CATÓLICA LISBON
BUSINESS & ECONOMICS

Equity Valuation Thesis

EDP Renewables

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Dissertation written under the supervision of
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Abstract

This dissertation has the intent of valuating EDP Renewables, a subsidiary company from EDP, listed on PSI20, inserted in the Utilities Industry - renewable energy. As a result of the energy sector transformations, fear of fossil fuel shortages and environmental protection, the progressive search for clean sources of power becomes essential to valuate companies that can be game changers.

To estimate the share price the Discounted Cash Flow method was used in both approaches: the Free Cash Flow to the Firm & the Free Cash Flow to Equity, obtaining thus an equity value of €m6.405 and €m6.248 respectively – this converts into a share price of €7.42 and €7.22. Rest on the Dividend Discount Model, the equity value is €m5.428 implying a share price of €6.28. As reported by the Multiples EV/Revenue, EV/EBITDA and Price/CF per share, prices of €8.60, €7.25 and €7.08 were estimated.

Finally a sensitivity analysis was performed due to the uncertainty associated the company's environment. In conclusion, a final price of 7.11€ per share and a recommend a buy action is in order (actual price: €6.80). As benchmark, valuations from Morgan Stanley (€8.10) and Macquire Research (€6.2) which allowed us to conclude that the value reached in this thesis is in line with the opinion of others financial institutions and provides this dissertation with practical usefulness.

Resumo

Esta dissertação tem o objectivo de avaliar a EDP Renováveis, uma empresa subsidiária da EDP, listada na PSI20. Como resultado das transformações do setor de energia, o medo de escassez de combustíveis fóssil e proteção ambiental, a busca progressiva por fontes limpas de energia torna-se essencial para avaliar as empresas que podem ser crucias no mercado.

Para estimar o preço da ação, o método Discounted Cash Flow foi utilizado nas suas duas abordagens: Free Cash Flow to the Firm & the Free Cash Flow to Equity, obtendo assim um valor de capital próprio de € m6.405 e € m6.248, respectivamente – traduzindo-se num preço de ação de € 7,42 e € 7,22. A partir do modelo de Dividend Discount Model, o valor patrimonial é de €5.428, o que implica um preço de ação de €6.28. Conforme relatado pelos múltiplos EV / Receita, EV / EBITDA e Preço / CF por ação, foram estimados os preços de € 8.60, € 7.25 e € 7.08.

Finalmente, uma análise de sensibilidade foi realizada devido à incerteza associada ao ambiente económico e à Indústria em que empresa se insere.

Em conclusão, um preço final de 7,16 € por ação e uma recomendação para comprar é devida (preço atual: 6,80 €). Como benchmark, as avaliações da Morgan Stanley (€8.10 e da Macquire Research (€6.2) permitiram concluir que o valor alcançado nesta tese está em linha com a opinião de outras instituições financeiras e fornece esta dissertação com utilidade prática.

Acknowledgments

The knowledge that I have acquired since the beginning of my bachelor degree until my current work experience compiles the pillars for this dissertation. Although university is much about individual learning and tests, individuality is the last word I would use to describe my path here. Without the help and teamwork of others, this path could never me possible.

This dissertation is dedicated to my parents, for always believing in me and supporting me even if it was hard for them to do so. I wasn't blessed with a big family, but I was blessed with the best one, for sure. May I ever be as attentive to my children as you were with me.

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Finally but not the least, I would like to thank Professor António Manuel Simões for teaching me the importance of mathematics in the world and to his incentives and passion for the numbers who were passed to me when I was very young.

Equity Valuation Thesis | EDP Renewables
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Research Note | **EDP Renewables**

Market Environment

The need for energy has been growing every year at a steeper pace; projections estimate a 40% increase in global energy demand until 2040. Fossil fuels seem to be becoming scarce and a lot of attention has been given for alternative ways of producing energy. Investment in renewable energy has been increasing on a global scale with a 17% increase from 2015/2016. Solar and wind energy have been benefiting the most producing nearly 20% of all energy produced worldwide with constant decreasing costs up to 66% until 2040.

In sum, the continuously increase for energy demand aligned with the continuous decrease in costs for implementing renewable energy has led for companies in the industry to create a competitive advantage and being involved with several deals with countries around the globe in a mutual effort to reduce greenhouse emissions, reducing fossil fuel usage and create a more sustainable source of energy.

Company

EDPR is a company that focuses the renewable energy sector, being considered a top player in the world market, producing 24,5TWh of electricity in 2016 and active in 12 countries. In 1Q17 it produced 7719 GWh of clean electricity, with revenues totaling €m 528.1 and EBIT €m 373.4. This represents an increase of around 4% when compared to the homologous period.

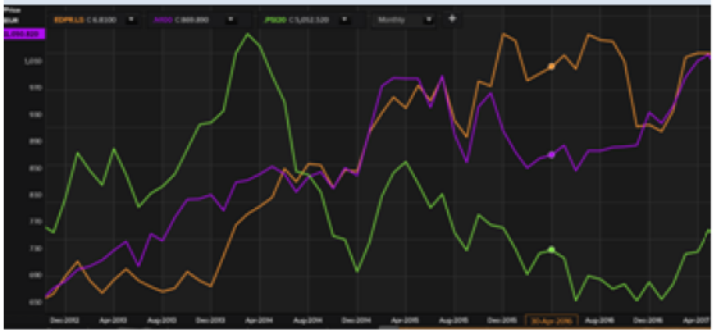
The company has been known for delivering to its shareholders the objectives it sets for itself, for example the continuous increase in capacity per year by 500MW. The implemented business plan up to 2020 in markets where its presence is already established goes hand to hand with the market share the firm already and further deepens the foundation for the company to grow.

EDP Renewables (EDPR.LS, EDPR PL)
Utilities/Portugal

Stock Rating	**Undervalued**
Industry View	**Very promising**
Price Target	**€7.16**
Share price @close (15/08/2017)	**€6.80**
Reccomendation	Overperform

BS & IS (€m)	**2016**	**2020E**	**2026E**
Total Assets	16 734	18 226	23 804
Total Liabilities	9 161	10 227	15 230
Revenues	1 651	1 686	2 155
EBITDA	1 171	1 141	1 733
EBIT	564	586	936
Net Income	176	177	439
Installed Capacity (MW)			
Europe	4 986	5 565	9 167
North America	4 861	7 034	26 832
Brazil	204	464	587
PPE (€m)			
PPE (€m)	13 437	14 781	19 808
CAPEX (€m)			
CAPEX (€m)	1 029	839	1 011
Cash-Flow (€m)			
Op. CF	869	855	1 388
Net Debt (variation)	952	298	584
Net Debt (€m)			
Net Debt (€m)	2 755	2 953	4 003

Stock Price Performance



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1. Literature Review

The present and first section of this thesis is a prospectus of the state-of-the-art in equity valuation, gathering and explaining the existing models in order to complete a valuation exercise on EDP Renewables.

That said, all the models here introduced will be thoroughly characterized in concordance with the literature that fundament, exploit and typify their assets and liabilities. It's essential to mention that, as it will be explained further, some models will be more suitable for the exercise than others, depending on parameters such as capital structure.

Also, some of the methods here explained will have similar objectives, making them almost substitutes. One of the main questions managers struggle to answer is what type of valuation method to use in order to correctly measure their companies value or performance. (Luherman, 1997). For that reason, not every method explained in this part will be used for the actual valuation of this dissertation topic but there will be a selection of the methods which create a more tailor-made path to a correct valuation of this company, taking into account its historical performance, the industry it is inserted and its fundamentals.

1.1. The purpose of Valuation

"There is one principal theme that carries through all of finance. It is value. What exactly is a particular object worth? To make smart decisions, you must be able to assess value—and the better you can assess value, the smarter your decisions will be."

-Welch (2009)

Valuation is not to be regarded as something simple, easy-to-do process. It's true that most of the work might be somewhat mechanic but the crucial steps, the assumptions one makes and the capacity of the analyst in understanding the company and its positioning in the market is crucial to better valuate the company. Goedhart et. al (2010) insist in having as a ground rule for value creation, a realistic estimation of market opportunities and a keen sense for the industry environment. That said, analysts should first comprehend up to what level external factors may affect the value of the firm so they can, with rigor, specify beneficial investment decisions (Damodaran, 2004). The same author goes further and states that what the

understanding of value determinants and the know-how in estimating that value should act almost as a prerequisite for this kind of exercise. (Damodaran, 2006)

It's important to keep in mind that valuation is not timelessly definitive. This implies that, mainly due to shifts in the economic cycle, assumptions made today will not, with high probability, hold in the future (Damodaran, 2002).

"When you do any valuation, there are three possibilities. The first is that you are right and the market is wrong. The second is that the market is right and that you are wrong. The third is that you are both wrong. In an efficient market, which is the most likely scenario?" (Damodaran, The Dividend Discount Model)

Finally it's imperative to introduce and explain the relevant models for valuation. These are, as said before, different approaches to fulfill the same purpose. In the next few parts of this section, each of these models will be presented and discussed.

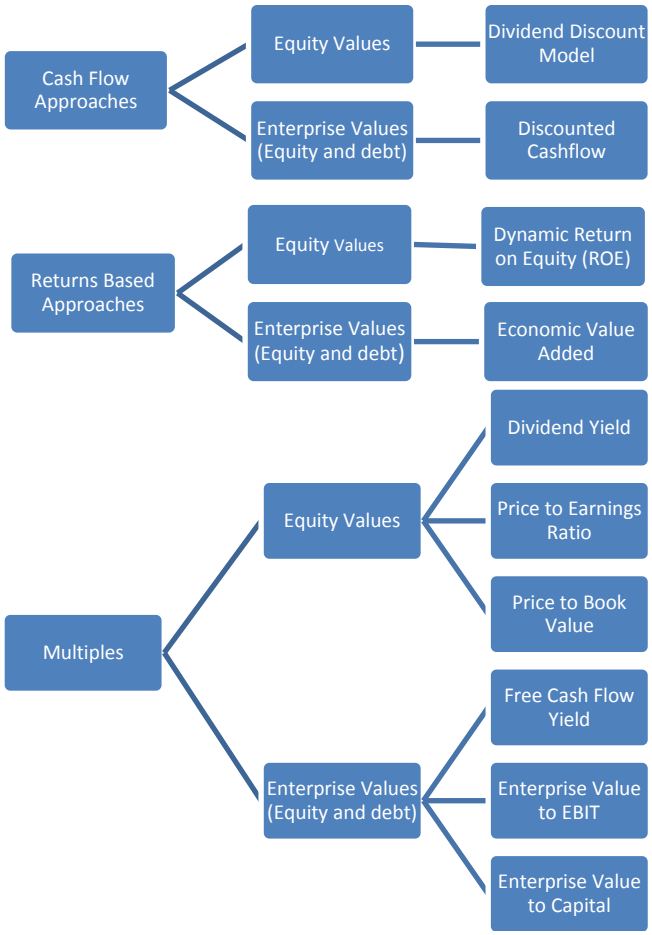


Figure 1 - Different types of Valuation

Source: Goldman Sachs (adapted)

1.2.Discounted Cash Flow Methods

1.2.1. Dividend Discount Model

The Dividend Discount Model is one of the hallmarks in valuation. Dating back to 1938, it was developed by Williams and later revised by Gordon and Shapiro in 1956. This revision caused a mixture in the true creator of this model, since until today, the Dividend Discount Model is commonly known as the Gordon Growth Model.

This model, as its name leads to believe, is based on dividends. It assumes that the only cash flow received from the acquisition of a publicly traded stock is the dividend it provides. This jumps to the underlying conclusion that stock value must reflect the present value of all its expected dividends.

$$Value\ per\ share\ of\ Stock\ P_0 = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+k_e)^t} \quad (1)$$

Where the numerator represent the expected value of dividends per share (DPS) and k_e the cost of equity.

Gordon and Shapiro revised this model, and assumed that firms would be forever in a steady state, meaning its growth would be constant over time. Damodaran (2005) also presents a two-step model adequate for companies whose growth rate may be somewhat abnormally high for a certain period but will then stabilize forever.

$$P_0 = \frac{E(DPS_t)}{k_e - g} \quad (2)$$

$$P_0 = \sum_{t=1}^{n} \frac{E(DPS_t)}{(1+ K_{e,\square g})^t} + \frac{\frac{E(DPS_{n+1})}{K_{e,st} - g_n}}{(1+K_{e,\square g})^n} \quad (3)$$

In equation (1), *g* represents the growth rate of dividends, whereas in equation (2), *g* is the extraordinary growth in dividends for the first *n* years, K_e is the cost of equity (*hg* is the high growth period and *st* is the stable growth period), g is the extraordinary growth for the first n years and g_n is the steady state growth for the remaining years.

Alternatively, Molodovsky et al (1965) propose a multistage growth model to correct the assumption of constant growth in the estimation of value. Hence, the

methodology follows a three-phase approach with different dividend growth rates. Typically, the growth rate will start as positive but it will linearly decline before reaching a lower constant growth rate that will endure for the rest of the firms live.

The classic Gordon Growth Model, although useful and convenient, meets its limitations regarding the assumption of steady state growth. Damodaran (1994) advises that if growth is constant forever, other measures of performance will also be constantly growing, which is not empirically observed for the majority of companies. Also, distributing dividends is a decision that can be based only as to give a signal of strong performance to the market. Furthermore there are companies who opt not to pay dividends at all even if they have a lot of cash surplus. This can be observed in big companies such as Amazon or Google. In these cases it's impractical and troublesome to compute a reliable valuation using the standard model.

For the two-stage period, some problems may arise. Firstly, it's hard to find a decision rule for how long the extraordinary period will last. As it is expected a decrease in the growth rate after the first period, a high investment will lead to longer periods. The issue is translating these qualitative assumptions into quantitative realities. Secondly, an abrupt drop in the dividend growth rate from period 1 to period 2 is also somewhat suspicious and inadequate. In reality, the growth rate would decline in a much more steady-paced movement, gradually settling into the period 2 growth rate. Subsequently, there might be skewed results when estimating a firms' value in a model which dividends are its core foundation and the company does not distribute all the dividends it could, in theory. In such cases, a firm's value will be undervalued because they decided to accumulate some cash instead of paying it out as dividends.

1.2.2. Discounted Cash-Flow

Havnaer et al (2012) state that this is one of the most widely accepted methods in valuation. In fact, as cash is king (Copeland et al, 2000) and value should be quantified as a function of cash, timing and risk (Luherman, 1997).

To estimate firm value using these methods, a prediction of the present and future cash-flows is needed, along with stable growth risk and an appropriate discount rate.

Within this method, there are two processes by which a firm's value can be computed: the Free Cash-Flow to the Firm (FCFF) and the Free Cash-Flow to Equity (FCFE).

The FCFF is regarded as the expected value of cash-flows derived from operations, after taxes, before interests being due and including company investments:

$$FCFF = NOPAT - Taxes + Depreciation\ Expense - CAPEX - \Delta NWC \quad (1)$$

The main idea behind this method is that shows the available cash-flow of all participants and as cash is least exposed to tempering (Estridge J. & Lougee B., 2007). So, using the weighted average cost of capital (WACC) as a discount factor, it is possible to compute a valuation of the firm:

$$Firm\ Value = \sum_{t=1}^{N} \frac{FCFF_t}{(1+WACC)^t} \quad (2)$$

The other perspective of a DCF valuation is somewhat similar to the idea behind the Dividend Discount Model. The available cash to be distributed in dividends should equal the cash-flow of operations net of all payments to debt holders. Hence, using the FCFF as a starting point, it's possible to compute the FCFE:

$$FCFE = FCFF - Interest \times (1 - t) + \Delta\ Net\ Debt \quad (3)$$

The objective is now to find the Equity Value. In order to achieve such result, it makes sense to discount all available FCFE to the cost of equity. Hence, Equity Value will be computed in a similar fashion as Firm Value:

$$Equity\ Value = \sum_{t=1}^{N} \frac{FCFE_t}{(1+r_e)^t} \quad (4)$$

These two approaches should, in theory, output the same results. This seems plausible due to the direct relation between the two paths. Goedhart et al (2005) state the usefulness of these methods, since they can be used to value investments as well as multinational companies.

Nonetheless, these methods also have its downsides. Pinto et al (2010) argued that a company with negative FCFE, is levered or a varying capital structure the FCFF yields a more accurate result since the cost of equity is more sensible to capital structure changes.

Also, Luerhman (1997) assert that for complex capital structures, fund raising strategies and tax positions increase the valuation errors. In addition, the author also specifies that the estimation of the weighted average cost of capital is sensible to tax shields, issue costs, debt securities. It's important to keep in mind that only market values should be used to compute the WACC (Fernández, 2003).

Considering the company chosen for this dissertation, this method will be used, given the usefulness, simplicity and the symbiosis that the method shares with the firm. The disadvantages stated don't fit with the company's structure.

One core, transversal question in using this method is to choose a time frame for the projections. Literature typically recommends an explicit period of five to ten years. This period is obviously adaptable, depending on the stableness of the firm. It would be unwise to choose a small window period for a relatively new company which is expanding or a very large period for stable companies.

This method, as of most of valuation, is an art (Titman, 2007). The key to perform a good valuation lies on its assumptions. Damodaran (2002) states that analysts build faulty valuations not due to the calculations, but due to the lack of information, the quality of the assumptions are already faulty. The problems with valuation lie more in the root of the process, not in the more mathematical part of it.

In conclusion, the DCF value will be given by:

$$DCF = \sum_{t=1}^{N} \frac{Cash\ Flow_t}{(1+r)^t} + \frac{Terminal\ Value_N}{(1+r)^N} \quad (5)$$

1.2.2.1. Terminal Value

Walt Disney once said that "forever is a long time". Aspects of everyday life are constantly changing and no one can expect that the world will enter in a steady state indefinitely. Intrinsically, the same happens with firms. This section is ought to explain the second part of a DCF valuation, the Terminal Value. Although this method contradicts the premise stated above, it's impossible to estimate every future cash-flow from today to the end of time, so as a last-resource option, it's easier and achievable to assume that from some point in the future until infinity, the cash-flow will be stable and growing at a constant rate.

There are three approaches to cope with Terminal Value, following Damodaran (2002): the liquidation in the final year of all the firm's assets and its net worth (after debt payments) in the market; applying market multiples to the company's earnings or sales revenues from the terminal year, though mixing multiples and DCF approaches may yield biased results; lastly using a stable growth model where there's a percentage of cash-flow invested every year into new assets – taking the opposite direction of the liquidation model- assuming a steady-state and stable growth for the company.

$$Terminal\ Value_t = \frac{CF_{t+1}}{R-g} \quad (6)$$

The main limitation of this method is the use of a perpetual growth rate. As this rate is fixed and assumed to last forever, it means that the company will always grow more than the world economy (Damodaran, 2005).

"Setting the stable growth rate to be less than or equal to the growth rate of the economy is not only the consistent thing to do but it also ensures that the growth rate will be less than the discount rate. This is because of the relationship between the riskless rate that goes into the discount rate and the growth rate of the economy." (Damodaran, 2002)

1.2.3. Adjusted Present Value

"APV is value additivity, you can use it to break a problem into pieces that make managerial sense." (Luehrman, 1997)

The Adjusted Present Value (APV) method appears in the literature as a direct substitute of the Discounted Cash Flow approach. The main idea behind this method is to estimate the value of a firm based only in equity financing and then adding the present value of the expected tax benefits net of bankruptcy costs. This method provides transparency since it's a two-step separated process which allows for a more clear view of this approach (Luehman, 1997).

$$APV = PV_{CF\ Assets} + PV_{All\ financing\ side\ effects} \quad (1)$$

The first step is to perform a valuation exercise as if the company was unlevered (only equity-financed). This is easily estimated by discounting the expected free cash-flow to the firm at the unlevered cost of equity, without forgetting the case where there's a constant perpetual growth.

$$Value\ of\ the\ unlevered\ firm = \frac{FCFF_t(1+g)}{r_d^u - g} \quad (2)$$

Then, for the second component of the equation above, it's imperative to compute tax shields, i.e., the expected tax benefits as well as the associated bankruptcy costs. Damodaran (2006) advises choosing the correct tax rate and choosing the right level of debt according to the rate volatility. Plus, if the company has a volatile level of debt, the discount rate is also a factor to be carefully thought of to reach a more accurate present value.

$$PV_{tax\ shields} = \frac{D_t * r_t * \tau_t}{(1+ r_d)^t} \quad (2)$$

The bankruptcy costs are the negative side of having debt. They can be defined as all the payments that have to be made if the firm is unable to honor their obligations. Regardless of the inexistence of a categorical model to estimate the bankruptcy costs, the part it plays on the estimation of the adjusted present value is still crucial. Using π_a as the probability of default and BC as the present value of the bankruptcy cost, the present value of expected bankruptcy cost can be estimated:

$$Expected\ Bankruptcy\ Costs\ (EBC) = \pi_a * \mathrm{BC} \quad (3)$$

The main issue regarding this estimation is that neither the probability of default nor the bankruptcy costs can be calculated directly, meaning the most accurate way of obtaining these parameters is through the use of a proxy.

Altman and Kishore (1998) suggested an estimation of a bond rating for each level of debt and use empirical data of default probabilities for each rating to find the probability of default of the firm. Regarding the bankruptcy costs, literature has focused on the magnitude of different types of costs, concluding that generally the direct costs of bankruptcy are small but the indirect costs, although substantial, vary widely across firms. Shapiro and Titman (1985) speculate that the indirect costs could be as large as 25% to 30% of firm value but provide no direct evidence of the costs. For pre-distressed companies, Branch (2002) estimates this value to be approximately 28%.

All the components estimated, the adjusted present-value will be given by:

$$V_L = V_U + PV_{tax\ shields} + EBC \quad (4)$$

This method is widely used and is significantly better than the Free Cash-Flow approach when facing a company whose capital structure changes considerably along the investor scope. Regarding the specific case of this dissertation chosen firm, this method doesn't add accuracy since its historical ratio is essentially stable and its politics also haven't suffered substantial modifications.

1.3.Profitability Models

1.3.1. Economic Value Added

The Economic Value Added (EVA) is a measure of the excess value that derives from an investment and is obtained through the difference between the company's cost of capital and return on capital. In a more rigorous definition, it's estimating a variable that is correlated with the value of the firm, specifically, a risk-adjusted cash-flow variable. This model is considerably simpler than the standard Discount Cash-Flow approach, since it's a derivation of the model. However, simplicity also punishes results, as this variable is not perfectly correlated with the DCF value.

$$EVA = After\ Tax\ Operating\ Income - Cost\ of\ Capital\ \times Capital\ Invested \quad (1)$$

The estimation of the capital invested and the cost of capital are the main variables and should be estimated carefully. The first one depends on the initial capital investment plus the cumulative market value. The latter is the market measure of the cost. One should ignore book values, as they tend to underestimate cost of capital for most firms, especially for highly levered firms. (Damodaran, 2005)

One of the basic principles of finance as a discipline is the concept of net present value rule, which represents the present and future expected cash-flows of an investment, resulting in a measure of value surplus of a given project. Economic Value Added is an extension of this rule (Damodaran, 2005). This enlargement allows for another approach to estimate firm value:

$$Firm\ Value = Capital\ Invested_{Assets\ in\ Place} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,assets\ in\ place}}{(1+k_e)^t} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,future\ projects}}{(1+k_e)^t} \quad (2)$$

1.3.2. Residual Income/Dynamic Return on Equity

The Dynamic Return on Equity model is a similar approach to the EVA, but it focuses on the equity-side perspective. Firstly, the Return on Equity is a ratio that shows the return of Net Income as a percentage of Shareholder's equity:

$$Return\ on\ Equity = \frac{Net\ Income}{Total\ Equity} \quad (1)$$

The dynamic ROE compares the return on equity (ROE) with the cost of equity (K_e).

$$V_{eq} = E_0 \times \sum_{t=1}^{n} \frac{E_{t-1} \times (ROE - K_e)}{(1+K_e)^t} \quad (2)$$

1.4.The Cost of Capital

In every Finance-related course, a key fundamental tool to use is the present value. To calculate it, it's imperative to use a discount rate, which represents no more than an opportunity cost; to valuate savings, for instance, it's common to use a bank's interest rate, since money not spent and stored in a bank will provide interest. On the other hand, for investments and firms, to perform valuation, analysts refer to a discount rate that reflects the opportunity cost of money that could be invested in another project. In a more meticulous way, equity-only financed projects will have a specific cost of equity; if the investment is funded through debt-only, it will yield a so called cost of debt; finally, for projects that use a mixed strategy of funds it's possible to achieve a weighted average cost of capital. This section goes through all these kinds of cost of capital.

1.4.1. The Risk Free Rate

The risk free rate is perhaps the most common variable to be used in any finance-based analysis, and is a core player in computing the cost of capital.

In principle, this rate cannot have any default or reinvestment risk (Damodaran, 2005). This criterion implies that only government bonds can fulfill these criteria, and not all of them are suitable for it since some governments don't print their own

money. Also, only bonds with the same maturity as the investment horizon should be considered.

Furthermore, according to Koller et al (2005), long-term government bonds in the U.S. and Western Europe show significant (low) covariance with the market. This already provides an estimation error when using those rates since the main assumption for the risk free rate, according to this author, is that the risk free rate should be regarded as the return of a portfolio that has no covariance with the market.

1.4.2. Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is a model developed first by Treynor (1962) as a development of the work of Markowitz (1952) on modern portfolio theory. However, Sharpe (1964) developed the CAPM model as most scholars study today and as it will be presented in this dissertation.

Hence, this model determines the relationship between systematic risk and the expected return of a security:

$$K_e = R_f + \beta\left[E\left(R_m - R_f\right)\right] \quad (1)$$

In this manner, β is the covariance risk of the security with the market, relatively to market variance, meaning this parameter is the marginal effect each dollar has on the market portfolio.

$$\beta_{stock} = \frac{cov(R_{security};R_{market})}{var(R_{market})} \quad (2)$$

"*The attraction of the CAPM is that it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk. (...)A risky asset's return is uncorrelated with the market return—its beta is zero—when the average of the asset's covariances with the returns on other assets just offsets the variance of the asset's return. Such a risky asset is riskless in the market portfolio in the sense that it contributes nothing to the variance of the market return. When there is risk-free borrowing and lending, the expected return on assets that are uncorrelated with the market return must equal the risk-free rate."*

(Fama and French, 2004)

1.4.3. Cost of Equity

The cost of equity is the minimum rate of return required by investors to enter as part of the equity of the firm. Similarly, it's an opportunity cost that equals to a return on alternative investment for the same level of risk (Pratt, 2002). Following Brealey and Myers (2000), the expected return on equity can be computed as:

$$r_e = r + \pi_e \tag{3}$$

Where r is the risk-free rate and $\pi_e$is the equity risk premium. The most common approach used to estimate cost of equity is the CAPM model, as discussed above and presented in equation (1).

After this parameter is estimated it yields a rate that will be part of the total cost of capital which is the reference and basis to make investment decisions and valuation. It's fundamental to keep in mind that, in practice, there are some additional premiums to be added on the cost of capital, either based by historical performance, bias or animal spirits. The models used often miss some important risk factors such as lack of information, survival risk and even illiquidity. These risk should be accessed, measured and added to the estimates of cost of equity.

Damodaran (2001) refers to the common use of the Small Cap Premium, used essentially to value small companies which are prone to be acquired. The author believes that, although most of the companies use this premium today, it doesn't make it right. In fact, the use of this method started in the 1970s, for academics realized that often the traditional CAPM underestimated expected returns for small market capitalizations.

1.4.4. Cost of Debt

The cost of debt is the rate a company pays on its current debt. It consolidates the default risk and the market interest rates, reflecting in this manner the cost of borrowing money for a company. This parameter can be estimated similarly to the cost of equity:

$$r_d = r + \pi_d \tag{4}$$

In this estimation process, is worth to remember two rules into how the estimation is done. Firstly, keep it current. The cost of debt should reflect the company's current default risk, regardless of how different it might have been when the company

purchased it debt. This also implies that cost of debt should be updated for today's risk free rate. Working these two assumptions together the outcome should be to keep away from book interest rate. As it has been stated before, market values provide much accurate results in valuation. Secondly, currency should stay consistent so as not to fall on differences in expected inflation. (Damodaran, 2016).

1.4.5. Weighted Average Cost of Capital

Combining the cost of equity and cost of debt, it's possible to compute, for any given firm, the Weighted Average Cost of Capital (WACC). Following Fernández (2011), "*The WACC is just the rate at which Free Cash Flows must be discounted to obtain the same result as in the valuation using Equity Cash Flows discounted at the required return to equity.*"

$$WACC = \frac{E}{E+D} \times K_e + \frac{D}{E+D} \times K_d \times (1 - T) \quad (5)$$

Although useful and widely used, this models has its drawbacks. Luerhman (1997) argues that for companies with complex tax structure, the WACC performs poorly. Also, literature strongly punishes this model as one of its main assumptions is that the company has a stable capital structure, otherwise the rate it provides doesn't properly reflect the cost of capital.

1.5. Relative Valuation

The methods for valuation described until now have as a common basis finding value through their given cash-flows, growth or risk characteristics. Relative Valuation takes a different approach to estimate the value of assets, based on the similarities of assets that are currently priced in the market (Larsen, 2012). Its main assumption is that it relies on the market being right on average but wrong on the pricing of individual stocks. In a first approach, multiples valuation as described below will be helpful so as to correct these errors (Damodaran, 2012).

1.5.1. Multiples Valuation

This type of valuation is one of the most used methods in valuation by analysts and academics. Goedhart et al. (2003) alerts for the often misuse of multiples in valuation as it's difficult in a comparative analysis to find the "fair" firm to compare. Also, using the industry is often a mistake, as the average doesn't mean much if the variance of performance is too high. The author then advises four basic principles to correctly use multiples valuation: peers with similar prospects for

ROIC and growth, forward-looking multiples, use of enterprise-value multiples and adjustment of the latter for non-operative items.

Although there is some debate about which multiples to use, Lie (2002) infers that it's always better to consider several multiples – the more the merrier.

$$Price/Earnings = \frac{Current\ Market\ Price}{Earnings\ per\ Share} \quad (1)$$

$$Enterprise\ Value\ Multiples = \frac{EV}{EBITDA\ or\ Sales\ or\ EBIT\ or\ Capital} \quad (2)$$

$$Price\ to\ Cash\ Flow = \frac{Share\ Price}{Cash\ Flow\ per\ Share} \quad (3)$$

The price-to-earnings ratio is a broadly known multiple. Fernández (2001) cites this and the Enterprise Value multiples as the most important ones to use in a valuation. Literature advises that different industries will have more suitable multiples than others; a great critique to the P/E ratio, for instance, is that it is distorted by different capital structures of firms and the embodiment of non-operating gains and losses in final result.

1.5.2. Peer Group

Finding a peer group to value a target firm it's a very demanding task, especially because it's not easy, even in the same industry, finding similar companies in all relevant characteristics (Henschke and Homburg, 2009). First things first, how can an analyst define industry? Some companies that are within the same industry according to the Standard Industrial Classification (SIC) codes are not comparable because their business is very different or have disparate business models (Koller et al, 2005). However, to define a set of comparable firms it's desirable to use a statistical tool, like the cluster analysis, or simply the disclosed information that companies make available in their annual reports regarding their peers.

No matter what tool the analyst chooses to use, it's necessary to have a carefully thought peer group. Literature varies a lot in the definition of what is a "good" peer group. Damodaran (2006) argues that comparable firms should have similar cash flows and level of risk while maintaining the same growth pattern. Koller et al (2005) on the other hand, states that return on invested capital and growth in the long run are more decisive factors. Simply enough, it seems somewhat logic that

companies that face the same industry and are involved in the same macro-economic environment are more prone to output a fairly more accurate valuation, qualifying them as excellent peers (Lieu et al, 2002 and Foushe et al, 2012).

1.6.Option Pricing Theory

The basic principle of most of the valuation techniques present until now are based on the fact that the value of any asset is the present value of all future cash flows. Option pricing theory is an exception in the way it approaches assets in two different points of view: assets derive their value from other assets' values and on the occurrence of specific events cash flows are unforeseen.

Options are derivative contracts which give their owner the right (but not the obligation) to buy (in case of call options) or sell (put options) assets at a predetermined price for a prearranged period of time. They provide flexibility and create value when the cost of the option is lower than the benefits it brings.

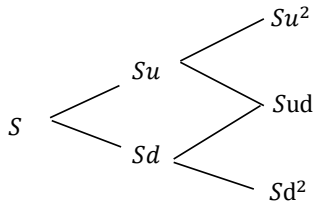
According to Copeland et al (1990) options are one of the methods to better manage risk and uncertainty. If an asset is constantly exposed to risk and henceforth is volatile, a manager can protect some of that risk using options. A good example is airline companies. There is a great dependence between oil prices and jet fuel which in turn has a big influence on airlines operations. Options on oil are a common way which big airline companies use to protect themselves against the increase of oil prices.

It's important to keep in mind that although this method brings a lot of benefits it should not be used as single valuation method; its main use is to complement other types of valuation, acting as a "check point" (Lueherman, 1997).

Option pricing theory dates back to 1972, following the works of Fisher Black and Myron Scholes who first created the now famous Black-Scholes model, using a "replicating portfolio" – a portfolio that is only composed by the asset in study another risk-free asset. Their work also made a breakthrough on the notion of arbitrage, i.e. no-risk investments. A simpler model was then developed, based on the formulation that an asset price will either move up or down in the future; this model, named the Binomial model assumes that the stock price follow a binomial process. Damodaran (2006) suggests that the present value of an option should reflect expectations about its future price, which is a direct aftermath of arbitrage.

In limit, the Binomial model, which suffers from discrete changes in prices, will converge to the Black-Scholes Model, a non-discrete approach to price option. Luherman (1997) advises the use of the latter since it shares more inputs with the classical DCF valuation, permitting a fairer, homogeneous comparison.

Binomial Model



S is the current stock price and moves up to Su with probability p and moves down to Sd with probability 1 - p.

Black Scholes Model

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

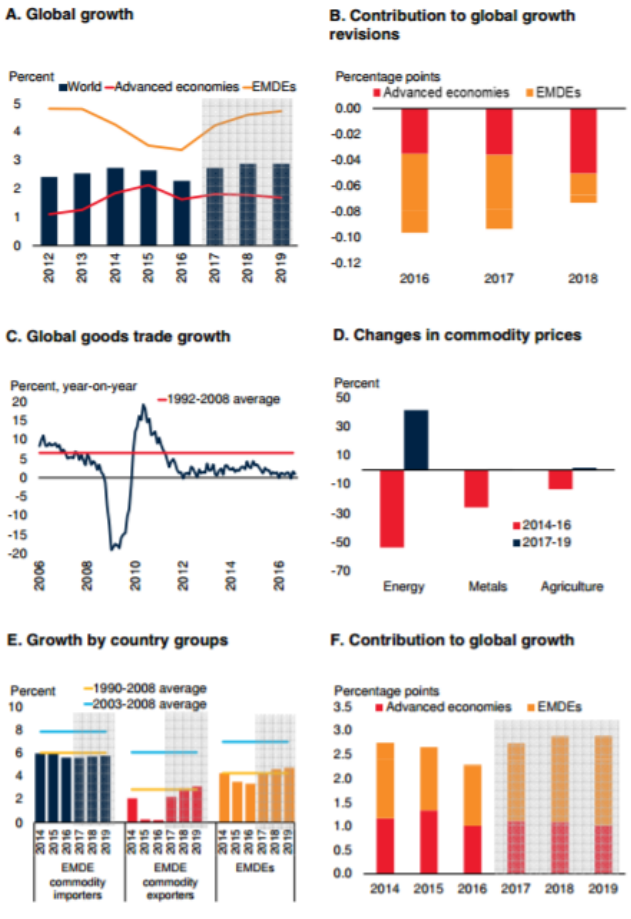
S - current value of the underlying asset
K - strike price of the option
t - option expiration life
r - risk free interest rate
σ^2 - variance of the underlying asset

2. Macroeconomic Review

This chapter has the solely objective of providing illustrative data about the general state of the macroeconomic and financial environment with particular emphasis on the utilities sector, acting as a background agent for the valuation assumptions that are going to be used for the specific case of EDP Renewables.

2.1. World Economic Outlook

The past year was marked as the worst since the global financial crisis by the World Bank. 2016 was notable for stalling global trade, poor investment and a fierce policy uncertainty. Results presented by this institute state that global growth has fallen to 2.6 percent in 2016 which represents a 0.1 percentage point below June 2016 forecasts. Although facing such deficient results, 2017 aims for some room improvement, counting on a rise to 2.7 percent, due mostly to emerging markets and developing economies (EMDEs). However developed economies will continue to struggle against growth and low inflation as a direct result of increased risk in policy, unfertile investment and dull productivity growth. As a result, the World Banks points to a 1.6 percent growth in these economies in 2016 and an average of 2.2 percent in 2017.

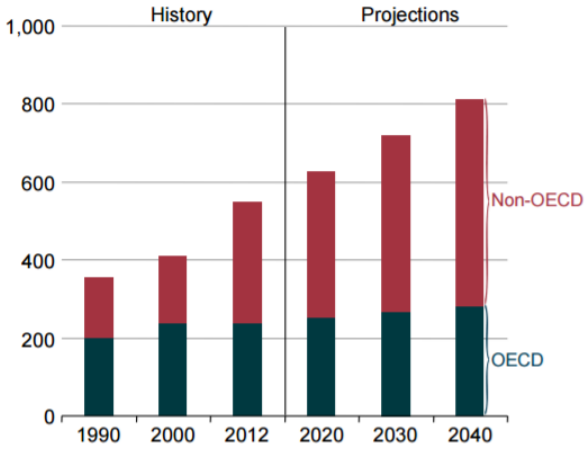


Sources: CPB Netherlands Bureau for Economic Policy Analysis, World Bank.

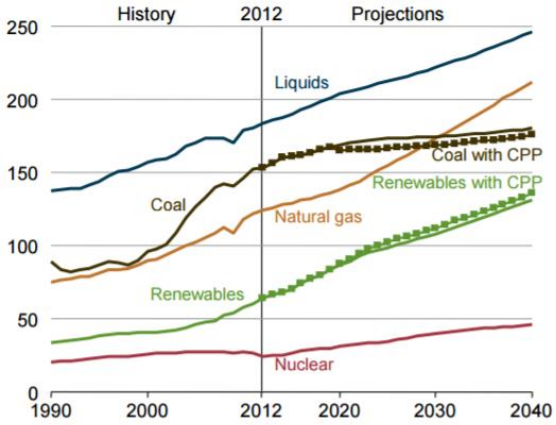
Figure 2- Main economic Indicators

3. Industry Overview

Awareness for the world's future energy is rising since the beginning of the century and concerns almost every big player in the market: governments, private industrial companies from several industries, financial sector and others. Furthermore, the need for energy is also increasing, with an estimating growth of over 40% between 2012 and 2040.[1]



Graph 1-Evolution of the world's energy consumption[2]



Graph 2- Evolution of different sources of energy[2]

Taking into account not only the fact that fossil fuels such as coal or oil are somewhat finite but also the severe climatic changes registered in the past decade, renewable energies can be seen as a strong bet to solve these two problems. In fact, there has already been a clear positive trend in the use of renewable energy.

3.1. Industry Leaders

The reference index for renewable energy is the RENIXX 30, containing, by market capitalization, the top thirty major companies operating in the business. Both the U.S. and China dominate this index

The top thirty major players are ranked by market capitalization in the Renewable Energy Industrial Index (RENIXX 30).

[1] Intergovernmental Panel on Climate Change 2016
[2] U.S. Energy Information Administration 2016

Figure 3- Renewable Energy Industrial Index by market capitalization, April 2017

Company Name	Country of Origin	Sales (€m)
Albioma SA	FR	367.8
Bourbon SA	FR	1,020.6
Brookfield Renewable LP	BM	2,452.0
Canadian Solar Inc	CA	2,853.1
CGG SA	FR	1,20
China High Speed Group Co.	CH	8,966.0
China Longyuan Power	CH	17,87
Dong Energy A/S	DN	57,39
EDP Renovaveis SA	PT	1,453.2
First Solar Inc	USA	2,951.3
Gamesa Corporation Tech	SP	4,61
Innergex Renewable Energy	CA	292.8
JA Solar Holdings Co Ltd	CH	15,74
JinkoSolar Holding Co Ltd	CH	21,40
Meyer Burger Technology	SW	453.1
Nordex SE	DE	3,40
Ormat Technologies Inc	USA	662.6
Plug Power Inc	USA	85.9
REC Silicon ASA	NO	271.2
SMA Solar Technology AG	DE	946.7
SolarCity Corp	USA	399.6
Solaredge Technologies Inc	IL	240.0
SunPower Corp	USA	2,559.6
Sunrun Inc	USA	453.9
Tesla Motors Inc	USA	7,000.1
Trina Solar Ltd	CH	3,035.5
Verbund AG	AT	2,61
Vestas Wind Systems A/S	DN	10,24
Xinjiang Goldwind Science & Tech Co. Ltd	CH	26,40
Yingli Green Energy Holding Co Ltd	CH	8,38

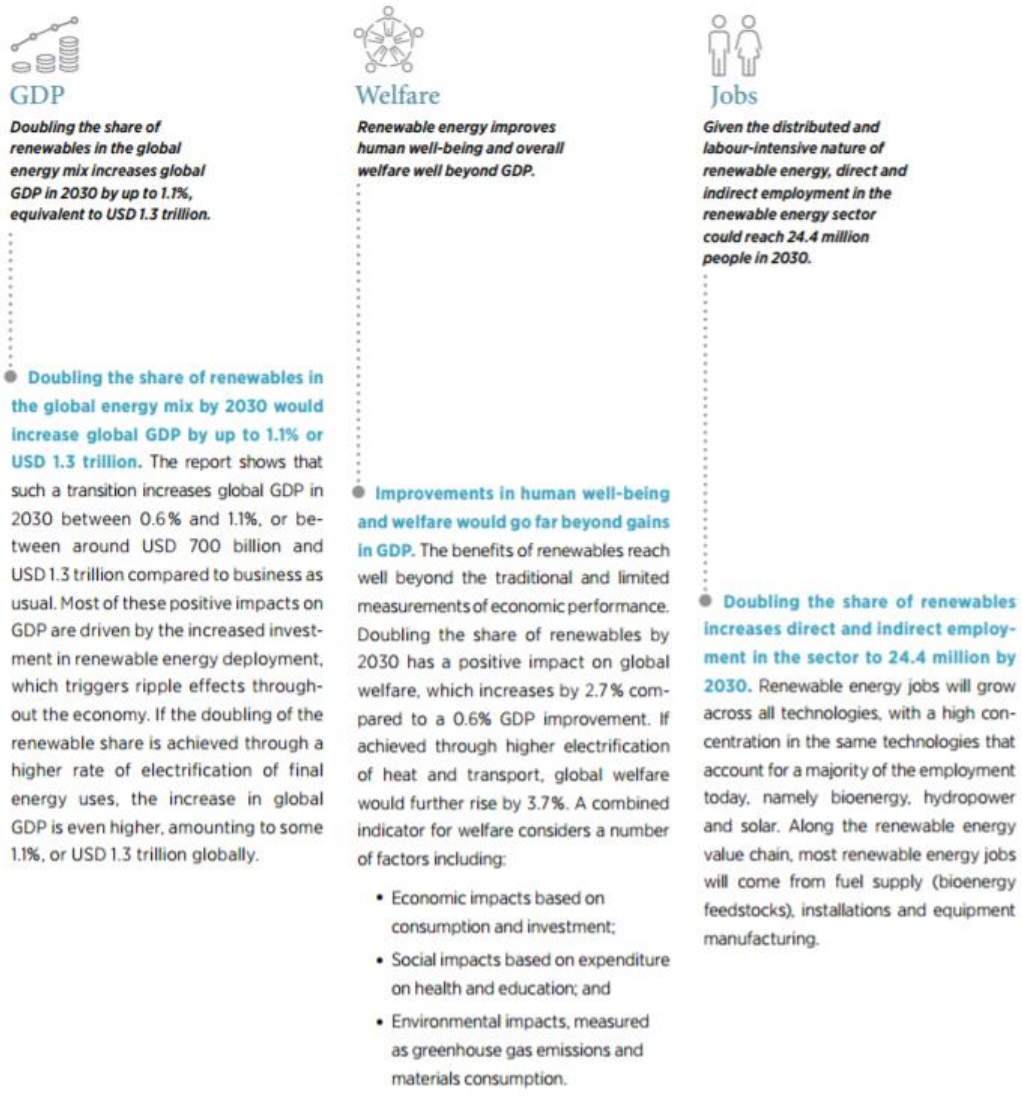
Source :Renewable-Energy-Industry.com and Thomson Reuters

3.2. Advantages of Renewable Energy

The accelerating change to an energy system based on renewable energy is regarded as a one-of-a-kind chance to satisfy not only the growing energy demand and climate goals but also enhancing human welfare. According to the International Renewable Energy Agency, investing in renewable energy is part of the plan of 164 countries that will contribute to achieve the Paris agreement on climate in 2030. The Agency's updated report "Renewable Energy Benefits: Measuring the Economics" predicts a 100% increase on renewable energy share on global energy production in the next 13 years, resulting in a global GDP increase up to 1.1 percent, an enhanced 3.7 percent in welfare (measured through 3 sub-indicators: economical, social and environmental, using variables such as consumption, total employment

and greenhouse gas emissions), and more than 24 million new jobs created on this sector. These are the main three elements that will change with the global attention that's being put on renewable energy, as the previously mentioned report states:

Figure 4- Three key changing elements with the investment in Energy

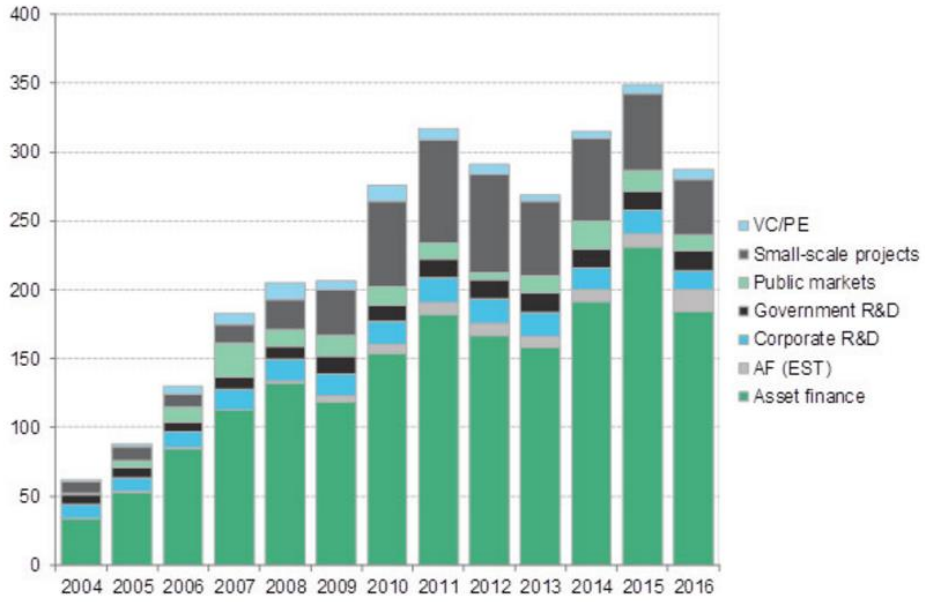


Source - Renewable Energy Benefits: Measuring the Economics (IREA; 2016)

3.2.1. Green Energy's Economics of Scale

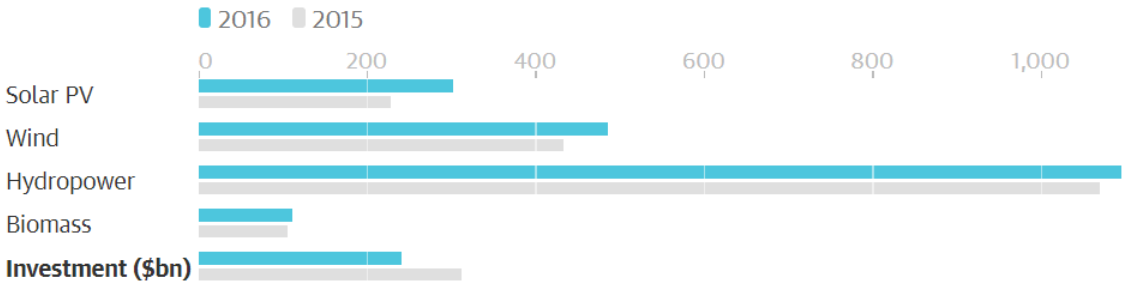
The evolution of technology as an economic term has always helped decreasing costs and the energy sector feels no different. In fact, for the past 6 years, the world has seen the cost of implementing green energy decrease further and further, resulting in an increase of investments in the sector.

Global new investment in clean energy by category, 2004 to 2016, $bn



Source - Bloomberg

Total renewable power capacity, in GW, compared to investment in $bn



Source – REN21

4. Company Overview

4.1. Introduction

EDP Renewables is a Portuguese company that focuses on value creation within the renewable energy sector. It builds and explores wind farms and solar power plants since 1996 and is already expanded to eleven other countries (Spain, France, Italy, Poland, Belgium, Romania, UK, Canada, USA, Mexico and Brazil). Its European headquarter is based in Madrid and its American counterpart is located in Houston.

In 2016, the company produced 24,5TWh of electricity, avoiding 20,1mt of Co2 emissions and managing 10,4GW of installed capacity, while employing over than 1000 collaborators.

Figure 5- Key Figures for EDP Renewables- 2016

Financial Data (€m)	2016
Revenues	**1 650,8**
Operating Costs & Other Operating Income	(479,8)
EBITDA	**1 171,0**
Operating Cash-Flow	869
Net Debt	2 755
Operating Data	**2016**
Installed Capacity (EBITDA MW + Eq. Consolidated)	**10 408**
Europe	5 163
North America	5 041
Brazil	204
Electricity Generated (GWh)	**24 473**
Europe	11 230
North America	12 576
Brazil	666
Employees	**1 083**
Europe	455
North America	422
Brazil	34
Holding	172

4.2. Stock Performance and Shareholder Structure

EDPR launched its IPO in 2008 and it's now listed in the Euronext Lisbon. There are 872.380.160 shares outstanding, of which 77.5% belong to EDP S.A., followed by MSF Investment Management with 3,1%. The remaining shares are branched throughout 23 countries

Table 1- Share Price Evolution

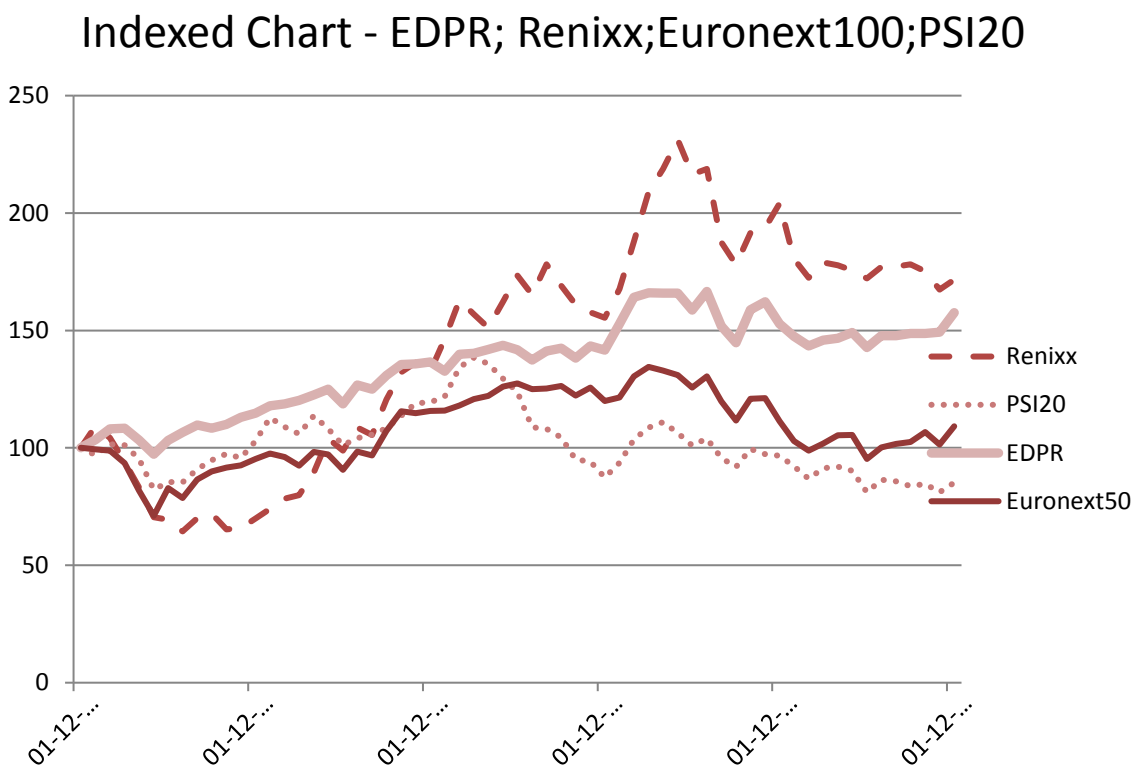


Table 2- EDPR stock highlights

EDPR - Market	2016	2015	2014	2013	2012
Opening Price (€)	7,25	5,40	3,86	3,99	4,73
Closing Price (€)	6,04	7,25	5,40	3,86	3,99
Market Cap (m€)	5 265 252 066	6 324	4 714	3 368	3 484
Volume (m)	291	289	397	448	446
Total Return (%)					
EDPR	-17%	34%	40%	-3%	-16%
PSI 20	-12%	11%	-27%	16%	3%
Euronext 100	3%	8%	4%	19%	15%

4.3. EDPR Portfolio

This company's portfolio is well expanded, operating in 13 countries, with the U.S., Spain and Portugal being its largest business areas in terms of installed capacity and production.

Table 3- EDPR's Portfolio

Portfolio	Installed Capacity (MW)	Production (GWh)	Load factor (%)	Market Share 2016
United States of America	4 810	12501	33%	6%
Spain	2 371	4826	26%	10%
Portugal	1 251	3 047	28%	24%
Romania	521	1 143	25%	16%
Poland	418	951	25%	8%
France	388	777	23%	3%
Brazil	204	666	35%	2%
Belgium	71	128	21%	3%
Italy	144	258	28%	2%
Canada	30	75	28%	n.a.
Mexico	200	-	-	0%

4.4.Operational data and performance

EDPR has a well diversified portfolio across Europe and the American Continent. Its employees are increasing every year, though in very small changes, mainly due to the North America branch. Regarding the Installed Capacity, Europe has been leading with an advantage of 24% over North America in 2016. Also, within Europe, Spain has the biggest installed capacity at 44% of all the European business, followed by Portugal.

On the other hand, North America has been generating more electricity in the past 3 years, holding an average of 51% per year of all electricity generated by the firm.

The load factor has been somewhat stable, with small changes across the different business areas, with highlights to Brazil which had a 5% load factor increase from 2015 to 2016.

The average selling price for the different areas of business have also not varied significantly. On average, the price per MWh has been around €61, with small fluctuations on all areas of activity.

Table 4- EDPR Operating data 2014-2016

Operating Data	2014	2015	2016
Installed Capacity (EBITDA MW + Eq. Consolidat	**9 036**	**9 637**	**10 408**
Europe	4 938	5 141	5 163
North America	4 014	4 412	5 041
Brazil	84	84	204
Electricity Generated (GWh)	**19 763**	**21 388**	**24 473**
Europe	9 323	10 062	11 230
North America	10 204	11 103	12 576
Brazil	236	222	666
Load Factor (%)	**30%**	**29%**	**30%**
Europe	27%	26%	26%
North America	33%	32%	33%
Brazil	32%	30%	35%
Average Selling Price (€/MWh)	**58,9**	**64,0**	**60,5**
Europe (€/MWh)	80,3	83,0	81,5
North America ($/MWh)	50,8	51,0	46,4
Brazil (R$/MWh)	346,4	370,4	216,1
Employees	**919**	**1 018**	**1 083**
Europe	434	445	455
North America	316	383	422
Brazil	26	32	34
Holding	143	158	172

4.5.Financial data and performance

In 2016, Revenues increased by almost 7% against the observed value for the previous year. EBITDA has also been successively increasing over the last 3 years. The EBITDA margin decreased 3% in 2016, but it is value is still considerably high: for every euro generated in revenues, around 71 cents are profits before all taxes and paid interests.

On another measure, net profits heavily diminished in 2016 due to the increase in net financial expensive (18%) and the decrease in the EBIT of about 3%. The Operating Cash Flow has been consistently increasing, standing at €564m in 2016.

These changes are mainly due to EDPR's asset rotation strategy[3]. Capital Expenditures have also been increasing up to €1029m, which are a direct result of the investments made mostly in the North American markets (81%). Net debt decreased 25% due to tax equity deals[4] a lower cost of debt which resulted from a renegotiation with EDP and forex differences.

Table 5- EDPR Financial Data 2014-2016

Financial Data (€m)	2014	2015	2016
Revenues	**1 276,7**	**1 547,1**	**1 650,8**
Operating Costs & Other Operating Income	(373,5)	(404,8)	(479,8)
EBITDA	**903,2**	**1 142,3**	**1 171,0**
EBITDA / Revenues	71%	74%	71%
EBIT	422,4	577,8	564,0
Net Financial Expenses	(249,9)	(285,5)	(350,1)
Net Profit (Equity holders of EDPR)	**126,0**	**166,6**	**56,3**
Operating Cash-Flow	707	701	869
Capex	732	903	1 029
PP&E (net)	11 013	12 612	13 437
Equity	6 331	6 834	7 573
Net Debt	3 283	3 707	2 755
Institutional Partnership Liability	1 067	1 165	1 520

4.6. Operational and Financial Data by Region

Taking a closer look by region, the most evident result is that Spain is the main market in Europe in both the operating and financial parts of the business. However this lead is softened in the financial part, since, although Spain has the highest revenue in the Europe side of EDPR's portfolio, its EBITDA stays somewhat in par with the rest of the continent. It's important to mention that from 2016 forward, EDPR expects to invest more in the rest of Europe, since Spain and Portugal have already met the market's need.

[3] Selling small assets which are foreseen to become in distress and re-investing its value into more favorable projects.

[4] Deal in which an investor takes advantage of the benefits for a short term commitment to a project.

Table 6- Operational and Financial Data for Europe, 2014-2016

Portugal	**2014**	**2015**	**2016**
Installed Capacity (MW)	624	1 247	1 251
Load Factor (%)	30%	27%	28%
Electricity Output (GWh)	1 652	1 991	3 047
Revenues(m€)	165,7	190,2	267,7
Operating costs and Other operating income (m€)	(31,4)	87,6	(44,5)
EBITDA (m€)	134,4	277,8	223,2
EBITDA / Revenues (%)	81%	146%	83%

Spain	**2014**	**2015**	**2016**
Installed Capacity (MW)	2 194	2 194	2 194
Load Factor (%)	28%	26%	26%
Electricity Output (GWh)	5 176	4 847	4 926
Revenues(m€)	344,8	375,4	348,6
Operating costs and Other operating income (m€)	(118,1)	(126,0)	(122,6)
EBITDA (m€)	226,7	249,4	226,0
EBITDA / Revenues (%)	66%	66%	65%

Rest of Europe	**2014**	**2015**	**2016**
Installed Capacity (MW)	1 413	1 523	1 541
Load Factor (%)	24%	27%	25%
Electricity Output (GWh)	2 495	3 225	3 257
Revenues(m€)	233,8	272,0	268,1
Operating costs and Other operating income (m€)	(65,0)	(93,0)	(73,7)
EBITDA (m€)	168,8	179,0	194,4
EBITDA / Revenues (%)	72%	66%	73%

Moving to the American continent, Brazil is showing some results, with its EBITDA margin increasing substantially every year. On the Operating side, the country has also increased its installed capacity to 204MW in 2016 from a shallow 84MW in 2015. According to the 2016 report, EDPR is now heavily focusing investments in Brazil, has it has revealed to be investment-worthy and it will continue to be one of the main investment areas in the foreseeable future.

On North America, the installed capacity doesn't grow at the same pace as Brazil, but it has seen a 14% increase in 2016. The investments in this region will also continue to grow since there is an estimated increased demand for renewable power plants.

Table 7- Operating and Financial Data for North America and Brazil, 2014-2016

North America	**2014**	**2015**	**2016**
Installed Capacity (MW)	3 835	4 233	4 861
Load Factor (%)	33%	32%	33%
Electricity Output (GWh)	10 204	11 103	12 576
Revenues(m€)	671,8	772,1	780,5
Operating costs and Other operating income (m€)	(217,1)	(281,2)	(251,1)
EBITDA (m€)	477,4	512,7	555,1
EBITDA / Revenues (%)	71%	66%	71%

Brazil	**2014**	**2015**	**2016**
Installed Capacity (MW)	**84**	**84**	**204**
Load Factor (%)	**32%**	**30%**	**35%**
Electricity Output (GWh)	**236**	**222**	**666**
Revenues(m€)	**78,5**	**79,1**	**132,6**
Operating costs and Other operating income (m€)	(30,8)	(35,9)	(41,8)
EBITDA (m€)	**47,7**	**45,5**	**96,7**
EBITDA / Revenues (%)	61,0%	58,0%	73,0%

5. EDPR Valuation

5.1. Introduction-Models Used

After reviewing the most used models among the literature, it's crucial to choose which are the more appropriate. Not all models will be applied for the purpose of this valuation because some of them are somewhat substitutes and others for one reason or another will not be a good fit for the type of company this dissertation is exploring.

The DCF method seems a good starting point: it's widely accepted within the literature and although in some cases, due to the structure of the company, it may not be the most suitable one, EDPR does not pose a threat for the accuracy of this method and henceforth it shall be used. By principle, the WACC shall also be estimated.

The DDM is the second obvious choice: the company pays regular dividends and their value is kept consistently so there aren't any precautions in poor estimations using this method.

A Relative valuation using multiples is also going to be used. In the sector of Utilities, in which this company is inserted, it has already been covered that some multiples perform better than others. Nonetheless, the method has a large support in the literature and will be considered.

Using all these methods, it's also important to conciliate them with the macro and micro economic environment currently felt by the firm. In the next parts of this chapter assumptions will also be discussed so that they can be properly introduced in a technical financial model.

One final note is to never forget the true purpose of this dissertation: to estimate a price per share for EDPR and recommend an investment on it.

5.2. Assumptions

5.2.1. Macro Assumptions

Although there is a chapter about the world's economic performance, one should specify and adjust this analysis for the specific case of EDPR. In the tables below, one can observed the estimated GDP growth[5] and inflation for the countries were EDPR has business activities.

Table 8- GDP growth (% change), 2015-2022

GDP growth (% change)	2015	2016	2017	2018	2019	2020	2021	2022
United States	2,596	1,616	2,307	2,519	2,121	1,825	1,672	1,703
Spain	3,203	3,203	3,203	3,203	3,203	3,203	3,203	3,203
Portugal	1,596	1,432	1,741	1,454	1,16	1,06	0,96	0,99
Romania	3,938	4,785	4,2	3,4	3,3	3,3	3,3	3,3
Poland	3,941	2,83	3,405	3,232	2,992	2,924	2,766	2,71
France	1,274	1,213	1,396	1,65	1,749	1,796	1,83	1,858
Brazil	-3,769	-3,595	0,165	1,748	1,954	2	1,998	1,993
Belgium	1,5	1,239	1,633	1,505	1,477	1,544	1,502	1,524
Italy	0,783	0,88	0,843	0,815	0,8	0,8	0,85	0,85
Canada	0,942	1,433	1,941	1,956	1,843	1,8	1,8	1,8
Mexico	2,629	2,302	1,664	1,957	2,71	2,682	2,743	2,708

Weighted average : 2,03

Source: WEO April 2017

Table 9- Inflation (% change), 2015-2022

Inflation (% change)	2015	2016	2017	2018	2019	2020	2021	2022
United States	0.120	1.275	2.654	2.381	2.637	2.324	2.180	2.271
Spain	-0.497	-0.200	2.401	1.426	1.549	1.653	1.760	1.856
Portugal	0.508	0.636	1.205	1.397	1.482	1.607	1.787	1.814
Romania	-0.596	-1.555	1.263	3.150	2.858	2.599	2.500	2.516
Poland	-0.933	-0.583	2.322	2.346	2.456	2.500	2.500	2.500
France	0.090	0.308	1.407	1.188	1.516	1.675	1.741	1.822
Brazil	9.030	8.740	4.368	4.315	4.475	4.453	4.523	4.512
Belgium	0.620	1.770	2.003	1.718	1.738	1.830	1.980	2.043
Italy	0.108	-0.050	1.256	1.299	1.350	1.400	1.400	1.400
Canada	1.132	1.409	1.972	2.098	2.068	2.003	1.999	2.007
Mexico	2.720	2.823	4.770	3.159	2.996	3.000	3.000	3.000

Source: WEO April 2017

[5] For the purpose of valuation, a single GDP growth rate will be considered. It will be the weighted average of all growth rates, weighted by the Installed Capacity for each country.

Focusing on Table 10, one can observe the current and expected values for tax rates across countries in which EDPR is operating. Although most values are stable, some remarks have to be made, as the CIT laws have been changed:

1. In Italy, starting from 2017, the applicable tax will be 24% instead of 27,5%
2. In France, a reduction of tax has also been approved, starting from April 2017.
3. In the U.K., starting also in 2017 the tax will be 18% which will be further reduced to 17% in 2021 onwards.

Table 10- Tax Rate (%), 2016-2017

Tax Rate (%)	2016	2017	2018	2019	2020	2021	2022
Belgium	33,99	33,99	33,99	33,99	33,99	33,99	33,99
France	33,33	28	28	28	28	28	28
Italy	27,5	24	24	24	24	24	24
Poland	19	19	19	19	19	19	19
Portugal	21	21	21	21	21	21	21
Romania	16	16	16	16	16	16	16
Spain	25	25	25	25	25	25	25
United Kingdom	20	18	18	18	18	17	17
Brazil	34	34	34	34	34	34	34
Canada	26,5	26,5	26,5	26,5	26,5	26,5	26,5
Mexico	30	30	30	30	30	30	30
United States	38,2	38,2	38,2	38,2	38,2	38,2	38,2

Source: EDP 2016 report & Government

5.2.1. Industry-specific Assumptions

Although having an understanding about the state of the global economy is important for valuation, one also has to follow a top-down approach, i.e., analyzing industry-specific data to better understand what the company faces[6]. In case of EDPR, Utilities and Renewables seem to be the best fit.

5.2.2. Company assumptions

Moving into a more in depth analysis, the next tables are concerned with EDPR's historical performance.

Table 11-EDPR's Installed capacity by country, 2008-2016

Installed Capacity (MW)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spain	1 692	1 861	2 050	2 201	2 310	2 194	2 194	2 194	2 194
Portugal	553	595	599	613	615	619	624	1 247	1 251
US	1 923	2 624	3 224	3 422	3 637	3 476	3 805	4 203	4 631
Brazil		14	14	84	84	84	84	84	204

[6] Please refer to annexes for a more detailed information

Table 12- Average Load factors (%), 2008-2016

Load Factors (%)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spain	26%	26%	27%	25%	27%	29%	28%	26%	26%
Portugal	27%	28%	29%	27%	27%	29%	30%	27%	28%
RoE	23%	23%	24%	23%	24%	25%	24%	27%	25%
US	34%	32%	32%	33%	33%	32%	33%	32%	33%
Brazil	-	22%	26%	35%	31%	31%	32%	30%	35%

Table 13- Electricity Output, 2008-2016

Electricity Output (GWh)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spain	2 634	3 275	4 355	4 584	5 106	5 463	5 176	4 847	4 926
Portugal	1 028	1 275	1 472	1 391	1 444	1 593	1 652	1 991	3 047
RoE	238	426	804	1 326	1 727	2 132	2 495	3 225	3 257
US	3 907	5 905	7 689	9 330	9 937	9 769	10 145	11 030	12 501
Brazil	-	26	31	170	231	230	236	222	666

These three tables are operational indicators. Regarding installed capacity and electricity output there is a clear positive trend for all countries. The load factor[7] is highly dependent of technology and it indicates the volatility of consumption, i.e., the lowest the factor, the more volatile it is. For the general case, all countries have an average load factor between 20% and 30% meaning they have good potential of investment.

Table 14- Average Selling Price, 2008-2016

Average Selling Price	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spain	100,72	84,04	79,13	82,53	87,71	80,28	50,33	48,73	60,18
Portugal	93,8	94,5	93,8	98,7	101,8	99,3	98,3	95,0	88,0
RoE	70,7	89,7	93,8	95,7	107,2	104,8	95,8	86,0	83,3
US	108,9	82,2	84,9	80,9	82,8	84,5	93,6	95,7	83,0
Brazil	-	262,5	254,4	278,4	286,4	309,2	346,4	370,4	216,1

[7] Average load divided by the peak load in a specified period of time.

Table 15- Revenues and EBIT, €m, 2008-2016

Revenues (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spain	264,9	273,3	343,5	370,3	445,0	438,3	344,8	375,4	348,6
Portugal	97,9	123,1	140,3	138,6	149,3	160,5	165,7	190,2	267,7
RoE	17,0	39,1	78,5	126,2	183,0	217,4	233,8	272,0	268,1
US	192,6	286,1	382,0	414,5	482,9	472,9	505,6	695,7	705,2
Brazil	-	6,1	7,5	45,3	62,1	69,7	78,5	79,1	132,6

EBIT (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spain	165,7	118,4	131,4	152,6	166,4	160,2	93,4	116,8	93,5
Portugal	51,1	71,3	81,8	83,0	92,4	103,9	107,1	234,3	151,0
RoE	4,1	12,2	40,9	9,8	123,5	98,0	64,9	70,3	96,2
US	50,8	57,1	75,9	74,2	98,3	128,9	156,8	195,0	212,5
Brazil	-	0,5	(1,8)	8,5	10,2	8,0	9,4	7,2	17,1

The average selling price does not reflect energy consumption increases. The main reason is that, although the energy market is an open market, it's heavily regulated by governments and so its price is solely defined by demand and supply. As for Revenues and EBIT, they show a quite positive trend which reflects good investments made during these years, following up EDPR's IPO in 2008.

Apart from the historical data, assumptions have to be made about the future. EDPR releases once a year, its business plan, which state the main objectives to conquer in the next few years. The last one available is the 2016-2020 one, states that new investments will be made up to €4,8bn. The main focus is the American market, since the United States will have a 65% increase in capacity, followed by a 38% increase in Brazil. Good news to investors: dividends are also planned to increase 25% until 2020, which illustrates the good historical and future results of the company.

Table 16- EDPR's Business Strategy 2016-2020

Strategy	Unit	Increase 2016-2020
Prioritize Investments in core markets	n.a.	n.a.
Invest in growth opportunities	bn€	€4,8bn

Capacity Additions	Unit	2016	2016-2020 (?%;GW)
North America	GW	4,23	65%
Europe	GW	4,96	13%
Portugal	GW	1,25	20%
Spain	GW	2,19	10%
RoE	GW	1,52	30%
Brazil	GW	0,08	38%

Operational		Increase 2016-2020 (%;GW)
Load Factor (excluding Brazil)	%	6%
Production (TWh)	%	10%
OPEX	%	-3%
EBITDA	%	8%
Net Profit	%	16%
Dividends	%	25%

These objectives can serve as guidelines to build assumptions for valuation. Assuming EDPR has more information about itself than an average investor, it's safe to conclude that the company's predictions for the future will be more accurate than the ones made by the common analyst. This is furthermore enhanced by EDPR's record: it has successfully attained its objectives in the past, which reveals a strong management and commitment, which for the purpose of this dissertation, makes their predictions valid and trustworthy to apply on a valuation.

5.3.Historical Data

Taking as valid the weak form efficiency of the market, technical analysis can infer the value of a company from its historical data. The available information about the company's performance starts in 2008 (year of its IPO) and goes until the end of 2016. The figure below illustrate consolidates results.

Table 17- EDPR's Consolidated Income Statement, 2008-2016

Consolidated Income Statement (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity sales and other	520,2	642,0	840,6	957,2	1 157,8	1 191,3	1 153,1	1 349,6	1 453,2
Income from institutional partnerships	61,2	82,7	107,0	111,6	127,4	125,1	123,6	197,4	197,5
Revenues	**581,4**	**724,7**	**947,7**	**1 068,8**	**1 285,2**	**1 316,4**	**1 276,7**	**1 547,1**	**1 650,8**
Other operating income	28,3	42,6	73,0	84,5	63,1	41,4	45,7	161,6	53,8
Operating costs	(171,8)	(224,7)	(307,9)	(352,6)	(410,7)	(437,2)	(419,2)	(566,3)	-533,6
Supplies and services	(107,0)	(148,3)	(196,2)	(225,1)	(261,8)	(255,2)	(256,6)	(292,7)	(304,7)
Personnel costs	(38,1)	(42,6)	(54,9)	(60,8)	(62,7)	(66,5)	(66,1)	(84,3)	(93,9)
Other operating costs	(26,8)	(33,8)	(56,9)	(66,7)	(86,2)	(115,6)	(96,4)	(189,3)	(134,9)
EBITDA	**437,9**	**542,6**	**712,8**	**800,7**	**937,6**	**920,5**	**903,2**	**1 142,3**	**1 171,0**
EBITDA/Revenues	75,0%	75,0%	75,0%	75,0%	73,0%	70,0%	71,0%	74,0%	71,0%
Provisions	0,8	0,2	0,2	0,3	-	(1,3)	(0,0)	0,2	(4,7)
Depreciation and amortisation	(207,8)	(314,4)	(434,4)	(468,5)	(502,7)	(464,7)	(499,8)	(587,5)	(624,5)
Amortisation of deferred income (government grants)	0,7	2,4	11,4	15,0	15,2	18,5	19,0	22,8	22,2
EBIT	**231,6**	**230,8**	**289,9**	**347,5**	**450,1**	**473,0**	**422,4**	**577,8**	**564,0**
Financial income/(expense)	(74,9)	(72,2)	(174,2)	(233,6)	(274,9)	(261,7)	(249,9)	(285,5)	(350)
Share of profit from associates	4,4	3,9	5,0	4,8	6,8	14,7	21,8	(1,5)	-0,2
Pre-tax profit	**161,2**	**162,5**	**120,8**	**118,7**	**182,1**	**226,0**	**194,3**	**290,8**	**213,7**
Income taxes	(49,0)	(44,8)	(37,8)	(28,0)	(46,0)	(56,9)	(16,4)	(45,4)	(37,6)
Profit of the period	112,2	117,8	83,0	90,6	136,1	169,1	177,9	245,5	176,1
Equity holders of EDPR	**104,4**	**114,4**	**80,2**	**88,6**	**126,3**	**135,1**	**126,0**	**166,6**	**56,3**
Non-controlling interests	7,9	3,4	2,8	2,0	9,8	34,0	51,9	78,9	119,8

The results are quite satisfactory: Revenues have been constantly increasing, which goes in accordance with the increase in installed capacity, as stated before. EBITDA margin is kept at a very respectable value, varying between 70% and 75%. Depreciations and amortizations are also increasing due to the heavy investments EDPR has made throughout the years, which combined with its EBIT is a clear statement of a successful bet in expanding the business. Profit also shows a somewhat positive trend, despite the downfall in 2016 caused by one-offs.

Table 18- EDPR's Consolidated Balance Sheet, 2008-2016

Assets (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Property, plant and equipment, net	7 053	8 635	9 982	10 455	10 537	10 095	11 013	12 612	13 437
Intangible assets and goodwill, net	1 395	1 336	1 367	1 334	1 327	1 301	1 405	1 534	1 596
Financial Investments, net	53	60	64	61	57	346	376	340	348
Deferred tax asset	22	28	39	56	89	109	46	47	76
Inventories	12	11	24	24	16	15	21	23	24
Accounts receivable - trade, net	83	106	144	146	180	202	146	222	266
Accounts receivable - other, net	512	637	757	750	800	655	859	338	338
Financial assets at fair value through profit and loss	36	37	36	0	0	0	-	-	-
Collateral deposits	-	-	-	-	49	78	81	73	46
Assets held for sale	1	-	-	-	-	-	-	110	-
Cash and cash equivalents	230	444	424	220	246	255	369	437	603
Total Assets	**9 397**	**11 294**	**12 835**	**13 045**	**13 302**	**13 058**	**14 316**	**15 736**	**16 734**
Equity (€m)									
Share capital + share premium	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914
Reserves and retained earnings	89	192	274	325	384	623	742	891	1 155
Consolidated net profit attrib. to equity holders of the p	104	114	80	89	126	135	126	167	56
Non-controlling interests	83	107	126	127	325	418	549	863	1 448
Total Equity	**5 190**	**5 328**	**5 394**	**5 454**	**5 749**	**6 089**	**6 331**	**6 834**	**7 573**
Liabilities (€m)									
Financial Debt	1 462	2 673	3 534	3 826	3 874	3 666	3 902	4 220	3 406
Institutional Partnership	895	920	1 009	1 011	942	836	1 067	1 165	1 520
Provisions	51	67	54	58	64	65	99	121	275
Deferred Tax liability	303	343	372	381	381	367	270	316	365
Deferred revenues from institutional partnerships	202	434	635	773	738	672	735	791	819
Other liabilities	1 293	1 529	1 839	1 542	1 555	1 363	1 912	2 288	2 776
Total Liabilities	**4 206**	**5 966**	**7 442**	**7 591**	**7 553**	**6 969**	**7 986**	**8 902**	**9 161**
Total Equity and Liabilities	**9 397**	**11 294**	**12 835**	**13 045**	**13 302**	**13 058**	**14 316**	**15 736**	**16 734**

The increasing total assets presented in the table above are a direct result of portfolio expansion, especially in what it comes to Fixed Assets due to the investments in power plants. This also is an indicator for the increasing value in net Financial Investments. Cash and cash equivalents, which are a good indicator for the company's liquidity, are solid, increasing in 2016 by 38% YoY.

Equity is also increasing throughout time, because not only of the increase in net profit, as already presented in the Income Statement table, but also because of non-controlling interests.

In the Liabilities side, Financial Debt decreased in 2016 by almost 20%, contradicting the trend until 2015. The institutional partnership account is increasing, result of new tax equity deals in the U.S. market. The Deferred Tax Liability account is kept somewhat constant, as the Other Liabilities account is increasing, which consists of the expenditure resulting from difference between amounts received and paid. Deferred taxes don't show a lot of variance across time, consisting of fiscal credit already received by investors.

Capital Expenditures are kept somewhat constant, after experiencing very high results in the first years. In 2016, it rises again, mainly due to portfolio expansion. This is also the greater motive in why Net debt increased in 2015 and 2016, after a

period of stabilization. The Funds from Operations are constantly increasing in a very pleasing pace.

Table 20- EDPR's Capex and Cash-Flow, 2008-2016

Capex (€m)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Spain	684	561	111	70	65	5	5	5	11
Portugal	85	102	8	11	9	10	8	16	29
RoE	124	351	420	287	349	372	151	163	91
Europe	**893**	**1014**	**539**	**368**	**423**	**387**	**164**	**184**	**132**
North America	**1 198**	**826**	**783**	**405**	**179**	**212**	**543**	**646**	**841**
Brazil		**2**	**72**	**62**	**9**	**25**	**25**	**73**	**57**
Other		4	7	(6)	1	3	0	0	0
Total Capex	**2091**	**1 846**	**1 401**	**829**	**612**	**627**	**732**	**903**	**1 029**
Cash-Flow (€m)									
EBITDA		**543**	**713**	**801**	**938**	**921**	**903**	**1 142**	**1 171**
Current income tax		(34)	(29)	(29)	(85)	(89)	(50)	(51)	(50)
Net interest costs		(87)	(167)	(189)	(205)	(199)	(207)	(188)	(179)
Share of profit of associates		4	5	5	7	15	22	(2)	(0)
FFO (Funds From operations)		**425**	**522**	**588**	**655**	**648**	**668**	**901**	**942**
Net interest costs		87	167	189	205	199	207	188	179
Share of profit of associates		(4)	(5)	(5)	(7)	(15)	(22)	2	0
Non-cash items adjustments		(8)	(36)	(46)	7	0	(6)	(65)	(12)
Income from institutional partnerships		(83)	(107)	(112)	(127)	(125)	(124)	(197)	(198)
Change in working capital		(25)	26	29	(66)	(30)	(16)	(127)	(43)
Operating Cash-Flow		**392**	**567**	**643**	**666**	**677**	**707**	**701**	**869**
Capex		(1 846)	(1 401)	(829)	(612)	(627)	(732)	(903)	(1 029)
Financial (investments) divestments		(117)	(79)	(237)	(22)	(47)	(19)	(157)	(31)
Changes in working capital related to PP&E suppliers		116	(20)	(23)	2	(180)	196	26	10
Cash Grant		156	169	3	5	91	22	1	1
Net Operating Cash-Flow		**(1 299)**	**(764)**	**(444)**	**39**	**(86)**	**173**	**(330)**	**(181)**
Sale of non-controling interests		-	-	4	176	402	215	395	1 189
Proceeds from institutional partnerships [2]							217	242	624
Payments to institutional partnerships		334	228	141	(15)	(36)	(70)	(174)	(172)
Net interest costs		(87)	(167)	(156)	(189)	(183)	(180)	(165)	(156)
Dividends net and other capital distributions		-	-	-	-	(58)	(79)	(115)	(146)
Forex & others		(12)	(35)	(161)	22	(21)	(291)	(277)	(207)
Decrease / (Increase) in Net Debt		**(1 064)**	**(737)**	**(616)**	**33**	**19**	**(14)**	**(425)**	**952**

Table 19- EDPR's Net Financial Expenses, 2008-2016

Net Debt (€m)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Bank Loans and Other	560	542	733	837	917	848	937	1 082	788
Loans with EDP Group related companies	902	2 132	2 800	2 989	2 957	2 818	2 965	3 138	2 618
Nominal Financial Debt + Accrued interests	**1 462**	**2 673**	**3 534**	**3 826**	**3 874**	**3 666**	**3 902**	**4 220**	**3 406**
Collateral deposits associated with Debt	-	-	-	-	49	78	81	73	46
Total Financial Debt	**-**	**-**	**-**	**-**	**3 825**	**3 588**	**3 821**	**4 147**	**3 360**
Cash and cash equivalents	230	444	424	220	246	255	369	437	603
Loans to EDP Group related companies and cash poolin	128	59	226	219	274	64	170	3	2
Financial assets held for trading	36	37	36	0	0	0	-	-	-
Cash & Equivalents	**393**	**540**	**685**	**439**	**520**	**319**	**538**	**439**	**605**
Net Debt (€m)	**1 069**	**2 134**	**2 848**	**3 387**	**3 305**	**3 268**	**3 283**	**3 707**	**2 755**
Net Debt Breakdown by Assets (€m)									
Net Debt related to assets in operation		1 666	2 435	3 169	3 023	3 028	3 168	3 658	2 399
Net Debt related to assets under construction & develop.		468	413	218	283	241	115	49	356
Institutional Partnership (€m)									
Net Institutional Partnership Liability	**852**	**835**	**934**	**1 011**	**942**	**836**	**1 067**	**1 165**	**1 520**
Net Financial Expenses (€m)									
Net interest costs	(48,6)	(87,3)	(166,9)	(189,5)	(205,0)	(198,6)	(205,2)	(189,5)	(178,6)
Institutional partnership costs	(43,6)	(54,2)	(64,8)	(62,4)	(66,7)	(60,8)	(56,6)	(79,0)	(90,3)
Capitalised costs	39,2	74,7	68,4	33,9	15,7	15,6	26,8	23,0	23,0
Forex differences	22,3	(5,1)	(1,1)	(20,5)	5,6	(7,7)	(5,0)	(2,7)	9,8
Other	(44,1)	(0,3)	(9,8)	4,8	(24,5)	(10,2)	(9,9)	(37,3)	(114,0)
Net Financial Expenses	**(74,9)**	**(72,2)**	**(174,2)**	**(233,6)**	**(274,9)**	**(261,7)**	**(249,9)**	**(285,5)**	**(350,1)**

Coming back again to net debt, table 19 shows a clear increase in net debt related to assets in operation and also under construction, insisting on the company's portfolio development.

Net interest costs are constantly the main reason for the results on the Net Financial Expenses, which are related with the firm's cost of debt. As stated in a previous part of this chapter, in 2016 net interest costs diminished due to a lower firm cost of debt.

5.4. Forecasts for 2017-2026

5.4.1. Main assumptions for 2017

This section has the objective to take in consideration all the data presented in this dissertation until now and expanding further, making forecasts for the consolidated IS, BS, CF and CAPEX map, Asset base map and Net Debt and Financials map. As for non-consolidated maps, the operational and IS data will also be forecasted, per country.

Firstly, it's imperative to find an estimate for the revenues in 2017 whose most updated result is the first quarter for 2017. By computing the growth rate for homologous quarterly growth, the same rate was applied to the next three quarters of 2017, yielding a total value of about 4% higher than the previous year. While this value seems a bit too conservative, it's not totally impossible: the growth rate of revenues for EDPR in the last eight years is somewhat volatile, with a standard deviation of around 12%.

Table 21- Consolidated Income State and prediction for 2017

							Forecast			
Consolidated Income Statement (€m)	**1Q16**	**2Q16**	**3Q16**	**4Q16**	**1Q17**	***g***	**2Q17**	**3Q17**	**4Q17**	**FY17**
Electricity sales and other	452,5	332,9	282,5	385,3	460,0	1,66%	338,4	287,2	391,7	1 477,3
Income from institutional partnerships	55,5	48,0	39,0	55,1	68,2	22,94%	59,1	47,9	67,7	242,9
Revenues	**507,9**	**380,9**	**321,5**	**440,4**	**528,1**		**397,5**	**335,1**	**459,4**	**1 720,2**

Also, for 2017 total assets should remain stable, since there are no further plans for acquisitions of this sort this year. So, the value for 2017 is assumed to be equal to the value of the 1st quarter.

Table 22 - Consolidated Balance Sheet with forecast for 2017

										Forecast
Consolidated Balance Sheet (€m)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total Assets	**9 397**	**11 294**	**12 835**	**13 045**	**13 302**	**13 058**	**14 316**	**15 736**	**16 734**	**16 779**

5.4.2. Forecasts 2018-2026

Regarding the remaining years after 2017, this section will provide insight and forecasts, using, whenever available, country/region specific data, financial and operational. If such data isn't available for some accounts, the consolidated results will be used. The objective is to segregate different markets to obtain a more realistic result, as strategy shifts from different areas around the globe where EDPR is operating.

The following tables will describe the assumptions per country for the non-consolidated forecasts:

Table 23- Portugal forecasts 2017-2026

Portugal	**2017**	**2020**	**2026**
Installed Capacity (MW)			
EBITDA MW	1 257	1 447	2 296
Avg. Load Factors (%)	24%	29%	30%
Electricity Output (GWh)	3 111	3 301	3 717
Average Selling Price (€/MWh)	89	103	138
Income Statement (€m)			
Revenues	228	205	245
Operating costs and Other operating income	(46)	(48)	(13)
EBITDA	182,3	157	233
EBITDA / Revenues	81%	77%	95%
Depreciation, amortisation and provisions	(59)	(70)	(99)
EBIT	**123,8**	**88**	**134**

- **EBITDA MW-** Up to 2020, following BP 16-20 (+16%); until 2026: PT is not a main investment market and already has electrical overcapacity so lower growth (+8%).
- **Load Factor** – Up to 2020, following BP 16-20 (+6%); until 2026: technology evolution takes some time to invent and more time to implement, so a flattish growth is to be predicted (+1% per year)

- **Output** -Expected growth of electricity demand of 2%
- **Price-** According with the 2017 Energy Outlook, an average growth per year of 5% is expected for Portugal.
- **EBITDA-** Up to 2020: BP 16-20 (+8%); Until 2026: Expected to outperform the economy due to expansion. However the main part of expansion already happened, so a slow in pace is to be foreseen (+3%).

Table 24- Spain's Forecasts 2017-2026

Spain	2017	2020	2026
Installed Capacity (MW)			
EBITDA MW	2194,2	2 294	3 641
Avg. Load Factors (%)	23%	28%	29%
Electricity Output (GWh)	5 029	5 337	6 010
Average Selling Price (€/MWh)	100	116	155
Income Statement (€m)			
Revenues	454	398	475
Operating costs and Other operating income	(129)	(134)	(35)
EBITDA	325,7	264	440
EBITDA / Revenues	72%	66%	93%
Depreciation, amortisation and provisions	(34)	(41)	(58)
EBIT	**291,2**	**223**	**382**

- **EBITDA MW** - Up to 2020: BP 16-20 (+5%); until 2026: Spain is a saturated market and, like Portugal, it will follow a growth-like pattern (+8%).
- **Load Factor** –Up to 2020: BP 16-20 (+6%); until 2026: again, following Portugal's case, +1%.
- **Output-** Expected growth for electricity demand of 2%
- **Price-** According with the 2017 Energy Outlook an average growth per year of 5% is also foreseen for Spain.
- **EBITDA-** Up to 2020: BP 16-20 (+8%); until 2026: Following Portugal's case, the growth rate will diminish to +3%.

Table 25- Rest of Europe's Forecasts 2017-2026

RoE	2017	2020	2026
Installed Capacity (MW)			
EBITDA MW	1 630	1 823	3 230
Avg. Load Factors (%)	23%	28%	50%
Electricity Output (GWh)	3 233	3 430	3 863
Average Selling Price (€/MWh)	92	104	131
Income Statement (€m)			
Revenues			
Operating costs and Other operating income	(119)	104	131
EBITDA	137,4	193	293
EBITDA / Revenues	53%	66%	74%
Depreciation, amortisation and provisions	(87)	(103)	(147)
EBIT	**50,5**	**90**	**146**

- **EBITDA MW**- Up to 2020: BP 16-20 (+20%); Until 2026: France and Germany's heavy nuclear energy power combined with the liberalization of the European electrical sector may be an opening for expansion, at +10%.
- **Load Factor** Up to 2020: BP 16-20 (+6%); Until 2026: again, highly technological dependence, +1%.
- **Output**- Expected growth of electricity demand of 2%.
- **Price**- According with the 2017 Energy Outlook an average growth per year of 4% is foreseen.
- **EBITDA** Up to 2020: BP 16-20 (+8%); Until 2026: Although the bigger countries are a powerful driving force, smaller, less developed countries (comparatively) may drive the growth potential down, at +5%.

Table 26 - North America's Forecast 2017-2026

North America	2017	2020	2026
Installed Capacity (MW)			
EBITDA MW	5 193	6 984	26 643
Avg. Load Factors (%)	30%	32%	34%
Electricity Output (GWh)	14 039	14 412	15 303
Average Selling Price (€/MWh)	49	56	76
Income Statement (€m)			
Revenues			
Operating costs and Other operating income	(280)	(274)	(290)
EBITDA	565,5	499	727
EBITDA / Revenues	69%	66%	73%
Depreciation, amortisation and provisions	(286)	(340)	(483)
EBIT	**297**	**179**	**273**

- **EBITDA MW –** Up to 2020: BP 16-20 (+65%); until 2026: North America represents the core investment market with more planned growth that any other country. Although a drop in growth rate, given the size of the American market, further investments might continue there, hence +25%.
- **Load Factor –** Up to 2020: BP 16-20 (+6%); until 2026: like Europe, technological dependence is crucial, so +1%.
- **Output -** Expected growth for electricity demand of 1%
- **Price -**According with the 2017 Energy Outlook an average growth per year of 5% is predicted
- **EBITDA –** Up to 2020: BP 16-20 (+8%); until 2026: expected to grow more than global economy, allied with a strong bet from EDPR in the American market, it's expected a small decrease after the initial expansion plan, to +5%.

By aggregating the previous forecasts, one can create a consolidated Income Statement for the whole company. Furthermore, the remaining financial maps and figures are also to be forecasted [8].

[8] Please see the full financial maps in Annexes.

Table 27- Consolidated Income Statement (m) Forecast 2017-2026

Consolidated Income Statement (m)	**2017**	**2020**	**2026**
Income Statement (€m)			
Revenues	**1 780**	**1 686**	**2155**
Operating costs and Other operating income	(569)	(544)	(422)
EBITDA	**1211,4**	**1 141**	**1 733**
EBITDA / Revenues	68%	68%	80%
Depreciation, amortisation and provisions	(485)	(577)	(819)
EBIT	**749**	**586**	**936**
Financial income/(expense)	(350,1)	(350,1)	(350,1)
Share of profit from associates	(0,2)	(0,2)	(0,2)
Pre-tax profit	**398,6**	**235,7**	**585,6**
Income taxes	(99,6)	(58,9)	(146,4)
Profit of the period	298,9	176,8	439,2
Equity holders of EDPR	**176,8**	**47,1**	**293,2**
Non-controlling interests	122,2	129,7	146,0

For the Balance Sheet, it was assumed that for PPE's, given the intense investment in several markets plus its historical average, the estimated value from EDPR's Business plan (+10%) would be suitable; after that, +5%. Intangible assets and goodwill are somewhat dependent on factors such as global reputation, so after 2020 it should keep in line with its historical average (around 1%), and until 2020 it will also follow the Business Plan (+2%). Financial Investments were assumed to be flat, due to its constant historical background. Accounts receivable have an historical growth per year of around 17%, but the assumption taken is that it will follow Production at +10%. Cash and equivalents should also grow at the same rate of Cash Flows, however, Reserves and Retained earnings are predicted to grow 16% until 2020 and assumed to decrease to 4%. Following the growth of already positive Cash Flows and overall trend, Financial Debt is assumed to be decreasing. Finally, Institutional Partnerships and Provisions are expected to increase due to EDPR's expansion strategy, at a 4% and 14% respectively, following their historical average. Below, one can see the Balance Sheet as well as other relevant financial maps whom were built on the main assumptions here presented. These are meant to give more insight into the financial behavior of EDPR's past and future performance, following the positive results that ended in the present expansion and interest for this Valuation.

Table 28 - Balance Sheet and other Financial Maps 2017-2026

Balance Sheet (€m)	**2017**	**2020**	**2026**
Equity	8 343	7 999	8 574
Liabilities	9 810	10 227	15 230
Total Equity + Liabilities	**18 153**	**18 226**	**23 804**
Total Assets	**18 153**	**18 226**	**23 804**

Asset Base	**2017**	**2020**	**2026**
Installed Capacity (MW)	10 509	13 062	36 586
Europe	5 082	5 565	9 167
North America	5 223	7 034	26 832
Brazil	204	464	587

Capex (€m)	**2017**	**2020**	**2026**
Europe	247	247	247
North America	484	545	689
Brazil	38	48	76
Total Capex	768,584	838,869	1011,35

Cash-Flow (€m)	**2017**	**2020**	**2026**
EBITDA	1211	1141	1733
FFO (Funds From operations)	1030	960	1552
Operating Cash-Flow	944	855	1388
Net Operating Cash-Flow	131	-28	333
Decrease / (Increase) in Net Debt	240	298	598

Net Debt (€m)	**2017**	**2020**	**2026**
Nominal Financial Debt + Accrued interests	2947	3325	4373
Total Financial Debt	2978	3384	4429
Cash & Equivalents	359	431	426
Net Debt (€m)	2619	2953	4003

5.4.3. CAPM Results

The importance of this model to the valuation is of first line: the Beta of the CAPM equation is the equity Beta, which is the base for the Discount Models that will be used. For data, it was extracted from Reuters monthly adjusted closing priced for EDPR since its IPO. As the company has its headquarters in Spain and most of its business is in Europe, the risk free rate and the index to be used for the CAPM would also have to be European, for the very least. As such, for the risk free rate, the

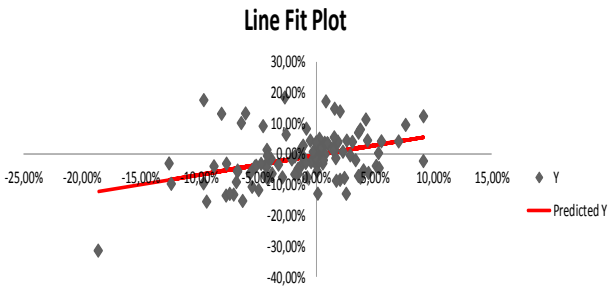
government German Bond yield at 10Y was used and the chosen index was the EURONEXT100. This is one of the main indexes in Europe, acting like a counterpart for the S&P500 in the United States. Using a regression analysis for the excess returns of both the index and the company, a beta of 0.6317 was obtained.

Table 29 - CAPM regression statistics

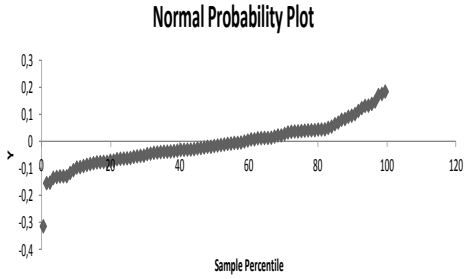
Regression Statistics	
Multiple R	0,384690765
R Square	0,147986985
Adjusted R Square	0,139551212
Standard Error	0,074380988
Observations	103

	Coefficients	Standard Error	t Stat
Intercept	-0,003891667	0,007557125	-0,514966541
X Variable 1	0,631736288	0,152308291	4,1884114

Graph 1 - Line Fit Plot for CAPM regression



Graph 2 - Normal Probability Plot for CAPM regression



For the market risk premium, a different yet simple approach was implemented. Every year, Fernández conducts a research which compiles the market risk premium for every country. His methodology consists of surveying CEO's for different companies operating in each country and taking a country average for what the managers' think market risk premium is. Using his latest survey, I took these results and ponder them through the share that EDPR's has on each country it operates. Also, Damodaran estimates that for the U.S. market the market risk premium revolves around 5%, and that the European market wouldn't be that much different from that. The results found using the approach described above yield a market risk premium of 6,05%; considering that Brazil and some East-European countries are there, it seems more than a reasonable value.

Table 30 - Market risk premium using Fernandez(2017) results

Installed Capacity (MW)	2016	Weight	MRP	Weighted average
Belgium	71	0,70%	0,06	0,04%
Brazil	204	2,03%	0,09	0,18%
Canada	30	0,30%	0,06	0,02%
France	388	3,86%	0,07	0,25%
Italy	144	1,43%	0,06	0,09%
Mexico	200	1,99%	0,09	0,19%
Poland	418	4,16%	0,06	0,27%
Portugal	1251	12,44%	0,08	0,95%
Romania	521	5,19%	n.a.	-
Spain	2194	21,83%	0,07	1,44%
US	4631	46,08%	0,06	2,63%
Total	**10052**	**100%**		**6,05%**

5.4.4. WACC results

The WACC was computed based on the methodology and assumptions presented in the table below.

Table 31 - Equity Beta and WACC calculation steps

Equity Beta	
A. Beta	0,63
B. D/E target ratio	0,63
C. Corporate tax rate (T_c)	0,25
D. Equity beta = [β_a+(βa - 0) x D/E x (1-Tc)]	0,93
WACC	
A. Risk free interest rate	0,22%
B. Market risk premium	6,05%
C. Average equity beta	0,93
D. Equity cost of capital (A+BxC)	5,86%
E. After taxes cost of debt	3,15%
F. Target Debt/Assets Value (D/V)	39%
G. Target Equity/Assets Value (D/V)	61%
WACC (D x G + E x F)	**4,81%**

For the Equity Beta, the corporate tax rate used was the Spanish one (25%) as presented in the 2016 report for EDPR. The D/E target ratio represents the historical five-years average, since it's not expected a big change on this value. As for the WACC calculation, the after tax costs of debt were calculated using the forecast provided by the Business plan for 2015-2025.

5.4.5. Discounted Cash Flows models – results

Keeping the assumptions that were presented in mind, the next parts illustrate the results obtained by running the models based on the already estimated values.

5.4.5.1. Free Cash-Flow to the Firm

The FCFF yields an equity value of € 6 620m, implying a share price of €7.59. 2017 seems to be a very good year and cash-flows are predicted to decrease until 2020, following EDPR's investment policies, but increasing after that period has passed, leaving more available cash.

Table 32 - Free Cash Flow to the Firm (FCFF) and DCF

Free Cash Flow to the Firm (FCFF)

(€m)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
EBIT	749	725	669	586	656	719	778	833	885	936
(-) Tax on EBIT	(187)	(181)	(167)	(146)	(164)	(180)	(195)	(208)	(221)	(234)
	562	**544**	**502**	**439**	**492**	**539**	**584**	**625**	**664**	**702**
(+) Depreciation	485	514	545	577	612	649	688	729	773	819
(+) Changes in deferred taxes	22	22	22	22	22	22	22	22	22	22
(-) Working Capital Variation	(56)	(62)	(68)	(75)	(82)	(91)	(100)	(110)	(121)	(133)
(-) CAPEX	(769)	(791)	(814)	(839)	(864)	(891)	(919)	(949)	(979)	(1 011)
(-) Other Investments in fixed assets	(55)	(55)	(55)	(55)	(55)	(55)	(55)	(55)	(55)	(55)
FCFF	**189**	**172**	**131**	**70**	**124**	**173**	**219**	**263**	**304**	**344**
g rate		*-8,8%*	*-23,7%*	*-46,5%*	*76,8%*	*39,8%*	*26,5%*	*19,7%*	*15,8%*	*13,2%*

DCF

(€m)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
FCFF	189	172	131	70	124	173	219	263	304	344
Perpetuity										**12 647**
g rate										2,03%
´@ WACC	4,81%									
`@ Discount Factor	95%	91%	87%	83%	79%	75%	72%	69%	66%	63%
										60%
(=) Discounted Cash Flows	180	157	114	58	98	131	158	180	199	7 749
(=) Value of Operations	**9 024**									

Table 33 - Equity Value

Equity Value	
	2017
Value of Operations	9 024
(+) Excess Market Securities	-
(=) EV	9 024
(-) Net Debt (end of 2016)	(2 619)
(=) Equity Value	6 405,14
Shares outstanding	872 308 162
Value per Share	**7,34**

5.4.5.2.Free Cash-Flow to Equity

Using the FCFE model based on the assumptions an equity value of €6.500m, translating it in a price per share of €7.45. The increases in CF's are as well mostly due to increase in the revenues based on the company portfolio and industry growth.

Table 34 - Free Cash Flow to Equity, DCF and Equity Value

Free Cash Flow to Equity (FCFE)

(m€)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Net Income	299	281	239	177	229	277	321	362	401	439
(+) Depreciation	485	514	545	577	612	649	688	729	773	819
(-) Investment in Working Capital	(56)	(62)	(68)	(75)	(82)	(91)	(100)	(110)	(121)	(133)
(-) CAPEX	(769)	(791)	(814)	(839)	(864)	(891)	(919)	(949)	(979)	(1 011)
(-) Principal Repayments	(246)	(267)	(276)	(287)	(294)	(287)	(295)	(303)	(308)	(313)
(+) New Debt Issues	240	329	358	298	423	381	439	500	550	584
FCFE	**(47)**	**4**	**(16)**	**(149)**	**23**	**37**	**134**	**229**	**316**	**386**

DCF

(m€)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
FCFE	(47)	4	(16)	(149)	23	37	134	229	316	386
Perpetuity										10 282
g rate										2,03%
´@ Ke	5,86%									
`@ Discount Factor	94%	89%	84%	80%	75%	71%	67%	63%	60%	53%
(=) Discounted Cash Flows	3	(14)	(118)	17	26	90	146	189	206	5 702
(=) Equity Value	**6 248**									

Equity Value

	2017
Value per Share	**7,16**

5.4.5.3. Dividend-Discount Model

As stated in the EDPR's 2015-2020 business plan, dividends are planned to grow 25% until 2020. The company's policy on dividend distribution is to reflect the real state of the company. With this assumption in mind and following the historic average, a 6% growth per year was conjectured for the following years after the end of the business plan. This methodology outputs a share price of €6.22. It's important to realize that this value is somewhat smaller than the ones found in the FCFF and FCFE models. Although the assumption that dividends are reflecting the company's performance, it is still unclear the direction those dividends are going to take, i.e., a decrease in the dividend growth might mean more investment to create larger dividends in the future.

Table 35 - Dividend Discount Model

Dividend Discount Model

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
DDM	193	190	187	182	193	205	217	230	244	258
Terminal Value										6 890
g rate										2,033%
´@ Ke	5,86%									
`@ Discount Factor	94%	89%	84%	80%	75%	71%	67%	63%	60%	57%
(=) Discounted Cash Flows	183	169	158	145	145	145	146	146	146	4 045
(=) Equity Value	**5 428**									

Equity Value

	2017
Value per Share	**6,22**

5.4.6. Multiples results

In order to implement a relative valuation, a suitable peer group is in order: as EDPR is a renewable energy company, a fair comparison would be with other firms doing business in the same area of expertise. For such effect, the RENIXX30 was chosen. This in an index which compiles the 30 biggest companies in the renewable

energy sector my market capitalization. As introduced before in this dissertation, the RENIXX30 is highly diverse and in order to produce comparable and logical results, the multiples used were the EV/EBITDA, EV/Revenues and Price/CF per share.

5.4.6.1. EV/EBITDA

Overall, EDPR is quite well placed, in the top of the 50th percentile. To further enhance EDPR's peer group, and adjustment was made in such way it would only consider firms who also belong to the same quartile. Further estimates will exclude either the 1st or the 4th quarter of the sample, so as to calculate a more optimistic or conservative scenario.

Table 36 - EV/EBITDA multiples comparison

Company Name	EV / EBITDA
Tesla Motors Inc	65,60
Bourbon SA	20,61
Innergex Renewable Energy	18,64
Brookfield Renewable LP	17,63
Xinjiang Goldwind Science & Tech Co. Ltd	11,24
Ormat Technologies Inc	10,54
Solaredge Technologies Inc	9,44
CGG SA	9,30
EDP Renovaveis SA	9,25
China High Speed Group Co.	9,20
Albioma SA	8,76
Dong Energy A/S	8,52
Verbund AG	8,40
Gamesa Corporacion Tech	8,30
Nordex SE	6,86
Vestas Wind Systems A/S	5,99
China Longyuan Power	5,81
SMA Solar Technology AG	4,58
JinkoSolar Holding Co Ltd	2,32
JA Solar Holdings Co Ltd	2,27
First Solar Inc	-3,59
REC Silicon ASA	-4,01
Plug Power Inc	-5,42
SunPower Corp	-9,18
Canadian Solar Inc	-19,53
Sunrun Inc	-24,95
Meyer Burger Technology	-33,39
SolarCity Corp	n.a.
Trina Solar Ltd	n.a.
Yingli Green Energy Holding Co Ltd	n.a.

Statistics	
Median	8,30
Mean	5,30
Low	-33,39
25th percentile	-0,66
75th percentile	9,37
High	65,60
Standart deviation	17,44
Skewness	0,95

Results	
EDPR Revenue	1 780,32
EV	9 441,20
Net Debt	(2 619)
Equity Value	6 821,89
Price per Share	7,82

Adjusted measures	
Median	8,30
Mean	6,89
Low	2,27
25th percentile	5,81
75th percentile	8,76
High	9,30
Standart deviation	2,53
Skewness	-0,92

EDPR Revenue	1 780,32
EV	12 263,98
Net Debt	(2 619)
Equity Value	9 644,67
Price per Share	11,06

Before the adjustment, EDPR's share price stood on €7,82, which is in line with previous models. However, with the adjustment the value increases substantially to

€11.06. This is mainly due to a smaller standard deviation in the center quartile when compared to the whole sample.

5.4.6.2.EV/Revenues

In the global comparison with its peer group, EDPR stand on the top 25% when it comes to EV/Revenue. Again, there is an increase in price when comparing the whole sample with the adjusted one, due to the heterogeneity of the sample, and its variance.

Table 37 - EV/Revenues multiple comparison

Company Name	EV / REVENUES
Innergex Renewable Energy	14,41
Brookfield Renewable LP	9,77
EDP Renovaveis SA	6,11
China High Speed Group Co.	5,70
Tesla Motors Inc	5,62
Ormat Technologies Inc	5,18
Sunrun Inc	3,94
Plug Power Inc	3,21
Verbund AG	3,05
Albioma SA	3,04
Canadian Solar Inc	2,59
Bourbon SA	2,45
Dong Energy A/S	2,21
Xinjiang Goldwind Science & Tech Co. Ltd	2,15
China Longyuan Power	1,61
REC Silicon ASA	1,61
Solaredge Technologies Inc	1,31
SunPower Corp	1,02
Vestas Wind Systems A/S	0,99
Gamesa Corporacion Tech	0,99
CGG SA	0,83
Meyer Burger Technology	0,81
Nordex SE	0,58
SMA Solar Technology AG	0,55
First Solar Inc	0,52
JinkoSolar Holding Co Ltd	0,37
JA Solar Holdings Co Ltd	0,29
SolarCity Corp	n.a.
Trina Solar Ltd	n.a.
Yingli Green Energy Holding Co Ltd	n.a.

Statistics	
Median	2,15
Mean	3,00
Low	0,29
25th percentile	0,91
75th percentile	3,58
High	14,41
Standart deviation	3,21
Skewness	2,18

Results	
EDPR EBIT	748,84
EV	2 243,94
Net Debt	(2 619)
Equity Value	-375,37
Price per Share	-0,43

Adjusted measures	
Median	5,70
Mean	7,25
Low	1,31
25th percentile	2,21
75th percentile	5,62
High	14,41
Standart deviation	3,38
Skewness	1,98

EDPR EBITDA	1 211,42
EV	8 779,08
Net Debt	(2 619)
Equity Value	6 159,77
Price per Share	7,06

5.4.6.3.Price/CF per share

Similarly to EV/EBITDA, EDPR stands in the 2nd quartile when it comes to Price/CF per share. However, when comparing the results for the adjusted and non-adjusted peer group, the difference in price is much smaller. This is due to the mean belonging of both the adjusted and non adjusted calculations being very similar.

Table 38 - Price/CF per share

Company Name	Price / CF Per Share
Tesla Motors Inc	54,06
Canadian Solar Inc	18,96
Solaredge Technologies Inc	15,35
Xinjiang Goldwind Science & Tech Co. Ltd	13,61
Ormat Technologies Inc	11,79
Innergex Renewable Energy	11,52
CGG SA	11,11
Gamesa Corporacion Tech	9,73
Nordex SE	9,57
EDP Renovaveis SA	8,16
Dong Energy A/S	8,10
Vestas Wind Systems A/S	7,52
China Longyuan Power	7,27
SMA Solar Technology AG	6,72
Verbund AG	6,62
Brookfield Renewable LP	6,52
Bourbon SA	6,51
Albioma SA	5,73
First Solar Inc	5,27
China High Speed Group Co.	4,36
JinkoSolar Holding Co Ltd	1,32
JA Solar Holdings Co Ltd	0,97
Sunrun Inc	-4,21
Plug Power Inc	-4,65
SunPower Corp	-6,96
REC Silicon ASA	-7,05
Meyer Burger Technology	-13,98
SolarCity Corp	n.a.
Trina Solar Ltd	n.a.
Yingli Green Energy Holding Co Ltd	n.a.

Statistics	
Median	6,72
Mean	7,18
Low	-13,98
25th percentile	2,84
75th percentile	10,42
High	54,06
Standart deviation	11,96
Skewness	2,11

Results	
EDPR CF	943,54
EV	6 776,72
Price per Share	7,77

Adjusted measures	
Median	6,72
Mean	7,08
Low	4,36
25th percentile	6,51
75th percentile	8,10
High	9,73
Standart deviation	1,56
Skewness	0,19

EDPR CF	943,54
EV	6 683,17
Price per Share	7,66

5.5.Different scenarios comparison and resume

This section intends to illustrate a summary for the results obtained in the above subchapters and include both a conservative and a optimistic scenario based on the results already presented.

Table 39 -EV/EBITDA scenarios

EV/EBITDA		
Conservative	**Base**	**Optimistic**
6,79	8,60	9,35
9 471	12 683	14 027
10,86	14,54	16,08

The base case for EV/EBITDA excludes the 1st and 4th quartile of the whole sample, as for the conservative and optimistic include only the 4th and the 1th (respectively) quartiles. Furthermore it's important to mention that, due to its large difference facing the other companies, Tesla motors was excluded for these calculations, so as not to create an upward bias towards the valuation, and hence an overpriced share.

Table 40 - EV/Revenues scenarios

EV/Revenues		
Conservative	**Base**	**Optimistic**
1,51	7,25	8,32
-791	6 160	7 461
-0,91	7,06	8,55

For EV/Revenues, the base case includes only the 1st quartile (where EDPR is included). The conservative scenario excludes the 4th quartile. For the optimistic scenario, the 4th quartile of the already selected 1st quartile is excluded.

Table 41- Price/CF per share scenarios

Price/CF per share		
Conservative	**Base**	**Optimistic**
0,13	7,08	13,15
122	6 683	12 410
0,14	7,66	14,23

The Price/CF per share base case compiles the mid quartile, where the company is included. The conservative and optimistic scenarios exclude the 1st or the 4th (respectively) quartiles. Similar to EV/EBITDA, Tesla Motors was excluded for clearly being an outlier.

5.6.Sensitivity Analysis

Until now, assumptions were made to estimate the value and share price of EDPR. However these assumptions are not perpetual, meaning that, even if they are accurate today, they may change over time. For the sake of an unexpected turn of events, sensitivity analysis is to be used in order to assess how the enterprise value and the share price react to the change of different variables and scenarios.

5.6.1. Single variables

On the Financials side, there is some sensitivity in terms of price share across changes in WACC and cost of equity, which is always expected in such exercises. The major outline is that share price isn't particularly affected by decreases in WACC, but there is some movement when WACC increases. On another note, the cost of equity seems to affect more the equity value and the price per share, registering a 10% increase when the tested variable moves 5bps.

Table 42 - Single-variable sensitivity analysis on Financials

FCFF		
WACC	**Equity Value**	**Value per Share**
3,79%	12 231	14,02
4,29%	8 710	9,99
4,79%	6 476	7,42
5,29%	4 937	5,66
5,79%	3 813	4,37
FCFE		
Ke	**Equity Value**	**Value per Share**
4,83%	8 312	9,53
5,33%	7 153	8,20
5,83%	6 296	7,22
6,33%	5 635	6,46
6,83%	5 110	5,86
DDM		
Ke	**Equity Value**	**Value per Share**
4,83%	7 501	8,60
5,33%	6 334	7,26
5,83%	5 475	6,28
6,33%	4 818	5,52
6,83%	4 298	4,93

For the Operational side, EBITDA/Revenues cause a considerable impact in both enterprise value and share price for both FCFF and FCFE as it is expected in such exercise. Also, changes in the load factor also affect the predictions, with variations around 10%.

Operational

EBITDA/Revenues

		Base Case				
FCFF	**bps**	65,69%	69,33%	72,98%	76,63%	80,28%
EV	**9024,45**	8122,00	8573,22	9024,45	9475,67	9926,89
Equity Value	**6405,14**	5764,62	6084,88	6405,14	6725,40	7045,65
Price per Share	**7,34**	6,61	6,98	7,34	7,71	8,08

FCFE	**bps**	65,69%	69,33%	72,98%	76,63%	80,28%
Equity Value	**6248,07**	5623,27	5935,67	6248,07	6560,48	6872,88
Price per Share	**7,16**	6,45	6,80	7,16	7,52	7,88

Load Factor

FCFF	**bps**	5,40%	5,70%	6,00%	6,30%	6,60%
EV	**9024,45**	8122,00	8573,22	9024,45	9475,67	9926,89
Equity Value	**6405,14**	5764,62	6084,88	6405,14	6725,40	7045,65
Price per Share	**7,34**	6,61	6,98	7,34	7,71	8,08

FCFE	**bps**	5,40%	5,70%	6,00%	6,30%	6,60%
Equity Value	**6248,07**	5623,27	5935,67	6248,07	6560,48	6872,88
Price per Share	**7,16**	6,45	6,80	7,16	7,52	7,88

5.7.Valuation Resume

This section sums up all the share prices estimated through the different valuation methods using along this dissertation. The minimum and maximum prices presented in each model are calculated using the average of the respective case in the sensitivity analysis.

Also, it is presented some statistics regarding each method, taking into account the specificities of the methodologies and peer groups used. On the right, the same statistics are presented using the full sample.

Table 43 - Share price across models

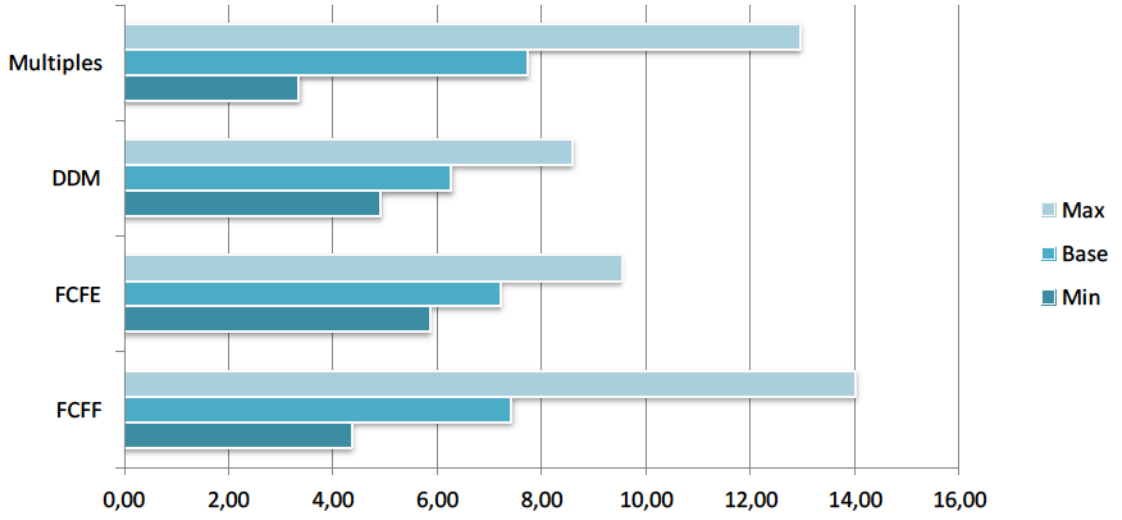


Table 44- Share price per method (averaged)

Price per Share per method (averaged)				
	Min	Base	Max	
FCFF	4,37	7,42	14,02	
FCFE	5,86	7,22	9,53	
DDM	4,93	6,28	8,60	
Multiples	3,36	7,73	12,95	
Statistics				**Full Sample**
Median	4,65	7,32	11,24	7,32
Mean	4,63	7,16	11,28	7,69
Low	3,36	6,28	8,60	3,36
25th percentile	5,16	7,50	13,22	8,83
75th percentile	4,12	6,98	9,30	5,63
High	5,86	7,73	14,02	14,02
Standart deviation	1,04	0,63	2,62	3,23
Skewness	-0,10	-1,33	0,03	0,84

We can observe some coherence along the models, with exception for the conservative and optimistic cases of the multiples valuation, partially influenced by the heterogeneity of the peer group. Above, it is presented the overview statistics for all the methods used. On average, the fair price for EDPR is €7.16. The price stands now at €6.80[9], which

[9] Price obtained in Reuters at 15/08/2017

means that the "fair price" stands 5% above the traded price and henceforth the recommendation is for a clear *buy*.

5.8. Comparison with other valuations

The purpose of this chapter is to compare how this dissertation's valuation compares with the ones made by professional analysts working in investment banks, which will serve has benchmarks. It's important to mention that these reference points are estimated taking into account a 5 year horizon while this dissertation comprehends 10 years of forecasted periods. Also, for the Morgan Stanley Valuation, WACC is estimated by using the last 5 years average for Debt/Equity ratio, while this dissertation uses all the historical data since EDPR's IPO. Macquire Research does not make available the WACC used.

Table 45 - Valuation Comparison

	Thesis			01/08/2016	Morgan Stanley			14/03/2017	Macquire Research			19/01/2017
Veridict	Outperform				Buy				Neutral			
Fair Value	7,16				8,1				6,2			
BS (€m)	**2017**	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**
Assets	18 153	18 173	18 213	18 226	17 196	17 428	18 285	18 592	17 239	17 810	18 230	18 715
Equity	8343	8228	8152	7999	5 972	6 435	6 610	6 833	7 806	8 062	8 214	8 276
Liabilities	9810	9944	10061	10227	11 224	10 993	11 675	11 759	9 433	9 748	10 016	10 439
IS (€m)	**2017**	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**
EBITDA	1 211	1 217	1 192	1 141	1 295	1 385	1 482	1 576	1 291	1 369	1 450	1 499
Capex&CF (€m)	**2017**	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**
CAPEX	769	791	814	839	877	1 156	1 020	924	999	1 008	718	718
CFO					953	997	1 053	1 154	1 040	1 074	1 165	1 266
Net Debt	2 619	2 746	2 846	2 953	4 323	4 510	4 073	4 073	4 567	4 307	4 700	5 202
WACC	4,79%				6%				n.a.			
EV	9 310				11 092				10 328			
Equity Value	6 296				7 030				7 806			
Share Price	7,16				8,1				6,2			

Overall, there seems to be mixed feelings between several investment banks on whether this stock is a good investment or an uncertain one. The overall estimated share price range across 17 analysts is €5.90-€8.10, which places this dissertation's fair price around the average.

6. Conclusion

The main purpose of this dissertation was to properly evaluate EDP Renewables' equity and reach a final price per share which would serve as a recommendation for potential investors.

The second objective was to see if, using theoretical models and carefully thought assumptions would lead to similar recommendations when compared to other analysts valuations.

As a result of a thorough analysis of the micro and macro environment of EDP Renewables 'environment, industry, economy and to the company's financial and operational data, a solid model was constructed where all the approaches followed points to the same conclusion: a OUTPERFORM recommendation headed for EDPR share. The estimated price by those models indicates that the fair share value of EDPR is €7.16, above of the current trading price of €6.80. The direction and recommendation of this dissertation matches the ones seen in several investment banks.

The beliefs about the renewable energy Industry are promising, given the data presented in this dissertation. EDPR has the portfolio, know-how and human assets to take advantage of this thriving industry and to mark its position deeply in the market as a top player.

Technical analysis showed that the company is undervalued which, adding to the assumptions made, makes EDPR a good mid/long term investment opportunity.

7. Annexes

Commodity prices	Source	Unit	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Coal	EDPR	$/ton	94,0	101,0	112,0	123,1	134,2	137,3	140,4	143,6	146,9	150,3
Brent	EDPR	$/bbl	97,7	98,4	104,7	109,2	113,9	122,8	132,1	141,8	151,8	162,1
CO2	EDPR	€/ton	7,4	14,1	17,1	19,6	22,2	23,6	25,1	26,7	28,4	30,2
Fuel	EDPR	$/ton	558,3	562,4	599,5	625,7	652,8	705,2	759,5	815,8	874,1	934,4

Pool price and spreads	Source	Unit	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Pool Price - Portugal	EDPR	€/MWh	57,9	65,5	71,1	74,2	77,4	73,9	78,0	82,3	86,7	91,4
Pool Price - Spain	EDPR	€/MWh	57,9	65,5	71,1	74,2	77,4	73,9	78,0	82,3	86,7	91,4
Pool Price - USA	EDPR	€/MWh	34,7	39,3	42,7	44,5	46,4	44,3	46,8	49,4	52,0	54,8
Pool Price - Brazil	EDPR	R/MWh	206,6	172,8	154,4	154,4	154,4	154,4	154,4	154,4	154,4	154,4

Net Generation	Source	Unit	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Portugal	EDP	GWh	49 972	50 699	51 476	52 337	53 252	54 115	55 029	56 019	57 334	58 417
Spain	EDP	GWh	263 708	269 198	276 142	280 598	285 130	289 557	294 398	299 411	304 605	311 328

Electricity Demand/consumption	Source	Unit	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Portugal	EDPR	GWh	45 187	46 006	46 861	47 736	48 631	49 419	50 253	51 158	52 359	53 347
Spain	EDPR	GWh	229 368	233 268	237 233	241 266	245 368	249 373	253 755	258 292	262 992	267 976
Brazil	EDPR	GWh	28 058	29 112	29 910	30 889	31 901	32 947	33 935	34 953	36 002	37 082
USA	Energy Outlook 2017	GWh	3 998 309	4 060 269	4 108 257	4 142 981	4 168 050	4 207 959	4 254 507	4 301 674	4 343 326	4 384 828

EDPR Business Plan 2015-2020

Strategy	Unit	Increase 2016-2020
Prioritize Investments in core markets	n.a.	n.a.
Invest in growth opportunities	bn€	€4,8bn

Capacity Additions	Unit	2015	2016-2020 (?%;GW)	Total (%;GW)	% Increase
North America	GW	4,2	65%	7,0	65%
Europe	GW	5,0	13%	5,6	13%
Portugal	GW	1,2	20%	1,4	16%
Spain	GW	2,2	10%	2,3	5%
RoE	GW	1,5	30%	1,8	20%
Brazil	GW	0,1	38%	0,5	453%

Operational		Increase 2016-2020 (%;GW)
Load Factor (excluding Brazil)	%	6%
Production (TWh)	%	10%
OPEX	%	-3%
EBITDA	%	8%
Net Profit	%	16%
Dividends	%	25%

Number of Shares		#	872308162
Debt Structure			
Loans			
EDP		%	0,74
Other Financial Institutions		%	0,26
Interest Rate			
Fixed		%	0,9
Variable		%	0,1
Maturity			
	2016	%	0,09
	2017	%	0,05
	2018	%	0,4
	? 2019	%	0,46
Cost of Debt			
	2015	%	0,042
	2014	%	0,052

Consolidated Balance Sheet (€m)

Assets (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Property, plant and equipment, net	7 053	8 635	9 982	10 455	10 537	10 095	11 013	12 612	13 437	14 925	14 877	14 845	14 781
Intangible assets and goodwill, net	1 395	1 336	1 367	1 334	1 327	1 301	1 405	1 534	1 596	1 687	1 704	1 721	1 738
Financial Investments, net	53	60	64	61	57	346	376	340	348	369	369	369	369
Deferred tax asset	22	28	39	56	89	109	46	47	76	121	121	121	121
Inventories	12	11	24	24	16	15	21	23	24	28	28	28	28
Accounts receivable - trade, net	83	106	144	146	180	202	146	222	266	315	316	317	318
Accounts receivable - other, net	512	637	757	750	800	655	859	338	338	320	352	388	427
Financial assets at fair value through profit and loss	36	37	36	0	0	0	-	-	-	-	-	-	-
Collateral deposits	-	-	-	-	49	78	81	73	46	31	31	31	31
Assets held for sale	1	-	-	-	-	-	-	110	-	-	-	-	-
Cash and cash equivalents	230	444	424	220	246	255	369	437	603	357	375	394	413
Total Assets	**9 397**	**11 294**	**12 835**	**13 045**	**13 302**	**13 058**	**14 316**	**15 736**	**16 734**	**18 153**	**18 173**	**18 213**	**18 226**

Equity (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Share capital + share premium	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914	4 914
Reserves and retained earnings	89	192	274	325	384	623	742	891	1 155	1 334	1 336	1 337	1 340
Consolidated net profit attrib. to equity holders of the parent	104	114	80	89	126	135	126	167	56	51	56	59	65
Non-controlling interests	83	107	126	127	325	418	549	863	1 448	2 045	1 923	1 842	1 680
Total Equity	**5 190**	**5 328**	**5 394**	**5 454**	**5 749**	**6 089**	**6 331**	**6 834**	**7 573**	**8 343**	**8 228**	**8 152**	**7 999**

Liabilities (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Financial Debt	1 462	2 673	3 534	3 826	3 874	3 666	3 902	4 220	3 406	2 955	2 834	2 682	2 568
Institutional Partnership	895	920	1 009	1 011	942	836	1 067	1 165	1 520	1 717	1 786	1 858	1 932
Provisions	51	67	54	58	64	65	99	121	275	275	303	333	366
Deferred Tax liability	303	343	372	381	381	367	270	316	365	365	380	395	411
Deferred revenues from institutional partnerships	202	434	635	773	738	672	735	791	819	862	862	862	862
Other liabilities	1 293	1 529	1 839	1 542	1 555	1 363	1 912	2 288	2 776	3 635	3 781	3 932	4 089
Total Liabilities	**4 206**	**5 966**	**7 442**	**7 591**	**7 553**	**6 969**	**7 986**	**8 902**	**9 161**	**9 810**	**9 944**	**10 061**	**10 227**
Total Equity and Liabilities	**9 397**	**11 294**	**12 835**	**13 045**	**13 302**	**13 058**	**14 316**	**15 736**	**16 734**	**18 153**	**18 173**	**18 213**	**18 226**

Installed Capacity (MW)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Spain	1 692	1 861	2 050	2 201	2 310	2 194	2 194	2 194	2 194	2 194	2 228	765	2 294
Portugal	553	595	599	613	615	619	624	1 247	1 251	1 257	1 320	1 363	1 447
France	185	220	284	306	314	322	340	364	388	413	420	425	435
Belgium	47	57	57	57	57	71	71	71	71	71	75	78	84
Poland		120	120	190	190	370	392	468	418	418	465	497	560
Romania			90	285	350	521	521	521	521	521	556	578	624
Italy	-	-	-	-	40	70	90	100	144	207	178	159	120
Europe	**2 477**	**2 853**	**3 200**	**3 652**	**3 876**	**4 167**	**4 231**	**4 965**	**4 986**	**5 082**	**5 243**	**3 865**	**5 565**
US	1 923	2 624	3 224	3 422	3 637	3 476	3 805	4 203	4 631	5 193	5 810	6 202	6 984
Canada	-	-	-	-	-	30	30	30	30	30	37	41	50
Mexico	-	-	-	-	-	-	-	-	200				
North America	**1 923**	**2 624**	**3 224**	**3 422**	**3 637**	**3 506**	**3 835**	**4 233**	**4 861**	**5 223**	**5 847**	**6 242**	**7 034**
Brazil		**14**	**14**	**84**	**84**	**84**	**84**	**84**	**204**	**204**	**290**	**348**	**464**
Total EBITDA MW	**4 400**	**5 491**	**6 437**	**7 157**	**7 597**	**7 756**	**8 149**	**9 281**	**10 052**	**10 509**	**11 380**	**10 456**	**13 062**