Lisbon School of Economics & Management
Universidade de Lisboa

MASTER

FINANCE

MASTER´S FINAL WORK

BUSINESS CASE

EDPR ASSET ROTATION STRATEGY: CRYSTALIZING VALUE WHILE ACCELERATING COMPANY´S GROWTH

PEDRO HENRIQUE CABRITA E COSTA

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GLOSSARY

AR – Asset Rotation

CFO – Chief Financial Officer

COD – Commercial Operation Date

CTG – Chinese Three Gorges

EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization

EDP – Energias de Portugal

EDPR – Energias de Portugal Renováveis

ESG – Environmental, Social and Corporate Governance

EV – Enterprise Value

FID – Final Investment Decision

GW - Gigawatt

GWEC - Global Wind Energy Council

IRR – Internal Rate of Return

ISO – International Standards Organization

ITC – Investment Tax Credit

MWh – Megawatt hour

NEF- New Energy Finance

NPV – Net Present Value

O&M – Operation and Maintenance

OPEX – Operating Expenses

PBSA - Purpose Built Student Accommodation

PPA – Power Purchase Agreement

PTC – Production Tax Credit

PWC – Pricewaterhouse Coopers

RAP – Receita Anual Permitida

RWE AG - RheinischWestfälischesElektrizitätswerkAktiengesellschaft

SOC – Start of Construction

S&P – Standard & Poor`s

UN – United Nations

WACC – Weighted Average Cost of Capital

WC - Working Capital

ABSTRACT, KEYWORDS AND JEL CODES

Over the last decades the concern for the environment and the development of sustainable initiatives has soared, with renewable energy playing a vital role in attaining the green goals set by international organizations and national governments for the present and future economy. With these measures, there is a big incentive to develop renewable energy projects, such as wind and solar, which has increased the predominance of these energies exponentially. Which in turn increases the necessity of investment and financing to build wind and solar projects. As such, these renewable energy companies have been undertaking a strategy called Asset Rotation (AR), which allows them to sell portions or all assets at early stages of a project to crystallize upfront value and recycle capital to invest in new valuable projects, with lower external debt burden, with this self-funding model bringing many other accounting and market rewards.

In this business case will be studied the use of AR strategy at EDPR, one of the major multinational renewable energy production, development, and operation companies. To do so, the current context of the renewable energy industry will be initially addressed, as well as all the theoretical aspects of AR that make it suitable for this capital-intensive industry. Then we will focus on EDPR and its business, to understand the fundamentals of this strategy in the company, its theoretical basis, the decision process, and its advantages.

The goal of this case is firstly to understand what AR means and how it works, and if this strategy is an added value to EDPR's business strategy. After a theoretical analysis of the implementation of AR in the company, and its benefits for EDPR's business, accounts and credit reputation, the conclusion was that AR is an enhancement for the company and fits with its present and future goals. Moreover, through a practical example from EDPR, it was possible to compare the outputs of a wind project embedded in the AR strategy compared to a project held till the very end of its useful life, with AR once again proving its advantage in financial terms.

KEYWORDS: Asset Rotation; Crystalizing; EDPR; EDP; Investment; Renewable Industry; Self-Funding; Wind Energy.

JEL CODES: G31; G32; L21; O22; Q01; Q42

RESUMO, PALAVRAS-CHAVE E CÓDIGOS JEL

Nas últimas décadas, a preocupação com o ambiente e o desenvolvimento de iniciativas sustentáveis aumentou, tendo as energias renováveis desempenhado um papel vital na consecução dos objetivos verdes estabelecidos por organizações internacionais e governos nacionais para a economia presente e futura. Com estas medidas, existe um grande incentivo para desenvolver projetos de energias renováveis, tais como eólica e solar, o que aumentou exponencialmente a predominância destas energias. O que, por sua vez, aumenta a necessidade de investimento e financiamento para a construção de projetos eólicos e solares. Como tal, estas empresas de energias renováveis têm vindo a empreender uma estratégia chamada Rotatividade de Ativos (AR), que lhes permite vender partes ou todos os ativos nas fases iniciais de um projeto para cristalizar o valor inicial e reciclar capital para investir em novos projetos de valor, com menor peso da dívida externa, sendo que este modelo de autofinanciamento traz muitas outras recompensas contabilísticas e de mercado.

Neste caso empresarial será estudada a utilização da estratégia AR na EDPR, uma das maiores empresas multinacionais de produção, desenvolvimento e operação de energias renováveis. Para tal, será inicialmente abordado o contexto atual da indústria das energias renováveis, bem como todos os aspetos teóricos da AR que a tornam adequada para esta indústria de capital intensivo. Depois centrar-nos-emos na EDPR e nos seus negócios, para compreender os fundamentos desta estratégia na empresa, a sua base teórica, o processo de decisão, e as suas vantagens. O objetivo deste caso é, em primeiro lugar, compreender o que significa AR e como funciona, e se esta estratégia é uma mais-valia para a estratégia empresarial da EDPR. Após uma análise teórica da implementação da AR na empresa, e dos seus benefícios para o negócio, contas e reputação creditícia da EDPR, a conclusão foi que a AR é uma melhoria para a empresa e se enquadra nos seus objetivos presentes e futuros. Além disso, através de um exemplo prático da EDPR, foi possível comparar os resultados de um projeto eólico incorporado na estratégia AR com um projeto realizado até ao fim da sua vida útil, tendo a AR provado mais uma vez a sua vantagem em termos financeiros.

PALAVRAS-CHAVE: Rotação de ativos; Cristalização; EDPR; EDP; Investimento; Indústria Renovável; Autofinanciamento; Energia Eólica.
Códigos JEL: G31; G32; L21; O22; Q01; Q42

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ACKNOWLEDGMENTS

At last, this long and challenging journey has come to an end. Without my lovely family and close friends, I would not have been able to overcome the obstacles that appeared in my path, it was a real internal struggle, but I believe that the fruits will be collected in the future.

Naturally, a particular thanks to my supervisors João Carvalho das Neves and Tiago Cruz Gonçalves who accompanied me during this work, and specially challenged me and believed in me to be capable of developing an innovative theme, which I hope will be an added value to the future academic and financial world.

I would also like to express my sincere gratitude for the crucial and genuine help from EDP group staff, João Salvação Barreto and Antonio Narciso. Without your explanations, information, and clarifications on this subject it would not have been possible to finish this work at all.

For many times I imagined this moment coming, since it’s the end of a major stage of my life. During these 2 years of master's degree and more than 5 years at ISEG, I lived through good and bad moments, but I showed once more that when we really want something and strive for it, we will always achieve our goals.

1. INTRODUCTION

The general concern of society with carbon emissions and the harm of traditional energies to the environment has been increasing, which has exponentially accelerated the demand for solutions derived from renewable electrical energy sources, such as wind, solar, hydrogen, among others. Consequently, this high demand for clean energy has made the renewable industry explode in the recent decades, with an estimated 90% of all global growth in 2021 and 2022 coming from renewable sources (IEA, 2021).

This expansion together with beneficial incentives from national governments and worldwide regulators, means that producers and suppliers of renewable energies need an intensive capital structure with constant investment to develop quality energy projects and expand their business globally. In the context of being able to withstand the rapid growth and accelerate the process of constructing and developing new projects, mainly related with wind power plants, a strategy called Asset Rotation (AR) began to be implemented by energy producing companies.

This strategy typically consists of an energy producer selling all or a percentage of its assets in the initial or mature phases of a project to another counterparty, which could be a mere investor or some agent more specialized in the matter. This sale can be made in the initial construction phases, development of the assets or when the project is already in a phase of full operation. The phase in which the project is sold depends not only on the financial and strategic objectives of the producer, but also on the risk aversion of the buyer, since it is much riskier to invest in a project in its construction phase than when the project is demonstrably operational.

In the field of wind energy, this strategy, from the producer's point of view, makes it possible to accelerate the company's growth process, since by selling the assets in the early stages of the project, it is possible to retain cash proceeds right away (upfront value crystallization) and reinvest this money in new parks or other beneficial business opportunities rather than waiting 25 or 30 years of wind assets useful life to retain the complete project value. This capital recycling makes it possible to quickly leverage the business while using the company's own funds to expand, reducing the need for external debt which ultimately will enhance the company´s solvency metrics and improve its credit rating.

This business case was first developed to better introduce and explain the AR strategy, and then apply this knowledge in the context of renewable energies, more specifically in EDP

renewables case. Thus, it would be possible to understand if this strategy is suitable for the company's business strategy and if it has clear advantages for its current and future activity. Thus, this case study was developed in a top-down approach, starting from a more global point, with the renewable energy industry and the asset rotation, moving to a description of EDPR and its business, and finally funneling for the characteristics and development of the AR strategy within the company.

In chapter 2, an overview of the current renewable energy industry was made, addressing not only the global development of the industry, but also focusing on the challenges and advantages of the wind and solar sector. Then we move on to an applied AR literature review, starting with its definition and the context of its application within the renewable energy sector. In addition, the main benefits of this strategy for renewable energy producers and investors were pointed out, and the application of this type of strategy in the area of real estate was also mentioned.

In chapter 3, a description of the company that will be studied, EDPR, was made, covering its history, its business, and its business strategy. In chapter 4, a complete analysis of the AR strategy within the company was made, from its implementation in 2012 to the present day, presenting its evolution and its numbers. Afterwards, a comparison was made between the benefits of the Old AR and the new AR (sell-down). Then, the company's decision process to implement this strategy in the wind sector and the respective timeline was presented. Finally, the various benefits of this strategy for EDPR were described and enumerated, framing these advantages with the company's current and future business strategy.

Finally, in the fifth chapter, a wind farm cashflow projection was developed for EDPR in order to compare the value of a hold to maturity project with the value of a project that would be incorporated in the company's AR strategy. For the latter scenario, an actual AR agreement between EDPR and Finerge group was used to estimate the real-world outputs of this project.

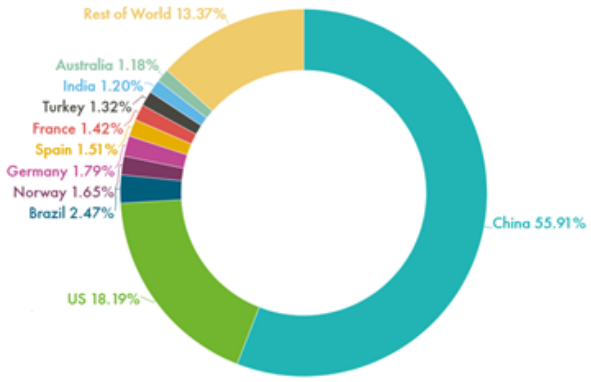
2. RENEWABLE INDUSTRY AND ITS INVESTMENT POLICY

2.1 Renewable Energy Industry: Outlook and Trends

According to the International Energy Agency (IEA, 2021), renewable energy installed capacity in 2020 increased by about 45%, recording a 280 GW increase, the highest YoY growth rate since 1999. In addition, 90% of all global power capacity expansions in 2021 and 2022 are expected to originate from renewables.

Paramount to note is the importance of the wind energy sector in this expansionary context, where in 2020 this sector increased its energy capacity by 93 GW (**Figure 1**), being pulled mainly by the growth of China and the United States, with 55.91% and 18.19% of the total global growth, respectively, as described in the Global Wind report carried out by the Global Wind Energy Council (GWEC, 2021).

Figure 1. Wind farms new capacity in 2020



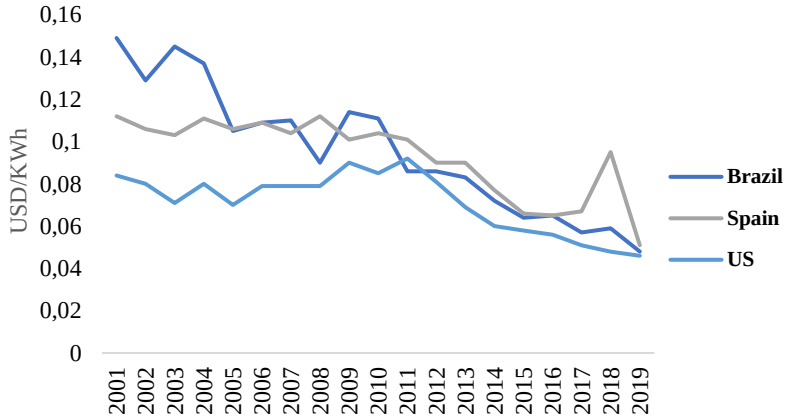
Source: GWEC- Global Wind report, 2021

Additionally, and according to GWEC Global Wind report, the Offshore wind farm market will reach an installed capacity of 234 GW by 2030, led mainly by projects in Asia-Pacific. In the European scenario, even though in the last decade there has been a clear downward trend regarding the weighted average Levelized Cost of Energy[1] (LCOE) of new Onshore wind projects all over the world (**figure 2**), countries continue to prefer the use of

[1] Represents the average amount of revenue per unit of energy produced that is necessary to reach break-even, that is, the amount that equals the costs of building and operating in a new energy plant. This ratio is widely used to evaluate the competitiveness and viability of investment in different energy projects (US EIA, 2021).

Offshore alternatives. For example, the case of the United Kingdom and Germany, which in 2019 were the countries with the strongest European percentages of installed capacity in Offshore wind plants, 44% and 34%, respectively (Iberdrola, 2019). Nevertheless, United Kingdom and Germany had a weighted average LCOE (measured in USD\KWh) percentage decrease (2010-2019) of 21.13% and 57.35%, respectively International Renewable Energy Agency (IRENA, 2019).

Figure 2. Weighted-Average LCOE of new Onshore Wind Projects



Source: IRENA – Renewable Power Costs, 2019

Based on a study done by Deloitte (2021), the renewable energy market is set to surge due to the concern for the environment and the companies' Environmental, Social and Corporate Government factors, leading to a much higher demand for sustainable alternatives, not only for the domestic, but also for the commercial and industrial markets. Innovation, operational efficiency and smart investment will remain to be key drivers of Renewables Industry success, which will improve companies` ESG scores.

In 2021 the American company "Form Energy" has created an iron-air battery capable of storing energy for 100 hours at a cost of $20 per kWh, about 10 times less expensive than usual lithium-ion batteries. Also, 76% of Offshore wind energy utilities that were surveyed in this study wanted to increase or change their electric transmission chain technologies in order to increase process efficiency and reduce costs of energy stuck in inter-transmission queues. Additionally, rising prices for raw materials and transportation costs make companies want to increase their range of domestic producers as well as looking for a larger and cheaper range of raw materials on the market, through partnerships with key suppliers, or government

agreements. Nevertheless, the process of treating the waste generated by this industry could also be essential for job creation and for enhancing the circular economy, since in the US alone it is projected that by 2030 solar panels will be generating 1 million tons of waste, and there will be 80 metric Kt of lithium-ion batteries for recycling (Deloitte, 2021).

According to the United States department of energy (DOE, 2015), LCOE compared to 2015 figures will shrink by 33% and 43% in 2030 for Onshore and Offshore wind plants, respectively. This drop will be due mainly to reductions in financing costs, greater operational efficiencies arising from innovation, and fewer market barriers due to new regulations and permits.

As an illustration of improved regulations and policy incentives, the Production Tax Credit [2] (PTC) and Investment Tax Credit[3] (ITC) in the US can be highlighted. In December 2020 the US congress extended the PTC to 60% of the total credit amount for all wind energy projects scheduled for construction after December 31, 2021, as stated by the US Energy Information Administration (EIA, 2021). Additionally, US congress on the same date mandated an ITC of 26% for solar panels installed in 2020-2022 and 22% for systems installed in 2023 as reported by the US Energy Efficiency and Renewable Energy office (EERE, 2022).

2.2 Asset Rotation Strategy: "Green" Room for Growth

According to Bloomberg (2021), asset rotation means companies financing their assets at a certain stage of their useful life then subsequently selling to other investors at another stage of the asset's life. This strategy is where the wind or solar project owner finances itself at higher rates in the early stages and then sells these project assets to another investor at a later stage. Hence, the project holder will have more money to be invested, and the new investor will get returnable operating assets. Also, as mentioned by Bloomberg New Energy Finance analyst Bo Quin: "Asset rotation shows that market works", where a given upfront investment will potentiate a subsequent higher new capital and so on. Moreover, investors' market expectations, especially in the renewable energy business, over the past few years tend to benefit companies

[2] PTC concerns a federal tax credit for producers of quality renewable energy, with the deduction rate measured per kWh of energy generated and differing by type of energy, as referred by US EPA.

[3]According to Solar Energy Industries Association, ITC consists of a dollar-per-dollar reduction in federal taxes paid by consumers and corporations that make use of renewable energy (solar mostly) in their facilities, the deductions value being on the actual money that has been invested in the energy systems.

with AR strategies, as pointed out by Société Générale analysts in 2020, citing this as the root cause of the 0.36% hike in EDPR's shares in May 2020. Nevertheless, is vital to comprehend the cycle of investors' increased returns through classic minority AR deals, since these gains are hardly accounted in the earnings of the year of the transaction, this value addition will arise through re-investment that will occur in that year or in following years according to the opportunities and company's current situation, as pointed out by the Chief Financial Officer of Engie in a conference call for its Q3 2020 results.

According to an article by Standard & Poor`s Global (S&P, 2021), investing in solar and wind plants already in operation is well suited to risk averse investors, increasing the overall investment of pension funds and insurance companies in this industry. Making infrastructure funds compete for higher risk-return ratio projects in the pre-financing and development/construction stages (illustrated in **Appendix A.1** and **A.2**) with corporate investors and other large utilities in the energy industry. Apart from increased competition from other investors, infrastructure fund deals have slowed down due to a shift in the AR strategy of big Renewable Energy industry players, such as Engie Société Anonyme and Energias de Portugal Renováveis, which have decided to increase the % share of projects in their statements, due to higher exponential valuation of their assets, somewhat setting aside the steady yields on post-construction projects for minority investors.

Therefore, the overall value and number of investments by infrastructure funds managed by giant institutional investors (**Table I**) such as BlackRock Inc. have stabilized in North America, shrunk in Asia and risen much less in Europe over the last 5 years, as stated in 2021 data from Prequin.

Table I. Major Investors per cash raised in 2020

Company	Headquarters	Capital Raised ($Billions)	Estimated Dry Power ($Billions)
Global Infraestructure Management LLC	New York, US	51.5	19.7
Brookfield Asset Management Inc.	Toronto, Canada	48.2	14.0
Macquarie Group Ltd.	London, UK	46.2	12.6
BlackRock Group Inc.	New York, US	28.7	7.2
Stonepeak Partners LP	New York, US	20.7	10.7
EQT AB	Stockholm, Sweden	17.0	3.2
KB Asset Management Co. Ltd.	Seoul, South Korea	14.7	4.3
AMP Capital Investors Ltd.	Sydney, Australia	14.6	3.1
KKR & Co. Inc.	New York, US	14.5	5.7
Copenhagen Infrastructure Partners K/S	Copenhagen, Denmark	14.4	6.6
	Total	**270.5**	**87.1**

Source: S&P Global - In renewables rush, infrastructure funds feel squeeze from rising competition, 2021

However, to attain the Paris Agreement's climate goals by 2050, it is estimated that an investment of $60 trillion is needed in the energy sector, amounting to $2 trillion of annual investments roughly. Shortage of cash available is not the issue. At the end of 2019, there was about $2 trillion raised but not yet invested in private equity money[4], over $50 trillion in world savings in pension funds and other insurance, and a grand total of over $100 trillion in assets managed by large asset managers (Bloomberg, 2021).

Nonetheless, if the AR market does not offer investors investment opportunities, these "green" transactions could fall short of expectations. This factor could be a great incentive for energy companies to keep asset rotation deals both riskier and less risky, since then all this idle money from asset managers, pension funds, and private equity can flow into the energy sector and promote a worldwide future decarbonization.

2.3 Asset Rotation Strategy: Overall Market Analysis and Advantages

Asset Rotation is embedded in several worldwide energy and renewable energy companies' business strategies, because these are capital-intensive industries, in which capex has a major preponderance for growth. The AR strategy allows these firms to leverage growth plans in a shorter period.

Among them is the German company Rheinisch-Westfälisches Elektrizitätswerk Aktiengesellschaft, which has Asset Rotation as one of the funding pillars for growth until 2027. With its capex imbedded in approximately 4 billion EUR in Asset Rotation and Divestments, aiming to optimize the overall asset portfolio risk and financing, through long-term partnerships with majority stakes in these projects, furthermore, the gains from these divestitures will be translated into a higher Adjusted EBITDA (RWE AG Capital Market Day, 2020). According to the company CFO Michael Muller, this strategy optimizes the investment portfolio while crystallizing money today, generating additional value.

Other good example is Iberdrola SA, the company employed this strategy to finance 5% of its EUR 94bn in Investments and Dividends until 2025, in which EUR 4.6bn in AR deals were already completed between 2018 and 2020. This form of financing gives the company

[4] Capital that, in the energy infrastructure world, is generally geared towards the earlier stages of asset life (Bloomberg, 2021).

greater flexibility and contributes at the same time to greater shareholder return and financial solvency (Iberdrola´s Capital Markets Day, 2020). In April 2021, a co-investment was agreed between Iberdrola and Mapfre to invest about 230 MW in wind and solar energy, with 80% of these renewable projects controlled by the Spanish insurer, where Iberdrola owns the remaining 20% and is responsible for the development, construction and maintenance of these plants (Mapfre, 2021). Plenty of other Energy companies have AR strategy as one major investment practice in its strategy as the renowned multinationals Engie SA and Acciona.

With similar principals as the AR strategy is the one known as "Forward Funding" strategy employed in the real estate industry. It consists of a sale and purchase agreement between a project owner-developer and an investor-buyer, the proceeds (in whole or in rents) of which are sold before construction is complete and often in the early stages of development, in which the feasibility of the up-front payment arrangement will depend on each party's assessment of profitability compared to a normal purchase and sale (Loyens & Loeff, 2021).

Forward Funding core benefit from the developer's perspective is the upfront cash flow received, providing flexible funds for the project, balancing the firm´s balance sheet, and sharing the construction risk with the investor. For the investor, due to the higher risk associated with the future project construction, the property can be acquired for less money and with greater negotiation flexibility (Dentons, 2021). Besides, this approach is widely used in the Build to Rent\Private Rented Sector[5] markets, which allows the project builders and developers to greatly economize on marketing channels, retail intermediation, and sales to the property's final customers, as well as speeding their investment cycle for possible new market opportunities.

One example is the investment executed in September 2021 by Ageas Portugal Group, which along with real estate developers Promiris and Cetim agreed on the acquisition and construction of a Purpose-Built Student Accommodation (PBSA) for university students in the city of Porto. The PBSA included 265 combined rooms with the construction starting in late

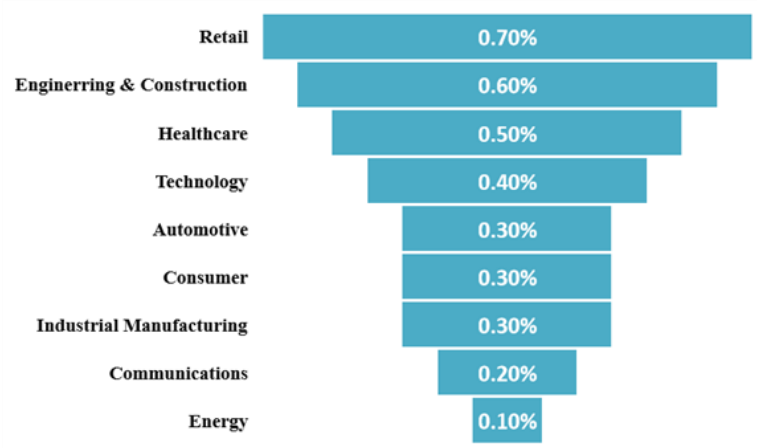
[5] As mentioned by the Rural Planning Services group (RPS, 2022), these sectors concern houses and buildings built exclusively for renting rather than selling. The major distinction between these two is that PRS properties are owned by regular landlords who may manage several assets, while BTR properties are systematically handled by institutional investors or real state specialized companies that try to promote community well-being and enhance long-term incomes.

2021 and expected to become operational in the Summer of 2023 (Grupo Ageas Portugal, 2021). According to a market study by Coldwell Banker Richard Ellis (CBRE, 2018), there was a shortage of supply for the Portuguese PBSA market, as for 122,000 students there were only 600 facilities in 2018, compared to 35,000 accommodations for 300,000 students in the UK.

First, from the AR strategy implementer's point of view, a major benefit concerns the **liquidity** created by upfront value crystallization. With partial or total asset sales, the initial cash proceeds can be re-invested in new projects of higher Internal Rate of Return or in projects of the same IRR, but at a faster rate due to the actual recycling of capital. A wind farm will last at least 20 to 30 years, therefore AR allows one to extract the value of the wind farm early and invest in other projects instead of waiting all these years. In addition, more liquidity also means better and wider short-term handling of payments and current operations, which contributes to an improvement of the Net Working Capital aspects. Being able to smartly manage a company's cash balance is as important as reducing the liquidity risk of companies.

Upon a study undertaken by Price Waterhouse Coopers (PWC, 2019), and after analysing the financial performance of the largest listed companies in the world, it was recorded 1.2 trillion euros in global balance sheets arising from Working Capital (WC) excess, and if this WC poor management was removed, the overall global Return on Invested Capital would go up by 30 basis points (**Figure 3**), depending on the industry- specific features.

Figure 3.ROIC improvements due to WC excess elimination



Source: PWC report – Creating value through working capital, 2019

The second advantage is a higher **solvency** brought on by this AR strategy, since it is a Self-Funding model, which means that the users will relieve their statements and investors of

the external debt burden. As disclosed in a Harvard Business Review paper (Piper & Weinhold, 1982), when achieving a certain % of debt in their capital structure, firms start facing agency costs stemming from the increased monitoring of management in terms of meeting deadlines and managing debt payments. Furthermore, higher levels of debt create financial distress problems due to a lower ability to react to competitors' attacks, limits new investment opportunities in the market, and undermines access to new debt capital. Thus, a decrease in external debt will enhance the companies' financial solvency and credit risk ratios, which in addition to providing more resources for pay-out policies, will also be crucial to raise third parties' and investors' view on the reliability and financial sustainability of the company.

These better financial solvency and credit figures contribute to an improvement in the **credit rating**, which will deliver some advantages for the company analysed by the credit agencies. Credit ratings are very useful for detailing creditworthiness to other stakeholders, improving your entry into new markets, increasing your corporate transparency, anticipating changes in the cost of debt and cost of capital, and demonstrating credit rating improvements is essential for achieving lower lending rates, among other advantages, as disclosed by S&P (2022). Thus, a credit rating is not only an improvement in the company's corporate transparency, but also a great chance to enter new markets, improve the reputation to potential investors and stakeholders, and get lower loan rates, which ultimately will reduce the cost of capital and generate a higher market valuation. Therefore companies, especially those listed on the market, implement in their business strategy the goal of improving their credit ratings.

Finally, there' s an advantage both from the seller and investor/buyer side of AR deals, which concerns the **diversification** policy of value-added projects and investments in their own portfolio. According to the world leader in asset management BlackRock (2021), there are three key advantages to a diversified portfolio: Mitigate investment risk throughout expending capital in different classes, industries and locations; Potentiate returns in new investment categories which will stabilize the long-term returns` variation; Achieved customized investment goals between safer fixed income and speculative investments, changing the strategy accordingly with its needs and timing. According to the Modern Portfolio theory, it is possible for investors to reduce the risk level of an investment by investing in several assets, since a portfolio is less sensitive to market volatility than the sum of the individual assets (Markowitz,1952).

Therefore, AR assets strategies cannot be studied solely based on the returns and efficiency of the assets that have been chosen to be transacted, but instead on the business strategy for the overall asset's portfolio from the perspective of both AR seller and buyer. In an investment decision, companies must evaluate the cost-effectiveness of these decisions based on the portfolio of Projects, and not based on the stand-alone projects (Mckinsey, 2012).

3. COMPANY OVERVIEW

3.1 EDPR: History and Business Description

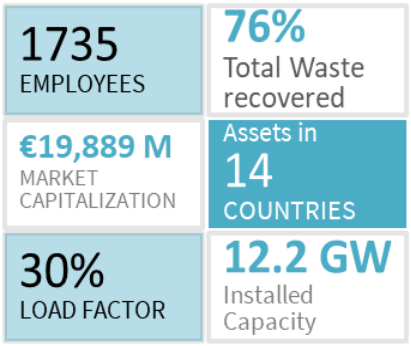
EDP Renováveis, Sociedad Anónima (treated as "EDPR" or "EDP Renováveis") was founded on December 4, 2007, in Spain, focused on the electricity business and with the objectives of planning, building, operating, and maintaining power stations, which come from renewable sources, mainly solar and wind power, having developed more than 270 wind farms and 15 solar parks worldwide. The company belongs to the renamed EDP group, with EDP Energias de Portugal, S.A., the largest energy generation and supplying company in Portugal, as its ultimate parent company.

In June 2008, EDPR began to be listed on the stock exchange through an Initial Public Offering on Euronext Lisbon. As declared via "Comissão do Mercado de Valores Imobiliários" (CMVM, 2008), the company transacted 25% of its share capital with an offering of its final subscription price of 8 euros per share, reaching an overall net value offer of 1568 million euros (excluding the so called "Greenshoe"[6] exercise), which included institutional investors of international excellence such as Morgan Stanley, J.P Morgan and the Citi Group.

Currently the company's main offices are in Oviedo, Spain, but it is a global player, and by the end of 2020 it was already on 3 distinct continents, managing a 12,200 MW installed capacity portfolio in 14 different countries, with 11,500 MW coming from its 11 subsidiaries around the world. The US is the country with the strongest installed capacity, with 51.63% of all EDPR's global installed capacity, and Europe is the continent with the largest workforce, with roughly 49.91% of the 1735 employees worldwide.

[6] Consisted of a supplementary lot offering, with a ceiling of 29,403,646 shares with a subscription option aimed at retail and institutional investors (EDP, 2008).

Figure 4.EDPR 2020 Key Metrics



Source: EDPR 2020 annual report

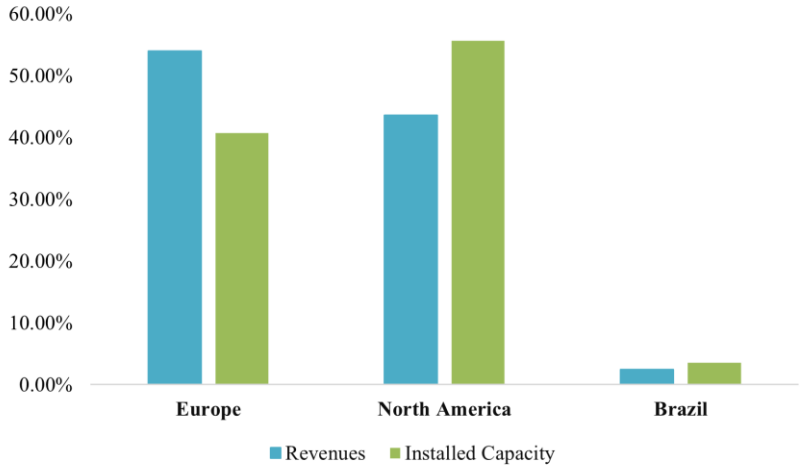
The whole business model is driven by the company's vision *"A global energy company, leading the energy transition to create superior value"* and supported by 3 core values (Innovation; Sustainability; Humanization) and 4 key commitments (Sustainability; People; Customers; Results). These grounds lead the company's daily activities, being in charge for the entire chain of generation and supply of energy from renewable sources. The company structured this process in 4 distinctive phases:

- Development: *Site Identification:* Find the places with the best geographical conditions in terms of wind and radiation; *Renewable sources analysis:* use expert equipment to study the meteorological conditions; *Obtain Permits:* deal with local authorities in order to obtain the necessary licenses and documents for the use of the space; *Design layout and equipment choice:* match the best type and characteristics of suitable equipment to the location of operation; *Long term contract for the sale of energy:* securing sales contracts that deliver long-term, stable returns; *Project funding:* define and obtain financing for the project;
- Construction: Build the wind turbines, solar panels, power substations, and all the necessary infrastructure for this purpose, such as the local roads and access routes;
- Operation: *Start of operations and deliver clean energy:* produce energy with the highest quality and minimum social environmental impact; *Ongoing maintenance service:* keep the maximum availability of the wind turbines and solar panels, as well as, minimize operational failure rates; *Data analysis:* Monitor project performance data in order to control profitability and energy activity, while looking for margins of improvement;

- Dismantling: Restore the land used in the project and try to recover the waste generated in these 30-35 years of useful life of the wind plants and solar panels.

Due to the business units' operations having different geographic locations and management styles, EDPR activities are divided into three strategic business segments[7]: Europe, North America, and Brazil. In 2020 the firm booked €1,528,974 thousands in total revenues, with 52.46% derived from the "Europe" segment, yet it was the "North America" segment that exhibited the only positive annual growth rate, recording approximately 2% YoY increase (**Figure 5**).

Figure 5.EDPR 2020 Revenues and Installed Capacity per Business Segment



Source: EDPR 2020 annual report

EDPR is extremely engaged in applying a sustainable management that promotes social and environmental well-being, and therefore drives 8 United Nations Sustainable Development Goals [8] in its daily activity, develops two of them in its core business and have a direct impact on other six. In 2019 the company has prevented 19,024 Kt of carbon dioxide from its activities, as well as reduced the installed capacity affecting protected areas from 18.9% to 16.2%. EDPR´s 2019 workforce were composed of 30% women, where management positions were

[7] Europe: EDPR EU group companies operating in Belgium, France, Greece, Hungary, Italy, Netherlands, Poland, Portugal, Romania, Spain, United Kingdom; North America: EDPR North America, EDPR Canada and EDPR Mexico; Brazil: EDPR Brazil

[8] 17 Sustainable Development Goals adopted by all UN member states in 2015 with the objective of combating social, economic, and environmental causes in a 15-year plan, as referred by the UN. EDPR promoted SDG: core business (7th and 13th) and direct impact (5th,8th,9th,11th,12th, and 15th).

27% held by women, there has also been a reduction in the injury rate[9] from 2.4 to 1.2 ratio between 2018 and 2019.

In 2020, EDPR has improved its total waste recovered rate to 76%, reaching 100% of installed capacity certified by the International Standards Organization, meeting ISO[10] 14001 and ISO 45001 standards. In parallel, 81% of its employees were trained in digital tools, and the number of employees raised by 11% YoY to 17035 employees. EDPR is engaged in several sustainability studies, which analyse ESG scenarios. These reports are analysed and published mainly based on the EDP group, which is very well ranked in several indexes.

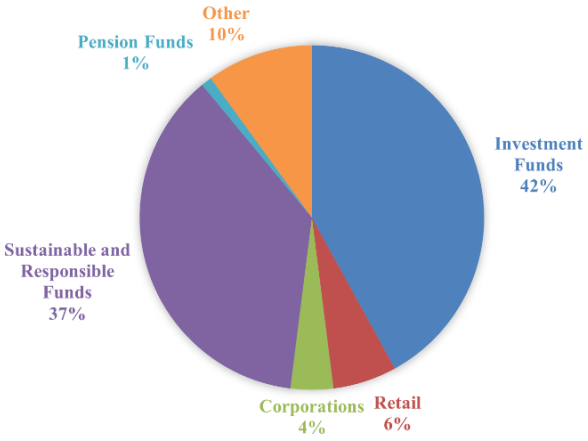
EDP's corporate governance model conforms to the Anglo-Saxon model and follows the recommendations of "Instituto Português de Corporate Governance" code. To increase the transparency of the company and to separate the company's management objectives with clear and specialized supervision, besides a highly experienced and qualified management team, there is a Board of Directors and 3 separate committees: Executive committee; Audit, Control and Related-Party transactions committee; Nominations and Remunerations committee. Regarding the remuneration policy for Board members, EDPR provides a fixed component (set by the Board) and a variable component (set by the executive committee). The later results from several components, where the highest weighting relates to the "shareholders" component, which has business performance metrics such as Operating cash-flow, net profit, Earnings Before Interest, Taxes, Depreciation and Amortization + Sell-down gains, among others. The Executive Directors also receive non-monetary benefits, such as retirement saving plans, company car and health insurance.

At the end of 2020, 82.6% of the company's shares were held by the EDP group, with the remaining percentage (**Figure 6**) made up of more than 30,000 private and institutional investors spread over 26 countries. Excluding the stake of EDP, investment funds and Sustainable and Responsible funds are the largest type of EDPR´s investors, with 42% and 37%, respectively. The United States and the United Kingdom are the countries with the most investors in EDPR, with 20% and 24%, respectively.

[9] Number of accidents with absence\Hours Worked*1,000,000 (EDPR, 2019)

[10] ISO 14001 (of 2015) and ISO 45001(of 2018) are accredited international standards that cover, respectively, environmental aspects, and health and safety aspects within a business, as explained by Sistema de Gestão Ambiental.

Figure 6.EDPR 2020 Shareholder Structure (excluding EDP) by investor type



Source: EDPR 2020 annual report

3.2 EDPR: Business Strategy Update

EDP's strategy is built around three major foundations:

- Selective Growth: In investment selection, EDPR seeks quality projects that provide secure long term cash flows that minimize risks and increase profitability. For this purpose, the company targets projects with secure Power Purchase Agreements[11] (PPA) to expand in current markets, establishing contracts with long term PPAs in different geographies, always aiming for less regulatory and economic risk, allowing to display a Net Capacity Factor[12] above the average of its current energy portfolio.
- Self-funding: To support its selective investment policy, the company draws on cash generated from its operating assets, asset rotation and sell-down strategies, as well as the monetary benefits of the US tax equity regulatory structure. Thus, it crystallizes value in the short term, and enables new opportunities for growth without relying more heavily on external funding.
- Operational Excellence: Through innovation, tight control and focus on detail, EDPR aims to maximize the operational performance and cost efficiency of its power plants.

[11]Primary contract between a supplier and purchaser of energy, to decrease competitive risk, improve the long-term certainty of cash flows and guarantee future energy demand and supply (World Bank, 2021).

[12]Also known as Load factor, it is the ratio between the energy effectively produced over the total energy capacity of an energy plant in a period, and is a metric of energy quality and efficiency, as stated by EDPR.

To accomplish this, three key metrics of operational progress are used: Load Factor, Technical Availability[13] and Core Operating Expenses per MW.

In EPDR's updated strategy report for 2021-2025, the 3 strategic pillars are kept with a simplified nomenclature of "Growth", "Value", and "Excellence", respectively.

4.THE STUDY CASE: EDPR ASSET ROTATION

4.1 EDPR Asset Rotation: Description and Core Milestones

According to EDPR, asset rotation is a strategy that aims to crystallize value in a project by selling a minority stake of an asset and consequently reinvesting this cash in other attractive market opportunities, in order to leverage and accelerate EDPR´s business growth. After the riskiest phases of the project, Development and Construction, the company sells a share of 34% to 49% of suitable projects to institutional investors and other financial players, using those sales up-front cash crystallization to diversify EDPR´s investments, while maintaining management control of those projects (since it owns the majority stake), and still obtaining a fix and secure long-term income stream from wind farms' operations.

In 2012, the EDPR's first successful AR transaction was booked, selling 49% of the assets of a wind power plant with 599 MW installed capacity in the US, to Borealis Infrastructure, for $230 Million (OMERS, 2012). A crucial factor in driving the AR strategy was the partnership formed with China Three Gorges (CTG) corporation, acquirer of 21.35% of EDP's share capital in December 2011. Following the financial crisis of 2008, the company encompassed in this partnership a form of improving its credit profile and strengthening its balance sheet. CTG were committed to invest €2 billion in AR deals by 2015, having a crucial factor for financial support in potential new crisis times, as well as existing an extensive cooperation for developing new technologies, and investing in new value-added market opportunities.

[13] Ratio between the energy currently produced and the maximum energy that would have been produced if there were no internal delays from maintenance and repairs, as referred by EDPR.

Up to 2017, 16 major AR transactions were undertaken, embracing a total capacity of 5808 MW spread across 9 different countries, of which 48.71% and 21.65% was aimed at investments in the US and Portugal, respectively. The global AR transactions amounted a total of €2.7 Billion in cash proceeds and reached an average EV multiple of €1.5/MW.

Since 2018, there has been a major change in EDPR's self-funding model, where in compliance with AR strategy principles, the so-called Sell-Down strategy emerged, which can be considered an updated version of AR. Sell-down consists of selling majority stakes of projects, typically still in development stages, to institutional and other investors, in order to crystallize immediate value and use these gains to reinvest in more value-added projects, while continuing to provide operation and maintenance services to the purchasers.

This change in stage of AR sale and % stake of projects sold under AR deals was mainly due to the perceived added value of recycling capital as early as possible to invest in new market opportunities. According to the Irish Wind Energy Association (IWEA, 2019), it can take up to 5-6 years on average for an Onshore wind farm to become totally operational, with all phases varying according to the capacity and characteristics of every project and energy developer. Therefore, instead of projects being sold after Commercial Operation Date[14], in the sell-down strategy this will occur during the development or construction phases, with a higher % stake sold, which will accelerate the capital recycling process and strengthen the current earnings of the firm´s statements.

Nevertheless, it is also important to highlight the change in the investment market aiming the renewable industry. Nowadays, the investors acceptance of risk has increased, as well as the competition for obtaining value-added renewable projects at the earlier stages of development or construction, which combined with an increased awareness for sustainability and a high amount of available money, led to a greater flexibility for profitable negotiations by energy project developers, such as EDPR.

In December 2018, the first Sell-Down transaction was performed, where an 80% stake in onshore wind assets located in the US and Canada, totaling 499 MW, were sold to Axium Infrastructure. The deal generated €260 million in cash, with an implied EV of €860 million,

[14]The date on which all the power generation equipment and all the materials and utilities required to bring the project into operation have been tested, ordered, and are now legally licensed to produce energy to be supplied to the transmission systems, as explained by an Agricultural Marketing Resource Center paper.

resulting in an Enterprise Value to MW ratio of €1.72 million. Up to 2020, EDPR executed 6 major sell-down transactions, totalizing 2440 MW of installed capacity traded, with 2.8bn euros recorded in cash proceeds, 690 million euros generated in capital gains, which delivered an average EV multiple of €1.7 m/MW. **Table II** below shows the evolution of EDPR's AR deals from 2012 to 2020:

Table II. EDPR Asset Rotations Transactions (2012-2020)

	Country	Year	Transaction	Assets Capacity (MW)	Share Sold (%)	Implied EV / MW(m)
Old Asset Rotation	US	2012	Borealis	599	49	$ 1.30
	PT	2013	CTG	644	49	€ 1.60
	US	2013	Fiera	97	49	$ 1.00
	Canada	2013	Northleaf CP	30	49	C$ 3.3
	US	2014	Fiera	1,101	36	$ 1.50
	France	2014	Axpo	100	49	€ 1.30
	US	2014	Dif	30	49	$ 3.10
	France	2014	EFG hermes	270	49	€ 1.30
	US	2015	Axium	1,002	34	$ 1.60
	Italy	2015	CTG	100	49	€ 2.10
	Brazil	2015	CTG	331	49	$ 1.20
	EU*	2016	EFG hermes	664	49	€ 1.70
	Poland	2016	CTG	418	49	€ 1.60
	Portugal	2016	CTG	422	49	€ 1.70
Sell-Down	Brazil	2018	Actis	137	100	R$ 9.2
	US/Canada	2018	Axium	399	80	$ 2.10
	EU*	2019	Vortex	997	51	€ 1.60
	US	2020	Nipsco	102	100	$ 1.70
	Spain	2020	Finerge	242	100	€ 2.10
	US	2020	Connor,Clark&Lunn	563	80	$ 1.50

** Belgium, France, Portugal and Spain*

Source: EDPR data

According to EDPR, by 2025 a further €8 billion is expected in AR transactions cash proceeds, allied to a greater appetite from Infra, Pension, and Sovereign wealth funds for this type of business with reduced associated risk. In 2021, EDPR already secured 27.5 % of the €8 billion target, being originated from 7 distinctive AR deals, in which one was completed in

July 2021 and 4 were signed in 2021, totalizing 1478 MW of energy capacity. Additionally, the company announced financial proceeds of €4bn by 2022 from Sell-Down transactions, with approximately 57.5 % of the target being already fulfilled by the end of 2020, and more €300 million capital gains estimated to 2021YE. These agreements are targeted for 2021-2025 to provide a crystallized upfront value of €0.3bn/yr, and during the same period is expected a 20 GW generated capacity but with capital requirements of only 13.34 GW, evidencing the AR strategy capital recycling advantage.

Finally, EDPR is working in new AR investments on transmission energy grids in Brazilian networks, this is mainly empowered by energy transmission inefficiencies created from Brazil immense territorial area and underinvestment on that sector, which combined with market entry government initiatives and regulated income, will enable EDPR to arrange low risk long-term agreements with local entities. Up to September 2021, the company already accounted for 8 major energy lines in Brazil, totalizing 1578 km of extension, in which approximately 33% are already operational. In December 2021, EDPR finalized the disposal of 3 major energy transmission assets to Actis, covering a length of 439 km, with an "Receita Anual Permitida[15]" (RAP) of approximately[16] €27.45 million and a transaction totaling an enterprise value of € 207.718 million.

4.2 EDPR Asset Rotation: Old AR strategy vs Sell-Down strategy

First and foremost, it is worth noticing that both strategies have crystallized upfront value and recycle capital to accelerate EDPR's growth strategy. Moreover, they contribute positively to improvements in crucial financial solvency and credit risk ratios that credit agencies employ, mainly in Net Debt/EBITDA figures, equally due to the cash proceeds from its agreements which will dimmish Net Debt and consequently decline that ratio. However, the way capital gains and earnings affect the company's statements is considerably different, given the project ownership percentage aspect.

[15]Refers to the pre-set revenues for the transmission operators in Brazil, which are disclosed annually by ANEEL, establishing the estimated RAP for the next 12 months with inflation adjustment. This yearly RAP can be adjusted for each firm according to company-specific indicators and information (ISA CTEEP, 2020).

[16]For RAP and EV figures were used a 6.3981 EUR/BRL exchange rate, withdrawal from the European Central Bank for the date on which EDPR officially announced the disposal, 28 Dec 2021.

For typical Sell-Downs with 80 or 100% sale of assets, due to minority or non-existent control, there will be a full deconsolidation of the assets in EBITDA, however the capital gains from these sales are 100% booked in EDPR's Operating Income, which increases the EBITDA of the year of sale, as well as contributing substantially to an uplift in Net Income. For the old AR, where EDPR has majority control of the project, the assets are fully consolidated in EBITDA, which will increase the visible operating cash flows for investors.

However, throughout the Income statement, this EBITDA will be diluted due to the so-called minority interests, which will drastically decrease the Net Income value for shareholders, since typically 49% of this income from assets does not belong to EDPR. That is, there is a large discrepancy between EBITDA and Net Income, which also affects the assessments of investors and credit agencies on the firm, since this gap between the statement items undermines the reliability and certainty of these evaluations. Furthermore, capital gains from the asset sales in the old AR will appear under reserves on the balance sheet and will have no positive visibility on the Income statement.

Another important difference concerns the Merchant Tail risk existing in the variation to the minute of the electricity price in the retail energy market. Renewable energy industry is moving into a 3rd phase of integration, where merchant tail risk is an increasingly important factor. For firms without government subsidization, this risk can be as high as 20 to 40 percent of capex in terms of Value at Risk, meaning that a 1.5% to 2.5% increases in minimum expected return will generate an increase in capex risk buffer by 20 or 30% (Mckinsey, 2018).

In EU, usually, wholesale energy prices are established through an auction basis from a marginal price setting policy (CaixaBank, 2022) in which prices are set up in Bid-Ask arrangements between EDPR and the energy wholesalers that are going to sell this energy to the end consumer. Although PPAs are normally established, in which the price is pre-fixed, usually PPAs length[17] has a maximum of 15 years, which means that EDPR will be possibly exposed to this risk in the remaining years until the assets, typically with 25 to 30 years of useful life, are decommissioned.

Therefore, through the Sell Down there will be a reduction of this merchant tail risk, since the value is initially locked up and the assets are mostly sold at the beginning, hereby for

[17] In Q4 2020 the avg. long-term length for PPAs in Europe and North America wind projects was 11.2 and 13.7 years, respectively (Level10 energy, 2020).

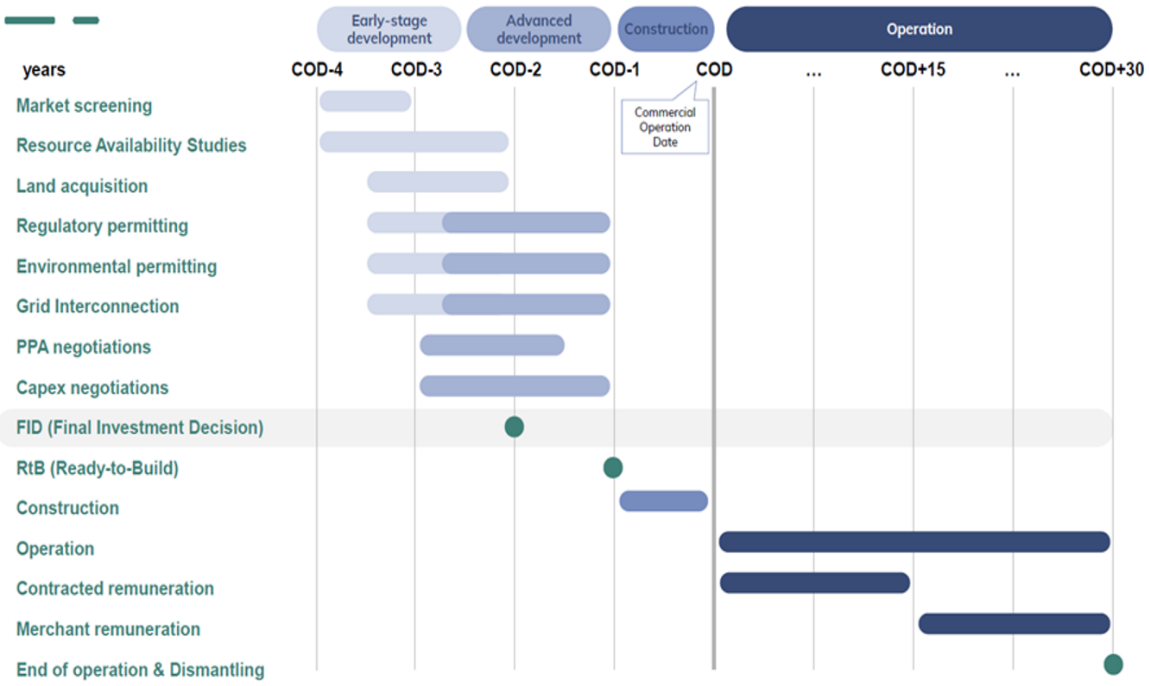
old AR will always exist a higher exposure to uncertain external factors which could provide wholesale price variations. These external factors include fuels costs variation; pre-operating and operating power plant expenses; transmission and distribution energy systems; temperature and weather conditions; and government regulations (US EIA, 2021).

Finally, Sell Down capital gains are heavily dependent on investors´ bid valuations, as well as, overall market appetite for this type of deals, which will create other potential issue related to the scheduled Operations and Maintenance services, since EDPR could deviate from their core business activity and overly trust in these services' execution, generating potential short-term negative synergies for the company.

4.3 EDPR Asset Rotation: FID and Assets Selection

AR strategy is a major pillar of EDPR´s investment decision and a key method to boost company´s growth through worldwide assets and markets. However, not every single asset would be beneficial from an AR investment strategy perspective, since for EDPR overall objectives some assets will worth more in a "Built to Own" standpoint instead of a "Build to Sell" standpoint. To accomplish it, EDPR follows a timeline from foundations to operations for each wind energy project (**Figure 7**).

Figure 7. Generic wind project timeline



Source: EDPR data

Firstly, exists a stand-alone deep study of possible value-added opportunities in the market, analyzing each region and each asset as they were "Built to Own" assets, understanding their worth and risks, which is undertaken throughout the project development stage. After concluding that those assets are feasible, value-added opportunities and fits the firm´s requirements, at an already advanced development stage, EDPR decision makers will execute the so-called Final Investment Decision (FID). Which according to Mckinsey Energy Insights is the stage in the process of capital project planning when the actual decision to undertake major financial commitments is taken. In the FID section, big equipment orders are placed, and contracts are concluded for engineering, procurement, and construction topics.

This EDPR decision also relies on an overall established target of 1.4 IRR[18] to Weighted Average Cost of Capital for each project studied and will define if EDPR will move forward

[18] Is the discount rate that sets a project's Net Present Value to zero. This percentage is calculated over a project's cash flows over time and can be stated as the expectable return on a project. If the IRR is greater than the pre-set total expected return rate, this project is considered profitable, as defined by the Association of Chartered Certified Accountants.

to construction. After certain details of the Capex and PPA agreements are finalized, and EDPR have full assurance of a good grid interconnection, FID is performed.

Therefore, these assets are Ready-to-Build assets, and the construction phase will take place. After executing this primary FID, there is sort of a secondary FID that then defines whether these assets will be used for a traditional AR strategy, for a Sell-Down strategy, or simply to be 100% owned until their useful life is over. The optimal and usual point for this latter decision to occur is as close as possible to COD, in order to extract as much value as possible from the agreed-upon PPAs and further decrease the perceived risk for possible investors. Nevertheless, this development and decision timeline will differ across projects and geographies, depending on other variables, for example the assets dimension, the project implementation complexity, the negotiation process with key shareholders and government local entities.

Therefore, to properly execute the secondary FID and select the best suitable assets to follow EDPR sell-down strategy, the following topics will be analyzed and discussed for each specific project:

- Worldwide portfolio balance: understand the corporate landscape in each geography, allowing for the choice of which assets and projects will be appropriate for the strategic purpose in that specific zone. In countries with high installed capacity and developed processes, it will be useful to use the AR strategy to hedge possible risks in that market, for example in the Portuguese market. While in countries with less involvement, AR may be a suitable way for EDPR to approach this new market in terms of potential future agreements and projects, for example Spain and Brazil.
- Investor's market expectations: The pre-analysis of project profitability will depend mostly on the comparison between expected value of the stand-alone assets and the market value at which investors will acquire these assets in the project's early stages. Hence, the selection of assets for the Sell-Down strategy is heavily reliant on the expectations, appetite, and risk aversion of each investor in each region of the globe. Due to a typical lower cost of capital, investors will value EDPR's projects and assets at a premium, consequently they will tender a bid higher than EDPR's initial appraised value using its own WACC. These surplus

between project value and offer value are extremely dependent on buyer's expectations and valuations.

- Merchant tail risk: The risk associated with the wholesale electricity sales price variation can make it feasible to use the Sell-Down strategy. If it is forecasted a higher merchant tail risk in a geography, long-term agreements and upfront value crystallization enables to lock in the project value. This subject is assessed every month at EDPR's restricted risk committee meetings, which are focused on reviewing the market and development risk of projects that are under development or under construction. It addresses the risks linked to the sale of energy, not only in terms of electricity prices, but also in respect to operational, country, and counterparty risk.
- Short-term synergies: It is equally critical to understand the potential negative synergies that the sell-down strategy creates in the short term. If EDPR executes a 100% disposal of assets, there will be no other source of income from these assets in the next few months or years, depending on when the up-front cash proceeds will be re-invested in other assets. Therefore, as a counterbalance, EDPR will be able to use excellency O&M[19] and managing services to create a trustable revenue stream from the very beginning and throughout the useful asset life. Nevertheless, if the negotiation with the customer for these services is unsuccessful, who might have negotiated a better deal with another player or may already have another O&M provider in his global portfolio, it could bring potential personnel and financial costs to the company. As the company may have hired specialized personnel, set up offices, established transportation logistics to provide these O&M services in a certain region, and failing to do business may cause financial losses due to the costs of salary, and the operational and financial tools to do so. Furthermore, teams are often built and hired in the foreign country of the specific project, which will make it more difficult to re-engage these people in the firm activities.

[19] These services enable the long-term sustainability and growth of wind energy worldwide. They already represent 20% of wind turbine manufacturers' total revenues and the market for aftersales and services in wind energy is expected to grow at a Compound Annual Growth Rate of 6% by 2020-2024 (GWEC,2021).

- Effects in leverage and profitability: Sell-down agreements will affect EDPR's statements, and therefore an analysis and forecast of the effect of these possible sales on leverage ratios and results is undertaken. Financial ratios analyzed included Net Debt/EBITDA and Funds from Operations/Net Debt, which follows the credit agencies guidelines and impacts EDPR's other strategic goals. Moreover, further assets under Sell-Down strategy will affect capital gains, net income and EBITDA, and these impacts will also be examined.

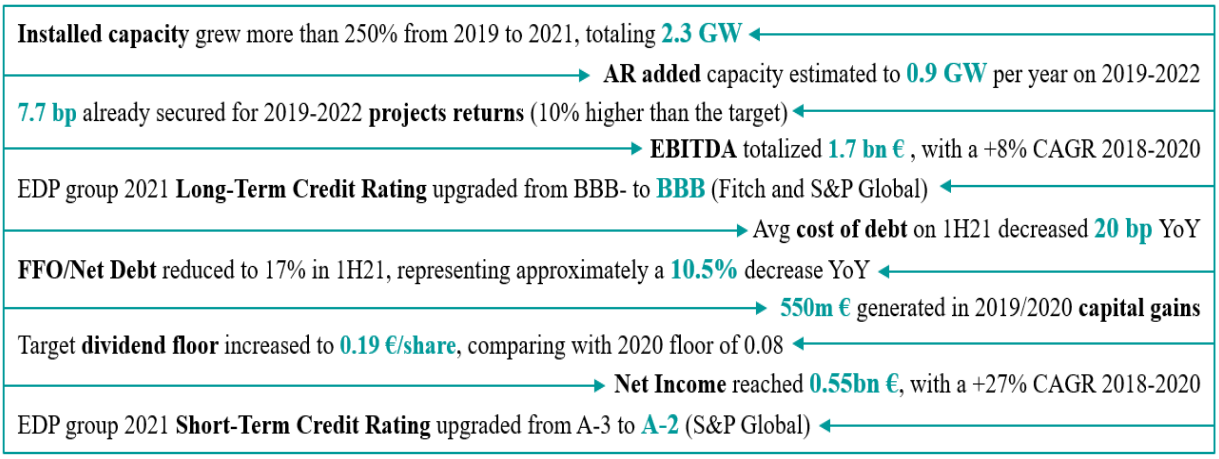
In short, in this decision-making process of selecting assets to be incorporated into the AR strategy, EDPR first examines the isolated projects based on geographic, meteorological, financial, environmental and regulatory conditions to determine their aptitude. Once decided that the project is a plus in primary FID, and finish negotiating with key stakeholders and counterparties, will be performed a deeper assessment of all the above referenced topics for undertake the secondary FID. Not only analyzing the performance and benefits of that specific project, but also in balancing EDPR's overall portfolio, always taking in consideration its current and future strategic objectives.

4.4 EDPR Asset Rotation: Framework with EDPR business strategy

The AR strategies are embedded in the point "Value" of EDPR's 2022-2025 strategic update, which is the powerhouse for leveraging and accelerating the company's selective growth into new markets, new locations, and new opportunities around the world.

By using this type of self-funding model, the firm can raise funds sooner, and investing them in valuable projects in a consistent manner that accelerates and increases rates of return for the firm. Along with this profitability and investment virtue, it is also clear the value-added benefits (**Figure 8**) in terms of liquidity, solvency, and credit risk that these deals have on EDPR's books.

Figure 8. AR benefits evidence up to 2021 in EDPR and EDP Group



Source: EDPR strategic update 2021-2025; EDPR Investor Presentation September 2021

In the following bullets are summarized the main advantages of the AR strategy for EDPR´s current business strategy. Which are mainly generated by Sell-Down deals, since they belong to the core AR strategy currently performed by EDPR.

- ✓ Recycle capital to leverage and accelerate value-added investments: rather than waiting 20-30 years to collect the full value of the wind assets, if EDPR executes the AR divestitures at COD, it will capture that value broadly in already the first 3-4 years. Thus, it can use those capital gains received from the assets sale to re-invest in other advantageous projects, and so on. This allows EDPR to grow quicker and invest in Capex with greater leverage and reduced initial invested amount, due to the already mentioned capital rotation.
- ✓ Crystallize up-front value to enhance earnings and reduce merchant tail risk: Asset value-added disposals generate substantial capital gains on recurrent EBITDA, which consequently will raise net income in the sale period. By maintaining O&M services to the asset holders, EDPR will also generate a secure revenue stream over the asset's useful life, which also contributes to higher operating income. Additionally, with this asset upfront sale, EDPR no longer has the merchant tail risk embedded in the energy generation that it would have in fully owned assets.
- ✓ Offers greater liquidity for operations and payout alternatives: The cash entering up-front from the assets sale greatly increases the company's financial robustness, enabling it to better manage its day-to-day operations and short-term obligations.

In addition, this increased liquidity also enables better payout policies through higher dividends, which is generally well appreciated by both current and future stockholders.

- ✓ Contributes to better solvency metrics and improves credit agency's opinion: More cash and higher EBITDA from AR helps to improve key ratios that demonstrate better financial solvency and contribute to upgrade the short-term credit rating of the EDP Group. With better public portrayal over the company and by shedding the external debt weight on investments through the self-funding model, the cost of debt will also decline, which ultimately enables future loans at better interest rates and a stronger company's equity valuation.

5. ASSET ROTATION PRACTICAL EXAMPLE: EDPR WIND PLANT CAPITAL BUDGETING

After the first FID and deciding that a given project is achievable, it would then be possible to conduct a more accurate financial analysis of the future cash flows of these wind assets, once they are at the Ready to Buy point, i.e., roughly in year COD-1. Therefore, an evaluation was carried out on the cash flows and projected profitability of a 30-year wind power plant with 242MW of capacity to be installed in Spain by EDPR, with a COD on the 31st of December 2021.

Hence, several assumptions (**Table III**) were made for the project's inputs to compute 2020YE figures that would be useful to EDPR's decision-makers. Certain inputs were based on external public information, to retain the economic, corporate, and regulatory environment in the Spanish renewable industry, since this asset project would be studied, built, and operated in Spain. Furthermore, assumptions based on EDPR's public data were also employed, mainly on a more operations and cost basis, since the wind assets performance will essentially depend on EDPR's efforts.

Table III. EDPR Wind Project Assumptions

Assumptions	Value	Unit	Description
Corporate Tax rate	25,0	%	Federal Corporate Tax Rate in Spain (Source:PWC,2021)
PPA Maturity	12,0	years	PPAs maturity in Spanish Onshore and Offshore wind projects(Source:EDPR 2020 annual report)
CPI (infl rate)	2,24	%	CPI 2021 rate in Spain (Source:Statista,2021)
PPA price (1st year)	44,0	€/MWh	Q2 2020 avg. PPA price in Spain plus 10% adjustment for assets dimension and regulation (Source:Level10 Energy, 2020)
Merchant Price	67,0	€/MWh	Avg. monthly Spain wholesale energy price in 2017-2022 (Source:Nominated Eletricity Market Operator and Banco de Espãna, 2022 and 2021)
Escalator	1,50	%	Adjusting PPA first year price, which reflects Spanish PPA market attractiveness which will lead to PPA price increases (Source: EY Renewable Energy Country Atractiveness Index, 2021)
Terminal Value	15,0	%	% of Capex recovered in assets dismantling (Source:EDPR 2020 annual report)
Load Factor	26,0	%	Load Factor achieved in 2020 for EDPR Spanish assets (Source:EDPR 2020 annual report)
Capex	1000,0	k €/MW	Spain avg. Capex invested for each MW employed in 2019 Onshore Wind Projects (Source:WindEurope, 2020)
Opex	48,00	k €/MW	EDPR 2020 Core Opex per average MW employed (Source:EDPR 2020 annual report)

The cash inflows of this project are quite straightforward in EDPR´s perspective, with accounted annual revenues resulting from the product between EDPR's operating load factor and the annual MWh generated by the 242 MW of these wind plants, which initially is multiplied by the pre-established unit price of this MWh, deriving from the initial PPA price agreed with other state-owned entity or corporation.

However, the PPA price will only extend for 12 years, which is the estimated duration of the established PPA agreement and will be elevated to a specific attribute called escalator, to reflect the positive market trends for the PPA price, since increases may occur in this price until its maturity. From the 13th year on, the MWh unit price will already be set exclusively by the Spanish wholesale merchant price, and will be raised to the expected Spanish inflation, being multiplied by the previous fixed product between EDPR load factor and the annual MWh generated.

Therefore, the quantity of energy generated will be fixed during the assets' lifetime and depends only on product between EDPR's operational capacity (load factor) and the assets' capacity (242 MW). Consequently, the existing changes in the annual revenues across project lifetime will be derivable from the unit price of an energy MWh, either by the PPA agreement establishments or by the wholesale energy market changes.

From a cost and cash outflows perspective, EDPR will incur an initial Capex of 1000k euros for each MW installed, totaling 242 000k €. The company operating costs as well as the load factor were considered fixed and depend on EDPR's operational excellence, delivering an OPEX value of 48k € per MW operated. In addition, these assets are also depreciated over time, for which were used the straight-line depreciation method to obtain an 8067 k € annual

depreciation, when dividing total capex by 30 useful life years. Additionally, it is important to refer the assumed terminal value of 15% which is the share of capex recovered in these wind assets dismantling phase, which is accounted in year 30 and will be used in EDPR assets valuation.

Beyond calculating a standard project NPV, were also calculated the 2020YE Enterprise value of this project through discounting EDPR total annual operation cash flows. For discounting purposes were used EDPR 2020YE WACC (see **Appendix A.3**), which were calculated with a mix of market value assumptions and EDPR 2020 accounted book values. These 2020YE estimated outputs besides being critical to understand how much the project might be worth in the present and how profitable it would be for EDPR to hold 100% of such assets in its portfolio, will also be used to frame it with an earlier real AR scenario executed by EDPR in Spain.

In August 2020, EDPR signed with Finerge group an asset rotation agreement for the sale of a 100% portfolio of 242 MW of onshore wind plants located in Spain. The transaction was settled for €426m, being the project appraised at an enterprise value of €507m, which corresponds to an EV multiple of approximately €2.1/MW. By comparing this public data with the excel estimates we can have an insight into how asset rotation would impact the accounts of the seller EDPR and the buyer Finerge, as shown below in **Table IV:**

Table IV. EDPR wind project outputs

Results (million €) 2020YE	**EDPR Outputs**
Net Present Value (NPV)	85,64
Enterprise Value (EDPR Wacc)	328
EV/MW	1,35
Economic Capital Gains	98
Capital Gains	184
Capital Gains/ MW	0,76

Results (million €) 2020YE	**Finerge Outputs**
Enterprise Value (Finerge WACC)*	507
EV/MW	2.10
Bargain Purchase Gains	81
Bargain Purchase Gains/MW	0.33
Sale Price*	426

**EDP public news, 2020*

These differences between the enterprise value calculated by EDPR and Finerge may arise from distinct costs of capital, better initial financing capabilities and dealings with third parties, or even merely distinct assumptions used in valuing the project. Thus, both sides will have income statement benefits, since EDPR would sell for a higher price than the capex initial invested (resulting in Income Statement capital gains[20]), and Finerge would buy the assets for

[20] This calculation is assuming that this AR transaction was sold on COD.

a lower price than it had evaluated when using its own WACC (resulting in bargain purchase gains[21]).

Nonetheless, also worth mentioning is the economic capital gain created by EDPR, which will arise because of the difference between the sale price and the enterprise value calculated with EDPR's WACC. From the buyers' point of view, this economic capital gain will be equal to the bargain purchase gains, since capex will only be the upfront payment. Therefore, the outcome of the AR transactions at inception is highly dependent on market expectations and assessments, since the profits are built on this bid-to-ask basis between the two counterparties.

Finally, two sensitivity analyses were carried out to estimate the project's EV change for various assumptions scenarios. The agreed PPA price in the first year and the merchant price (**Table V** and **IV**) may change depending not only on EDPR's bargaining position but also on the market changes, regulations, and the underlying economy of the country where the project is undertaken. In addition, as already mentioned, the WACC is critical to the project's value since a lower cost of capital will raise the discounted value of the project (**Table VII** and **VIII**), hence it is a key input to the bid-ask difference between the buyer and seller valuations of these assets.

Table V. Sensitivity Analysis- PPA 1st Year price vs Merchant Price (output: EV)

	PPA first year price					
EV(m €)	**327,6**	34,00	39,00	**44,00**	49,00	54,00
Merchant Price	57,00	252,2	271,4	290,5	309,6	328,7
	62,00	270,8	289,9	309,1	328,2	347,3
	67,00	289,4	308,5	**327,6**	346,8	365,9
	72,00	308,0	327,1	346,2	365,3	384,5
	77,00	326,6	345,7	364,8	383,9	403,0

[21] The Financial Accounting Standards Board considers this gain an economic gain, so it must be reported in the income statement. Besides subtracting the net identifiable value of the assets from the acquisition value, it is also required to remove any non-controlling interests (PWC, 2021).

Table VI. Sensitivity Analysis - PPA 1st Year price vs Merchant Price (output: EV)

PPA first year price						
EV/MW(m €)	**1,35**	34,00	39,00	**44,00**	49,00	54,00
Merchant Price	57,00	1,04	1,12	1,20	1,28	1,36
	62,00	1,12	1,20	1,28	1,36	1,44
	67,00	1,20	1,27	**1,35**	1,43	1,51
	72,00	1,27	1,35	1,43	1,51	1,59
	77,00	1,35	1,43	1,51	1,59	1,67

Table VII. Sensitivity Analysis - WACC vs Federal Tax Rate (output: EV)

WACC						
EV(m €)	**327,6**	4,6%	5,1%	**5,6%**	6,1%	6,6%
Tax Rate	15%	415,2	383,5	354,8	329,0	305,6
	20%	399,0	368,6	341,2	316,5	294,1
	25%	382,8	353,8	**327,6**	304,0	282,6
	30%	366,7	339,0	314,0	291,5	271,1
	35%	350,5	324,2	300,4	279,0	259,6

Table VIII. Sensitivity Analysis - WACC vs Federal Tax Rate (output: EV/MW)

WACC						
EV/MW(m €)	**1,35**	4,6%	5,1%	**5,6%**	6,1%	6,6%
Tax Rate	15%	1,72	1,58	1,47	1,36	1,26
	20%	1,65	1,52	1,41	1,31	1,22
	25%	1,58	1,46	**1,35**	1,26	1,17
	30%	1,52	1,40	1,30	1,20	1,12
	35%	1,45	1,34	1,24	1,15	1,07

6. CONCLUSION

This paper was designed to introduce and address the main characteristics as well as the overall market of the AR strategy. For this purpose, a case study was conducted to the AR strategy employed by EDPR across its renewable energy projects, to link the theoretical rationale of AR with the practical outcomes encountered in EDPR´s business.

EDPR is placed in a context of high need for capital, in a fast-growing industry, where large investments are required to meet global sustainability goals as well as to boost its earnings. Thus, we conclude that EDPR considers the AR strategy as an imperative pillar for its global expansion through its selective growth in quality projects. This strategy delivers both leverage and revenues through its capital recycling benefits, upfront value crystallization, and through its ongoing income from O&M services.

In addition to these profitability and liquidity factors, the fact that AR is a self-funding model brings significant solvency benefits to the company, which enables better debt management, allows EDPR to use its AR proceeds for potential payout strategies improvements and enhances its external image through a better credit rating, indirectly supporting better debt arrangements.

Besides the theoretical benefits that have been identified and proven by various figures and results found in EDPR's financial statements and public information, it has also been possible to understand some real benefits through the hands-on example of a wind plant project. Through the differences in cost of capital between EDPR and the buyers, there will be large capital gains from EDPR in these sites that will be quickly retained and re-invested in further quality projects.

Therefore, gathering the previous advantages with the renewables industry positive perspectives and global demand for sustainable initiatives, it’s clear that AR strategy is suitable to EDPR's current business and vision for the future. Not only in financial matters for isolated energy projects but also when analyzing the company´s global energy portfolio strategies, since AR could be specifically employed to try to achieve certain accounting objectives, or even to hedge other EDPR investments and market positions.

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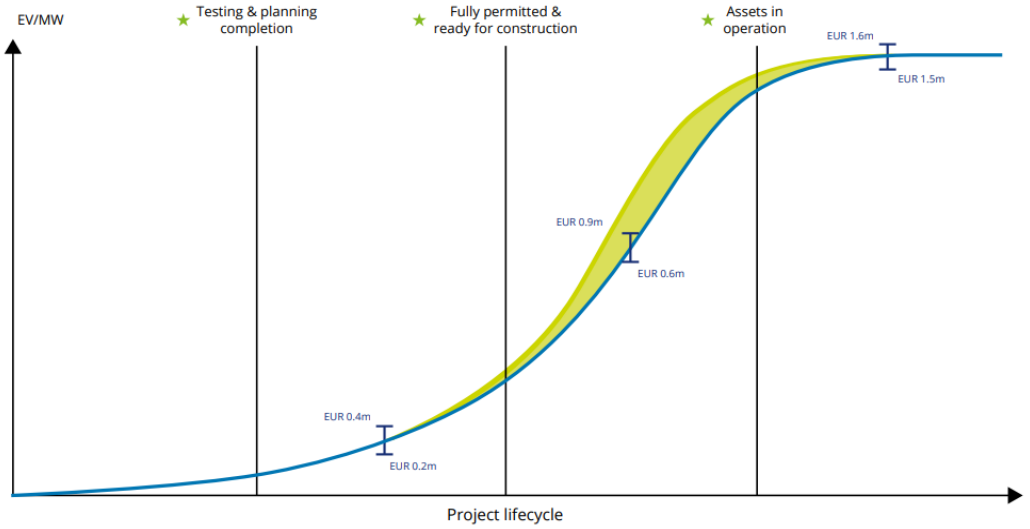
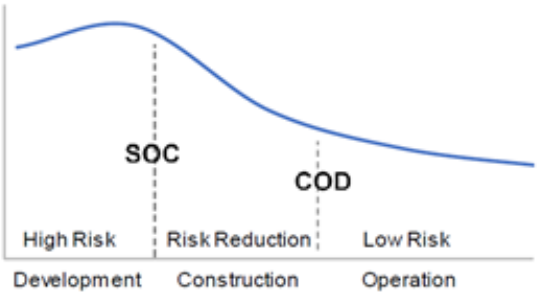
APPENDICES

A.1. EV creation throught onshore wind assets lifecycle



Source: Deloitte Report – A market approach for valuing onshore wind farm assets, 2017

A.2. WACC during a wind farm lifecycle



Source: EDPR 2012 annual report

A.3. EDPR Practical Example – EDPR WACC assumptions

WACC	2020YE	Assumptions
Cost of Equity(Ke)	**5,76%**	
Risk Free Rate	1,03%	Avg. for 2016-2020YE 10 Years Spanish Government Bonds yield (Source: St.Louis FED, 2022)
Beta	1,00	Equal to 2020YE EDP group levered Beta (Source: Jornal de Negócios, 2021)
Market Risk Premium	4,72%	Average Equity Risk Premium between Weastern Europe and North America markets (Source: Damodaran, 2022)
After-tax Rd	**4,55%**	
Cost of Debt(Kd)	5,10%	Used EDPR 2020YE book values, Kd: Int. Expenses/ [ST Debt + LT Debt] (Source:EDPR 2020 annual report)
Effective Tax Rate	10,78%	EDPR 2020YE Effective Tax Rate (Source: EDPR 2020 annual Report)
WACC	**5,55%**	
D/V	26,88%	Used EDPR 2020YE Debt and Equity book values (Source: EDPR 2020 annual report)
E/V	73,12%	Used EDPR 2020YE Debt and Equity book values (Source: EDPR 2020 annual report)
Ru (Pre-Tax Wacc)	**5,58%**	