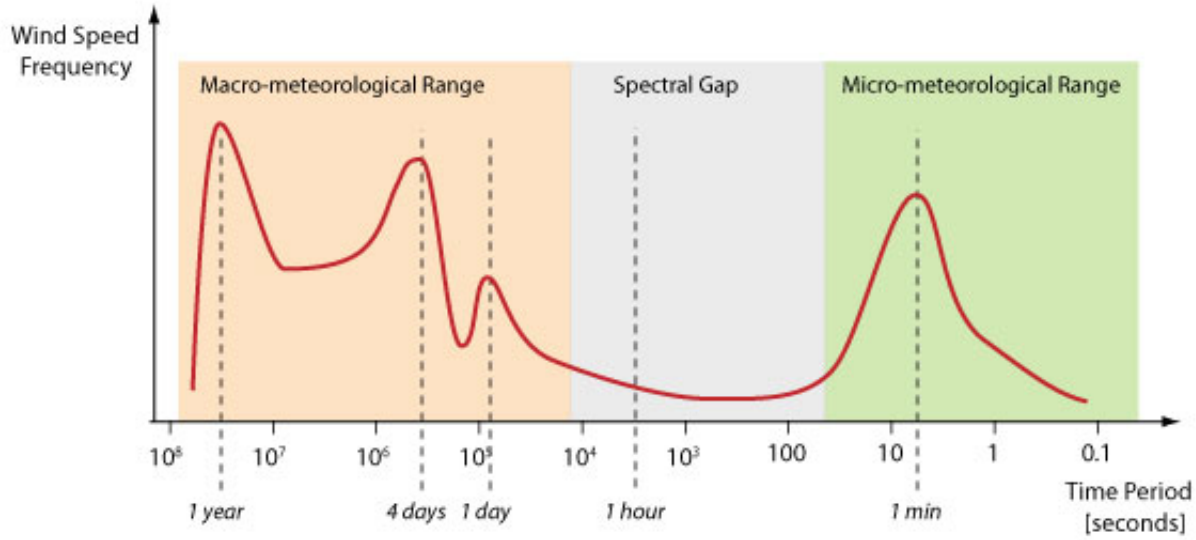
Although Generg only had its first wind farm operational in 2003, the preparation to explore a resource that has a global potential five times superior than the global demand, had started much before. First of all, it was necessary to obtain the license to build the wind farm. And before getting the license, the company must locate areas with wind potential, with the smaller environmental impact as possible. Then it has to do wind measurements, to confirm the truth potential of the area. Finally it has to design the integral project to be submitted for approval.

The approval is the first crucial moment in the process of building a wind farm. Only after getting the license, the company is authorized to explore and start the construction. Every MW of renewable electric power has an enormous cost. Even after all the time the technology has to prosper, to construct a new MW still requires deep pockets. A MW of wind power, currently cost around 1.5 M€ to build. This is why Project Finance mechanism was crucial to meet the necessities of very large wind farms, with more than 100 MW of installed capacity.

The potential of each wind farm must be coherent with the region potential. Big wind mils do not produce more energy unless there is enough wind to make it work. The pattern of the wind over the year, as well as over a single day, can fluctuate considerable, being very difficult to predict its availability. For the center region of the country, where Generg has the exploration license the average amount of wind exposure is 2295 hours/year, with a standard deviation of 131 hours[2].

[2] "Estatísticas rápidas - nº 109 - março de 2014", DGEG

Figure 3 – Wind exposure curve



Source – Green Rhino Energy

Currently, wind is the resource that Generg is using the most. It counts with 436,4 MW, belonging totally to the group. On top of that, it has 20% of the production of ENEOP, which was 946 MW at the end of 2012.

Solar

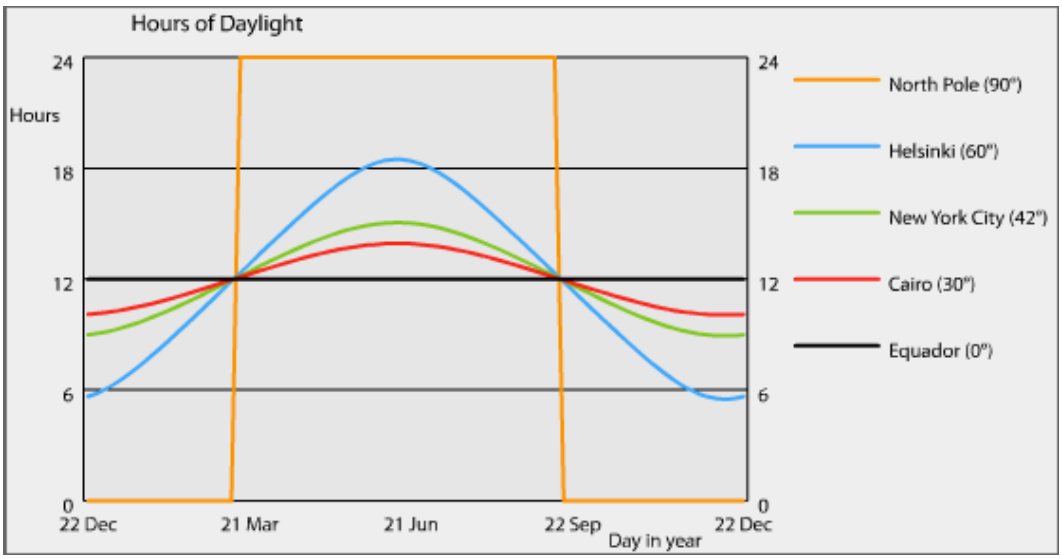
Generg since 2008 started to explore the most abundant source of energy in the planet, the sun. The potential generation of global solar resources over land is more than 100 times the global demand for electricity. Although behind in performance level, the technology, comparing with other alternatives, began to show a bright future. Aware of this technology outlook, Generg began to build the first solar plant, just before the big economic and financial crisis. Since then, the group could only increase the solar portfolio by 6 MW, in 2011, to a total of 18MW.

Regarding the techniques to explore the sun power there are two main types, the Concentrated Solar Power (CSP) and Solar Photovoltaic Power (Solar PV). The first produces heat, which generates electricity via turbine. The second converts directly the solar radiation into electricity through photo-effect. Also for the second technology there are two variants, either fixed or movable solar panels. The first type is mounted in the optimal position for the specific region. Tracking devices, which move over on axis can be horizontal or vertical axis tracker. The horizontal rotation allows the panels to track from north to south, from winter to summer. The vertical rotation makes the panels do

earth's opposite rotation movement, tracking the sun from the east to the west. There are also solar panels with two tracking axis, which can track both daylight and seasonal differences. The prices that used to be more 6 M€ per MW (the first solar park with 12 MW of power capacity cost 50 M€) are now around 1M€ for the fixed panels and 1.3 M€ and 1.4M€ for one and two movable axis panels, respectively. As the cost is reducing, so does the financial incentive. The price for solar energy until 2010 was at least 310€ per MWh, now it is 257€. With performance level registering higher and higher values, it is expected that the support offered by the government follow the opposite direction, reducing the incentives for the renewable promoters.

For the region of Castelo Branco, the average solar exposure of 1738 hour/year, with a standard deviation of only 60 hours[3]. The two-axis type of solar panels can absorb almost the entire irradiation, achieving more than 95%, while with only one tracking axis, from east to west, it can canalize almost 90%. With fixed solar panel, the amount of solar radiation utilized reduces to 75%.

Figure 4 – Solar exposure curve



Source - Green Rhino Energy

Although the solar power has less resource exposure than wind, sun is more predictable, both short-term and long term. It is easy to predict, to the minute, the time of the day when the sun comes up and goes down. It is also the resource that presents fewer variations from the normal year.

[3] "Estatísticas rápidas - nº 109 - março de 2014", DGEG

Conclusion

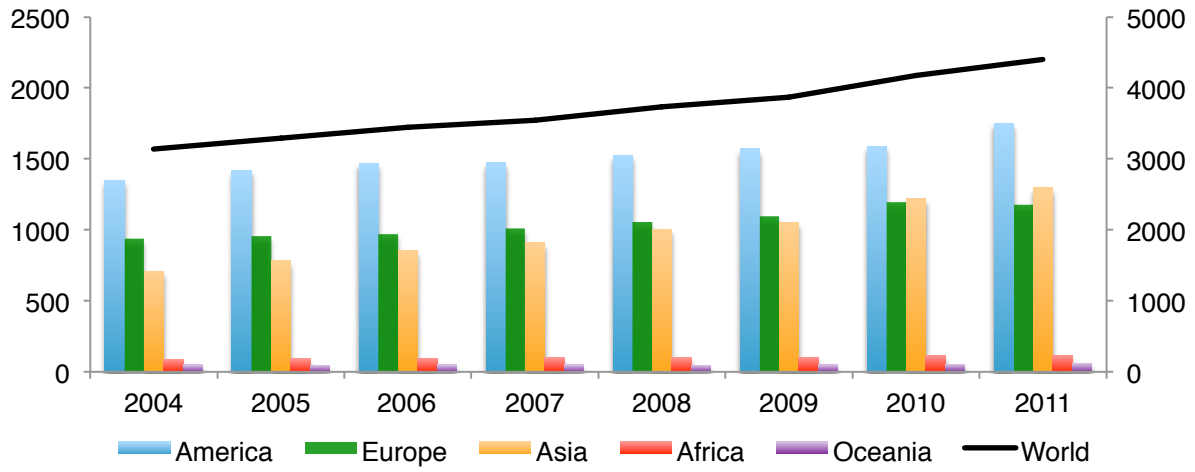
Generg, at this point faces a dilemma for the construction of the next renewable park. But the CEO knows that this choice has deeper repercussions than the profitability of the project itself. Considering the crisis that Portugal faces and subsequent reduction in electricity demand, alongside with new energy policy that cuts in the political support for renewable developers, the opportunities to grow nationally have shrank. If Generg wants to diversify its portfolio, it has to do it internationally.

The management team believes that the technological choice for the new renewable park will influence the ability for a potential international expansion. Maintaining the initial license plan and stick with wind technology, Generg will strengthen its main renewable focus, suggesting that solar technology is not yet ready. By opting for a solar technology, the investment would be consistent with the last two, reinforce the change in Generg's focus, implying that this is the renewable technology for next years.

The answer Generg is looking for is which of these two technologies conjugates better the immediate profitability with long-term concerns and expectations.

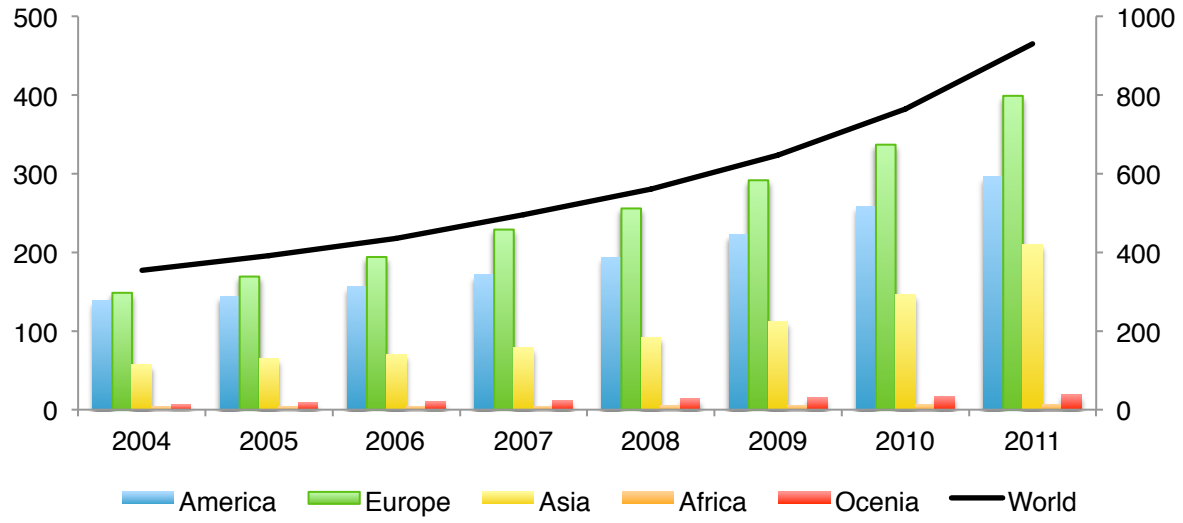
Exhibits

Exhibit 1 – Global Renewable Electricity Net Generation (GW)



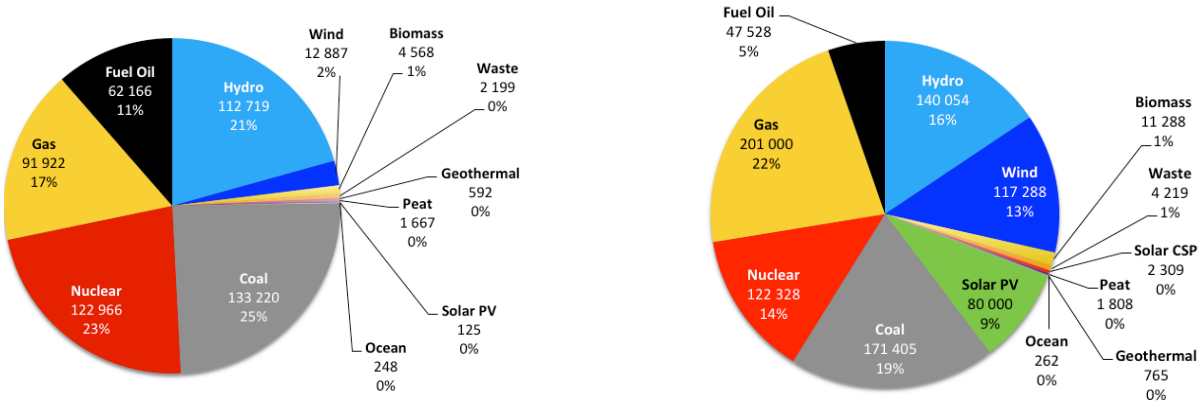
Source – EIA (US Energy Information Administration)

Exhibit 2 – Global Non-Hydro Renewable Electricity Net Generation (GW)



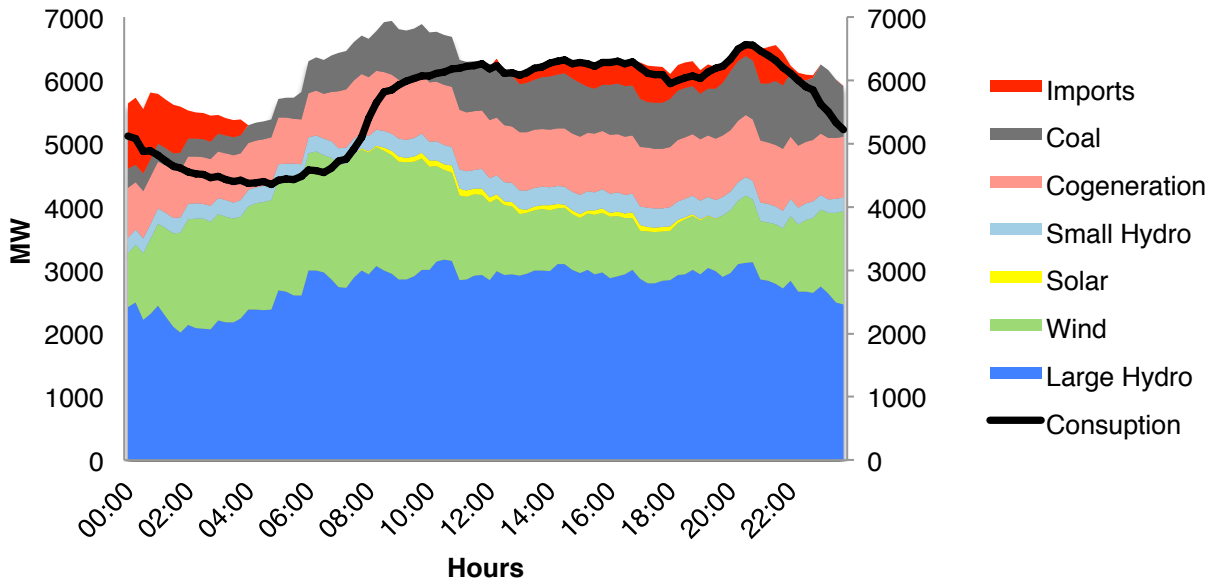
Source – EIA

Exhibit 2 – EU power mix 2000 and 2012 (GW)



Source – EWEA (European Wind Energy Association)

Exhibit 4 – Consumption Diagram in Portugal, 9 April 2014 (Wednesday)



Source – REN

Exhibit 5 – Penetration of Renewable Energies, 2012

	%		TWh		
	RE (w/hydro)	RE	Total Generation	RE (w/hydro)	RE
Iceland	100.0%	26.4%	16.9	16.9	4.5
Norway	97.0%	1.4%	125.2	121.4	1.8
Denmark	44.9%	44.9%	34	15.3	15.3
Portugal	**37.2%**	**25.3%**	**52.2**	**19.4**	**13.2**
Italy	32.3%	17.1%	284.8	92.0	48.7
Spain	30.3%	22.3%	292.5	88.6	65.2
Germany	22.1%	19.0%	575.6	127.2	109.4
France	16.4%	4.6%	541.4	88.8	24.9
USA	12.7%	4.9%	4 078.5	518.0	199.8

RE: Wind, solar, biomass and geothermal

Note: countries with high percentage of hydroelectricity can lead to great variation in the overall percentage

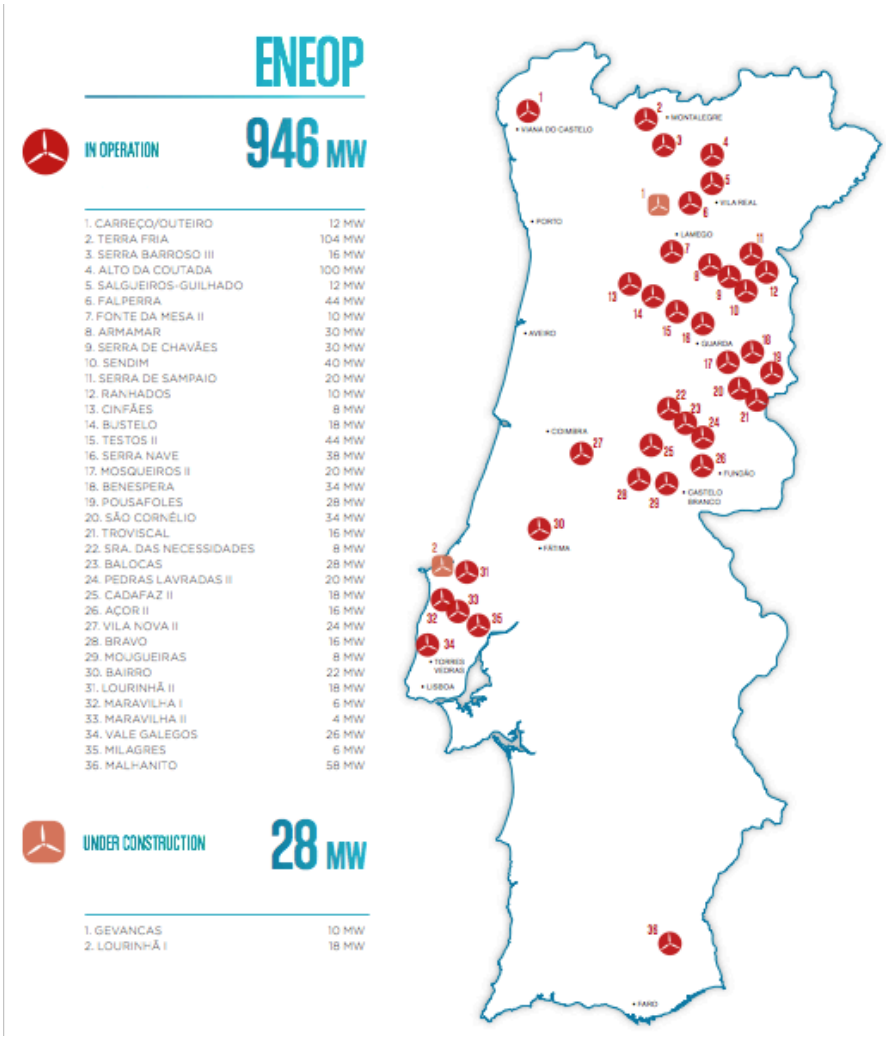
Source – Reneweconomy

Exhibit 6 – Evolution of available power capacity, in MW

Technology	1990	1995	2000	2005	2010	2013
Large Hydro	3 414.5	4 147.5	4 147.5	4 602.3	4 602.3	5 299.3
Small Hydro	95.6	259.6	317.8	360.7	443.6	450.9
Biomass	70	100	119	351.9	452.9	453.2
Geothermal		13	13	13	23	23
Wind			110.1	1 236.5	4 304	4 726.2
MSW			79.6	87.6	87.6	87.6
Biogas				10.7	29.7	52.2
Waves				0.4	0.4	0.7
Solar PV					108.9	140.6
Total	3 580.1	4 520.1	4 787.0	6 663.1	10 052.4	11 233.7

Source – DGEG

Exhibit 7 – ENEOP portfolio 2012



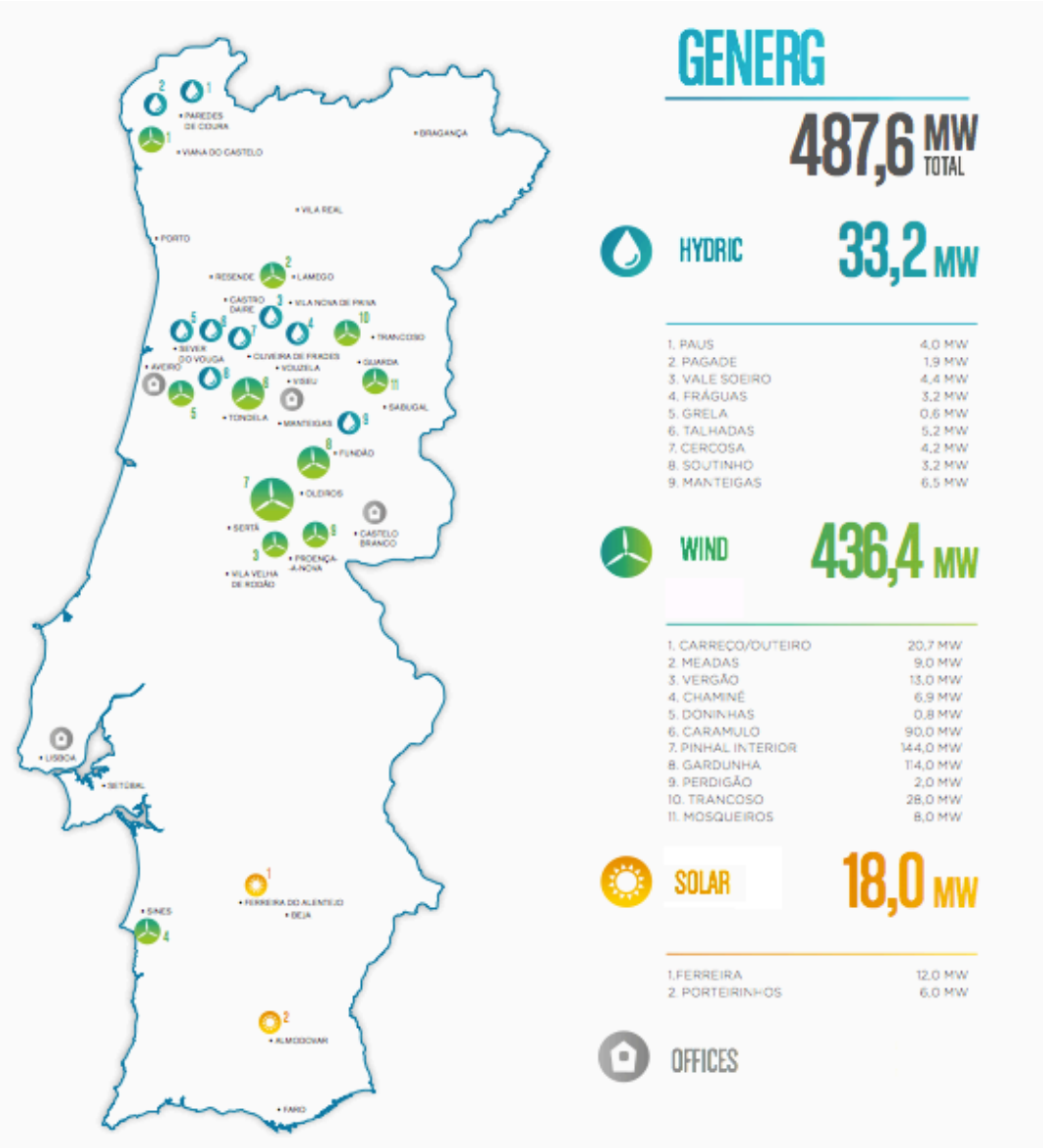
Source – Generg

Exhibit 8 – Generg consolidated profits and losses

	2011	2012
Revenues	129 998 523	149 843 362
Ext. Supply and Services	20 261 232	22 442 672
EBITDA	108 010 182	126 123 322
Depreciations	49 297 478	48 472 106
EBIT	58 712 704	77 651 216
Cost of finance	34 732 573	33 370 329
Profits	19 925 341	34 052 508

Source – Generg

Exhibit 3 – Generg portfolio 2012



Source – Generg

Literature Review

Generic frameworks

In the literature, there are useful framework to better understand the industry and the business. For the present analysis, three distinct frameworks were considered.

5 Forces

The renewable energy is a totally different business sector from the traditional ones. It is imperative to comprehend how the market works, the main constrains and what makes it different from the others. To analyze it, the Michael Porter's 5 Forces framework is a useful tool.
According to Porter, "the collective strength of these forces determines the ultimate profit potential in the industry". To reach the collective and overall attractiveness of the industry lets determine the factors that influence each one of the forces.

PESTLE

The PESTLE analysis was first developed to understand the magnitude of external factor had in a determinate business industry. The framework has been updated to consider more dimensions and to be more specific on the influence of that exogenous factors have in the industry. The dimensions comprehended are: Political, Economic, Social, Technological, Legal and Environmental.
From these dimensions, there are three that which have a greater influence on the renewable energy industry:

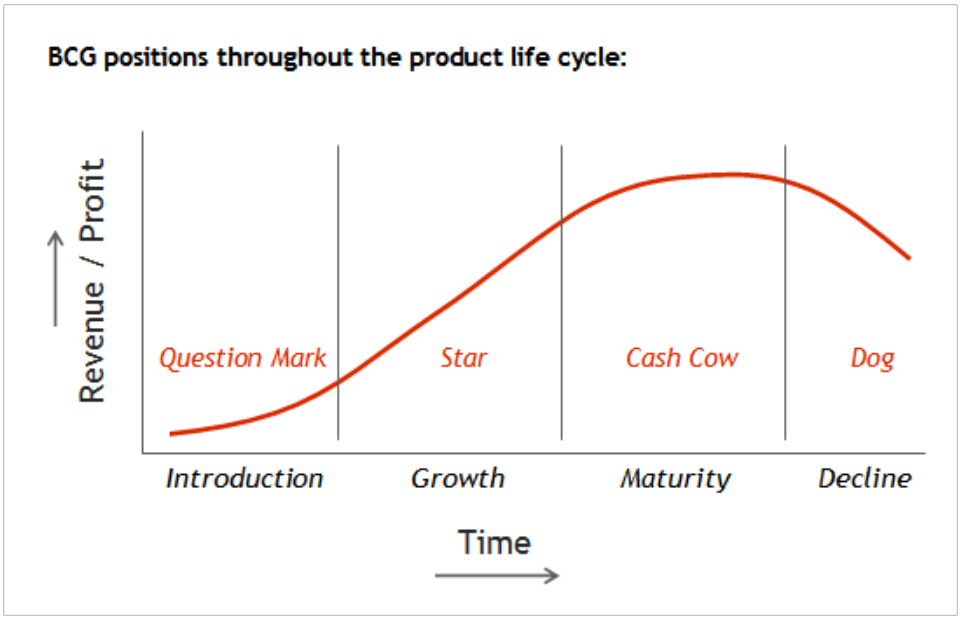
- Political – the industry is more or less influenced by a government according with its power to apply tax and/or fiscal policies, trade tariffs, regulated prices, etc.
- Technological – this refers to the how operations and efficiency are influenced by factor such as levels of automation, costs of research and development and technological awareness.
- Environmental – this dimension of the analysis is crucial for industry linked with natural resources. Factors like climate, weather and geographic location and constrains influence a lot the industry potential.

BCG

The matrix developed by BCG (Boston Consulting Group) is an investment matrix, and therefor a helpful framework to analyze the dilemma presented in the case. One of the inventors of the BCG

matrix, and also the founder of the company, Bruce Dooling Henderson, stated: “To be successful, a company should have a portfolio of products with different growth rates and different market shares. The portfolio composition is a function of the balance between cash flows". The matrix, presented below, is a two-by-two matrix that relates relative market share with market growth.

The matrix divides the market in four very different situations, involving distinct strategies and approaches. According to the position in which a product or service is in, the profitability and the expected cash-flows are totally different, being the Star the most attractive position to be. But the location of a product within in the matrix is most likely to change. By crossing the BCG matrix with the Life-Cycle Product It is possible to have a general idea of how a successful product evolves over time.

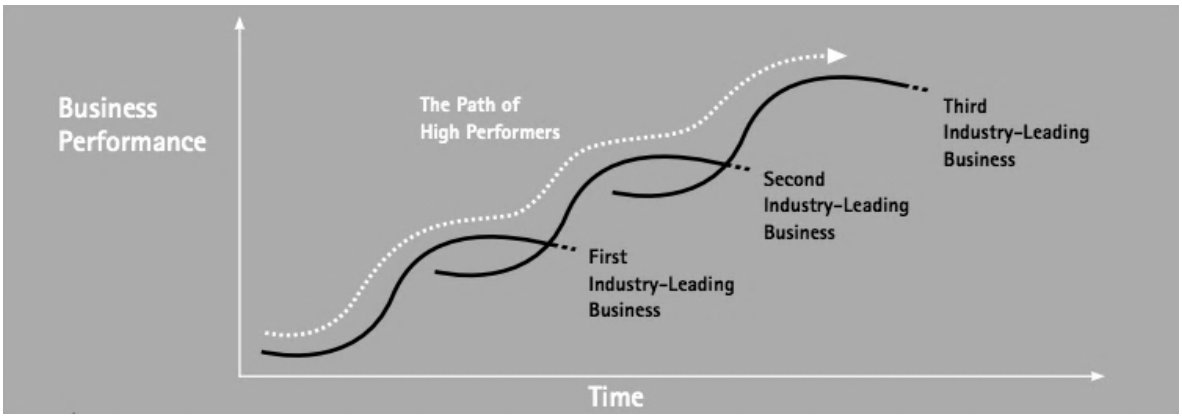


Specific literature

S-Curve

In every industry highly dependent on innovation, from time to time, there is a new technology that overcomes the dominant one in terms of performance. In 1986, Foster developed the S-Curve, or lifecycle model, relating performance and R&D time/effort. “The basic idea is that any technology with commercial potential passes through a lifecycle. During the early stages of the commercialization process, progress is slow as fundamental technical issues are addressed. The rate of progress increases, as these issues are resolved. As the technology ages, performance approaches upper limits” Callahan (2007). The pattern of performance over time has a shape of an S, as shown

in the figure bellow. This tool is particularly important to determine the current stage of performance for certain technology, as well as to access to future potential.



Renewable energy potential

The renewable energy industry is very distinct from a conventional one. On top of that, inside the renewable industry, there are significant differences. From the wide range of natural resources, none of them have the same pattern of consumption. The available technology is in different stages of maturity. Natural barriers also influence the potential, and those differ greatly from region to region. About the potential of renewable energies, Krewitt et al. (2008) defined the following potential:

Theoretical potential: The theoretical potential is derived from natural and climatic parameters (e.g., total solar irradiation on a continent's surface). The theoretical potential can be quantified with a reasonable accuracy, but the information is of little relevance. The theoretical potential of renewable energy sources is huge compared to global energy demand, and there are various constraints in exploiting the theoretical potential.

Technical potential: The technical potential takes into account geographical restrictions (e.g., land use cover that reduces the theoretical potential) as well as technical and structural constraints. Due to technical progress of energy conversion technologies, the technical potential may change over time.

Economic potential: The economic potential is the technical potential that can be exploited at competitive costs. As the break even between renewable energy technologies and conventional

technologies change over time (rise in fossil fuel prices, reduction in renewable energy generation costs), the economic potential is highly dependent on framing conditions.

Deployment potential: The deployment potential characterizes the potential market uptake of renewable energy technologies under pre-defined framing conditions. It depends on e.g., the structure of the existing supply system, the development of energy demand, and on energy policy targets and instruments in place.

Demand potential: With increasing competitiveness of renewable energies, in the future the economic potential may exceed the energy demand. In such a case the deployment potential of renewable resources is of course limited by the energy demand.

With this range of definitions, starting with a broad one, and narrow it down, it can be estimated the current and future potential for a specific resource, comparing with other natural resources (eg. Wind vs Solar) and also to evaluate the potential of a certain region (eg. Portugal).

Case Analysis and Teaching Notes

1. Introduction

The present section serves as a guide plan for the instructor. It includes a brief summary of the case study, recommended questions to explore the case and a few guidelines, which represent a possible answer, relating the case study with generic management frameworks and specific theory for the renewable energy industry.

2. Case Summary

Generg, a Portuguese based company and a promoter of renewable energies, has been operating for over 25 years. During its first decade of activity, it started by exploring small hydric power plants, and then diversified into to wind power. It subsequently expanded once more, in terms of employed technologies, with the construction of two solar power parks. Generg's current portfolio comprises a total of 487.6 MW of clean power, distributed by 436.4 MW of wind capacity, 33.2 MW of hydro capacity and 18 MW of solar capacity.

Nowadays, after several years without new investment, an opportunity to finance a new renewable park appeared. The company has a license to explore wind energy, with a total of 20 MW of power generation, which can be changed to solar energy, due to the smaller environmental impact presented. Should Generg maintain the license for wind technology? Or should change it for solar?

3. Learning Objectives

The case study was prepared with the following learning objectives:

- To develop a macro analyze on the renewable energy industry, using strong and accepted frameworks such as the Porter's 5 Forces, or the PESTLE analysis, in order to recognize key aspect in the industry as well as comprehend the extent in which they influence the companies
- To understand the main challenges faced by the renewable energy industry and how they may influence future choices
- To analyze Generg's management strategy over the time
- To present a solution to Generg' dilemma, analyzing the pros and cons of two alternatives, considering the present and the future of the company

4. Suggested Assignment Questions

CORE QUESTION

1. Should Generg maintain the wind technology for the next park, or should change to solar?

ADDITIONAL QUESTIONS FOR DISCUSSION

1. What are the characteristics of the Renewable Energy Industry?
2. How powerful are the suppliers in this industry?
3. What are main external risks faced by the industry? And Generg?
4. What are the trends in this industry? And Portugal?

5. Analysis

Core Question

1. **Should Generg maintain the wind technology for the next park, or should change to solar?**

Considering both the present characteristics of the industry and the future expectation towards the two alternative technologies, the recommendation is to invest in solar energy.

Short-term

The first step to resolve the case must be understand the renewable energy industry, stressing out the differences and realize how they influence the companies' strategies and operations and establish the parallelism with industries that enjoy similar characteristics.

An efficient tool to study the structure and overall attractiveness of the renewable industry is the Michael Porter Five Forces[4]. The rivalry between companies can be separated in two moments, obtaining a license and producing. To obtain a new license to produce energy from renewable energies, companies are subject to competition, mainly if they are responding to a public tender organized by the government. While producing, the rivalry level decreases substantially since it is a regulated activity in which the electricity originated from renewable sources has priority over

[4] A detailed analysis is presented ahead in the discussion

traditional ones. This preference for clean electricity originates an insignificant threat of substitution, being only related with availability of the resources. Since the regulation of the electric activity affects all intervenient, producers, distributors and retailers, the bargaining power of the clients is very reduced. The threat of new entrants reduced since the financial crisis, reducing even further after the new renewable policy in 2012, where new licenses do not enjoy regulated prices. Finally there is the bargaining power of the suppliers. This force is the most preponderant in the renewable energy and has three major groups, the capital suppliers, the technological suppliers and the natural resources. The natural resources are the most important because on there availability depends the final outcome. It is important to have a diversified portfolio of renewable parks in term of resources to still be able to produce clean energy in case of one, or more, resources are lacking. But there is no point in investing on a resource that is only available in a small quantity. Even though the availability of a certain resource in a specific area, it is extremely important to have a technological level that maximizes the production of energy. Lastly, to construct a renewable park, even for a small power capacity and a mature technology, costs several millions euros, making the finance cost extreme important and determinant for the overall profitability of the project. It is the combination of resource availability, technological performance and cost of finance that determine which is the most attractive investment.

Assuming that the external investment that Generg has available presents the same financial cost for either projects, let's analyze the potential of both resources.

Theoretically, the potential of the sun exceeds the global demand of electricity by 100 times. This is 20 times higher than the wind potential. Although in the long run it is important to invest in a resource with vastly potential, in the short run, the technological potential is the one that matters the most. The technological potential is not only linked with technology itself, but also with geographic and structural restrains. Instead of the theoretical potential, the technological one is changeable. Taking in consideration the technology constrains, the wind, as a consequence of being much more mature, presents higher potential than the sun, although the gap between them is vanishing over time. Geographically, the wind is more disperse throughout Portugal, which facilitates its deployment and expand its potential as a clean energy source, while the sun as only one predominant region, Alentejo.

The economic potential is, within the technological potential, the part that is exploitable at competitive prices. Without incentives from the government, none of the two would even reach the break-even point. The Table 2 presents the average prices that Generg will receive, depending on the

resource. The economic potential is therefor related with those values. This concept is also variable; depending on the policy followed by the government, price of fossil resources or CO_2 fees.

The demand potential is the totality of energy consumed. Even though Portugal has more renewable capacity than it should has in order to guarantee the most competitive prices for the consumer, the truth is that there is still potential demand. As a result of previous investments, mainly hydro and wind power, Portugal reaches its higher values of renewable energy production during the winter, with fossil resources and imports increasing during the summer. This distribution of production leaves enough demand for renewable energy in a considerable part of the year, being the solar power the perfect solution to reduce the volatility in the production (revenues for Generg) and dependence of one or two resources.

Even though the solar technology appears to be the best alternative, the company wants to maximize its profitability. Using the information provided in the different technologies sections, in the case, these are the financial results for both technologies.

Expected Investment Cost		Cost per MW (€M)	Capacity	Total (€M)
Wind		1.5	20 MW	30
Solar	Fixed	1		20
	One Axis Tracker	1.3		26
	Two Axis Tracker	1.4		28

Expected Revenues		Hours/Year	Capacity	Production (MWh)	Price (€/MWh)	Total (€M)
Wind		2,300	20 MW	46,000	74.5	3.43
Solar	Fixed	1,305		26,100	257	6.71
	One Axis Tracker	1,566		31,320	257	8.05
	Two Axis Tracker	1,653		33,060	257	8.50

By computing the expectable cost and revenues for the wind and solar, it is easy to conclude that the most profitable resource is sun. This result is obtained, mainly due to a price offered per MWh of solar energy. Being more than three times the price of wind energy, it more than compensates the fewer production. On top of that, the cost Generg has to pay to construct a solar park is inferior up to 10 Million €. The analysis does not contemplate operational costs, which among the three solar alternatives, would be lower for the fixed solution, being the more costly, the solar panel with two axis tracker.

Using the break-even point it is possible to know how many years each option takes to pay the construction cost. According with the values, the alternative that maximizes the profits is a renewable solar park, with fixed panels.

Break-even		Years
Wind		8.75
Solar	Fixed	**2.98**
	One Axis Tracker	3.23
	Two Axis Tracker	3.30

The monetary incentives offered to electricity produced via solar energy is so attractive that, even in a bad case scenario of 50% reduction of the current price per MWh, solar power would still be the most attractive solution for the construction of the new renewable park.

Bad Case Scenario	25% Reduction		50% Reduction	
New Price (€/MWh)	192.75		128.5	
	Revenues (€M)	Break-even (Y)	Revenues (€M)	Break-even (Y)
Fixed	5.03	3.98	3.35	5.96
One Axis Tracker	6.03	4.31	4.02	6.46
Two Axis Tracker	6.37	4.39	4.25	6.59

Long-term

Taking in consideration that the choice of Generg will influence the future strategy of the company, continue to invest in wind power, as it has been doing, or diversify and commit to a new resource still in expansion, it is important to analyze the expectable future of each resource's technology. Using the S-Curve, which can be used for technologies or markets, it is possible to better predict the future performance levels associated with each technology, if there will be a change in the dominant supplier resource, and if so, when.

In the renewable energy industry the market curve is deeply influenced by the technology curve of each natural resource. Hydro was the first resource to have its technology in a mature phase, followed by the wind. These to are the leading resources in terms of installed base. But as the technology in the solar market is growing its performance, so does it will become an important renewable market. Due to the complementarity of the renewable resources, as raw material, for

production of clean energy and the inconstancy of resources through place and time, both short and long-term, makes nearly impossible to have, in the future, a renewable resource market that completely surpasses the remaining ones.
Until the electricity storage is available for massive capacities, each region/country should invest in the best resources it possesses, assembling a portfolio as diversified as the technology allows it, in order to minimize the lost occurred from the absence of one or more resources.

Looking for the current panorama, the renewable power capacity will grow across all resources. Wind power will grow the most in absolute value mainly due to the more advanced stage of maturity and inferior geographic restrictions. As it is also in a more developed phase of the market there is also more companies to compete with, driving down the overall profitability.
On the other hand, with a small deployment basis, solar power, will register the biggest growth rate, as the performance/cost ratio starts to improve and it starts to become a truly alternative in term of clean energy production. Countries that already invested in renewable energies will see solar power as way to offset the renewable outcome. At this point, with the market for solar energy still in a growing phase, Generg would be in a better position to leverage its competitive advantage.

To resume, putting the two alternatives in the investment matrix developed by BCG, the wind power alternative appears halfway through from a Star position to a Cash Cow. The solar power alternative is one stage behind, passing from a Question Mark to a Star position. This means that from a renewable energy promoter point of view, the alternative that is in the better investment position is the solar.

Additional Questions for Discussion

1. **What are the characteristics of the Renewable Energy Industry?**

An efficient tool to study the structure and overall attractiveness of the renewable industry is the Michael Porter Five Forces. The five features suggested by Porter are: the threat of new entrants and substitute product, the bargaining power of buyers and supplier and the rivalry among companies.

Rivalry

As stated in the case, the electricity produced through renewable sources of energy, has preference over traditional sources, which means that only after the entire renewable production is consumed, traditional one is produced. Allying the consumption preference to the government control over price it is possible to conclude that rivalry does not exist in the "open market". But before a company starts its renewable activity, it has to obtain a license of exploration. The process to obtain licenses is open to everyone, being subject to conventional competition. More than one company can present a renewable project to explore the same area. In the case of a public tender, as definition, competition is encouraged. Whoever wins the license wins the right of exploration.

Threat of New Entrants

The possibility of more companies integrate the market is always a problematic topic for existing companies. In this industry, a potential entrant represents a threat to future additional earnings. As just presented, in the "open market" a new entrant would not shrink the profits from the others, since the price is regulated, but it would represent a threat in future public tenders.

Although from the presented entry barriers proposed by Porter, many do not apply to the renewable energy industry like product differentiation, switch costs or economies of scale. The product sold in this industry is electricity, a product that itself has no differentiation, although it could be a slightest environmental differentiation by comparing clean and sustainable sources with fossil resources. If there is no product differentiation it is likely to have new entrants. Also in the renewable industry the economies of scale have little influence. The renewable parks are always producing at full capacity, leading the unitary cost to a permanent minimum. Regarding the switching costs, they represent a marginal value. The electric network incorporates a mix of several sources, producing and sending electricity to the network as it needs and always maximizing the renewable share.

But there are two barriers incredible powerful. These barriers are government policies and capital requirements. Without favorable government policies there are no new opportunities or the opportunities are simply not profitable enough to the companies. Without fulfill the capital requirement it is impossible to respond to the opportunities. The renewable energy industry is characterized for its intensive capital needs, being the capital requirement the reason why Generg could not diversified its portfolio recently. Most of the companies that can enter the industry are large corporation, with activities somehow linked to the renewable energies.

Threat of Substitute Products

The renewable energy industry is in the commodities business, and the product they sell is electricity. But it is a special commodity for two main reasons. The first is the incapacity to be stored and the second is the fact that as no substitute. Only electricity can power electronic devices. For sure electricity can be obtain from panoply of resources but the final product is always the same. Therefor, the threat of substitution drives from the resources side and not from the product itself.

Bargaining Power of Clients

Every producer of electricity in Portugal has only one client, which is REN, the electric distributor. Existing only one client it is expected that it have a great influence over the price. But since the electricity market is characterized by strong regulations, REN has to buy electricity at pre-established prices.

After REN there are the retailers. Now that the commercialization market is liberalized, the end consumers have more alternatives and better access to information. This liberalization may lead to more economical price for the consumer due the rivalry between retailers, but it does not affect the price for renewable producers, or their profits.

Bargaining Power of Supplier

The supplier is probably the force presented by Porter that has the greatest influence in the renewable energy industry. Being the suppliers any form of input for the company, there are three very different suppliers determinant to this industry, the natural resources, technology companies and financial institutions. They intervene in different phases of each project, with different temporal influence and different bargaining power.

Starting with capital supplier, the one that makes the projects possible. Companies operating in the renewable industry finance themselves mainly through Project Finance, a very strict and rigorous method of finance that involving huge amounts of money. It is not easy to get many loans from banks because for every loan the company's liabilities increase, and with it, the risk of not pay back. For a capital supplier, the amount of debt today influences the credit that they are willing to lend. It has mid-to-long temporal influence, until it is completely paid off, which should be always inferior to

the lifetime of the project (in the hypothetical case of one loan for project). The company's objective must always pass by having the lower cost of capital.

The technological supplier is directly linked to the project itself and with the resource explored. Here there is a significant product differentiation between and within companies. The choice of the technology supplier has influence during the entire lifecycle of the project, and may even determine for how long it will go on. The fact that the technology plays such an important role reduces importance to other suppliers, like the workforce. But here, instead of the capital supplier, there is no obligation to continue with the same supplier for the upcoming projects. Even though it is easy to change supplier, there are not many companies operating, mainly for less mature branches within the renewables like the solar energy. When choosing the tech supplier, the company's objective must be profitability.

Although really important for the renewable industry, the capital and technological supplier are also critical for other industries. The really odd supplier is the natural resources. The natural and sustainable resources are the raw materials to the renewable industry. Without them there is no production. Even though they are free, they are unpredictable, which means that companies cannot forecast with accuracy the amount of power in a given moment. This lack of projection is, without any doubt, one of the most important challenges faced by the renewable energy industry. Using the Porter's theory, the natural resources have total bargaining power over companies.

2. How powerful are the suppliers in this industry?

As just mentioned in the analysis of the renewable energy industry, among the several factors that influence the profitability of the industry, the majority is originated from the effect of suppliers. The fact that the price of each MW of power exceeds 1 Million Euros, for the cheapest alternative, being the price for the same amount of power raise to 1,5 Millions Euros, makes this industry highly dependent on the cost of capital. It is imperative to have low interest rate in order to maximize the potential earnings. For Generg in 2012 the cost of capital represented 22,3% of the volume of sales. The year before the cost of capital was 26,7% (Exhibit 8). This perfectly illustrates how dependent companies are from external finance and how important the cost of capital for the industry. That allied to the rough periods of financial and economic crisis, where banks face liquidity problems and the cost of capital increases a lot, turns potential projects in unfeasible ones.

The companies developing the technology to explore the resources are also critical for the profitability of the industry. The cost to pay for a windmill, a solar panel or a dam should not be inferior to the future cash flows. While several years ago the price to pay for a MW of wind power could reach values higher than 6 Millions Euros, nowadays the technology growth to a mature face, presenting much lower costs. That is why a decade ago the installed power capacity was exponential lower than it is today, and all thanks to generous incentives given by Governments. The evolution registered in this industry, based on intensive research and development resulted in competitive and attractive techniques to explore natural resources. Currently, compared with a decade ago, there are more alternatives; the sun for instance is a viable resource to explore. Even within the different resources, the attractiveness brought by technological development, drove new competitors to the market. This increment of competitors will definitely benefit the overall attractiveness for the renewable producers; driving costs down at the same time that performance increases. The influence of each technology provider is greater in early phases of the development, losing the bargaining power with the entrant of new suppliers.

Finally there are the natural resources. By looking to the Consolidated Profit and Losses of a renewable energy company, one of the feature that pops-up is the almost inexistence of cost of goods sold and consumed. Generg presents a value of 0,02% of the total volume of sales. The reason of such reduced value is, as mentioned before, the fact the resources are free, drives down unitary cost of production. But although the resources are free, they are also uncontrollable, associating production with uncertainty. The volatility of production is one of the major concerns that this industry is trying to address. By mixing two, or more natural resources, not dependable on each other, the overall volatility of production is mitigated. The sun does not affect the wind, and the wind does not affect the water supply. This autonomy between factors, associated with different patterns of exposure of resources contributes to the extenuation of instability in production. The sun power is only present during the day, while the wind could blow all day. Winters are characterized for the rain, accumulating tons of water, while summers are very sunny and dry. By exploring both resources, the production level is somehow kept at a regular level.
Until the technology allows storing electricity in large scale, the solution, to reduce volatility in production, is enlarges the mix of natural resources.

3. What are main external risks faced by the industry and Generg?

Every industry, and every company competing within an industry is subject to external factor. They can have different natures and more importance degrees of influence. Applying the PESTEL analysis for the renewable energy industry as an all, and for Generg particularly, there are three crucial factors: political, technological and environmental.

Political: as mentioned several times before, the Government has a huge power in this industry. It is the Government that determines whenever there is a public tender to explore a new renewable park. It is the Government that defines the price of electricity sold from renewable sources, and the difference between different sources and capacity. It is the Government that, according with the Energetic Plan, decides if the renewable energy industry will grow or stagnate.
A company cannot do anything about variation on price. What, one-day can be a golden business, the next day, by a simple change in policy, can be ruined. The industry is highly dependent on incentives and subsidies given by Government, without which the renewable would not be profitable at all.

Technological: the renewable energy industry has a great influence of technology. 100 years ago, developed countries could only produce electricity from one natural resource: water through dams. Currently, mankind can produce electricity from a range of sources: wind, sun, tidal and geothermal, although these last two still need more research and development until achieve a minimum performance level. Wind farms offshore are struggle to become competitive because the deterioration in the sea is way deeper that in on-shore wind farms. This evolution is only possible through technological breakthroughs.
Besides the importance of technology in pursuing new natural resources exploration, technology is held as the solution for one of the biggest issues in the industry, the storage. It is impossible to store wind or sun, but is possible to store electricity in batteries. If the future brings a solution to store the huge amounts of energy required by a city, or country, the renewable energy industry would register an exponential growth.

Environmental: this is possible the most important external factor. It is related with geographic location, climate, weather, etc. For an industry that relies on natural resources, the surrounding environment it is of the most importance. There is not point building a dam in the middle of a desert, or a solar park in the mountains. The exploration of resources is conditioned to the natural potential offered by a certain location. Fortunately, Portugal is a great country in term of natural resources. It

has rocky regions with wind potential. It has the region in Europe with the most solar exposure in Alentejo. The environmental determines whether there is potential, and which resources are worthy to explore.

4. What are the trends in this industry? And Portugal?

The overall industry is registering amazing growth rates across all three major sources of renewable energy, water, wind and sun. The big developing countries, like Brazil or China, are addressing the upcoming energetic necessities primarily by building enormous dams. The other two main renewable sources have more representation in developed countries, being Europe the region that has been made the bigger effort to pursuit a sustainable path.

Regarding wind and sun, the two sources in debate in the case, the overall industry, as well as Portugal, have been registering a bigger growth in terms of installed capacity for wind, as a result of the more mature stage of the technology, although sun capacity is the one that presents the higher growth rate, consequence of the gradual decrease of the price per MW and the smaller installed base capacity.

For Portugal particularly, even with the economy starting to present encouraging results it is not expected, in a near future, that the Government start to promote more the industry. But the incentives and political support will definitely comeback. If the Government wants to achieve the "20-20-20" goals, set by the EU, it has to promote the industry.

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