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Equity Valuation: EDP – Energias de Portugal, S.A

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Master in Finance

Supervisor:
PhD Pedro Manuel de Sousa Leite Inácio, Assistant Professor, ISCTE-Iul

November, 2021

BUSINESS
SCHOOL

Department of Finance

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Acknowledgement

I would like to express my eternal gratitude to my parents Alcina Rafael and Carlos Rafael whose efforts made the realization of this dream of mine possible. For these last five years, they were my support for the worst and best times. To all my friends and family who supported me and incentivized me during these challenging times I deeply appreciate you. To my supervisor Prof. Pedro Inácio I thank you for all the help and inspiration provided as a supervisor and a professor. And to all the professors along this journey who inspired me to strive for excellence, I will be forever grateful.

Resumo

A EDP, S.A. é uma empresa portuguesa, verticalmente integrada, presente em toda a cadeia de valor da eletricidade e na atividade de comercialização de gás. O principal objetivo deste projeto é calcular o justo valor da ação da EDP - Energias de Portugal, S.A. em 31 de dezembro de 2020 e, em última análise, compará-lo com o preço de mercado.

Após uma extensa revisão teórica dos principais métodos de avaliação de empresas e contabilizando as preferências dos profissionais e adequação dos métodos à empresa em estudo, os métodos escolhidos para o cálculo foram o Fluxos de Caixa Descontados e a Avaliação dos Múltiplos. Além disso, foi realizada uma análise de sensibilidade de forma a ter em conta possíveis variações nos fatores-chave da avaliação.

Embora esta avaliação seja realizada exaustivamente e cuidadosamente, tendo em consideração as últimas informações quantitativas e qualitativas e a literatura mais impactante sobre o assunto, será, ainda assim, um assunto discutível, devido à natureza dos exercícios de avaliação de empresas.

Os resultados dos métodos de avaliação aplicados são coerentes e sugerem que o justo valor das ações da EDP é superior ao seu valor de mercado em 31 de dezembro de 2021.

Palavras Chave: EDP; Energia; Avaliação de Empresas; Fluxos de Caixa; Múltiplos

JEL Classification: G30; G32

Abstract

EDP S.A. is a Portuguese company, vertically integrated, present in the entirety of the electricity value chain and gas commercialization activity.

The purpose of this project is to compute the fair equity value of EDP – Energias de Portugal, S.A on the 31st of December of 2020 and ultimately compare it to the market price.

Following an extensive theoretical review of the main equity valuation methods and accounting to practitioners' preferences and overall fit to the company in study, the methods chosen were the Free Cash Flow to the Firm and Relative Valuation. Furthermore, a sensitivity analysis was carried to take into account possible variations in key drivers of the valuation.

Although the valuation will be thoroughly and carefully done, taking into consideration the newest quantitative and qualitative information and the most impactful literature on the subject, it will nonetheless still be a debatable subject, due to the nature of equity valuation exercises.

The outcome of the valuation methods applied are coherent and suggest that the fair value of EDP's shares is higher than its market value as of 31st of December 2021.

Keywords: EDP; Energy; Corporate Valuation; Discounted Cash Flows; Multiples

JEL Classification: G30 (Corporate Finance and Governance: General); G32 (Corporate Finance and Governance: Value of Firms)

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List of Abbreviations

B2C – Business to consumer

CAGR – Compound Annual Growth Rate

CAPEX – Capital Expenditures

CNMC – Comisión Nacional de los Mercardos y Competencia

EBIT – Earnings Before Interest and Taxes

EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization

EDP – EDP, S.A.

EV – Enterprise Value

EV/EBITDA – Enterprise Value to EBITDA

FCFE – Free Cash Flow to the Equity

FCFF – Free Cash Flow to the Firm

GDP – Gross Domestic Product

GHG – Green House Gases

HHI - Herfindahl-Hirschman Index

IEA – International Energy Agency

IRENA - International Renewable Energy Agency

KwH - Kilowatt-hours

Mtoe – Million Tonnes of Oil Equivalent

NOA – Net Operating Assets

NOPLAT – Net Operating Profit Less Adjusted Taxes

P/E – Price to Earnings Ratio

ROI – Return on Investment

STEPS - Stated Policies Scenario

TwH – Terawatt - hour

WEO – World Energy Outlook

Introduction

Equity valuation is a core topic in Finance due to its wide range of purposes from portfolio management to corporate finance.

This report intends to estimate the fair value of EDP S.A stock as 31 December 2020. The price is then compared with the actual price of closing on the beforementioned date.

EDP – Energias de Portugal, S.A is a vertically integrated, Portuguese utility company, being present throughout the entirety of the electricity value chain meaning that they produce, distribute, and supply energy. Furthermore, is also present in gas commercialization activity. Its activity is spread through 19 countries, separated into 4 different continents. EDP is an innovative and disruptive company, with the vision of being a global energy company, while leading the current energy transition. In that context, this project assumes additional interest since it values a company actively tackling such an important and interesting problem.

The project initiates with a literature review, where the most relevant valuation methods are presented. The duality of equity valuation where is needed quantitative and qualitative information to combine a precise forecast and an appropriate valuation model provides an intriguing intellectual challenge when trying to capture the fair value of an asset.

Following the literature review, a market and industry outlook is presented, where market conditions and industry trends are explored. The industry is currently suffering fast and profound transformations while working towards a more electric and less carbon-heavy energy system. The energy transition currently undergoing is quite fascinating and is of major importance for present and future generations.

The final chapter approaches Valuation. In this chapter, the best-fitted methods exploited in the literature review are applied, more specifically the Free Cash Flow to the Firm and Relative valuation. Furthermore, all assumptions required to perform the valuation are described and a sensitivity analysis is performed.

1.Literature Review

"Valuation can be considered the heart of finance" (Damodaran, 2006, p. 3).

Valuation has an important role in core areas of finance, such as corporate finance, portfolio management, mergers, and acquisitions. Every asset can be valued, although some assets present themselves to be more challenging to evaluate (Damodaran, 2012). Equity valuation theory presumes that the fair value of a publicly-traded stock can be different from market price, being the fair value defined as the value of an asset if theoretically all investment traits are known (Pinto, Henry, Robinson, & Stowe, 2015).

When observing the different techniques, used to evaluate different assets, there are similarities in the basic principles of valuation (Damodaran, 2012), such as cash, timing, and risk (Luehrman, 1997). Damodaran (2012), reckons that professionals and academics employ a broad range of models, some more complex than others, and considers that there are four different approaches to valuation: the discounted cash flows valuation, the relative valuation, the contingent claim valuation, and the asset-based valuation. Knowing these methods in-depth has a huge importance since it allows to pinpoint sources of value creation and destruction in the company (Fernández, 2007).

Uncertainty is inherent to equity valuation, independently of the valuation approach (Pinto et al., 2015). Even conjugating a well though, precise and accurate forecast, risk adjustments, and an appropriate valuation model, the positive outcome of the valuation exercise is not guaranteed (Pinto et al., 2015) since assumptions about the future of the company and economy are made and cash flows and discount rates are estimated (Damodaran, 2012).

There is no linear regularly applicable method, but rather a range of appropriate methods, that combined with quantitative and qualitative knowledge can provide a well theoretically supported estimate of fair value (Schmidlin, 2014).

1.1 Discounted Cash Flow Valuation

The reasoning behind discounted cash flow valuation is that the value of an asset can be discovered by computing the present value of all expected cash flows on that asset. This task is done by discounting the expected cash flows at a rate that reflects their riskiness (Damodaran, 2006).

This method is considered the foundation in which all the other valuation approaches are constructed (Damodaran, 2012), the only one that is conceptually correct (Fernández, 2007), and one of the most used by academics (Damodaran, 2006).

The cash flows are usually computed in a period between five and ten years and are commonly assumed to grow at a constant rate after this period, known as terminal value (Schmidlin, 2014).

Although there is an abundant number of discounted cash flow models, the se can only vary in a limited number of aspects (Damodaran, 2012). The valuation can be performed from two different angles: valuing only the equity stake in the business, equity valuation, or the value of the entirety of the business, Firm Valuation (Damodaran, 2012). This method is particularly appropriate for companies with a more linear business strategy (Schmidlin, 2014).

1.1.1 Free Cash Flow to Equity (FCFE)

In equity valuation models, such as the Free Cash Flow to Equity, the focus is on the equity inv estors of a business and how to value their stake. This goal is accomplished by discounting the expected cash flows to equity investors, at a rate of return that reflects the equity risk in the company (Damodaran, 2006), meaning that the discount rate is only reflecting the cost of equity financing (Damodaran, 2012).

The FCFE formula can be written as:

$$FCFE = Net\ Income + D\&A - CAPEX - \Delta WC + Debt\ Repayments \quad (1)$$

where:

D&A – Depreciation and Amortizations;

CAPEX – Capital Expenditures;

ΔWC – Changes in Working Capital;

The Free Cash Flow to Equity Model is not very divergent from the Dividend Discount Model. Instead, it discounts potential dividends instead of the actual dividends (Damodaran, 2006) .

1.1.2 Free Cash Flow to the Firm – FCFF

The Free Cash Flow to the Firm model, values the entire business (Damodaran, 2012). The Free Cash Flow to the Firm is the aggregate of the cash flows to all claim holders in the firm (Damodaran, 2012). Free Cash Flow to the Firm, is considered the favorite method of professionals and academics because it relies uniquely on the cash flow (Koller et al., 2015).

The discount rate in this method is known as the Weighted Average Cost of Capital (WACC), which is the cost of the sources of financing utilized by the company, according to their proportion (Damodaran, 2012).

The formula for the FCFF can be written as:

$$FCFF = EBIT\ (1 - T) + D\&A - CAPEX - \Delta WC \quad (2)$$

Where:

EBIT = Earnings before Interest and Tax;

T = Corporate Tax Rate;

D&A = Depreciation and Amortization;

CAPEX = Capital Expenditures;

Δ WC = Changes in Working Capital;

In the Free Cash Flow to the Firm method, to compute the firm's value is necessary to make some adjustments.

$$Value\ of\ the\ Firm = \sum_{t=1}^{n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{TV_n}{(1 + WACC)^n} \quad (3)$$

Where:

$FCFF_t$ = Free Cash Flow to the Firm in the time period, period 1 to n;

TV_n = Terminal Value at the end of the time period;

WACC = Weighted Average Cost of Capital;

1.1.2.1 Weighted Average Cost of Capital - WACC

"For financial management to make wealth maximizing capital budgeting decisions, a model that will determine correctly the market value of a project's levered cash flows is required" (Miles & Ezzell, 1980,p.719).

Managers are advised to valuate an investment by comparing the investment required and the present value of the expected cash flows (Fama & French, 1997). Present value of future cash flows is obtained by discounting expected cash flows at a rate, WACC, which represents the cost of different financing components, weighted by their market value share (Damodaran, 2012).

The weighted average cost of capital is defined by (Koller et al., 2015) as the return that investors, both debt and equity, expect to earn for their investment.

Fernandez (2019) possesses a slightly different view, defining WACC as the weighted average of a cost, the cost of debt, and a required return, the required return to equity, that is commonly referred as cost of equity, in a wrongful way, since there is a difference between a cost and a required return.

The weighted average cost of capital is constructed by three elements: the cost of equity, the after-tax cost of debt and the company's target capital structure (Koller et al., 2015).

The assumption that the cost of capital is constant over the life of the investment, is commonly made (Pratt, 2002), and is not the same through the entire company, since each business unit should have a different WACC (Arzac, 2008).

The weighted average cost of capital is written as:

$$WACC = \frac{D}{D+E} K_d(1-T) + \frac{E}{D+E} K_e \quad (4)$$

where:

D = Market value of Debt;

E = Market Value of Equity;

K_d = Cost of Debt;

K_e = Cost of Equity;

T = Tax Rate;

1.1.2.2 Cost of debt

Cost of debt represents the cost to a company of borrowing capital in order to finance projects and is fundamentally determined by three variables: risk-free rate, default risk and tax rate (Damodaran, 2012).

The most straightforward way of estimating cost of debt is to compute the yield on long-term bonds, but only when they are frequently traded (Damodaran, 2012). This solution is also recommended for investment-grade companies, debt rated as BBB or above (Koller et al., 2015).

If the bond appears to have low liquidity, but it still rated, cost of debt is obtained by using the rating and respective default spread, hence the formula being:

$$r_D = r_f + Default\ Spread \quad (5)$$

Where:

r_D = Cost of debt;

r_f = Risk Free rate;

If not rated, cost of debt is obtained by analyzing recent borrowing data or by estimating a rating (Damodaran, 2012). Other authors, affirm that the cost of debt is equal to the company's interest expense, adjusted to tax effects (Pratt, 2002).

1.1.2.3 Cost of equity

The cost of equity is defined as the rate of return that is required by investors on an equity investment (Damodaran, 2012) and estimating cost of equity is a major difficultly in estimating the cost of capital (Koller et al., 2015).

Although there are several methods to estimate the cost of equity capital, the Capital Asset Pricing Model (CAPM) is preferred towards others (Pratt, 2002; Damodaran, 2012). The components needed in CAPM are the risk-free rate, Beta and market risk premium and the formula can be written as:

$$K_e = R_f + \beta(R_M - R_F) \quad (6)$$

where:
K_e= Required Return to Equity;
Rf = Risk Free Rate;
β = Beta;
Rm = Expected Market Return;
$R_M - R_F$ = Market Risk Premium or Equity Premium;

Koller et all (2015), affirms that the target values of debt and equity must be used, although in mature companies the targeted capital structure is commonly identical to the company current capital structure, using market values of debt and equity.

1.1.2.3.1 Risk-Free Rate

"The risk free rate is the starting point for all expected return models." (Damodaran, 2008, p.31)

When investors acquire an asset, returns are expected from the asset but it may occur that the actual returns do not exactly coincide with the expectations, being this difference, the source of risk, that is viewed as the variance measured in real returns around the expected returns (Damodaran, 2008). Thus, for an investment to be risk free, the actual return must be the same as the expected return.

There are two main conditions that must be fulfilled in order to consider an investment risk free: there cannot be default risk and there cannot be reinvestment risk (Damodaran, 2008). The first condition, of no default risk, can only be met in government securities while the second condition is of no reinvestment risk, meaning that the actual return is the same as the expected one, which is met by a

default-free government bond with the same duration of the investment being evaluated (Damodaran, 2008).

In European company's valuation, is recommended to use the 10-year German government bonds, due to having lower credit risk and being traded more frequently than other European countries bonds (Koller et al., 2015).

1.1.2.3.2 Betas

Beta (β) is a factor used in CAPM, to measure systematic risk, and measures the sensitivity between the return of an asset and the market, represented by a widespread value-weighted equity market index (Pinto et al., 2015). Only the risk represented by Beta is priced, the remaining risk, known as idiosyncratic risk, can be diversified by owning multiple securities (Koller et al., 2015). A high sensitivity from the stock price in relation to the market, signals high volatility, meaning that investors demand a higher return (Koller et al., 2015).

Accordingly, to Damodaran (2012), there are three different ways of estimating the value of beta: one is to perform a regression of investment returns against returns on a market index, the most common; the second is to perform an estimation using fundamental characteristics of the investment; and the third is by using accounting data.

Pratt (2002) warns that beta estimations may present significant differences when comparing the several reporting services, due to different chosen variables, such as length of time in which the returns are measured, frequency of measurement, choice of market proxy and risk-free rate.

Furthermore, it is advised to use the unlevered beta of a peer group of companies, since the measurements of beta are unreliable (Koller et al., 2015). In some cases, when the different segments are from different industries, different betas must be used (Damodaran, 2010a).

1.1.2.3.3 Equity Risk Premium

The equity risk premium represents the additional returns that investors demand in order to hold equities, instead of risk-free assets, being the equity risk premium the difference between demanded return on equities and the risk-free rate (Pinto et al., 2015), since in order to accept a larger risk, a higher expected return is expected (Pratt, 2002).

There is no consensus in how to measure equity risk premium (Koller et al., 2015), which is surprising when taking into consideration the importance of this factor in valuation (Damodaran, 2019). Damodaran (2019), points three different methods to measure the equity risk premium, which one can present different values: Survey Premiums, Historical Premiums and Implied Equity Premiums.

As indicated by the name, Survey Premiums, it consists in questioning several groups of investors, to have an estimative of their expected equity return. The main challenge in this method is to find a group of investors that accurately reflects the market. Historical premiums rationale is to compare the past return on equity with riskless investments and utilize this historical premium as rate required. Implied Equity, unlike the previous approaches tries to estimate a forward-looking premium by analyzing current market prices. By scrutinizing the most relevant literature in corporate finance and valuation, Fernández (2009) noticed that the recommendations of the textbooks decreased over the years, with the 5-year moving average from 8,4% in 1990 to 5,7% in 2009.

Equity risk premium should incorporate volatilities of different markets, country risk premium, since there is a noteworthy investor geography bias in investing portfolios, among other factors (Damodaran, 2019).

1.1.3 Terminal value

With the final purpose of estimating a company's value, future cash flows are divided in two different periods, during and after an explicit forecast period (Koller et al., 2015). The present value of cash flows after the explicit forecast period, known as terminal value or continuing value, is a key element in any valuation, due to commonly being a large percentage of a company's total value (Koller et al., 2015). The weight of terminal value on the total present value increases as the explicit period decreases (Pratt, 2002).

Terminal value is calculated assuming that a stable growth rate that can be maintained throughout eternity, resultant of the inability of the company to maintain a high growth, allowing to estimate the value of cash-flows after the explicit period (Damodaran, 2012).

Terminal value is highly impacted by the stable growth rate, meaning that the value of firm is quite sensible to this rate (Damodaran, 2012). Given the importance of this rate, Damodaran (2012) suggests some constrains on the stable growth rate such as: the constant growth rate must be inferior to the growth of the economy where it operates, or in case of being multinational, must be inferior to the growth rate of the global economy or area where it operates, and it must be in the same terms, real or nominal as the rest of valuation.

$$TV_n = \frac{FCFF_{n+1}}{r_n - g_n} \tag{7}$$

Where,

TV – Terminal Value;

FCFF – Free Cash Flow to the Firm;

r_n – Discount Rate;

g_n – Growth Rate;

Growth rate is considered to be the most important input in valuation and can be determined in three basic ways: historical growth rate; analyst estimated and firm's fundamentals (Damodaran, 2012). Historical growth rate, built on observing growth in a company's past earnings, is especially suited for stable firms and hence not suitable for high-growth companies; while with analyst estimates, the major concern is that the quality of long estimates is not ideal and can lead to wrong estimations of valuation; finally, firm's fundamentals which argues that the growth of a company is decided by the amount invested and the quality of investments.

1.1.4 Economic Value Added

The economic value added (EVA), also known as residual income (Pinto et al., 2015), measures the profitability of an investment or portfolio, being calculated as the difference between the Net Operating Profit Less Adjusted Taxes (NOPLAT) and the cost of the capital invested (Damodaran, 2012):

$$EVA = NOPLAT - (WACC * Capital\ Invested) \quad (8)$$

Where:

NOPLAT – Net Operating Profit Less Adjusted Taxes;

WACC – Weighted Average Cost of Capital;

A company able to create higher income than the cost of obtaining capital, has a positive EVA and for such is creating value, while a company with negative EVA is destroying value (Pinto et al., 2015).

A closely tied concept to EVA is Market Value Added (MVA), which shows if a business can create profitability over time, instead of an individual period of time. To arrive at the MVA value is necessary to compute the sum of the present values of several EVA values. Normally WACC is used as the discount rate. With this approach, is necessary to add the invested capital to the MVA to obtain the

Enterprise Value. If the equity value is the final goal, then the value of non-operating assets should be added to the Enterprise Value, while subtracting the value of non-equity claims.

1.1.5 Adjusted Present Value (APV)

When is expectable for the company's debt to disproportionally outgrow the company's value, models such as the Free Cash Flow to the Firm and economic-profit valuation are not suitable since they would exaggerate the value of tax shields, because they assume a constant debt to equity ratio (Koller et al., 2015). An alternative answer to this problem is the Adjusted Present Value method that by separating the unlevered enterprise value and the value of tax shields provides a more accurate model for this type of situations. When properly applied it should result in the same value as the DCF valuation.

APV = Unlevered Company Value + Present Value of Tax Shields - PV of Bankruptcy Costs (9)

The present value of tax shields with tax savings viewed as a perpetuity, from a determined debt level can be written as, (Damodaran, 2012):

$$PV\ Tax\ Shields = T * D \quad (10)$$

Where:

T – Tax rate;

D – Debt;

The Present Value of Expected Bankruptcy costs is typically the most problematic part, since there is no direct way of estimating both components of bankruptcy cost, probability and present value of bankruptcy costs.

To reflect the effect of the debt level on the default risk and consequent bankruptcy costs, the present value of expected bankruptcy costs can be written as (Damodaran, 2012):

$$PV\ of\ (Expected\ bankrupcy\ cost) = \pi_a * BC \quad (11)$$

Where:

π_a - Probability of bankruptcy;

BC - Present value of bankruptcy costs;

1.1.6 Dividend Discount Model

Exceptional businesses are prone to generate excess returns, result of their earnings surpassing the investment needed for the business to continue competitive (Schmidlin, 2014). The distribution of excess profit can be done by paying the shareholders a dividend, that is commonly distributed in regular intervals and the amount defined accordingly to the distribution time interval profit (Schmidlin, 2014). Accordingly, to Fernández (2007), dividends are commonly the only regular flow of income that shareholders receive. The rationale of this method is that the net present value of expected dividends is equivalent to the stock price (Fernández, 2007). Damodaran (2012), characterizes this model as one of the simplest for equity valuation purposes and also old-fashioned. This model has enough flexibility to incorporate several different versions of the original model, depending on the assumptions about future growth (Damodaran, 2012). If the dividend is expected to be constant every year, the model can be expressed as:

$$Equity\ Value = \frac{DPS}{Ke} \tag{12}$$

Where:

DPS – Expected dividend per Share distributed in the next period;

Ke - Required Return to Equity

However, if instead the dividend is not constant, but is predicted to grow in perpetuity, the formula must be:

$$Equity\ Value = \frac{DPS_1}{Ke - g} \tag{13}$$

Where:

DPS_1 – Dividends per share for the next year;

Ke – Required Rate of Return;

g – Constant annual growth rate;

Damodaran (2016), enounces an additional model, the Two-Stage Dividend Model. Unlike the previous mentioned models, it admits two different phases of growth: a preliminary phase, typically with a non-stable growth rate and a stable state.

Fernández (2007), warns, that accordingly to empirical evidence, the companies that increase the amount of paid dividends, measured in the Pay Ratio, do not observe an increase in their share price, since the distributed earnings reduce the growth of the company.

1.2 Relative Valuation

The rationale behind this approach is that it is possible to extrapolate the value of an asset from similar assets since similar assets should have a similar price (Koller et al, 2015). This is a well-known process by practitioners and commonly used on equity research valuations (Damodaran, 2002, cited in Damodaran, 2006). In order to compare, it is necessary to standardize the values in a common variable, Multiples, (Damodaran, 2006) to compare absolute performance indicators with current market valuation (Schmidlin, 2014).

This method is attractive to academics and practitioners due to its simplicity (Damodaran, 2012). To make it possible to compare Multiples, it is necessary to choose the right peer group (Koller et al, 2015) and Multiples, because there is an inherent possibility of misusing and misunderstanding the multiples (Koller et al., 2015). Fernández (2001), recommends that Multiples should be used as a complementary valuation method, since it is common for this method to present a large dispersion. There are plenty of multiples, which can be divided into three different groups (Fernández, 2001):

Equity Value Multiples	P/E – Price to Earnings ratio P/BV – Price to Book Value
Enterprise Value Multiples	EV/EBITDA – Enterprise Value to EBITDA EV/ Sales - Entrepise Value to Sales
Growth-referenced Multiples	EV/EG – Enterpirse Value to EBITDA growth P/E Growth – Price Earnings to Growth

Figure 1. Multiples Categories *Fernández (2001)*

Damodaran (2012), categorizes multiples in an extra category, sector specific multiples, which associates operating data with firm value.

To assure that the relative valuation is in line with comparable peers four principles are suggested (Goedhart, Koller, & Wessels, 2005):

1 Select peers with similar expectations for Return On Invested Capital (ROIC) and Growth: picking the correct companies to serve as peer group is of critical importance and highly difficult. The chosen group should not only be present in the same industry but additionally also have similar prospects for ROIC and Growth.

2 Employ forward-looking multiples. Backed by both empirical evidence and valuation principles, specifically that a company's value is equivalent to the present value of future cash flows (Koller et al., 2015). Is recommended to perform the valuation using multiples based on forecast instead of historical data. Liu, Nissim, & Thomas (2002) analyzed the attributes and performance for historical and forward-looking multiples, for a set of companies trading in NASDAQ and NYSE. By individually comparing the companies opposed to industry mean, was observed that the dispersion of historical P/E was almost double of one-year forward E/P ratios. Furthermore, it was also noticed that forward looking multiples resulted in higher price accuracy.

3 Use enterprise-value multiples. P/E multiples have two major shortfalls. Since they are affected by capital structure, unlevered companies can increase the ratio by swapping debt for equity. Secondly since the ratio is based on earnings, which encompass several nonoperating items, with one-time events possibly be misleading.

4 Adjust the multiple for nonoperating item included in the reported EBITDA, such as excess cash, non-operating assets, operating leases and employee stock option can distort the real value of multiples.

1.3 Contingent Claim Valuation

Damodaran (2012) affirms that one of the latest developments in valuation methods is the possibility that in some cases, the value of an asset can be higher than the present value of expected cash flows if the cash-flows are dependent of the occurrence of a certain event. This occurs due to the possibility of an occurrence that might or not happen (Damodaran, 2012).

Opportunities are a frequently encountered problem in valuation. The opportunity to defer a decision has value, even if the decision is not to exploit that opportunity (Luehrman, 1997). This method uses option pricing models to valuate assets that have similar properties when comparing with options (Damodaran, 2006).

Even though the acceptance of this premise was mainly attributed to the development of option pricing models, there have been recent attempts to stretch the scope of this model to more traditional valuation problems, arguing that patents and underdeveloped reserves behave very similar to options (Damodaran, 2012).

1.4 Asset-Based Valuation

This method argues that it is possible to value a firm by adding all the individual assets owned by the company. Asset-Based Valuation is mainly directed to the valuation of financial services enterprises and through valuating existing assets, net debt and outstanding claims, it is possible to arrive at the equity value. There are several limitations to this model such as not accounting for future growth and is difficult to use if the financial services firm being evaluated is present in several business. There are several variations to this method such as liquidation value, replacement cost, and accounting book value (Damodaran, 2012).

These methods do not present themselves as an alternative to the previous methods due to being reliant on them, to arrive at the value of replacement and liquidation. The results derived from this method could converge with the value derived from the discounted cash flow valuation if the firm has no growth potential and the market valuation reflects expected cash flows (Damodaran, 2012).

1.5 Sum-of-the-Parts

A valuation method commonly used by experienced practitioners is Sum-of-the-Parts. The reasoning behind this method is that the company's different business units have different key factors such as profitability and growth (Chlomou & Demirakos, 2020). Therefore, to arrive at the value of the firm, it is necessary to evaluate each segment of the company individually (Chlomou & Demirakos, 2020). This method allows a better valuation estimation, comparing with a valuation on the firm as a single enterprise. Besides that, it will provide a more profound insight into the company and make it possible to pinpoint where and how the company is generating value (Koller et al, 2015).

The bigger the difference between the different parts of the company, in terms of key indicators such as risk, growth and profitability, bigger the payoff in breaking the company apart (Damodaran, 2010b).

2.Industry and Market Review

2.1 Industry Overview

In this chapter, an overview of the energy industry is presented, focused on the electrical and renewable segments, while exploring current and future market characteristics, growth opportunities, and impacts on the economy and environment.

The world's energy needs are set to grow during the next 30 years. The demand increase, which would be higher if it was not the efficiency gains, will be mainly met by Renewable energy. The growth of global energy needs is fully attributed to the increase of living standards and well-being in emerging countries since there is a strong association between access to energy and living conditions. The Covid-19 pandemic undid some of the progress made in reducing global poverty and inequalities [1] in emerging countries.

The energy transition currently undergoing is primarily founded on three pillars: renewables, electrification and energy efficiency[2]. There are various frameworks, depending on the information source and scenario analyzed, on how much the energy needed will grow, nevertheless, some major ideas are common among them: the belief that renewable energy will be more present in the energy mix aided by consumer choice, rather than resource availability and that even though the necessity of oil and gas will remain for the next decades, it will gradually decay.

There are two main metrics used when analyzing energy demand, primary energy demand, and total final energy use. When measured in primary energy demand, until 2050, the estimate of growth is of 9% and 10%, according to Bloomberg (Economic Transition Scenario) and BP (Rapid), respectively. If measured in total final energy use it rises by 24%, in the same timeframe (Bloomberg).

The International Energy Agency (IEA) outlook, which encompasses a smaller time frame, only until 2040, expects an 18% increase, measured in primary energy demand, and a 23% increase in total final energy use. This energy demand forecast of IEA is the one included in the Stated Policies Scenario (STEPS), a scenario that assumes that the risks to public health brought by Covid-19 are controlled over 2021, allowing a steady recovery, where global GDP returns to pre-crisis levels. Furthermore, in this scenario, global energy demand is predicted to also return to pre-crisis levels, although later, 2023. The STEPS scenario foresees that Fossil fuels will only slightly increase, in absolute terms, being their share in primary energy mix significantly reduced from 81% to 73%. Renewable sources are expected to experience substantial growth, with a share increase to 22%, from 14%. This growth in renewable energy is powered mainly by wind and solar power which are the highest growing sources of energy

[1] International Monetary Fund. 2020. *World Economic Outlook: A Long and Difficult Ascent.* Washington, DC, October.

[2] IRENA (2021), *World Energy Transitions Outlook: 1.5°C Pathway*, International Renewable Energy Agency, Abu Dhabi.

in the next decades. By the end of the outlook, 2040, the share of coal, in the metric used, dips below 20%, an unprecedented achievement in modern energy history.

The current energy situation and respective carbon emissions are unviable in the long term. It is required a drop-in carbon emission supported by regulations change, starting with the increase in carbon prices to shift towards a more sustainable energy mix.

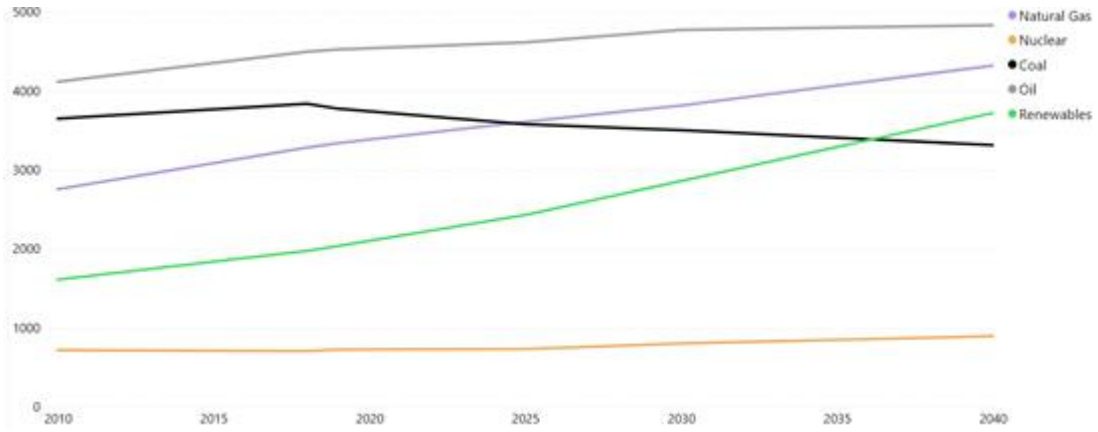

Figure 2 - World Primary Energy Demand in Mtoe, Standard Policies Scenario, *source: WEO IEA 2020*

The energy industry is responsible for around 65% of all greenhouse gases emitted, being the release of GHG the main cause of climate change. Climate changes have a severe and direct impact on economic productivity and growth, meaning a change of over -7%, in areas such as Africa, the Middle East, and India, if compared to projections using average temperatures that will be kept constant.

The Paris Agreement, signed in 2015, to limit global warming, requires a change in policies. Even though changes were and are currently being made, the pace of transition is not ideal. To achieve this goal, the International Renewable Energy Agency (IRENA) identifies in the World Energy Transitions Outlook: 1.5°C Pathway, six components of the energy transition strategy, being the more significant ones: the use of renewables, energy conservation and efficiency, electrification, and hydrogen use.

The reason electrification is one of the main components in the energetic transition strategy is due to electricity having a very different generation mix, comparing to general energy. Until 2040 the global electricity mix is expected to witness major changes, with renewables being the major difference-maker. This source is expected to increase over 170%, accounting in 2040 for almost half of the electricity generation, from the current 27%, in 2019. Even though all renewables' sources grow, the overall growth is powered by Wind energy which is anticipated to grow almost 3x while solar is foreseen to grow by over 7x. With this accelerated growth both of these technologies will be at the

same level of Hydro power, the current and future leader of electricity generation in between the several renewables.

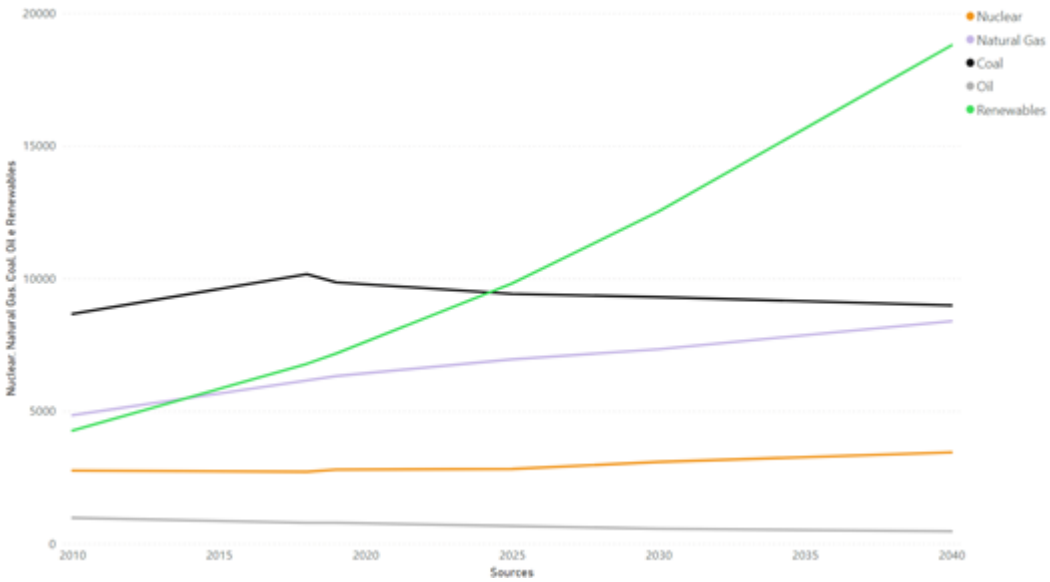

Figure 3- Electricity Generation (TWh) *IEA, Stated Policies Scenario*

When analyzing different geographies, it is perceptible that the US shares a similar percentage as the foreseen situation, the whole world, but Europe it is in a different state of affairs, with a more advanced energetic transition currently sitting at 37% of electricity generation provided by renewable sources, and is expected to reach 66% until 2040.

The growth of electricity use, in recent years, has been approximate twice the growth of overall energy. The ascending path of electricity requires investment in all different segments of the system, including networks. These are a fundamental pillar in modern power systems and have even higher highlights in a high-speed energy transition since they are required to reliably supply energy.

A monumental advancement in this field is expected, accordingly to the International Energy Agency (IEA), with an increment of 2 million kilometers of transmission infrastructures and 14 million kilometers of distribution to be added over the next decade.

Renewable energy has caught the attention of financial markets and investors, that foreseeing the opportunities in energy transition are allocating capital to renewables and divesting from fossil fuels. This allows for companies who are leading the energy transition to obtain with relative ease new capital in order to expand, while the fossil fuel sector struggles, comparatively. Observing two indexes, during 2020, the S&P Global Clean Energy Index, and the S&P 500 Energy Index, which is fossil fuel-heavy, there was a valorization of the clean energy index in 138%, contrasting with the fossil fuel-heavy with a devaluation of 37%. There was been a trend in which oil and gas companies are investing in

order to add clean energy to their portfolios[3]. The investment in the energy transition is estimated to create almost three times more jobs when comparing it to fossil fuels.

The hefty gain in competitive power of renewable sources over the last decade allowed the raise of production capacity which translates into consumer savings, environmental gains, economic gains, and increased fossil fuel independence by some countries.

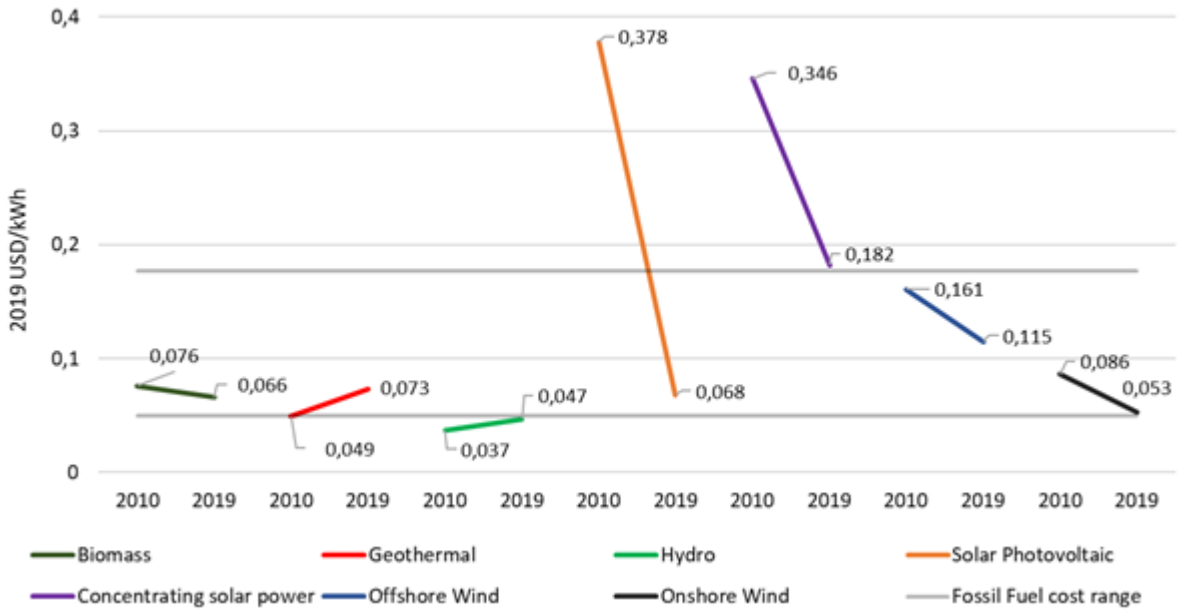

Figure 4 – Global Weighted Average Levelized Cost of Electricity from utility-scale renewable Power Generation technologies, 2010 and 2019. *IRENA Power Generations Costs 2019*

The cost of electricity originating from renewables has been falling and this descending tendency is predicted to persist in the near future. The majority of renewable sources, registered an impressive decrease in cost, during the last decade, with others seeing a very small increase. Nevertheless, there are now a wide variety of renewable energy sources that are within the limits of the fossil-fuel cost range, presenting themselves as economically viable competitors. In addition to the already seen drops in cost, the cost of wind and solar energy are expected to drop significantly in the next three decades, 30% in wind and around 65% in solar. This factor, aligned with encouraging policies towards lower-carbon energy sources will result in major advances in these technologies. Wind and Solar energy are the most competitive renewable sources, mainly due to being the more mature technologies, resulting in these sources being more economically advantageous than fossil fuels, in several different geographies of the world. Regarding offshore wind, although with a sharp decline in costs, it is still in a more embryonic stage of development when compared to onshore wind and photo-voltaic solar.

[3] IRENA (2021), *World Energy Transitions Outlook: 1.5°C Pathway*, International Renewable Energy Agency, Abu Dhabi

Nevertheless, it definitely has potential, since it was specific characteristics unique to this technology, such as greater wind availability and stability, in offshore sites.

The most recent development in the energy transition is the increased use of Hydrogen. Hydrogen plays an important role in the transition to a lower-carbon energy system. It is one of the main options of storing renewable energy and decarbonizing sectors which are not possible or are not economically viable. Even though the current level of consumption of hydrogen is quite low, it is expected that, due to its wide variety of applications, to expand rapidly.

Governmental policies have a significant impact on the industry. The incentives in form of policies vary across regions and countries. Programs for installation of PV panels in agriculture or tax reduction on the installation of green technologies, such as the ones in vigor in Portugal and Sweden, respectively, are good examples of direct incentives that are being enforced.

2.2 Market Review

2.2.1 Portuguese Electric Market

The entirety of the population resident in mainland Portugal can freely choose its electrical supplier, due to the liberalization of the energy market. The prices are determined by each supplier and supervised by a regulator. As of December 2020, the large majority of consumers, 95%, were on this market, representing 5,3M customers.

Market Share	Clients	Consumption	Big consumers
EDP	75,5%	40,1%	18,4%
Endesa	7,5%	17,2%	24,8%
Iberdrola	6,3%	16,4%	24,2%
Galp	5,0%	7,3%	8,6%
Fortia	<0,04%	3,6%	16,2%

Figure 5- Market share in Portugal. *ERSE*

In market share, measured by the number of clients, EDP is the undisputable leader, owning 75,5% of the market, roughly ten times higher than the closest competitor, Endesa, who is followed by Iberdrola and Galp.

Despite being the clear leader in market share by clients, this does not exactly carry over to Market Share by consumption, where although EDP is still leading the competitors are significantly closer. This

can be explained by the relatively low percentage of Big Consumers that are clients of EDP contrasting with the other suppliers.

2.2.2 Spanish Electric Market

The Spanish electric market is quite larger than the Portuguese market, is composed of 29 million consumers, being 63% of consumers being provided by a free market, representing 87% of consumption. Unlike the Portuguese market, EDP does not possess the same weight in the share of energy supplied. Endesa is the market leader in this class, followed by Iberdrola, Naturgy, and EDP.

	Endesa	Iberdrola	Naturgy	EDP	HHI
Domestic	36%	32%	13%	4%	2 500
SME	26%	21%	9%	4%	1 275
Industrial	32%	20%	7%	7%	1 729

Figure 6 – Market Share by Suppliers in Spain. *CNMC*

The CNMC, responsible for providing this data, also computes the index, the Herfindahl-Hirschman Index (HHI). This index is a common measure of market concentration and provides insight, to some degree, on the competitiveness of the market. The higher the HHI, the higher the concentration. The index indicates the existence of growth opportunities, especially in segments like Small and Medium Enterprises.

The production in the Iberian Peninsula is integrated into a single market, known as MIBEL- Iberian Electricity Market. The final price of electricity, in both Portugal (0,21 €/kWh) and Spain (0,23€/kWh) is in line with EU-27 Average (0,21€/kWh). The tax and fees element in Portugal is one of the highest in Europe, only falling behind Denmark, Germany, and Spain, almost doubling the price compared to the base value.

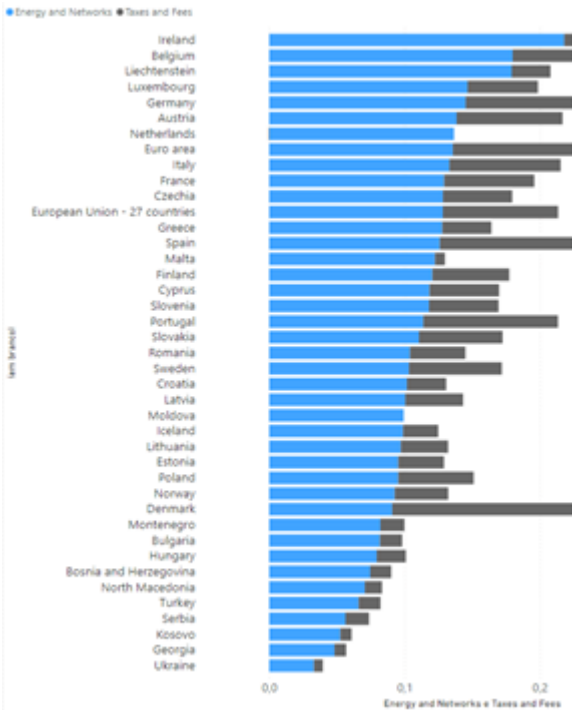

Figure 7- Electricity Prices for domestic customers, €/kWh *Source: Eurostat*

2.2 Macro-economic Environments

The purpose of this chapter is to provide essential insight on current and future macro-economic conditions where the segments analyzed are inserted. The macroeconomic environment highly impacts the performance of companies.

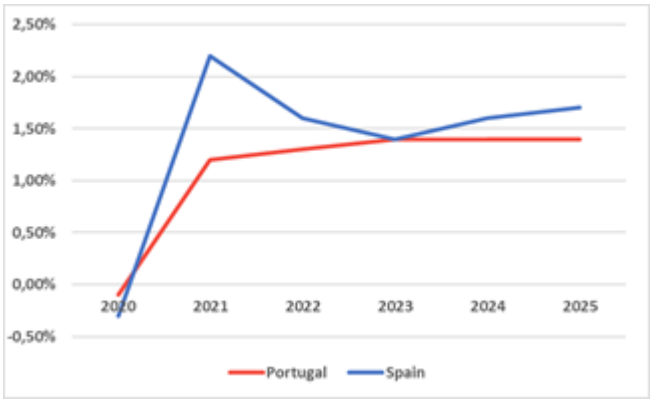

Figure 8 – Inflation. *IMF World Economic Outlook 2021 October*

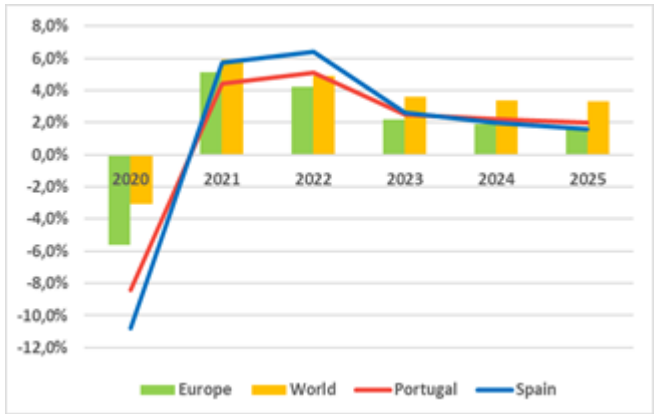

Figure 9 -Real GDP Growth. *IMF World Economic Outlook 2021 October*

Examining the Iberian Peninsula, both countries follow similar trends, in both metrics, over the years. After a grim 2020, there are expectations of GDP growth in the next few years, slowing down after 2021.The global Covid-19 pandemic caused a profound and considerable impact on the economy.

The shutdown of several economic activities and businesses enforced by lockdown measures was felt by all sectors of the economy, with particular severeness in the tourism sector, which is particularly important in Iberian economies. In 2020, the Portuguese economy shrank 8,4%, with a historical decline in GDP of 16,4% in the second quarter of the year. This grim outlook was even worst in Spain, one of the European countries most seriously affected by the pandemic, with a 10,8% decrease in GDP. Both Iberian countries witnessed a decrease in private consumption, investment, and equilibrium of the trade balance, with public consumption being the only component of GDP that registered a small increase in 2020.

Regarding inflation, during 2020, both countries went back to negative results, and below the Eurozone average, 0,3%. Economic growth, measured in GDP growth, has historically been associated with higher electricity consumption, originated in a population expansion, and increased generation of goods and services. Nonetheless, this relationship has been deteriorating over the last years, due to the replacement of manufacturing economies by service economies. Typically, service economies require less electricity, when comparing it to manufacturing-heavy economies.

3. Company Overview

3.1 Profile

EDP is a multinational utility company, vertically integrated based in Portugal. Since its inception in 1976, it has grown into a relevant energy producer worldwide, being Its activity is spread through 19 countries, separated into 4 different continents (Annex A). Counting more than 12000 employees, the company is present in the entirety of the electricity value chain, from Production, Transmission, Distribution, and Commercialization and also on gas commercialization. It provides to more than 9 million customers and it is currently the fourth biggest wind produce r in the world.

EDP's compromise with sustainability is clear and long in time, being recognize d by several indexes such as Dow Jones Sustainability Index. Sustainability is one of the values chosen by the company to guide its path, along with innovation and humanization.

As of the end of 2020, the installed capacity reached 23.680 MW, which of 79% is renewables, which resulted in a production of 64.318 GWh, 74% of which is renewables. To put into perspective is higher than Portugal's 2020 energy consumption. The company is present in the Euronext Lisbon stock exchange, being present in the PSI 20, with the second highest rank in market capitalization, just behind EDP Renewables.

3.2 History

Electricidade de Portugal, S.A. (EDP) was born in 1975 when the Portuguese electricity sector was nationalized and the major Portuguese electrical companies, twelve different ones, were merged. Among these companies the most outstanding had been Companhias Reunidas de Gás e Eletricidade (CRGE), 1891. CRGE originated from the fusion of Companhia Lisbonense de Iluminação a Gás e a Companhia Gás de Lisboa whose origin can be traced back to mid-1800s, decades before the first known use of electricity in Portugal. In the wake of its inception, EDP was faced with some major problems, the electrification of the country, which required the overhaul of distribution networks, and the creation of a unique tariff for all clients. In the 1980s EDP's distribution covered practically the entirety of Portugal. In this time frame, investment highly grew as the group needed to keep pace with demand.

At the time, EDP was one of the handfuls of Portuguese companies with international credibility, which allowed EDP to obtain loans from the world bank. In 1991, the government changes the status of the company, from a state-owned company to a public limited company. The first phase of privatization in 1997, which represented 30% of capital, was carried on with great success since the

demand surpassed the offer thirty times. Several privatization phases were organized and in 2013 the last shares owned by the state were sold.

3.3 Shareholder Structure and share Performance

As of the end of 2020, EDP's total ordinary share number was 3.965.681.012.

The largest EDP shareholder is China Three Gorges, currently owning 22% of EDP's capital. China Three Gorges is owned by the Chinese State, is one of the biggest power companies in the world, and was in charge of the construction of the biggest hydroelectric power plant in the world, Three Gorge Dam. The current capital structure is the one presented below.

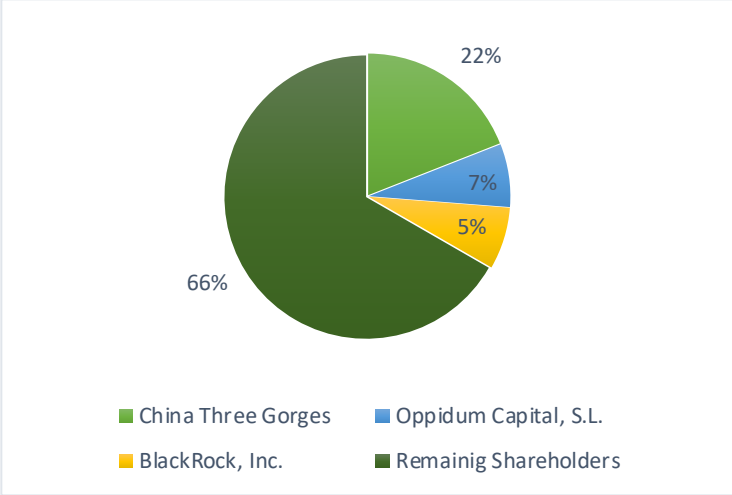

Figure 10- EDP's shareholder structure as of 31 December 2020. *Annual Report 2020*

The company's share price over the last 5 years it is represented in the figure below. In the last couple of years, a noticeable increase has been registered, including an all-time high at the end of 2020.

Figure 11 - EDP share price in 2020. *TradingView*

At the end of the year 2020, the closing share price was 5,16€, a notorious increase of 33,4% vs 2019, when the price was 3,86€. When taking into consideration the dividend of €0,19 paid in May 2020, resulting in a dividend yield of 4,9 %, based on 2019 closing price, EDP shareholders registered a total return of 43,2% in 2020, assuming dividend reinvestment. To put into perspective the evolution of the stock price in this period of time is helpful to compare it to related assets, as shown in figure 11. The reference Index of Eurozone, Euro Stoxx 600 registered a total positive return of 0,8%, suffering from the fear and uncertainty caused by the Covid-19 pandemic, especially in the first trimester of the year. This effect was attenuated over the course of the year, due to the development of fiscal plans, interest rate slashes, quantitative easing measures implemented by the Central Banks, and record-breaking vaccine developments. The European utilities, represented by Euro Stoxx Utilities achieved a significantly higher return, +14,1%, than the overall market, Eurostoxx 600. This result was possible due to an increase in demand from investors in low volatility stocks, continuation of low-interest rates, and the development of recovery plans focused on decarbonization. Alongside this, the search for equities with high Environmental, Social, and Governance (ESG) standards rose, which prompt a higher growth in the utilities more exposed to Renewables, when compared to overall utilities.

PSI 20 had a record of -2,7%, due to general feelings decay towards European actions by the markets.

Figure 12 - Stock Prices in 2020 based at 100. *Trading View*

EDP stock surpassed all of the mentioned indexes. Even while highly uncertain conditions were met, the company was able to properly execute its strategic goals, while taking advantage of lower debt costs. In 2020 a €1bn equity increase took place, the first in the last 16 years, which allowed the acquisition of Viesgo company.

3.4 Financial Analysis

For the past 5 years, EDP has demonstrated a steady and resilient business model. The 2017 and 2018 results are partially distorted in opposite directions, which impacts YoY comparisons as pictured it. In 2017 a positive one-off impact of €268M, mainly due to portfolio reshuffling and impairments; while in 2018 a negative one-off impact of €277M was attributed to administrative decisions. Nevertheless, Total EBITDA presented a CAGR of 1,24% from 2016 to 2020, and even though detailed information is not available, observing the data between 2018 and 2020 is correct to assume that the growth is mainly due to the Renewables Segment. Net Profit presents a CAGR of -3,58% from 2016 to 2020, with signals of recovery in the last year.

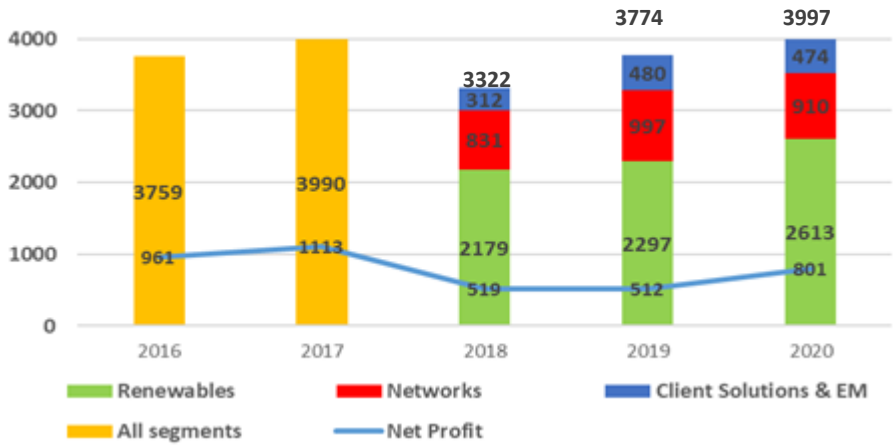

Figure 13 - EBITDA per Segment and Net Profit (in million €). *EDP Reports*

Return on Investment (ROI) is a metric used to evaluate the profitability of investments. Comparing the ROI of EDP with its peer group is possible to perceive the high quality and consistency of investments that the company has been doing over the years.

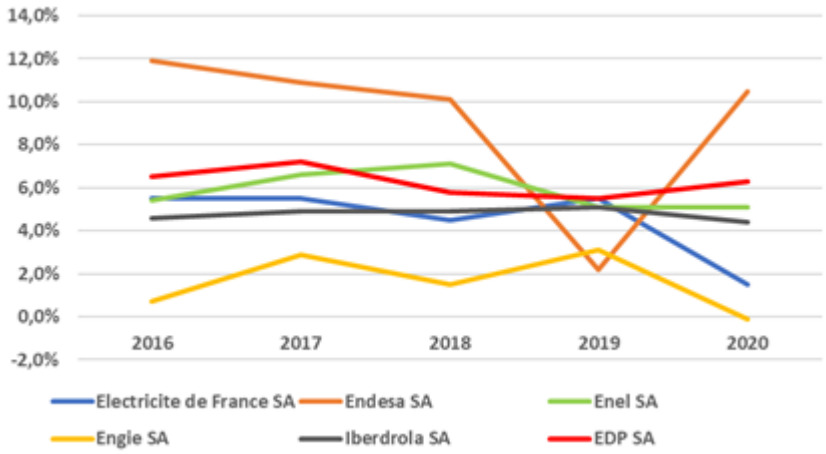

Figure 14 - Peer Group ROI. *Bloomberg*

3.5 Business Segments

EDP is a vertically integrated company, being present in the entire value chain of electricity and in gas supply activity. With the purpose of organizing the company, a simpler structure was introduced, to allow an increase in efficiency in the organization. A more straightforward structure allows the flow of knowledge and efficiency. Hence, to achieve this goal, the company divided its operations into three segments: Renewables, Networks, and Clients Solutions & Energy Management (CSEM). The segments intend to cover the totality of EDP's business segments.

The main segment, in EBITDA terms, is by a large margin the Renewables segment and the sub-segment Wind and Solar, as pictured in figure 15. All of the company's segments are divided into sub-segments. Geographically, the company is mainly present in Portugal, North America, Spain, and Brazil.

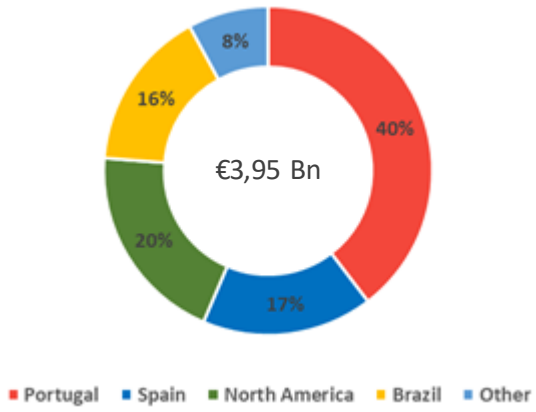

Figure 15- Consolidated EBITDA per Geography 2020. *EPP Report 2020*

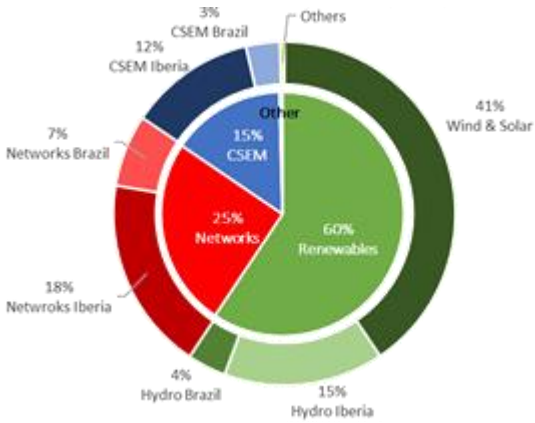

Figure 16- EBITDA per Segment 2020. *EDP Report 2020*

3.5.1 Renewables

The Renewables segment it is the group's primary growth platform, totaling as of December 2020 19,8 GW of installed capacity of which 1.6GW were built in the last 12 months and with 2,4 GW being under construction. As a growth platform segment, it accounts for 60% of the group's EBITDA and 74% of its CAPEX, in 2020. The segment's EBITDA rose by 14% vs 2019, caused by extraordinary effects of hydroelectric dam sales. Renewable's segment is directed exclusively at Generation, the first link in the electricity value chain. Power plants use different energy sources, renewable and non-renewables to produce electricity, being this segment responsible for hydro, wind, and solar generation, with the highlight being in hydro and wind power. Geographically, Portugal is the main propulsor of hydro energy while North America of wind energy. This is the segment most scattered through the world, being present in 3 continents: Europe, America, and Africa.

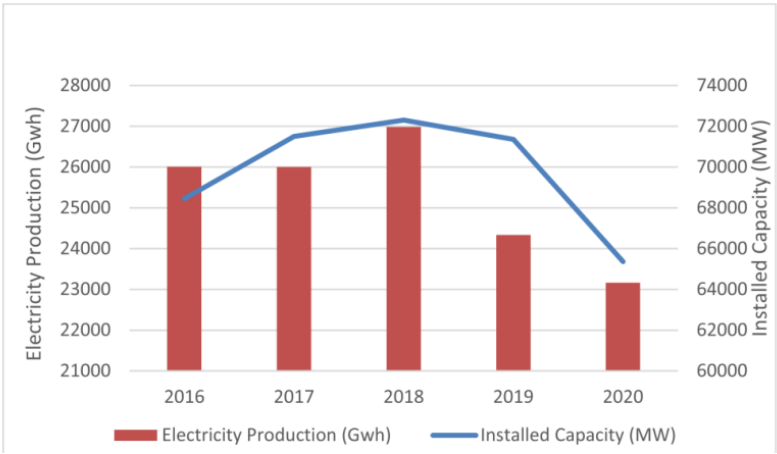

Figure 17-Electricity Production and Installed Capacity 2020. *EDP Report 2020*

Observing the main operation metrics of the segment, namely, Electricity Production and Installed Capacity, both have fluctuated over the last 5 years, with 2020 being atypically lower.

The net expansion activity accounted for €1,787m in 2020, nearly the triple of 2019, prompt by the growth of expansion investment to €2,907m in 2020, double of 2019, with North America being the focus of expansion investment.

In 2020, EDP closed €1,678m worth of asset rotation deals, in Brazil, Spain, and US.

3.5.2 Networks

The network's segment oversees the two intermediary activities in the electricity value chain, distribution, and transmission. Furthermore, the segment is also in charge of last resort supply activity in Portugal. This segment is considered a platform stabilizer.

The transmission activity is responsible for conducting the energy generated into the transport network, which is constituted by high voltage lines that will conduct energy into the distribution network. Distribution is responsible for conducting the energy received from the transmission into the distribution grid. This allows the flow of energy to the supply points

Distribution can be found in three different geographies: Portugal, Spain, and Brazil. In 2020 this activity distributed 79.123GW through more than 370.000 km of networks. In Portugal its present in the entirety of the mainland, in Spain in some northern autonomous communities while in Brazil in Espírito Santo, São Paulo e Santa Catarina. Transmission only occurs in Brazil. Among the three different countries, Portugal is the one that contributes more to this segment, being responsible for more than 50% of the segment EBITDA and distribution network (km).

The business strategy of the segment is to focus on continuously improving the service and becoming more digital, with the final goal of becoming a reference in distribution and being well-prepared for future challenges. Over the last couple of years, the group has made efforts to increase its activities, by entering the Brazilian transport segment and acquiring Viesgo. As of 2020, EDP had already installed 4,6 million smart meters thorough the Iberian Peninsula. This automated consumption measuring is already fully implemented in Spain, while is like 75% in Portugal.

Looking now at the operational data tied to Network's segment, the main indicator is the electricity distributed, that has been pretty stable over the last 5 years.

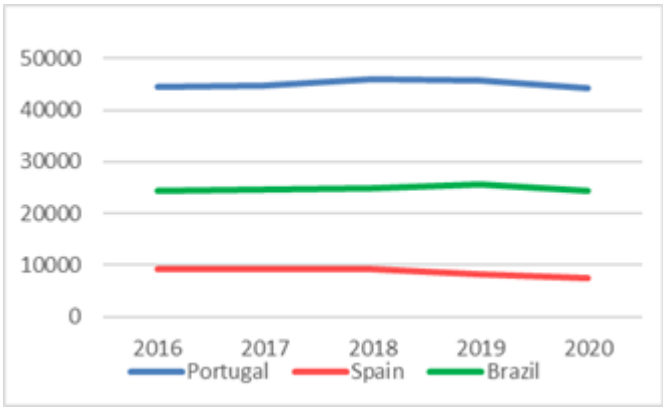

Figure 18- Network Extension 2020. *EDP Report*

3.5.3 Clients Solutions & Energy Management

This segment incorporates the services provided to clients, energy trading, and thermal generation. The segment serves EDP as a growth opportunity in new downstream and it hedges the company's portfolio. Clients Solutions & Energy Management segment is responsible for the final step on the electricity value chain, supply. Beyond that also include gas sold and production of electricity from non-renewable sources such as Coal, Nuclear, and Gas. Likewise, the networks segment, is present in the Iberian Peninsula and Brazil.

This segment represents a small share of the group's portfolio, the smallest in terms of EBITDA and CAPEX. In terms of operating performance, the segment has seen an increase in the volume of gas and electricity sold in Brazil, contraposing with a decline in electricity sold in the Iberian Peninsula.

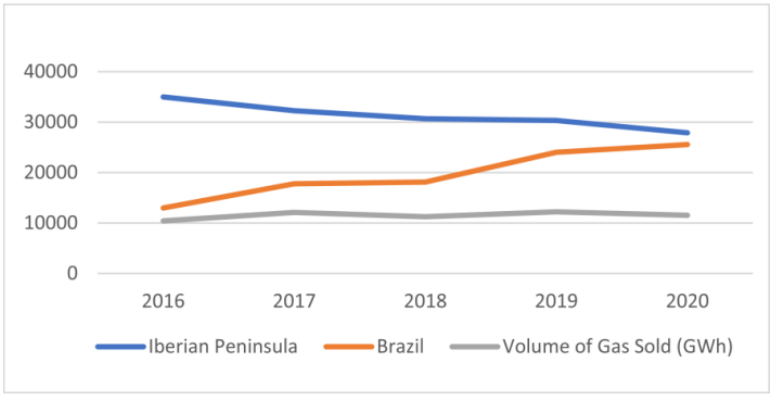

Figure 19- Volume of Electricity and Gas commercialized. *EDP Reports*

3.6 Strategic outlook

The energy transition that is currently ongoing presents difficult challenges for the company, and ultimately the sector. Taking into account this context of additional uncertainty and volatility, the company released its strategic priorities (2019-2022) and business plan (2021-2025), of which some main takeaways can be retrieved. The strategic pillars defined are:

- Accelerated and focused growth
- Continuous portfolio optimization
- Solid balance and low risk profile
- Efficient and digitally enabled
- Attractive shareholder renumeration.

Accelerated and focused growth is defined by the company as a 5% EBITDA growth per year until 2022 while focusing on renewable energies investments with the goal of a cumulative CAPEX of €12Bn until 2022 and €24Bn until 2025, of which €1Bn is exclusively directed to digitalization. The referred growth is planned to be fueled by the sale of renewable assets, portfolio optimization, and hybrid bonds issuance. There is an intention to increase the flee float of EDP Renewables with the ultimate goal of fund EDP accelerated growth.

Portfolio optimization has two different components to its strategy: renewable asset rotation and disposal of non-strategic assets. The renewable asset rotation strategy is of tremendous importance to the company since it allows to stimulates organic growth and the materialization of value, while the sale of non-strategic assets allows to balance EDP's risk profile and release capital to reinforce the group's balance sheet.

The purpose of preserving a solid balance sheet and a low-risk profile is to financially deleverage the company in order to secure debt investment grade.

Efforts have been made by EDP to become more efficient and digitally-enabled, heading into a future packed with unprecedented challenges. The commitment towards digitalization made by increasing investment in IT and employee training will allow for the enterprise to become more agile, flexible, and global.

The last strategic pillar of endowing shareholders with an attractive remuneration is obtained by providing an attractive remuneration and superior value through a differentiated track record in renewable energies, profit growth as priorities. A €0,19 dividend floor was established.

Sustainability goals are also present in the business plan. The urgency to decarbonize is present, with the objective of becoming carbon-free by 2030, through 100% renewables generation, and to close all coal capacity by 2025.

3.7 Capital Structure

Over the last 5 years, EDP's equity has been fluctuating, totaling a positive change of 17%, when comparing 2016 vs 2020, the result of an all-time high price in 2020. Contrary to this upward trend, a consequence of significant and successful efforts, the company's debt has been significantly reduced to €12.242M, from €15.923M (in 2016).

	2016	2017	2018	2019	2020
Equity (million €)	12 055	10 582	10 549	11 149	14 129
Net Debt (million €)	15 923	13 902	13 480	13 827	12 243
Net assets (million €)	13 737	13 480	12 900	12 632	13 079
Adjusted Net Debt/EBITDA	4,2x	3,9x	4,0x	3,6x	3,2x

Figure 20 - Capital Structure. *EDP Reports*

Due to these capital structure changes, EDP reached a healthier capital structure. In 2020, EDP achieved a Debt-to-Equity Ratio of 0,6; which is lower than overall peers in the Power sector (0,65), but substantially higher than the Green & Renewable sector (0,39), accordingly to Damodaran's data set (Annex G).

Both Net Debt and Adjusted NET Debt/EBITDA were in 2020 the lowest in the past 13 years. This reduction of debt was possible due to several business transitions such as the disposal of 2 Combined Cycle Gas Turbines (CCGTs) and the client portfolio in Spain the sale of several hydro plants in Portugal. Additionally, two renewable asset rotation deals in Europe and USA were made, as well as the Viesgo acquisition. These actions truly and well reflect EDP's strategy to progress to a low-risk profile, while focusing on energy transition.

The dividend policy practiced has been attractive, with the dividends per share distributed having been exactly the same over the course of the last 5 years. This originated higher pay-out ratios in the years where the net income attributable to the shareholder is lower. The dividend per share from the last years will also be the dividend floor in the future, with a potential increase in dividends by share possible if recurring net profit allows it. The payout ratio is expected to be between 75% and 85%.

	2016	2017	2018	2019	2020
Market Shares (in million shares)	3657	3657	3657	3657	3966
Dividends distributed (in million €)	691	691	691	691	691
Dividends by Share	0,19 €	0,19 €	0,19 €	0,19 €	0,19 €
Payout Ratio	72%	62%	133%	135%	86%

Figure 21 – Payout Ratio. *EDP Reports*

4.Valuation

The valuation method chosen to perform this valuation is the Free Cash-Flow to the Firm since is the favorite method used by both professionals and academics and is the one recommended when the expected cash flows can be predicted with some certainty. As recommended, a relative valuation was also performed, using a peer group of companies. In the impossibility of applying fully the Sum-of-the-Parts method, due to the lack of detail in the information provided by the company, some fundamentals of the referred method were applied in order to present a more precise and fairer estimate. EDP revenues were computed separately by segment. The principles were also applied to other items. Since EDP operates in different geographic and business areas, that have different characteristics, these items were computed with the weighted average of the several sub-segments.

2020 (without others)	EBITDA (in million €)	Sub-Segment
Renewables	**2 613,00**	
Wind and Solar	1 655,00	41%
Hydro Iberia	764,00	19%
Hydro Brasil	194,00	5%
Networks	**910,00**	
Iberia	640,00	16%
Brasil	270,00	7%
CSEM	**474,00**	
Iberia	342,00	9%
Brasil	132,00	3%

Figure 22- Segments and Sub-Segments Average Weight. *Own estimates*

4.1 Valuation Assumptions and Forecasts

Since the valuation exercise it is relatively subjective, and a significative number of assumptions need to be made, this chapter will explicitly explain the rationale behind the assumptions and forecasts made. An explicit forecast of 5 years will be calculated, ranging from 2021 to 2025. With the objective of performing this valuation exercise, it is assumed that EDP S.A will maintain the nature of its business and that it will operate in the future, in perpetuity.

Early on some problems present themselves to us. The data configured to the current division of segments is only available from 2018 onward. This means that information specific for the segments is limited in the timeline. To aggravate the situation, 2020 was an extremely atypical year, due to the Covid-19 pandemic, that corrupts an already short data sample with outlier results. Due to these conditions, it was avoided to use the growth rates based on past years.

To perform this valuation, some data, discriminated bellow, was retrieved on Damodaran's data sets. This data is divided by geographic area and Industry, which the author classified EDP, S.A as Power and EDP Renewables as Green & Renewable Energy.

4.1.1 Income Statement Items

4.1.1.1 Revenues:

Due to an extremely atypical 2020, where the demand shock was harsh and severe, the 2019-2020 revenues growth was shockingly negative, ranging from -7% to -14%. It was assumed that until 2022 a higher growth rate will be verified, compared to 2023-2025, to encompass the general growth expected, with a return to normality. This means that a shift in the growth rate occurs in the explicit period. The current trends in energy previously analyzed combined with the intent of EDP to grow, showed a very exciting and favorable future for renewables. This optimistic view was reflected in the expected revenues growth.

Renewables Segment: Even though the segment considered as the growth platform of the group presents the smallest amount of Revenues (excluding CAA/Other, which is negative), it is the segment that contributes the most to EBITDA. Historically, with very high percentages of Gross Profit/Revenues, it is of pivotal importance to the valuation defining the growth rate of this segment. This is the segment that is expected to have a higher value of growth, due to its nature and industry trends, supported by a higher expected investment, when comparing it to other business areas.

Networks Segment: considered the group's stabilizer, responsible for the distribution of the energy generated, will also be expected to experience growth in Revenues but with a smaller rate, supported by the continuous growth of Networks kilometers and overall consumption. Even though is not expected for this segment to grow as much as Renewables, the outlook is still favorable. The 2019-2020 decrease in revenues was more severe than Renewables, reason why the first phase of revenues growth of the segment is as high.

Client Solutions & Energy Management: with the largest amount of revenues, roughly the aggregate of the last two segments described, the contribution to the company's EBITDA is disproportional small. Due to nature of its operations, a slightly smaller revenue growth was assumed, aided by the disposal of the B2C portfolio in Spain, which include both electricity and gas.

Segments/Growth Rate	2021-22	2023-2025
Renewables	7,5%	4,5%
Networks	6,5%	3,5%
CSEM	5,5%	3,0%

Figure 23- Assumed Segment Growth Rate. *Own estimations*

4.1.1.2 Gross profit and Operating Expenses

Both of these items were determined by their respective historical average 2018-2020 ratio by Revenues. By observing past values, it was confirmed that 2020 percentages presented values in line with the other years, and not complete outliers. The same rationale was applied to Joint Ventures and Associates, which present a residual value.

4.1.1.3 Provisions

Provisions refers to funds meant to finance anticipates losses, such as legal fees and taxes proceedings. Since this item it is not directly correlated with operations, the 2016-2020 average was assumed for the explicit period.

4.1.1.4 Amortization and Impairment

Result of the significant investments expected to be made and the respective anticipated increase in business revenues, an increase in the assets owned by the enterprise is also expected. To emulate this growth, it was assumed that the past 5 years' percentage of amortization and impairment per sales to be verified in the explicit period of the valuation.

4.1.1.5 Effective Tax Rate

The effective tax rate of the group has seen huge swings in the last years, from as low as 1% in 2017 to a 20% rate in 2020. To foretell this item, the average of the previous years, 2016-20, was used, 11,40%. This rate is significantly lower than the industry average in Europe, which is close to 15%, for both industries in which EDP is part.

4.1.1.6 Non-Controlling Interest

Non-controlling interests are ownership positions that do not grant control. The Non-controlling interests owned by EDP can be divided into EDP Renewables, EDP Brasil, and Iberia (Ex-wind) & Other. All of these segments contribute to the share of profits through attributable installed capacity and ownership attributable to the free float, 17,4% of the free-float of EDP Renewables, and 49% attributable to free-float of EDP Brasil. Likewise, EDP performance, the different parts that constitute the non-controlling interest are expected to grow, by assuming that the historical growth rate of 2016-2020 will be verified in the explicit period.

4.1.2 Balance Sheet Items

4.1.2.1 Working Capital

Working capital is defined as the divergence in the company's current operating assets and current operating liabilities. Current operating assets include items such as Inventories, Account Receivables, Other Current Assets, and State and other public entities. Since the information relative to change in operating working capital, taxes and others are readily available from 2018 onward, this was the used information, instead of using individual values of the several items of current operating assets and current operating liabilities. This item excludes Regulatory Receivables, that were added in order to obtain the actual change in working capital, taxes, and others. This item was been historically negative. The growth in Revenues was used to forecast future values of working capital, using the 2020 working capital value.

4.1.2.2 Capital Expenditures (CAPEX)

The group aims to invest unprecedented amounts, in order to reach the goals, set by themselves, focusing on Renewables, especially in Europe and North America. Aiming for a cumulative CAPEX 2021-25, of €24bn, being €21bn directed to expansion. From the cumulative CAPEX, €1Bn is going to be allocated to Digital Transformation. From this cumulative CAPEX, 60% is already secured or is expected in the short term, while 85% of CAPEX 2021-2023. To achieve this bold goal, a significant investment acceleration is required. In 2020, EDP's Capex reached 2,9€bn. The group aims to increase this number by 65%, to reach their goal of 4,8€bn per year during 2021-2025. In the year 2020 was possible to recognize the effort made, with an increase of 29%, compared to 2019, especially in the expansion of the renewables segment, 87%. All of the other segments, except maintenance of networks, saw a decrease in capital expenditures, both in expansion and maintenance. Since historical rates do not reflect the growth expected, it is not suitable to assume as future growth. It was assumed a growth rate of 5%, except for the expansion of renewables and maintenance of networks, which it was assumed growth of 10% during the first two years, returning to 5% after.

4.1.2.3 Dividends

EDP has stated a dividend floor of €0,19 per share in its strategic update, until 2025. This value it is in line with the previous years.

4.1.3 Weighted-Average Cost of Capital

4.1.3.1 Capital Structure

EDP's financial debt is mainly issued at holding level thought EDP S.A. and EDP Finance B.V. It was assumed, that the book value of debt it is equivalent to its market value. The capital structure has seen a steady increase in the weight of equity. The weight of Debt is significantly higher than the average of both industries, Power and Green & Renewable Energy in Europe. The average of the past years does not seem to reflect the present or future capital structure of the group, due to the downward trend of the Debt weight, being the 2019 values the one used in this valuation.

	2016	2017	2018	2019	2020	2016-2020 AVG
#Shares (Millions)	3 657	3 657	3 657	3 657	3 966	
Price (in €)	2,89	2,89	3,05	3,86	5,16	
Market Value of Equity (in million €)	10 582	10 549	11 149	14 129	20 449	
Market Value of Debt (in million €)	18 379	17 374	16 493	17 392	17 519	
D/(E+D)	63%	62%	60%	55%	46%	57%
E/(D+E)	37%	38%	40%	45%	54%	43%
D/E	174%	165%	148%	123%	86%	139%

Figure 24 - EDP's Capital Structure. Source: EDP, *Yahoo finance and own estimates*

4.1.3.2 Cost of Debt

As previous mentioned, EDP's financial debt is mainly issued at a holding level, through EDP S.A. and EDP Finance B.V. The debt of the group it is mostly raised in debt markets, 88%, with the remaining debt originating from bank loans and commercial paper. Even though EDP issued long-term bonds, with coupons ranging in-between 1,7% and 4,496%, these are not investment-grade, since they are rated by Fitch as BB. Since EDP provides the average cost of debt, this seems the best way to reach at cost of debt. The value reported in 2020 was of 3,3%, a decline from 2019, 3,9%, which was achieved by proactive debt management and lower cost of recent issues. This cost of debt is aligned with industry averages, with European sectors of Power and Green & Renewable Energy presenting costs of debt of 2,69% and 3,35% respectively.

4.1.3.3 Cost of Equity

4.1.3.3.1 Risk Free Rate

As recommended by the literature, the risk-free rate was assumed to be the 10-year Government Bond. Since EDP it's present in several countries, for European countries, the German bond was used. For the US and Brazil, it was each country's bond.

As of 31st of December of 2020, the 10-year government bond of Germany, US and Brazil was respectively -0,576%; 0,917%; 6,900%.

4.1.3.3.1 Betas

For this item, the unlevered beta provided by Damodaran (on his Data set[4]) was used. Due to the nature of this valuation, where the company is divided into segments, several betas were used to determine the company's beta. A division with two criteria, industry and geographic area, was made. The two industries identified were Green & Renewable Energy, which only the Renewables Segment is part of, and Power which includes the rest of the segments. For the geographical area, three data sets were analyzed, from Europe, the US and Emerging countries. The process of linking the sub-segments to its geographic area is straightforward, except for Wind a & Solar. In this sub-segment several assumptions were made: that the activities only occur in Europe and US and that the beta of the sub-segment is the weighted average of betas of the two different geographies based on 2020 EBITDA.

4.1.3.3.2 Country Risk Premium

This data, also retrieved from Damodaran's Data set, allows us to know each country risk premium. The Iberia risk premium was derived from the simple average of Portugal's and Spain's risk premium, and followed the same rationale for Wind & Solar from betas. The Market Risk premium, also called mature market premium, utilized was 4,72%.

Segment	Renewables	Networks			CSEM	
Sub-Segments	Wind & Solar	Hydro Iberia	Hydro Brazil	Networks Iberia	Networks Brazil	Iberia	Brazil
Risk-Free Rate	0,02%	-0,58%	6,90%	-0,58%	6,90%	-0,58%	6,90%
Tax Rate	11,40%	11,40%	11,40%	11,40%	11,40%	11,40%	11,40%
Unlevered Beta	0,68	0,69	0,64	0,55	0,49	0,55	0,49
D/E	1,23	1,23	1,23	1,23	1,23	1,23	1,23
Levered Beta	1,43	1,44	1,35	1,14	1,02	1,14	1,02
Market Risk Premium	4,72%	4,72%	4,72%	4,72%	4,72%	4,72%	4,72%
Country Risk Premium	1,10%	1,84%	2,91%	1,84%	2,91%	1,84%	2,91%
Cost of Equity	7,9%	8,1%	16,2%	6,7%	14,6%	6,7%	14,6%
Cost of Debt	3,30%	3,30%	3,30%	3,30%	3,30%	3,30%	3,30%
After-Tax Cost of Debt	2,92%	2,92%	2,92%	2,92%	2,92%	2,92%	2,92%
D/(D+E)	55%	55%	55%	55%	55%	55%	55%
WACC	5,14%	5,24%	8,86%	4,60%	8,16%	4,60%	8,16%

	Renewables	Networks	CSEM
Weighted WACC by 2020 EBITDA	5,44%	5,66%	5,59%
Final WACC	**5,51%**		

Figure 25 -Beta Computations Summary. *Own Estimation*

[4] http://people.stern.nyu.edu/adamodar/New_Home_Page/datacurrent.html

4.2 Valuation

4.2.1 DCF-FCFF Valuation

4.2.1.1 Terminal value

To determine the terminal value, according to the literature, three inputs are required: the last year of explicit valuation free cash flow to the firm, discount rate, and growth rate.

Following the literature recommendations, the growth rate should be capped by the growth of the economy where the company operates. Observing the IMF Real GDP Growth for the main areas of business of EDP Group, in 2025, the growth oscillates from country to country, from as low as 1,4% in Spain to as high as 2% in Brazil.

Since the prospect of EDP future seems bright, the maximum value recommended by the literature, economic growth of the area, was used. To arrive at the economic growth of the areas where EDP operates, it was assumed that Renewables was only present in the Iberia and US and that Iberia growth can be computed as the simple average of Portugal and Spain growth, using 2020 EBITDA values to weigh the different growths, resulting in a value of 1,66%.

4.2.1.2 Sensitivity analysis

With the purpose of equating possible variation of assumptions in the model, a sensitivity analysis was performed. To measure the sensitivity of EDP's share price, the variables chosen were the perpetual growth rate and Weighted Average Cost of Capital. The analysis was made with changes of 0,25%, in absolute terms, to the values assumed. Since even the smallest change deeply affects the share price, it is needed to perform the sensitivity analysis with small differences.

As the table indicates, the model could assume that both metrics, were 0,25% lower than the values used, or 0,5% individually, and still resulted in a value higher than the one being traded as of 31st of December 2020, 5,16€. Is also perceptible that the share price is less sensitive to the perpetual growth rate than it is to WACC

		Perpetual Growth Rate				
		1,16%	**1,41%**	**1,66%**	**1,91%**	**2,16%**
WACC	**6,01%**	4,73	5,06	5,42	5,84	6,30
	5,76%	5,13	5,50	5,91	6,38	6,91
	5,51%	5,57	5,99	**6,46**	7,00	7,61
	5,26%	6,06	6,54	7,08	7,71	8,43
	5,01%	6,62	7,17	7,80	8,53	9,39

Figure 26 - Sensitivity Analysis. *Own estimates*

4.2.2 Relative Valuation

As recommended by the literature, a relative valuation was performed, since it is an excellent complementary valuation method to the discounted cash flow valuation.

The peer group chosen was retrieved from a bigger peer group, the Bloomberg Investment Europe Power Generation Top Competitive peers, which encompasses the top European power generation companies. The companies were chosen due to being direct competitors of EDP.

The multiples used in this auxiliary valuation method were: P/E and EV/EBITDA.

	P/E 2020	EV/EBITDA 2020
EDP – Energias de Portugal SA	**19,6**	**9,4**
Electricite de France SA	45,1	5,0
Endesa SA	17,0	7,8
Enel SA	31,0	9,5
Engie	37,3	10,1
Iberdrola SA	19,2	12,8
Naturgy Energy Group SA	14,4	11,3
Average (without EDP)	**27,3**	**9,4**
EDP's Implied Share Value	**5,52**	**6,87**

Figure 27- Relative Valuation and Peer Group. *Bloomberg and own calculations*

For the first multiple, P/E, EDP's 2020 Net income is multiplied by the average ratio of the peer group to obtain the Equity Value of € 21.894M, which is then divided by the number of outstanding shares to reach the implied share value of €5,52.

The following multiple, EV/EBITDA need to be multiplied by the value of EBITDA, in order to arrive at Enterprise Value of €37.196M. Then, Net Operating Assets (NOA) and Debt value must be subtracted to the Enterprise Value, to reach Equity value, that finally is divided by the number of outstanding shares.

4.3 Valuation Results Summary

The results presented by the different valuations methods are to some degree disperse, but the methods applied in this valuation share a similar outlook of the stock price.

The DCF-FCFF valuation yielded a price of 6,46€ per share, a significantly higher price than the share close price at the end of the year, 5,16€, meaning an upside of +25%. The auxiliary valuation method, Relative valuation, presented dispersed results. The multiple P/E resulted in a price of 5,52€ (+7%) while the EV/EBITDA yielded a significantly higher price, 6,87€ (+33%) per share.

All the results obtained point towards an undervaluation of EDP stock price, when compared to its market value as of 31st of December 2021.

Conclusion

The elaboration of this work sought to present an informed and reasoned valuation on EDP S.A share on 31 of December 2020 and compare it to the closing price of the share on the same date.

Upon careful analysis of the main literature on equity valuation, several methods were reviewed of which two of them were chosen to perform this valuation exercise, due to their characteristics being the best fitted. The main method chosen was the Discounted Cash Flow, which was assisted by the relative valuation method – multiples.

The group and industry are facing unprecedented conditions and opportunities which means increased uncertainty and volatility. Nevertheless, with an extensive search of the studies made on the subject, the risk is attenuated.

Both methods applied in this valuation share a similar outlook of the stock price. The DCF-FCFF valuation provided a price of 6,46€ per share, an upside of +25% compared to the share close price at the end of the year, 5,16€. The sensitivity analysis supported this conclusion, since even with a decrease of 0,25% in WACC and Perpetual Growth Rate, or 0,5% individually, the yielded price is superior to 5,16€.

Relative valuation yielded dispersed results, but both of them were superior to the market price. P/E multiple resulted in a price of 5,52€ (+7%) and EV/EBITDA yielded a significantly higher price, 6,87€ (+33%) per share.

The outcome of the valuation methods applied are coherent and suggest that the fair value of EDP's shares is higher than its market value as of 31st of December 2021.

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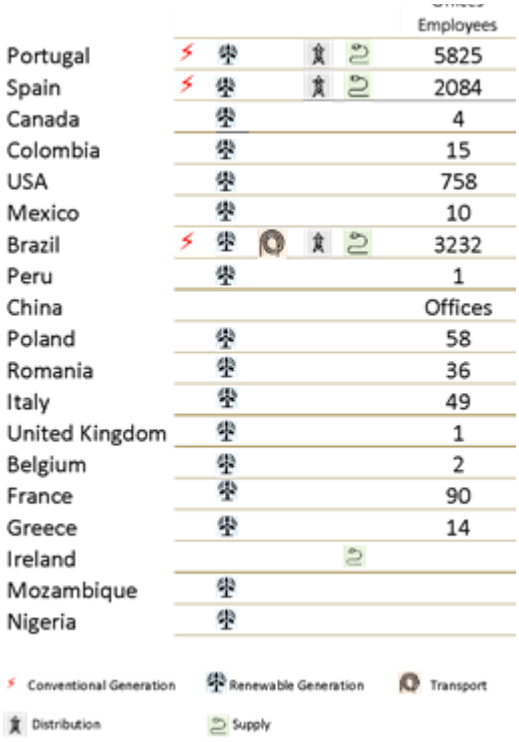
Annexes

Annex A – Business Geography



Source: EDP

Annex B – Consolidated Income Statement

(in million €)	2016	2017	2018	2019	2020	2021F	2022F	2023F	2024F	2025F
Revenues from energy sales and services and othe	14595	15746	15 278,00	14 333,00	12 448,00	12943	13955	14552	15169	15808
Gross Profit	**5738**	**5391**	**5099**	**5217**	**5092**	**5038**	**5382**	**5593**	**5813**	**6041**
Supplies and services	948	991	957,00	898,00	857,00	870	935	974	1014	1057
Personnel costs and employee benefits	661	681	652,00	620,00	667,00	632	666	686	708	730
Other operating costs (net)	370	-270	174,00	-6	-379	-119	-134	-145	-157	-169
Operating Costs	1979	1401	1 782,00	1 512,00	1 145,00	1383	1467	1515	1565	1617
Joint ventures and associates	-22	12	0,00	25,00	3,00	9	10	10	10	11
EBITDA	**3737**	**4002**	**3328**	**3731**	**3950**	**3771**	**4038**	**4205**	**4378**	**4558**
Provisions	-15	-4	288,00	102,00	112,00	96,6	96,6	96,6	96,6	96,6
Amortisation and impairment	1510	1676	1 445,00	1 766,00	1 632,00	1446	1560	1626	1695	1767
EBIT	**2242**	**2330**	**1595**	**1863**	**2206**	**2228**	**2382**	**2482**	**2586**	**2695**
Net Financial Interest	-813	-691	-626	-597	-563	-563	-563	-563	-563	-563
Capitalized Financial costs	58	33	34,00	48,00	71,00	49	49	49	49	49
Unwinding of long term liabilities	-189	-187	-177	-204	-205	-192	-192	-192	-192	-192
Net foreign exchange differences and deivatives	-18	-35	-5	-19	-24	-20	-20	-20	-20	-20
Other Financials	71	72	219,00	102,00	51,00	103	103	103	103	103
Financials Results	**-891**	**-808**	**-554**	**-670**	**-671**	**-624**	**-624**	**-624**	**-624**	**-624**
Pre-tax Profit	1351	1521	1041	1194	1535	1604	1758	1858	1962	2071
Income taxes	89	10	100	226	309	183	200	212	224	236
Effective Tax Rate (%)	7%	1%	10%	19%	20%	**11,4%**	**11,4%**	**11,4%**	**11,4%**	**11,4%**
Extraordinary Contribution for the Energy Sector	62	69	65	68	65	66	66	66	66	66
Non-controlling Interests	240	328	357	388	361	335	335	335	335	335
Net Profit Attributable to Shareholder	**961**	**1113**	**519**	**512**	**801**	**1021**	**1157**	**1245**	**1338**	**1434**

Source: Own estimations and EDP

Annex C – Consolidated CAPEX

(in million €)	2016	2017	2018	2019	2020	2021F	2022F	2023F	2024F	2025F
Expansion	**1267**	**1017**	**1394**	**1724**	**2397**	**2622**	**2869**	**3012**	**3163**	**3321**
Renewables			1309	1121	2101	2311	2542	2669	2803	2943
Networks	no data		73	585	286	300	315	331	348	365
Other			12	18	10	11	11	12	12	13
Maintenance	**697**	**709**	**637**	**534**	**508**	**550**	**596**	**626**	**657**	**690**
Renewables			41	46	34	36	37	39	41	43
Networks	no data		428	326	334	367	404	424	446	468
Other			168	162	140	147	154	162	170	179
Consolidated Capex	**1964**	**1726**	**2031**	**2258**	**2905**	**3172**	**3465**	**3638**	**3820**	**4011**

Source: Own estimations and EDP

Annex D - DCF Valuation

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
EBIT	2242	2330	1595	1863	2206	2228	2382	2482	2586	2695
Tax Rate (%)	7,00%	1,00%	10,00%	19,00%	20,00%	11,40%	11,40%	11,40%	11,40%	11,40%
NOPLAT	**2085**	**2307**	**1436**	**1509**	**1765**	**1974**	**2110**	**2199**	**2291**	**2388**
Depreciation (AMORTIZATION AND IM	1510	1676	1445	1766	1632	1446	1560	1626	1695	1767
Changes in NWC		-95	-647	-1189	-1040	-1101	-1166	-1215	-1267	-1321
Capex	1964	1726	2031	2258	2905	3172	3465	3638	3820	4011
FCFF	**1631**	**2352**	**1497**	**2206**	**1532**	**1350**	**1371**	**1403**	**1434**	**1465**
WACC						5,51%	5,51%	5,51%	5,51%	
Discounted FCFF						**1279**	**1232**	**1194**	**1157**	
Terminal Value									38055	
Discounted Terminal Value					**30709**					
Enterprise Value					**35571**					
Non-Operating Assets					7557					
Debt					17519					
Equity Value					25609					
Outstanding Shares (Millions)					3966					
Target Price					**6,46**					

Source: Own estimations and EDP

Annex E - Working Capital

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Change in Operating Working Capital, taxes and other	no data	-697	-681	-1124	-992					
Change in Regulatory Receivables	no data	602	34	-65	-48					
Total		**-95**	**-647**	**-1189**	**-1040**	**-1103**	**-1171**	**-1220**	**-1272**	**-1326**

Source: Own estimations and EDP

Annex F – GDP Growth

	GDP GROWTH 2025
Portugal	1,80%
Spain	1,40%
Iberia	1,60%
US	1,60%
Brazil	2,00%
g	1,66%

Source: IMF (2020)

Annex G – Damodaran's Data Set

Europe

Industry Name	*Number of firms*	*Beta*	*D/E*	*Effective Tax rate*	*Unlevered beta*	*Effective Tax rate*
Green & Renewable Energy	49	0,90	38,30%	14,01%	0,69	14,01%
Power	71	0,83	65,44%	15,74%	0,55	15,74%

North America

Industry Name	*Number of firms*	*Beta*	*D/E*	*Effective Tax rate*	*Unlevered beta*
Green & Renewable Energy	25	0,98	64,06%	1,74%	0,67
Power	55	0,67	78,08%	9,91%	0,42

Emergent

Industry Name	*Number of firms*	*Beta*	*D/E*	*Effective Tax rate*	*Unlevered beta*
Green & Renewable Energy	121	0,95	63,52%	10,53%	0,64
Power	378	0,88	108,26%	17,49%	0,49

Source: Damodaran's Data Set