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Sustainability Reporting: Analysis of Practices in the Energy Sector

Pedro da Silva Gomes

Master in Business Administration

Supervisor:
PhD Maria do Rosário da Veiga, Assistant Professor,
Department of Accounting,
ISCTE Business School

September, 2023



BUSINESS
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Department of General Management and Sustainable Development

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Resumo

A indústria energética é vital para a civilização moderna, uma vez que é o motor que impulsiona o desenvolvimento económico e a qualidade de vida das pessoas. A energia é necessária não só para iluminar as nossas casas e fazer funcionar os nossos eletrodomésticos e as indústrias, como também para acionar os nossos veículos. Sem energia acessível e fiável, as infraestruturas dos países têm tendência a desmoronar-se, comprometendo assim a produtividade e facilidade que tomamos como garantidas no dia a dia. No entanto, emite CO₂, que é uma das principais causas do aquecimento global. Desta forma, vários países decidiram fazer a transição para energias renováveis, com o fim de atingir o objetivo de zero emissão de gases de estufa. O aumento da população e o consequente crescimento da procura de energia nos próximos anos exercerão uma pressão extrema sobre este sector. Tendo em conta esta preocupação, o objetivo deste estudo passa por analisar as práticas sustentáveis no sector da energia, não olhando apenas para formas de aumentar a eficiência energética, mas também que tecnologias e práticas inovadoras podem ajudar a acelerar a transição para fontes de energia limpas, através de uma abordagem qualitativa para explorar e descobrir os padrões recentes praticados no sector energético. De facto, todas as cinco empresas estudadas estão a fazer um esforço considerável para se tornarem mais sustentáveis, desde um maior investimento em energias renováveis, à procura por formas de causar um impacto positivo nas comunidades em que operam. Todas estas práticas requerem tempo e investimento financeiro, o que significa que as empresas não estão ao mesmo ritmo nesta transição. Ainda assim, quatro em cada cinco empresas mostraram-se empenhadas em ser mais sustentáveis através das suas práticas.

Palavras-chave: Sustentabilidade, Relatório de Sustentabilidade, Sector da Energia

Classificação JEL: M10 – Geral; Q01 – Desenvolvimento Sustentável

Abstract

The energy industry is vital to modern civilization since it is the engine that propels economic development and people's quality of life. Energy is required to illuminate our houses, run our appliances, power our vehicles, and run industries. Without affordable and dependable energy, a country's infrastructure crumbles, undermining the productivity and ease we take for granted in everyday life. However, it emits CO₂, which is said to be a major cause contributing to global warming. Multiple countries have decided to transition to renewable energies in order to achieve their goal zero greenhouse gas emissions. The increase in population and the consequent growth in demand for energy in future years will be putting extreme pressure to this sector. Bearing this concern in mind, the aim of this study is to analyze the sustainable practices in the energy sector. It looks not only for ways to enhance energy efficiency, but also for innovative technology and practices that can help hasten the transition to clean energy sources, through a qualitative approach to explore and to discover the recent patterns being practiced in the energy sector. Actually, all the five companies studied are placing a greater effort to become more sustainable, from greater investment in renewable energies such as ways to make a positive impact within the communities they operate. All these practices require time and financial investment, which means that companies are not at the same pace in this transition. However, four companies out of five showed a commitment to being more sustainable through their practices.

Keywords: Sustainability , Sustainability Reporting, Energy Sector

JEL Classification: M10 – General; Q01 – Sustainable Development

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Chapter 1

Introduction

For a long time, humankind had no reasonable instrument with which to measure its demands on nature. Moreover, for quite a while, no instrument seemed to be needed, as nature was thought to be vast and infinite. Today, we think differently. Now, the limits of nature have become quite obvious, whether concerning the depletion of groundwater, the declining fish stock of the oceans or even climate change. As we, humanity, realized this problem, new tools have been created to measure the impact of our existence, such as our Footprint which reveals how much of our planets' productive area is used for each human activity (Wackernagel & Beyers, 2019).

Economic and financial performance are assessed based upon measures which are reported in terms of indicators such as return on investment, revenues, costs, profits. However, the common denominators between economy and ecology go beyond their designations. In both areas, mismanagement is characterized by spending more than earned. As a matter of fact, according to the latest footprint calculation, humanity has overused nature's natural resources budget by 75% in 2019 (Wackernagel & Beyers, 2019). In other words, we are currently using 75% of natural resources faster than planet Earth can renew them. Some may wonder if we, the human race, are in the midst of an overwhelming, unprecedented crisis: shortness of water supply, climate change, shortness of fisheries, or shortness of food supply. According to Wackernagel and Beyers (2019) all crises are rooted in the same cause: mismanagement.

Over the last few decades, the evolution of energy practices has been distinguished by a dramatic shift towards cleaner and more sustainable energy sources. Initially dominated by fossil fuels, the industry has seen an increasing investment in renewable energy such as solar power, wind, and hydropower, fueled by environmental concerns and a desire to cut carbon emissions (Lund, 2007). Furthermore, technical advancements have permitted higher energy efficiency, enhanced energy storage, and smart power grids, transforming the way energy is produced, distributed, and used (Anders & Vaccaro, 2011). Additionally, the transformation of businesses in order to adopt more sustainable practices marks a leap step towards finding long-term solutions to global concerns aimed at a positive social and environmental effect (Costa & Rovere, 2002). It is envisioned not only the capacity to fulfill expanding global energy demands, but also to reduce the

negative environmental repercussions of outdated practices , creating a more sustainable and cleaner future (Silvestre & Țîrcă, 2019).

In the Brundtland report, as mentioned by Emas (2015), the United Nations General Assembly (1987) considers sustainable development the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In this sense, it is important to take into consideration that the solution of this problem has to implicate companies and organizations at general since they are essential economic actors in our society and make extended use of natural resources. In consonance with Schalteger et al. (2006), corporations are key contributors to economic, environmental, and social well-being. In addition, business activities permeate the present and are likely to continue to be critical in the future, with business sustainability being necessary for the long-term sustainable development of both the economy and the society as a whole.

The spread of inanimate forms of energy was critical to the world’s rapid development. The energy industry, which is the technological and economic backbone of this world, is completely dependent on natural energy extraction techniques, and the development or the lack of these technologies had the power to determine the fate of countries in the contemporary world – those who were capable of developing and exploring them led the industrialization process, but on the other hand, those that did not invest in the energy sector became technologically deficient countries, jeopardizing their social and economic life (Simabukulo et al., 2017).

Still, energy is inextricably related to growth since it is seen as the major driver of development. Development carries increases in global energy demand along with growing populations and urbanization, resulting in a demand for more effective development approaches (Roosa, 2010). For instance, it is possible to increase the gross domestic product (GDP) by using less petroleum though the development of renewable technologies that will be able to replace petroleum in a few decades (Tinoco, 2010).

Now, more than ever, because environmental concerns and the quest for answers to climate change intensify, companies are increasingly incorporating sustainable methods into their operations. This understanding not only matches demanding consumer expectations, but also contributes significantly to the development of a more responsible global economy (Sovacool, 2013).

Several academic studies have been carried out on the energy industry regarding the practices that have been adopted by companies in this sector. However, most of these studies focus on one country only, or on a specific type of practice, thus not making a broader or comparative analysis between different energy companies. For instance, Lee et al. (2015) is an example of this, considering that it focuses solely on China's energy market; Lu et al., (2019) focuses on just one group of practices, the corporate social responsibility ones, not considering a lot of other environmental ecological practices. The present study aims at contributing to narrow this gap in the literature by investigating the apparent conflict between a growing emphasis on sustainability and the expanding footprint of the energy industry of five multinational companies operating in the energy sector to understand What practices are currently being implemented in the energy sector in the Sustainability field?, and How is Scope 1 evolving in the energy sector?

In addition, this study, by investigating mainly the sustainability reports of five companies through a qualitative research method, expects to provide meaningful insights on how the energy sector might cut its carbon emissions, namely by improving energy efficiency, promoting sustainable energy sources, and actively engaging in corporate social responsibility and environmental measures. Also, it hopes to help companies by assisting them in improving their image and competitiveness.

The dissertation is structured into eight chapters. The first chapter introduces the problematic and shows how it relates to the field of study, as well as its practical and theoretical significance. The second chapter was developed to analyze different perspectives of the topic, presents a general overview of the literature concerning the practices in the energy sector as well as the instrument of divulgation of these practices. The third chapter presents a justification the methodological approach regarding data collection and data analysis. The fourth chapter aims to delve deeper into the problematic and also provides a more in-depth understanding of current and future sources of energy, both on the supply and demand side. The fifth chapter is concerned with providing data concerning the analysis of the case studies that in light of the research questions. The sixth chapter gathers all the information in terms of the organization's practices and their respective analysis.

The discussion chapter follows to compare the literature review and the analysis chapter. Finally, in the conclusion chapter, I present a summary of the research findings and make recommendations for future research and disclose the limits of this study.

Chapter 2

Literature Review

2.1. Strategic Corporate Social Responsibility (CSR), Creating Shared Value (CSV) and Sustainability: Concepts and Relationship

Over the years, the Corporate Social Responsibility (CSR) term has drawn the attention of several researchers in a worldwide scale with multiple backgrounds and, of course, ways of thinking. This attention has been leading to an open discussion about what the term means and how it can mark the steps of the companies regarding their future. According to Chandler (2020), there is one aspect that is crucial to any interpretation of the strategic CSR concept. That aspect is directly related to the fact that companies often connect a CSR perspective not only with their organizational culture, but also the strategic planning process itself, giving space to an interactive relationship between the companies and its stakeholders.

Looking at Porter's and Kramer's (2014) approach (as cited in Grant, 2018) it is possible to state there are three main reasons, or arguments, for why the CSR is in the companies' best interests – sustainability, reputation and license-to-operate. Sustainability assumes that the CSR is found in companies due to an existing interest of supporting the ecosystem they belong while reputation has a focus on enhancing the companies' reputation with both their costumers and third parties. License-to-operate stands for the companies' need for the support of the constituencies they are dependent on. Each of these three dimensions constitutes a crucial factor for both the definition and the implementation of the companies' strategic proposition. Identifying which CSR dimension should prevail on the companies' interests is not an easy task. Therefore, it is imperative that research is conducted effectively in order to select the more adequate one, considering the companies' nature and interests while making sure that it is possible to generate positive outcomes from it (Grant, 2018).

While analyzing the Creating Shared Value (CSV) concept definition, in accordance with what Porter and Kramer (2011) postulate, when it comes down to guiding the companies' investments in their communities, CSV should replace CSR given that the later concept has a limited connection to business and CSV, appears to be rather essential to the companies' profitability, as well as to their strength and competitiveness. Going further into this point of view, it is also possible to highlight that while the value associated with the CSR is defined "to do good", the value of the

CSV concerns both economical and societal benefits in association with cost. Moreover, unlike CSR, CSV is absolutely crucial to profit maximization and possesses a strong focus on competing, rather than responding to external pressures (Porter, Kramer, 2011: 76).

Lastly, regarding sustainability, as Chandler (2020) refers, the term is commonly used today in relation with natural environment. Nevertheless, sustainability is also a subset of strategic CSR that concerns the companies' operations. The broadness of use of this term entails advantages and disadvantages. As for the advantages, the broad application of the term enables it to be generally accepted and, consequently, used in different organizations. However, this advantage can become a disadvantage since that acceptance also implies multiple interpretations while what we really need is consistency. After all, planet's climate and biodiversity are at stake, and we need to be fully aware of the dangers we have been facing already for a while by now (Chandler, 2020).

Chandler (2020) also points out a central issue that leads us to reflect on sustainability at its core. This issue relates to the interest of companies in making a significant shift in investment towards a more sustainable path and as the author suggests, unless the companies are worried with making that change and invest in CSR thoroughly, they will not reach the progress that actually has to be done. That progress strongly depends on the two conditions that Grant (2018) identifies in order to establish a competitive advantage: the resources relevance regarding the key success factors in the market, and to recognize that if that resource can be found all over the industry, then it might be fundamental, but that does not mean that it will provide the company with the competitive advantage it is looking for.

In conclusion, the nature of business is shifting and there is a considerably small room left for companies to commit mistakes. If the companies wish to prevail, they need to be conscious that they cannot fail to deliver the promises they make and the value that the costumers expect. The key to do that is understanding how they can successfully merge the strategic CSR and CSV with their value creation, giving birth to a sustainable competitive advantage.

2.2. CSR in the Energy Sector

Nisipeanu et al. (2011) advocate that there are three foundations of CSR applicable to energy: economic, social, and environmental responsibility.

Economic responsibility is characterized by taking into account a company's long-term and short-term profitability, as well as creating competitive services and products that meet the

expectations of the customers, providing reliable power supply and cost-efficient operations, and also offering reasonable pricing and high-quality services, demonstrating a vision of continuous development and recognition of the need to change towards more environmentally friendly solutions.

Social responsibility, on the other hand, is characterized for covering and ensuring the well-being, qualification, and motivation of employees, but also the promotion of open interactions and good practices with the stakeholders, plus increasing population, and overall community welfare.

Environmental responsibility is characterized by encompassing both the understanding and adherence to environmental regulations, thus, reducing environmental effect of energy production, distribution, and transportation through reducing resource use, pollution, and emissions, taking into consideration the protection and preservation of biodiversity.

2.3. Importance of Sustainability Reporting

In today's world, it is no longer enough for stakeholders to say that their company is sustainable. They have to actually prove it through tangible goals. Taking this into consideration, the corporate mindset in terms of sustainability has been evolving, and sustainability reporting is becoming a worldwide business practice. This concern dates back to 1997, when Global Reporting Initiative (GRI) pioneered the making of the first global standards for sustainability reporting applicable by any organization.

In order to further explore this type of document, let's take a look at its definition. According to GRI (2011), sustainability reporting is anything but "the practice of measuring, disclosure, and accountability to internal and external stakeholders for organizational performance towards the goal of sustainable development". However, 'sustainability report' is also used with a broader scope, often to describe reports containing topics such as economic, environmental, and social impacts.

Additionally, the sustainability reports have been gaining relevance in the corporate world and the 2020 KPMG Survey of Sustainability Reporting contains evidence of this evolvement. While analyzing the survey, it is possible to verify an increase of 5 percentage points within a sample of 100 companies, in relation to the last survey conducted by the same company in 2017 regarding the carrying out of sustainability reports. Also, relevant is the fact that this is the first time since the 1993 KPMG survey, that the number of independent third-party assurance of sustainability

reporting information (among the sample of 100 companies) has exceeded 50 percent (KPMG, 2017).

According to Romero et al. (2014), the importance of sustainability reporting has indeed been growing among several companies since an error or failure to properly measure their sustainability initiatives can trigger allegations of material omission, as well as “misstatements in the financial statements”. Due to this, the future of sustainability reporting seems to be, in many ways, laying on an increasing demand for a more consistent, correct, and accurate measurement, legitimating corporate activities, products and services, and increasing both brand and corporate reputation while benefiting companies with multiple competitive advantages (Schaltegger & Herzig, 2006).

Regarding sustainability reporting’s importance, according to GRI (2011), this type of report should be able to provide a representation of an organization’s sustainability performance, thus evaluating if that same performance is positive or negative, as well as a representation of its values and governance model, demonstrating the connection between the organization’s strategy and the commitment to a sustainable global economy. When it comes to its aims, the sustainability report should help companies in generating savings, functioning as a useful management risk tool linked to a better decision-making, but also to increase of the stakeholder’s trust.

However, Eccles and Mirchandani (2022) argue that there is still a lot of work ahead when it comes to sustainability reports. As a matter of fact, one of their criticisms to it is that there are several frameworks encompassing the scope of sustainability reporting concept such as: Climate Disclosure Standards Board (CDSB), Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC), Sustainability Accounting Standards Board (SASB), Task Force on Climate-related Financial Disclosures (TCFD). Moreover, the perspective of Eccles and Mirchandani (2022) postulate that investors are now becoming increasingly interested in learning more about the company’s performance on material sustainability challenges. Simultaneously, corporations are constantly being accused of “greenwashing” their sustainability reports.

Having standards in place, together with adequate audits, addresses both difficulties. In fact, companies should give trustworthy information on an organization's reporting on its accomplishments in meeting whatever objectives they chose to establish. In this sense, to reach this goal, Eccles & Mirchandani (2022) are supporters that the sustainability reports must be mandatory and must have one universal accounting standard, acknowledging that this part can bring some costs to the company.

It will be necessary to make an initial investment in order to have the same internal control systems and measurement systems of high quality to support this communication, but the same applies to financial information, as experience and technological evolution will lower operational costs over time. Moreover, the non-adoption of sustainability reports, or reports with wrong information, will lead to significant losses in the trust between the investor and the corporation, which consequently can be reflected in the companies' share prices.

There is an existing failure in the sustainability report model where three main scopes are identified to measure the GHG emissions (Kaplan and Ramanna, 2021). Scope one is characterized by measuring the emissions that come straight from sources that a firm owns or controls, such as its manufacturing and transportation equipment. Scope two, on the other hand, is characterized by measuring the emissions from plants that generate electricity that the corporation buys and consumes, and Scope three concerns the measuring of emissions from a company's upstream supply chain operations, as well as downstream activity by company's customers and end-use consumers. In the same study, a critical fault is pointed out by the authors in sustainability reporting concerning the difficulty on the correct measurement of scope three emissions. The protocol's designers incorporated scope three to motivate the companies to exercise control over emissions which they do not directly control. They might, for example, buy from or sell to firms who have lower scope one emissions, and work with their vendors and customers to decrease GHG emissions throughout their value chains. However, due to the complexity of tracking the emissions from many suppliers and consumers across multiple value chains, it is almost impossible for a corporation to calculate its scope three statistics properly, leading to many companies that do the sustainability report not to divulge scope three data (Klapan & Ramanna, 2021).

Another aspect highlighted by Klapan and Ramanna (2021) is the way businesses can lower GHG emissions in sustainability reports, which may not be realistic. For instance, some businesses may opt to actively reduce GHGs from atmosphere through carbon capture and replanting. In addition, a corporation that does this may deduct the amount from its audited environmental liability statement, decreasing its exposure along the distribution chain until it reaches the final customer.

2.4. The Revolution in the Energy Sector

Sustainable development is widely described as living, creating, and consuming in a way that it serves the requirements of the present without jeopardizing future generations' capacity to satisfy their own needs, emerging as a critical policy guiding idea in the twenty-first century. Worldwide, politicians, business owners, environmentalists, economists, and theologians all agree that the idea must be applied at the global, national, and local levels (Twidell & Weir, 2006).

According to Dudin et al. (2019), the Energy sector is not different, as it is moving to renewables or carbon free energies, and the conventional hydrocarbon energy carriers such as oil, coal, and gas will remain in high demand throughout the first half of the twenty-first century. For decades, these very own sources of energy have formed the backbone of the worldwide energy system, and they continue to play an important role in providing the world's energy demands. However, it is crucial to highlight the shift to renewable energy sources is gaining traction, and hydrocarbons' proportion in global energy balance is likely to decline over time. In addition, the technological advancements are predicted to enhance many areas of the energy business, namely exploration, extraction, production, consumption, and energy efficiency, allowing the renewables to enter the market at a competitive price. Also, renewable energy sources are predicted to rise significantly and take a larger percentage of global energy consumption.

Brown (2015) supports that the market is changing as well, with the growth of restrictions affecting oil corporations on both the supply and demand sides of the energy equation. One example of the declining demand can be seen in advanced economies, as vehicles become more efficient and the majority of society adopts alternatives to driving, not to mention those who rather opt for electric automobiles and plug-in hybrids. Furthermore, governments are also promoting this change giving some support for companies in the sector to become more sustainable, while implementing more local measures at the same time. In some cities of the world, cars are already banned in city centers because governments have recognized the pollution and the noise coming from them. Meanwhile, on the supply side, the existing oil deposits are less exploitable than the massive gushers discovered in previous decades, increasing the cost of bringing additional oil to market.

In connection to this, the use of technology provides the ability to cut the maintenance expenses, emergency response time, and scheduled downtime, boosting productivity by improving operating modes. Another benefit of technology is the capacity to control the level of emissions,

which will aid in environmental improvement. It is feasible to maximize the combination of renewable energy and fossil energy by further employing technology, since their combined usage is required in the near future. As a result, according to Zhukovskiy et al. (2021), not only technology should be at the center of the discussion to solve the problematic environmental challenges, but companies in the energy sector should be aware of this, as technology is able to facilitate and optimize the market penetration of renewable energies, making them more competitive. An example of this is the force of hydrogen to supply the heavy industries, thus leaving the oil behind.

On the other hand, Chimielewski (2010) argues that renewables will not transform the energy sector as a whole, but rather help the sector to be less polluting in the context of GHG emissions. The author thinks that the future of energy production is going to be dominated by traditional energies like coal, oil, and natural gas. However, to make it more ecologic, air pollution management must be implemented. Chimielewski (2010) also believes that other relevant advancements should be centered on nuclear energy, with distributed sources considering renewable energy sources. In fact, the creation of the renewable energy or carbon free sources has been highly anticipated due to all climate problematics. However, market penetration of renewables is slower than planned, and the overall advances in energy efficiency have not compensated for rising energy consumption due to economic expansion.

There is a clear concern with the reduction of GHG emissions on the part of countries and its states as well, which can be seen with the Paris Agreement. This agreement creates a new international legal framework to boost the global response to climate change, and it was accepted at the annual conference of the parties to the United Nations Framework Convention on Climate Change in December 2015 (Horowitz C. 2016).

The Paris Agreement works in a five-year cycle, where the first of these five-year goal cycles will begin in 2023 with a global stock take, with Parties expected to publish their post-2030 ambitions by 2025. This cycle, as well as the future ones, will be critical in reducing the gap between present and stated emissions objectives and contributions. Moreover, these evaluations will be required if Paris Agreement's goals of limiting temperature increase, peaking global emissions, and reaching "net zero" emissions are to be met. In addition, although the ambition, shape, and substance of the Parties' objectives and contributions will be established at a national level, the Paris Agreement establishes norms and mechanisms in order to facilitate their harmonization, quantification, and comparison across time. In this sense, Parties agreed to continue

discussions on common elements that would be relevant to future target rounds (Delbeke et al, 2019).

The general aims of the Paris Agreement are to keep the global temperature rise in the future years to $<2^{\circ}\text{C}$, over the pre-industrial average. However, it also intends to restrict temperature increases to 1.5°C , technology transfer and investment around \$100 billion per year between wealthy and developing nations to support climate change action, and an agreement meant to be reviewed every five years. Furthermore, although there is not a practical necessity for governments to precisely comply to the treaty's terms, expert monitoring of each signatory's efforts is necessary, so, parties must submit progress reports every two years. The pact is currently signed by 197 nations and the European Union (Cochran & Pauthier, 2019).

It is important to have in consideration that all the companies in this study are headquartered in countries that have signed the agreement.

2.5. The Challenges

Looking back and reflecting on the progress we have made as society, we can say that, since a few decades ago, there has been a clear change regarding the physical environment that surrounds us. Nowadays, attitudes such as recycling, driving electric cars, and riding in natural gas-powered transportation, for example, have become more and more the “new normal”, evidencing the concerns of the citizens to adopt a more sustainable lifestyle. But despite this, there is still much work that has to be done for ensuring a more sustainable society, a cleaner economy, and a more environmentally conscious world (Hajer, 2011).

As such, the energy industry might face various challenges that shape both its present and future trajectory, like the transition to renewable energies, energy security and geopolitics, environmental impact and climate change, and the access to energy and its affordability. For instance, the rapid growth of the world population is a natural generator of increasing demand for land, water, and marine exploitation, which in turn are in the center of losses related to biodiversity, nature areas, and climate change. There is a need for industries to quickly adapt to this and to react, changing their production and consumption patterns, and the energy industry is surely no exception.

According to Steger (2002) one of the challenges that the energy sector faces is the closing of the gap between the demand and critical constraints. Therefore, two approaches are often used:

greater energy efficiency and decarbonization. While the first one seeks to isolate GDP from the energy consumption, the second seeks to replace fossil resources with renewable or carbon-free energy sources. However, current advancements in the energy industry demonstrate that both procedures are too sluggish for reducing the increase in CO₂ emissions. In other words, the author criticizes the energy industry due to not being sustainable, neither in terms of climate protection, nor of energy supply security.

Another challenge the industry faces is the quantification of the amount of CO₂ emissions that we, as society, and as far as the energy sector is included, needs to cut. According to Diesendorf (2007), the drawback of the cost-benefit analysis is that it cannot quantitatively handle the many types and scales (some of them unknown) of risk related to the various costs and benefits. This indicates that an objective analysis cannot be used to identify the appropriate emission reduction rate. As such, if the reduction is too gradual, there is a risk of rapid aggravation of global warming, but if the reduction is too quick, governments and companies may face concerns and the cost of assets that are stranded (like pipelines, power plants, among others), that are no longer used and may end up being a liability before the end of their intended economic life, thus, making energy prohibitively priced in an undirected or direct way. Subsequently, common sense is required to set short-term targets that are ambitious enough to start the process of fundamentally transforming the energy system.

Besides these problems, another aspect that this sector in specific faces is the time that it will be needed to do a total transformation to renewables or to carbon free energies. As a matter of fact, Dudin et al. (2019) defend that in the long run perspective, new energy sources (mainly renewable energy sources) are going to be broadly distributed, and adequate facilities for their use will be created, influencing worldwide use of hydrocarbon raw materials. It should be further noted that developing a suitable infrastructure for the utilization of new types of energies takes approximately 25-30 years, given that the energy industry is a quite conservative sector of the economy, and the technological limit of previously developed facilities has not yet been reached.

On another note, all the components that transform primary energy (such as coal, natural gas, and crude oil) into the last form of energy (like electricity, methane, and gasoline) are included in the energy supply system. Supply parts comprise primary energy extraction and treatment, conversion technologies, secondary energy, and distribution technologies. In addition, all the

components that transform final energy into end-use services (such as cooking, lighting, and mobility) are included in the energy demand system (Holden et al., 2021).

Therefore, in consonance with Holden et al. (2021), one of the main challenges for the energetic sector is to combine three elements: respecting the environmental limits, satisfying energy needs, and ensuring energy justice. The author also argues that the environmental literature related with this sector currently focuses mainly on technological solutions for a low-carbon transition and to promote the use of renewables. That being said, it should be broadened to incorporate the needs of energy demand and equitable access to energy, as well as concerns for the integrity of biosphere.

In sum, the energy industry is going through numerous challenges, with the most urgent being the switch to renewable or carbon free energy to combat climate change. In fact, this sector and its companies cannot make a total transformation in a short period of time to remain competitive, considering that the demand for energy is growing due to the increase of the world population. So, in order to have affordable and reliable energy, it will still be necessary to rely on traditional energy sources, such as oil, natural gas, and coal, which are becoming less used and replaced by renewable energy sources.

With the use of these renewable energies, the sector will be able to lower GHG emissions and at the same time, lower production costs in the long term. In the short term, this change will mean an increased cost for all companies in the sector. However, due to the regulations that are increasingly being implemented in the western world, one tends to think that the future of the energy industry will go through more and more renewable energies, and less by traditional energies. Accordingly, with these practices, the ultimate goal is to create the energy we require, while lowering CO₂ emissions and preserving biodiversity (Holden et al., 2021).

2.6. The vision of other authors in the sector practices

According to Bell and Stellingwerf (2012), the evolution of the energy sector will involve fundamental aspects such as biomass, hydroelectric power, and geothermal energy. The second-generation technologies are now on the market and being actively deployed, with solar heating, photovoltaics, wind energy, solar thermal power plants, and modern bioenergy forms among them. Furthermore, in order for these practices to occur, significant R&D investments must be made,

producing a globally cost-effective product. Biomass gasification, biorefinery technologies, hot-dry-rock geothermal power, and ocean energy are examples of it.

Moreover, the future electricity mix, according to the IEA [International Energy Agency] (2007), is yet unknown and can be influenced by a variety of factors. What we can see so far is that the low cost of fossil fuels continues to be a great barrier to the mainstream adoption of renewable energy. This is especially true in nations where fossil fuel costs have been intentionally kept below global market rates due to government intervention. In this sense, Beck et al. (2020) argues that a large part of the reduction in CO₂ emissions will come from expanding the use of electricity.

According to McKinsey (2020) research organizations in the oil and gas industry will need to reformulate their procedures and rethink their strategies, as they will both be critical to the global energy transition. As transparency grows, so do expectations, and customers, employees, and investors are already able to tell the difference between the leaders and the laggards. Thus, companies who get ahead of the curve in the oil and gas industry may find themselves in a stronger position in the face of change. The study also demonstrates the possibility for these companies to start a significant change by investing in facilities to produce green hydrogen, which the authors believe to be a viable replacement and a long term investment.

However, despite the fact that some businesses have chosen to replace coal with natural gas in their energy production processes, this transition is marked by some controversy. Holden et al. (2021) defend that even though natural gas emits less carbon dioxide (CO₂), when heated, the picture changes. In fact, in comparison to gasoline, it also contributes significantly to total emissions of greenhouse gases. Additionally, the extraction and transportation of natural gas might result in methane leaks, a gas that possesses an even stronger effect than CO₂. As a result, it seems that switching to natural gas is not exactly the step to take in the right direction, and it is certainly not a permanent solution to lowering CO₂ emissions.

Mapelli et al. (2016) have identified three main generalized practices in the energy sector in terms of corporate social responsibility. First, corporations that operate in several markets are committed to developing strong relationships with local non-economic stakeholders as they become more conscious of the hazards associated with the commoditization of energy supplies in developed markets. Subsequently, multi-stakeholder participation is a critical component of strategy for these organizations. On the other hand, there is a strong focus on a global scale, more specifically on how to achieve shared value in emerging markets and underdeveloped countries.

Finally, the third action applies to companies with a bigger scale of operation, that the authors argue to be more forced to invest in advanced CSR programs. Nevertheless, smaller energy companies are starting to show that they are becoming more and more conscious of these practices and its benefits, and thus becoming interested in practicing the same strategy as well. In line with the previous authors, Radhakrishnan et al. (2018) states that most companies in the energy industry engage in social responsibility initiatives that aim to benefit the communities in which they operate, such as environmental education programs, fauna and flora development programs that help characterize the practices of companies in this sector, and the development of local infrastructure and support for social causes.

In conclusion, these studies are an overview of sources where the particular topic is in common with this research, the sustainable practices. Therefore, they are important references and means of comparison.

Chapter 3

Methodology

In order to achieve the most complete and accurate answer possible to the research question a qualitative research has demonstrated to be the adequate research method to apply to this study, given that it allows to explore and clarify many different elements (Birkinshaw et al., 2011). Due to its ability to examine both the complexity and the subjectivity of the events researched, qualitative methodology is often seen as the most effective instrument for discovering patterns (Tenny et al., 2022). It focuses on gaining a comprehensive and contextual understanding of the factors under consideration, enabling the immersion in different nuances and interpretations (Yin, 1994). Furthermore, the qualitative technique allows for the study to be adapted as new views arise, providing a more holistic and complete view of the patterns underlying the phenomena under study (Rynes et al., 2004). As a result, the qualitative approach excels at uncovering deep patterns and comprehending the complexities inherent in the environments under investigation (Tenny et al., 2022).

Primary data can be defined as the original material gathered straight from the source, making it beneficial for specific research goals due to its freshness and relevance (Zikmund et al., 2013). The most significant primary sources are those that were recorded closest to the phenomena under study in terms of time and place (Merriam et al., 2015). Therefore, the primary data in this study was collected from internal sources, namely the companies' sustainability reports and integrated reports. Additionally and according to Goodwin (2012), secondary data can be used to compare and to validate qualitative study findings. In addition, this type of data may be necessary for following certain patterns and developments. When it comes to data collection, the same procedure was applied to all five companies – Secondary data was collected out of external sources, such as newspaper articles, master's thesis, case studies, website posts and research papers.

In terms of data analysis, the coding procedure took place during the data analysis phase in order to meet the objectives of finding patterns in companies' practices. This process has involved the selection of specific sections of the data that shared a meaning, building construct blocks, and then labeling them with a code. Arvidsson and Dumay's (2021) article was fundamental to this coding task, having served as the basis for the elaboration of the code to create the conceptual categories and later aggregate the dimensions. The coding process among the five companies has

resulted in a total of 201 empirical themes. Each company was given the same 22 conceptual categories and 6 aggregated dimensions. Furthermore, in order to calculate the results of the variations in Scope 1 emissions (2018-2022) reported by the companies, EuroStat's (2023) formula has been used to obtain the rate of change (or percentage (%) of change): $[(\text{value at the later time} \div \text{value at the earlier time}) - 1] \times 100$.

The application of a coding system in qualitative approaches is indeed a highly effective method for discovering patterns (Williams & Moser, 2019). By using this method, researchers can methodically evaluate and categorize data, granting them the ability to identify repeating themes, patterns, and interdependent links between the materials that are being analyzed. Furthermore, the coding technique gives an orderly structure for understanding the data, allowing for the extraction of underlying meanings and important insights. In this sense, this strategy can be extremely helpful for finding underlying patterns that would otherwise go unnoticed in a less structured examination by encouraging extensive and rigorous analysis (Yin, 2018). In this approach, coding processes in qualitative research show to be an indispensable instrument in the search for and identification of significant and revealing patterns, exposing the need to use a coding technique to properly address my research question (Holton, 2007).

As mentioned previously, the secondary data used in the present study was collected from external and internal sources of information in order to avoid falling into any bias (Johnson, 1997). For instance, the introduction of external information has proven to be crucial to meet the research objectives with more quality and more accurate information. Moreover, because sustainability reports are not governed by a global accounting standard, this lack of standardization on reporting sustainability, according to Eccles and Mirchandani (2022), could lead to a distortion of reality in case this study use the companies' internal sources of information only.

The selected companies were the following – ENEL [Ente Nazionale per l'Energia Ellettrica], from Italy; Ostred, from Denmark; NextEra Energy, from United States of America; Woodside Energy, from Australia; and lastly, Portugal Energies [EDP, Energias de Portugal], from Portugal. The decision to choose these five companies was made owing to the fact that these companies have a great market share in their respective market and that they are all leading representatives in the sector, thus having the ability to influence policy making in terms of envisioned sustainability reporting standards. The initial requirement for this selection was that the companies were headquartered in developed countries, and in democracies with freedom of speech , but also they

are multinational companies listed on a stock exchange with compulsory financial external audit, thus ensuring a certain quality of the internal sources of data. The difference of the energy sector branch these companies are operating in, their size and their locations, were the three other metrics that gave rise to the choice of these companies. For example, and more precisely, Orsted is Denmark's largest multinational company that produces energy mostly from renewable sources, and Woodside Energy is Australia's largest gas and oil producer and explorer. In turn, Enel and EDP are the two largest companies in their countries (Italy and Portugal, respectively), and they both operate the production, the commercialization of electricity, and gas. Finally, NextEra Energy is the largest electric utility holding company by market capitalization and produces roughly half of its energy from fossil fuel sources, and the other half from renewable sources.

Moreover, with market trends, technologies, and practices shifting dramatically in the last few years, analyzing the last five years provides a precise and recent snapshot of this sector's dynamics, allowing to discover patterns or changes in corporate behavior (Farmer & Trancik, 2007). Additionally, it is important to study the last five years of evolution in the Scope 1 emissions in a continually energy shifting sector in order to stay updated in today's reality and to understand the direction the sector is going to (Hoang et al., 2021).

Furthermore, a sample of five different companies from the energy sector was identified in order to be a significant representative of it. As there is no rule about the number of companies that should be studied so that it is representative of a certain sector or industry, and according to Morse (2020), a larger study does not necessarily imply that it is a better study, there is room for error both with the reduction or the enlargement of the sample. For these same reasons, the decision to narrowing the study to five companies could be seen as a limitation. Even though, the parameters used for the design of the case studies mitigates this limitation.

Chapter 4

Data Contextualization

Human society cannot exist without the constant consumption and supply of energy. Human energy was the first source of energy for social activities, as the energy of human muscle provided the mechanical power required at the start of civilization. Then came the capacity to regulate and use fire from wood combustion, and with it, the ability to harness chemical changes caused by heat energy, used to cook food, heat homes, and extract metals (such as bronze and iron). Draught animal energy also began to be used in agriculture, transportation, and across industries. Finally, human cultures gained control of coal, steam, oil, electricity, and gas in a quick succession. (Goldemberg, 2000)

According to the World Population Prospects 2012 Revision by United Nations (2012), in 1950, the world population was 2.4 billion. Later, in 2015, it reached 7.3 billion, and by 2050 and 2100, the UN projects it will be around 9.7 billion and 11.2 billion respectively, at which point it is expected to achieve a plateau and stabilize global population growth. This increase implies a problem for the energy sector and planet earth itself, as population levels have a direct impact on energy demand – the greater the population, the more total energy is required – with the magnitude of total energy depending on per capita energy consumption. This is one of the basis for the belief that population growth in developing nations poses the most severe threat to the global climate via the phenomena of global warming (Rahman, 1998). Having this in mind, there seems to be an urgent need for companies to adopt a more sustainable approach. For that, environmental management and sustainable development are vital, as they both present various techniques that benefit the natural environment. (Alcântara et al. 2012).

With sustainability frequently appearing on the agenda of debates around the globe, the investigation of topics such as energy and environmental policies, and renewable energy sources becomes ever more crucial for advancements on sustainable development, helping to construct ways to achieve growth by the preservation of earth's natural resources. (Lopes & Taques, 2018)

According to Richard Norris (2020), an oil and gas professional with nearly three decades of experience split between industry and finance, today's energy industry and the world alone face two major problems: one is climate change, which requires solutions to replace fossil fuels with

low carbon and cheap alternatives, and the other, which is equally pressing, is meeting the energy needs of a growing global population. According to Edenhofer (2012), since 1850, the global usage of fossil fuels has increased to a dominate energy supply, resulting in significant increases in CO₂ emissions. By the end of 2010, data revealed that the consumption of fossil fuels represented the vast majority of worldwide anthropogenic greenhouse gas (GHG) emissions, with concentrations increasing to more than 390 parts per million over preindustrial levels (Owusu & Sarkodie, 2016). This a great example that demonstrates how today's economy is energy-dependent, with a propensity to consider energy supply as the primary issue in the energy sector.

Energy issues have been historically motivated by one fundamental issue: increased energy supply. However, major concerns have also grown in recent decades regarding the logic of adopting a supply-obsessed approach. The focus is now changing towards a more balanced perspective that considers energy demand as well, with access and usage of energy remaining a critical component of growth (Owusu & Sarkodie, 2016).

According to United Nations Development Program (2021), the energy sector, which is dominated by fossil fuels, is responsible for 73 percent of human-caused greenhouse gas emissions. That being said, a more renewable and efficient energy transition is urgently needed to reduce the emissions that are rapidly overheating our planet. Moreover, global temperatures are already 1.2oC higher than pre-industrial levels, resulting in more frequent and harsh weather. In the next 30 years, it is expected that nearly a thousand cities will experience frequent climate-related extreme weather, increasing the frequency and severity of devastating flooding, droughts, and wildfires, while causing population displacement, livelihood loss, and loss of life. This global energy change can and must involve universal access to energy, which will be responsible for creating new opportunities and aid in the elimination of profound disparities.

In the Global Energy Perspective 2022 by McKinsey & Company (2022), the final energy consumption per fuel is divided by Electricity, Oil, Hydrogen, Coal, Bioenergy, Natural Gas, and others. In terms of electricity, as electrification and living standards improve, power consumption is expected to triple by 2050. Electrification has been identified as one of the first decarbonization levers introduced, as it is the least expensive and easiest to deploy in most industries. In terms of Hydrogen consumption, it is forecasted to more than fivefold by 2050, driven mostly by road, marine, and aviation transportation, while supply is likely to transition from nearly 100% grey hydrogen to 95% clean production by 2050 as costs fall and regulators boost hydrogen technology

adoption. Bioenergy and sustainable fuels can reduce GHG emissions similar to electric vehicles and might account for up to 37% of transportation energy consumption by 2050. They are also relevant in a variety of industries and are required to satisfy decarbonization requirements. On the other hand, Natural Gas has progressively expanded its part of the energy mix and, due to its lower carbon intensity, it is the most robust of all fossil fuels. Gas, however, is expected to play an important part in the transition due to its vast range of applications, and its demand is expected to peak by 2035. When it comes to oil and global liquids consumption, it is expected to peak in the following two to five years, mostly due to the increased use of electric cars. Still, crude oil demand is expected to fall substantially only after 2030, with the majority of remaining liquids demand increase likely to come from non-energy uses of oil, as well as bio- and synfuels. In addition, in 2013, global coal demand peaked. Despite a short-term rebound from the effects of COVID-19, coal demand is expected to fall by 20% by the end of this decade. Nevertheless, coal is expected to be a key component of the energy system until 2050 (depending on region and industry), thus jeopardizing future climate promises.

Facing this enormous evolution will require a joint effort of all corporations. For a plausible start, they should consider using more viable alternatives, such as renewable energy, leading to a considerable cut on greenhouse gas emissions. Renewable energy supplies should be sustainable since they are produced organically from continual flows of energy in our environment and they also must be infinite and offer non-harmful delivery of environmental products and services in order to be sustainable. A sustainable biofuel, for example, should not raise net CO₂ emissions, should not have a negative impact in biodiversity. (Twidell & Weir, 2006)

Chapter 5

Case studies

The following chapter gathers information on the organizations and their business models. This detailed information will offer a full picture of each organization's plans, allowing for a more accurate assessment of the influence of their activities on the entire context, helping to comprehend the results and their significance.

5.1. NextEra Energy

NextEra Energy is an energy firm established in the USA, involved in the generation, transmission, and distribution of electricity. The company's business approach is built on delivering inexpensive, dependable, and sustainable energy solutions to the clients by generating electricity through the use of a range of fuels, nuclear power, and renewable energy sources such as wind, solar, and battery storage. The corporation has made major investments in renewable energy in the recent years, becoming one of the world's top producers of wind and solar electricity. NextEra Energy also provides transmission and distribution services, apportioning power to clients within its service zones. The corporation is aiming to increase both the efficiency and reliability of its transmission and distribution networks, while investing in new technology.

In addition to its main electricity generating and distribution activities, NextEra electricity provides a vast number of energy-related services, namely energy management solutions, energy efficiency services, and also electric car charging infrastructure. The American company's business strategy is similarly oriented on sustainability and the transition to a low-carbon economy.

The corporation has set aggressive objectives for reducing greenhouse gas emissions and boosting renewable energy capacity, and it is investing in R&D to improve the efficiency and performance of its energy assets. In fact, NextEra Energy's business plan comprises the generation and transportation of power from different sources, offering energy-related services and investing in sustainable energy solutions to fulfill the rising need for clean, cheap energy.

5.2. Orsted

Orsted's business model is based on the fact that the company continues to be the world's largest developer and operator of wind farms across 11 countries. The Danish company is committed to advancing sustainability and social responsibility through its investment in communities and providing green energy solutions, allowing it to offer cheap energy to the customers. In addition to wind farms, the firm has a research and development innovation chapter at its core, providing a competitive edge in the market with a strong focus on developing renewable energy technologies such as solar power and energy storage systems.

Orsted energy's primary clients include industrial ones, such as Nestlé and Microsoft, and commercial, like hotels or retail complexes, but also public customers, such as universities and hospitals.

Orsted benefits from a more established position in the renewable energy market, with the ambitious objective of becoming carbon neutral by 2025 and assisting its customers in becoming carbon neutral by 2030. Besides this aspect, the company envisions a world powered by renewable energy.

Orsted develops, builds, and operates on offshore and onshore wind farms, solar farms, energy storage facilities, renewable hydrogen, and green fuels facilities, as well as on bioenergy plants, all with an end-to-end process knowledge.

5.3. EDP – Energias de Portugal

EDP, commonly known as Energias de Portugal, is a multinational energy corporation headquartered in Portugal. Its business strategy is built on the generation, distribution, and selling of electricity and gas, as well as energy solutions and services.

EDP generates revenue through the selling of electricity and natural gas to residential, commercial, and industrial clients, and its main sectors include electricity generation and distribution, renewable energy, and energy services.

The energy distribution arm of EDP is mainly responsible for providing electricity to end consumers through its network of power lines and substations, but the firm engages in the gas distribution segment as well, offering gas supply and distribution services to the customers. In addition to its primary commercial activities, EDP also invests in research & development to increase the efficiency of its operations and boost the creation of new energy solutions. EDP's

business strategy emphasizes sustainability and environmental care, and the company's mission is to become a global leader in renewable energy, with renewable energy accounting for 90% of its installed capacity by 2030. To encourage clean energy adoption, the Portuguese company also works closely with government agencies and other stakeholders.

In sum, EDP's business plan consists of generating and distributing electricity and gas, providing end customers, trading energy, and investing in renewable energy technology in order to promote sustainability and environmental responsibility.

5.4. Woodside Energy

Woodside Energy is built on two pillars: oil and gas. Its business strategy is based on the exploration, development, production, and sale of oil and gas resources, especially liquefied natural gas (LNG). As mentioned before, the company generates revenue through selling oil, gas, and energy to clients such as utilities, industrial users, and LNG importers, with its business sectors including the North West Shelf, Pluto LNG, Browse, Wheatstone, and Kitimat LNG.

North West Shelf is responsible for an integrated LNG project that involves offshore gas production, onshore processing, and shipping. Pluto LNG, on the other hand, is an LNG facility in Western Australia that produces and sells LNG, condensate, and LPG. The Browse sector is in charge of exploring and developing Western Australia's offshore gas resources and Wheatstone is a joint venture project with a partner.

In addition to exploration and production, Woodside Energy invests in R&D to increase operational efficiency and decrease environmental impact. The firm is devoted to long-term survival and intends to be a pioneer in low-carbon energy generation, integrating in its business the location and development of oil and gas resources, extracting, and refining these resources into valuable products in order to sell them to clients worldwide.

5.5. ENEL – Ente nazionale per l'energia elettrica

ENEL is a worldwide energy corporation that specializes in the generation, delivery, and selling of electricity. The company's business strategy centers around the generation and distribution of electricity and natural gas, as well as the supply of energy-related services.

ENEL creates electricity using a range of fuels and renewable energy sources such as wind, solar, hydro, geothermal power, and nuclear energy. The corporation operates in over 30 countries, with a focus on Europe, Latin America, and North America.

The Italian company transmits energy using a network of electrical lines and cables, while also distributing gas, and provides clients with a number of energy-related services, such as energy management systems and energy efficiency services. Its business model is based on sustainability and the transition to a low-carbon economy.

The corporation has set aggressive objectives for reducing greenhouse gas emissions and boosting renewable energy capacity, and it is investing in R&D to improve both the efficiency and performance of its energy assets.

ENEL's business plan involves generating and distributing electricity and gas, offering energy-related services, and investing in sustainable energy solutions to fulfill the rising need of energy.

Chapter 6

Analysis

6.1. EDP – Energias de Portugal

6.1.1. Net Zero Goals

One of EDP's primary goals is to eliminate coal use by 2025. Recognizing the negative environmental consequences of coal-based energy generation, the corporation has taken major measures to move coal out of its energy mix. This strategic decision demonstrates the company's commitment to decreasing greenhouse gas emissions and tackling climate change.

EDP has made significant investments in renewable energy sources in order to meet this lofty target. The company has avoided 15.0 million tons of CO₂ emissions through the utilization of wind power, solar, hydro, and other sustainable sources. This significant contribution to emission reduction exemplifies EDP's proactive commitment to solving the global climate catastrophe.

Its commitment to renewables has resulted in several socioeconomic advantages in addition to lowering emissions. The company was able to generate employment, encourage innovation, and strengthen local communities by investing in sustainable energy initiatives.

6.1.2. Corporate Responsibility

EDP has established clear targets for 9 of the 17 SDGs, focusing on several elements of social investment and environmental responsibility. The corporation has made major steps since 2017 by adopting Environmental, Social, and Governance (ESG) Due Diligence, ensuring that its activities comply to the highest ethical standards and contribute positively to society and the environment. In 2020, this Due Diligence process was expanded to include all business areas, ensuring a unified strategy across the corporation.

In addition, EDP established the "EDP Y.E.S" (You Empower Society) brand for enhancing awareness of its social investment programs in the countries where it operates. The organization intends to invest in initiatives that address a variety of essential issues, such as fighting poverty, increasing access to energy and energy efficiency, and implementing solar energy and electric transportation solutions.

As part of its Corporate Social Responsibility strategy, EDP has also pledged to invest more than €300 million in a new worldwide social investment program by 2030, proving its commitment to make a visible difference in the communities that the company serves.

Moreover, the corporation encourages its workers to get involved in community service programs and multiple volunteer opportunities. In 2022, EDP's workers demonstrated a remarkable reaction, with 3,626 volunteers donating 10,551 hours of their working hours and 2,699 hours outside of work hours to various activities and initiatives. Also, through the partnership with 512 companies, the corporation funded €15 million in programs that directly contributed to the SDGs, impacting a total of 1.7 million people. EDP has made a significant voluntary investment in its communities of 31.2 million, underlining its commitment to encouraging sustainable growth and beneficial social effect. The corporation funded 634 initiatives, resulting in a considerable beneficial impact on 3.2 million direct recipients.

But that is not all. Recognizing the value of diversity and gender equality, EDP aspires to increase the ratio of female workers from 27.5% in 2022 to 30% by 2025, encouraging inclusion and equal opportunities throughout the business. Furthermore, the company has joined forces with the Municipality and the National Institute for Skilling and Employment (IEFP) in a successful cooperation, resulting in the skilling and employment of 128 employees, and contributing to local economic growth and job creation.

6.1.3. Environmental Responsibility

EDP is committed to protecting the world's natural and cultural heritage. In accordance with this promise, the corporation has agreed not to build any new power generation facilities in regions that are part of UNESCO World Heritage Sites, as it strives to protect the unique biodiversity and environmental services provided by these famous areas, thus valuing them.

In 2022, EDP made a bold worldwide pledge to become environmentally beneficial by 2025. This lofty ambition requires actively improving and repairing the natural environment harmed by the company's operations, and it is part of EDP's plans to create a net-positive influence on biodiversity and ecosystem health through participating in a variety of environmental activities.

EDP also recognizes the importance of innovation in lowering its environmental footprint, as it is always investing in new technology and initiatives to reduce the environmental effect of its

operations. These initiatives vary from using renewable energy sources to improving energy efficiency across its infrastructure.

Complementarily, the company seems to be aware of the significance of water conservation and has taken significant steps to decrease its water use. In 2022, EDP achieved a remarkable 25% decrease in specific fresh water consumption compared to the previous year. This reduction was primarily driven by a 10% decrease in coal-fired power output, underscoring EDP's commitment to a greener energy future.

EDP is open about its sustainability efforts and regularly reports on its success. As a result, the company presented a thorough summary of their current actions since 2010 in answer to the CDP Water Security. EDP displays responsibility and transparency in tackling water-related concerns by disclosing its activities and outcomes.

6.1.4. Workforce Conditions

When it comes to retirement aids, EDP helps its employees by providing them with contributions whether they wish to join private retirement or pension plans.

On another note, regarding the field of training, EDP provides both training and awareness-raising events on emergency response for employees, service providers and others involved.

6.1.5. Sustainability Goals and Accomplishments

The corporation has set targets for increasing its investment in renewable energy, with a particular emphasis on wind, solar, and hydro projects. The company's objective is to reach 10% of total investment in this area.

Over the years, EDP has actively expanded its wind and solar power portfolio, culminating in a 1.2GW growth and reflecting a total installed capacity of 14.7GW. These activities have had a direct influence on SDGs 7, 9, 11, and 13, which focus on guaranteeing cheap and clean energy, encouraging industry, innovation, and infrastructure, constructing sustainable cities, and addressing climate change, respectively.

Between 2021 and 2025, the corporation invested €24 billion in its renewable energy program. Looking ahead, EDP intends to invest an additional €25 billion between 2023 and 2026, with a substantial share of €21 billion going towards renewable projects, and the remaining €4 billion going towards strengthening electrical grid infrastructure.

Additionally, EDP has set the target of producing 20 Mton of green hydrogen by 2030, keeping up with its sustainable energy agenda. The company believes that this clean and adaptable energy carrier will play a fundamental role in lowering carbon emissions and promoting a more sustainable future in the heavy industries.

EDP's dedication to renewable energy is also visible in its power facilities, which are built to convert diverse energy sources into electricity effectively. The company's power plants generate 75% of their electricity from renewable sources, proving EDP's commitment to decreasing their carbon footprint and encouraging environmental responsibility.

Furthermore, the firm has taken significant measures to promote electric transportation and reduce dependency on traditional fossil fuels. EDP has committed to electrifying more than 40% of its light vehicle fleet by 2025, with the goal of reaching 100% electrification by 2030.

6.1.6. Red Flags

In Spain, an EDP subsidiary, also known as EDP Renewables, has been involved in a number of issues that have alarmed the public and environmentalists. The bird deaths at its Rabosera wind farm, Aragon, have been exposed as one of the most outrageous situations to be recorded. This wind farm, maintained by EDP Renewables, is said to be inflicting severe harm to bird populations, casting doubt on the company's dedication to environmental sustainability.

Furthermore, EDP is also dealing with the difficult task of shifting away from coal-fired power facilities. While there is growing agreement on the need to transition to renewable energy sources, the firm sees the closing of coal facilities as a dangerous decision due to probable job losses. This approach has spurred discussions about how to strike a balance between environmental stewardship and economic stability.

Environmental risks have also been a persistent issue for EDP. The corporation had 99 tiny oil spills and 101 environmental near-accidents in 2022 alone, contributing to its bad public image. The recurrence of similar mishaps has called into question the company's capacity to put in place appropriate safety and environmental protection measures.

Aside from environmental problems, EDP has been entangled in financial squabbles. One example was the purported sale of six dams to an Engie-led group for a large price of €2.2 billion. Nevertheless, it was determined that EDP did not pay the requisite stamp duty for this activity, raising concerns about its financial and tax compliance.

EDP has also dealt with internal difficulties relating to individual behaviors, with charges and suspicions of infringement of fundamental human and labor rights being recorded on occasion. Such incidents have not only harmed the company’s brand image but have also highlighted the need for better responsibility and a more ethical behavior inside the firm.

Finally, EDP’s previous affiliation with Manuel Pinho, former Portuguese Minister of Economy (2005-2009), has been called into question. Manuel Pinho was charged with many offences in the EDP case, including passive corruption for an illegal conduct, another accusation of passive corruption, money laundering, and tax fraud. This relationship has increased public skepticism about the company’s commercial methods and corporate governance.

6.1.7. Scope 1 Emissions

Table 6.1.7.1. Evolution of EDP's scope 1 emissions in Million tonnes of CO2e.

2018	Percentage Variation	2019	Percentage Variation	2020	Percentage Variation	2021	Percentage Variation	2022	2018-2022 Percentage Variation
18,43	-22%	14,36	-35%	9,3	5%	9,81	-4%	9,41	-49%

Source: Author’s elaboration, Excel

From 2018 to 2019, and from 2019 to 2020, EDP had a sharp decline in the use of stationary combustion which has a direct impact on the Scope 1 emissions with a decrease of 22% and 35% in the respective years. According to Environmental Protection Agency from United States of America, the stationary fuel combustion sources are devices that combust solid, liquid, or gaseous fuel, generally for the purposes of producing electricity, generating steam, or providing useful heat or energy. Stationary fuel combustion sources include, but are not limited to, boilers, simple and combined-cycle combustion turbines, engines, incinerators, and process heaters.

All these variations are due to the same factor – the oscillation of the use of stationary combustion – which made Scope 1 emissions increase between the years 2020 and 2021. Nevertheless, from 2018 to 2021, there was a 49% decrease of Scope 1 emissions.

6.2. Orsted

6.2.1. Net Zero Goal

Orsted is a corporation that aspires to be net-zero, displaying a significant commitment to the sustainability factor. It intends to get at least 10% ‘near-zero’ concrete by 2030, demonstrating a commitment to making environmentally responsible decisions in Orsted’s operations.

The corporation has the aim of contributing to completely decarbonized world’s energy systems, including tough industries such as steel, concrete, and shipping, in addition to their own activities.

Orsted’s desire to reduce the emissions intensity exceeds their initial 98% reduction objective, demonstrating its dedication to making continual improvements and also producing substantial environmental effects. Additionally, the organization aggressively drives out emissions throughout Scopes 1-2 to keep their commitment, taking responsibility for both direct and indirect emissions.

Orsted has made a big financial contribution to its green aspirations in 2022 by issuing DKK 28.4 billion in green bonds and green hybrid bonds. The allocation of \$8 billion in these bonds reflects their pledge to a long-term development.

6.2.2. Corporate Responsibility

In Orsted’s external Scope 3 reporting, one of the company’s primary projects is the adoption of asset-specific life cycle assessments (LCAs) for offshore assets. This technique enables Orsted to obtain a thorough understanding of the environmental footprints of their assets and make educated decisions to decrease their carbon footprint.

Recognizing the value of collaboration, Orsted has also teamed together with eleven other energy companies and the Carbon Trust to launch a joint industry initiative. They hope to build a single standard for monitoring emissions through this initiative, assuring a consistent and more accurate reporting across the sector. This collaborative endeavor strongly highlights Orsted’s dedication to promoting sustainable practices outside of their own activities and encourages other companies to do the same.

On another note, the corporation has also taken important initiatives to engage with its suppliers in order to foster sustainability throughout their supply chain. Over 90% of their strategic suppliers have revealed emissions data to CDP, suggesting a high degree of openness and accountability. Furthermore, in their attempts to promote a greener supply chain, Orsted has made

achievements in ensuring that its suppliers share their commitment to sustainability. In fact, approximately 40% of their suppliers have already established or committed to establishing science-based objectives that are consistent with the global goal of minimizing global warming.

The corporation's dedication to shifting to renewable energy sources comes as another remarkable accomplishment. Orsted actively contributes to the overall reduction of greenhouse gas emissions by pushing their suppliers to transition to renewable energy, and so far, more than 69% of Orsted's suppliers have already switched to 100% renewable energy or have committed to doing so by the end of 2025.

In addition to environmental responsibility, the organization is also committed to fostering gender equality, having set an ambitious target of establishing a gender ratio of 40:60 (women:men) by 2030. This gender diversity project demonstrates Orsted's dedication to creating a more inclusive workplace and supporting equal opportunity for all employees.

6.2.3. Environmental Responsibility

Orsted has partnered with Lincolnshire Wildlife Trust and Yorkshire Wildlife Trust, co-funding the Humber Seascape Restoration Program. This initiative aims to rejuvenate maritime ecosystems and increase biodiversity in the Humber area by restoring salt marsh, seagrass, and oyster beds. Still in the marine life field, Orsted has started the ReCoral program, which attempts to investigate the feasibility of growing corals on the jacket foundations of offshore wind turbines. This strategy might help reduce the danger of coral bleaching and sustain coral reef ecosystems in locations near wind turbines.

The corporation has also stepped into a five-year worldwide cooperation with WWF, or World Wide Fund for Nature, to establish a new standard for biodiversity conservation and restoration in offshore wind construction. This partnership helps put to evidence Orsted's dedication to making a positive impacting the environment.

While searching for more information on Orsted's environmental responsibility, it was possible to find that the organization is a strong supporter of efforts and practices that can help increase ocean biodiversity. In fact, Orsted has set an ambitious goal of creating a net-positive biodiversity effect from all new renewable energy projects launched by 2030.

On the water management front, Orsted seems to be making great advances to lessen the intensity of its freshwater withdrawals. As such, the organization has made a promise to reduce the

intensity of freshwater withdrawal by 40% (measured in m³ per GWh) by 2025, and it had already achieved a significant 13% decrease by 2022.

Orsted is also continuously working to reduce waste and increase recycling activities and has taken the lead in ensuring that no wind turbine blade trash ends up in landfills. Furthermore, the company has successfully recycled over 4,000 damaged modules in the US, recovering an astonishing 140 metric tons of materials. Orsted is focused on developing additional long-term relationships with reuse and recycling firms across North America to strengthen their recycling efforts.

6.2.4. Workforce Conditions

Orsted is working hard to improve workers' awareness in terms of Diversity, Equity, and Inclusion (DE&I). The organization has undertaken a variety of activities and training programs to reach this goal, and over 1,850 workers actively engaged in live trainings aimed at cultivating an inclusive workplace culture. Over 600 employees also completed the e-learning sessions, emphasizing the significance of continuous learning culture.

Orsted is also committed to meeting the target of 2.5 injuries per million hours worked (Total Recordable Incident Rate - TRIR), considering that the company's injury rate in 2022 was of 3.1 occurrences per million hours worked. Regardless of this statistic, Orsted says it remains engaged to safety and is actively adopting ways to help minimize the TRIR, thus providing a safer working environment for its workers.

6.2.5. Sustainability Goals and Accomplishments

Orsted has seen extraordinary developments in its solar portfolio in recent years. With its strong commitment to sustainability and green energy, the organization hopes to achieve a 50:50 capacity mix for its worldwide onshore portfolio by 2030. Orsted has entered into an unusual collaboration with one of its suppliers in its search of cutting-edge solutions with the goal of investing in the world's first service operation vessel (SOV) that runs solely on green fuels, lowering carbon emissions and furthering the cause of sustainable transportation. Moreover, Orsted has pledged not to acquire or lease fossil-fueled cars, significantly lowering its carbon impact.

In response to the electric revolution, the corporation has set lofty ambitions for transitioning its light vehicle fleet to entirely electric by the end of 2025. Surprisingly, the corporation already has 51% of its fleet comprised of electric cars, including plug-in hybrids.

Nevertheless, the organization is not only setting a good example in its own operations, but it is also extending further its commitment to sustainability throughout its supplier chain. Orsted has broadened its expectations to include strategic suppliers' electricity use, requiring it to be powered entirely by renewable energy by the end of 2025.

6.2.6. Red Flags

One of the biggest concerns plaguing the organization is the large carbon footprint being left by its offshore assets, with steel accounting for almost 50% of supply chain emissions, highlighting the urgency of developing greener alternatives.

Despite having taken several steps towards renewable energy sources, Orsted has not walked that path without committing any flaws. In fact, the corporation continues to generate a percentage of its electricity from coal, raising many questions about its commitment to lowering greenhouse gas emissions and moving to greener energy sources.

Additionally, in 2022, Orsted's Scope 1 emissions, which include the direct emissions from the company's operations, increased. This increase is a cause for reflection and needs an immediate reevaluation of their environmental policies in order to reduce future climate impact.

Furthermore, the company is being confronted with the issue of high CO2 intensity in its activities, thus suggesting that Orsted's energy generation and supply chain activities continue to rely largely on carbon-intensive practices.

6.2.7. Scope 1 Emissions

Table 6.2.7.1. Evolution of Orsted's scope 1 emissions in Thousand tonnes CO2e.

2018	Percentage Variation	2019	Percentage Variation	2020	Percentage Variation	2021	Percentage Variation	2022	2018-2022 Percentage Variation
3,483	-47%	1,846	0,27%	1,851	16%	2,142	17%	2,510	-28%

Source: Author's elaboration, Excel

There was a 47% drop in Scope 1 emissions during 2018 and 2019. This was mostly due to lower coal-based output at the Asnaes, Esbjerg, and Studstrup power plants, as well as lower natural gas usage following the sale of the Enecogen power plant in 2018.

Scope 1 greenhouse gas (GHG) emissions grew slightly between 2019 and 2020, with its major cause concerning an increase in coal consumption at Esbjerg and Studstrup power plants, owing to the delivery of ancillary services, countered by a drop in natural gas use.

From 2020 to 2022, there was a hiccup in the road and Scope 1 emissions rose considering that Orsted had to temporarily restart coal burning at Studstrup Power Station in Denmark, as a result of the global scarcity of wood pellets driven by a Russian import restriction and a Studstrup wood pellet fire. Due to this same restriction, the company has also followed the instructions from Danish authorities to temporarily prolong the operation of three of our coal- and oil-fired power plants in order to maintain the security of Denmark's electricity supply.

From 2018 to 2021, there is a 14% decrease of Scope 1 emissions.

6.3. Woodside Energy

6.3.1. Net Zero Goal

Woodside announced its intention to achieve net-zero equity on Scope 1 and 2 greenhouse gas emissions by 2050, if not sooner. This implies that the company aims to reduce or eliminate their direct and indirect emissions from operations and energy generation.

Woodside's approach relies mainly on developing good relationships with all stakeholders, from suppliers to the customers, as it strives to create lucrative energy solutions that can readily grow to keep up with the constantly evolving energy shift while aligning solutions with the clients' requirements.

In addition, Woodside has made significant investments in innovative energy products and lower-carbon services, contributing \$100 million to a \$5 billion investment program. This investment focuses on increasing environmentally friendly and sustainable energy sources in order to tackle climate change.

The Australian company has also launched a Native Reforestation Project as part of its efforts to reduce emissions and increase carbon sequestration, having the intent to trap roughly 1,100,000 metric tons of CO₂-equivalent over a 25-year period. This initiative creates Australian Carbon Credit Units, which are subsequently used to offset Woodside's carbon footprint.

6.3.2. Corporate Social Responsibility

Woodside has assumed its duty to the local communities in which it operates in by paying the Commonwealth and State governments in Australia A\$2.702 million (A\$2.7 billion) in taxes and royalties in 2022. This financial contribution bears a part in the nation's advancement by funding important services and infrastructure development.

Recognizing the significance of community development, Woodside contributed A\$25.5 million in social contributions internationally in 2022 as well. An amazing A\$23.3 million (91.4%) of this money was directed to voluntary social contributions that benefitted different local organizations. In addition, the company has demonstrated its commitment to nutrition and well-being by helping to produce and serve approximately 8,000 nutritious soy-based breakfast dishes across 68 distribution stations. This effort was critical in ensuring underprivileged populations have access to healthy food.

Education also seems to be a concern for the Australian company, as it has worked with Enseña por Mexico along with the Ministry of Education to enhance education for over 3,000 youngsters in the Tamaulipas area. The organization gave high-quality training to local instructors, boosting the young brains' learning experience. But that is not all. Woodside demonstrated a commitment to assisting disadvantaged individuals of the community by supporting vehicle upgrades for Orange Sky's Perth service. The enhanced service gave clean clothes, hot baths, and nice chat to people in need, therefore improving the lives of the less fortunate.

As far as equity is concerned, Woodside launched a Racial Equity Strategy and Plan in the Q4 of 2022. The company's goal was to create a more equal workplace and to remove professional and career hurdles for persons who are Black, Indigenous, or People of People of Colour (BIPOC). Woodside boosted the overall percentage of First Nations Australians in their workforce to 5.4% in 2022, illustrating their dedication to diversity and inclusion. This action benefits Indigenous communities while also promoting a diverse and inclusive work environment.

On top of that, Woodside has shown its commitment to developing people by hiring 33 Pilbara-based apprentices and trainees as permanent employees in 2022. This step was a great aid in the development of a trained and capable workforce.

6.3.3. Environmental Responsibility

As part of its environmental responsibility, Woodside has been actively involved in pygmy blue whale research since the early 2000s. The company is helping to expand both knowledge and conservation efforts for these amazing marine creatures by contributing to this research.

Also, to complement its risk assessment methods, Woodside uses the “Guidance on Risk Related Decision Making” (Oil and Gas UK 2014). By adhering to this framework, the firm guarantees its activities are carried out with a thorough awareness of potential risks and suitable risk mitigation techniques.

Woodside’s dedication to environmental stewardship is reflected in its undertakings as well. The “Scarborough Project” has been approved by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), proving the company’s commitment to environmental stewardship.

Because the company is committed to complying with all regulatory standards, Woodside has also made a concession to comply with the General Direction and is taking all reasonable steps to monitor the status of Responsible Tailings Management (RTM) and reduce hazards to the environment and maritime users. For instance, Woodside Karratha Gas Plant and Pluto LNG surpassed their water efficiency goals in 2021, and even the King Bay Supply Facility has outperformed its water efficiency target, putting to evidence Woodside’s commitment to a more responsible water use.

Besides these aspects, Woodside has made progresses in trash management. The company has diverted successfully 79.6% of garbage from landfills at the end of Q3 of 2022, reflecting a considerable drop from 2021. Woodside is particularly interested in enhancing waste segregation techniques in Trinidad and Tobago, and their global commitment to environmental sustainability is shown in this endeavor.

Despite the obstacles, Woodside has maintained its commitment to recycling until 2022 and even though the new treatment plant is not yet open, the company maintains its recycling efforts, with 50% of waste generated in 2022 being recycled.

6.3.4. Workforce Conditions

Recognizing the need of work-life balance, Woodside sponsored a trailblazing public holiday trial, enabling employees to use up to five public holidays for personal reasons. This project aims to

provide employees the ability to prioritize their personal needs while still satisfying professional obligations.

Additionally, the company has shown dedication to its staff by giving assistance to people afflicted by family and domestic abuse. Recognizing the impact such situations may have on employees' lives, the firm implemented ten days of paid leave for employees who have been directly harmed by this abuse. This proactive approach not only addressed individual issues, but also underscored Woodside's commitment to fostering a safe and caring working atmosphere.

The company has also invested in the professional development of its Australian leaders in 2022. Workshops with chosen executives were held by the organization to look deeper into the principles of Human and Organizational Performance (HOP). The result was the construction of a culture of continuous improvement through improving employee well-being and safety through increasing knowledge of HOP.

Woodside's commitment to safety and operational excellence was demonstrated by the reduction of High Potential Incidents (HPIs) from 14 in 2021 to only 10 in 2022. Its Total Recordable Injury Rate (TRIR) increased in 2022, with 30 recordable injuries reported, and this result has motivated the organization to strengthen its safety processes and risk management techniques in order to avoid such events in the future. Similarly, Woodside's Total Recordable Occupational Illness Frequency (TROIF) increased to 0.72 per million hours worked, up from 0.36 in 2021.

6.3.5. Sustainability Goals and Accomplishments

The Woodside Solar project is one of the company's major endeavors. This project is expected to be a key participant in the solar energy industry, supplying up to 100 MW of solar energy. What is more interesting is its development potential, with plans in the works to achieve an outstanding maximum capacity of 500 MW. This big move towards renewable energy will potentially help to reduce dependency on fossil fuels and battle climate change.

But the company's commitment to renewable energy does not end with solar. Woodside is also working hard on the H2Perth project, a cutting-edge hydrogen and ammonia production plant that allows for the long-term production of these critical components. In this case, hydrogen carries an enormous promise for decarbonizing different sectors, whereas ammonia is a critical component in the worldwide push toward carbon-neutral fertilizers.

Woodside has also inked a memorandum of agreement (MOU) with Murihiku Regeneration on July 29, 2022, recognizing the value of establishing partnerships for delivering more sustainable solutions. The Memorandum of Understanding aims to allow in-depth talks and collaboration on a prospective large-scale hydrogen manufacturing project and with it, the two companies hope to investigate creative ways to create hydrogen at a scale that will have a real impact on global carbon emissions by combining their knowledge and resources.

Another project worth mentioning is the H2OK. This ambitious program focuses mainly on the electrolysis-based manufacture of liquid hydrogen. H2OK has the potential to change the hydrogen industry and push the adoption of this clean energy source, with a maximum design capacity of 90 tonnes per day (tpd) of liquid hydrogen. With its high energy density and potential for long-term storage, liquid hydrogen can play a critical role in satisfying future energy demands while avoiding environmental concerns.

6.3.6. Red Flags

Woodside's approach to tackling climate concerns has been one of the major causes of dispute. The company has recently declared that it will not hold a second "Say on Climate" referendum for shareholders. This action limits investors' alternatives and appears to show a lack of readiness to engage in transparent climate-related discussions.

Furthermore, Woodside has suffered some major consequences from regulatory organizations. Following a terrible event on its North Rankin platform that resulted in the death of a contract worker, Australia's offshore regulator issued a directive requiring the business to conform to particular conditions. This event prompted questions about the company's safety standards and risk management.

In addition to these problems, Woodside's climate policies have been greeted with persistent and unprecedented shareholder resistance. However, despite this opposition, Woodside has remained steadfast in its reluctance to change direction. This refusal to change has fueled more criticism and dissatisfaction among stakeholders worried about the Australian company's carbon footprint.

The environmental effect of Woodside's activities has also been a source of concern. The North West Shelf liquefied natural gas (LNG) processing facility alone is anticipated to emit 4 billion tons of CO₂ per year, a sum that is comparable to about 10 years of Australia's entire carbon

pollution, highlighting the company’s substantial contribution to greenhouse gas emissions. Moreover, Woodside is one of Australia’s major greenhouse gas polluters, according to the critics. Projects like the Burrup Gas Hub are predicted to generate an astounding 6 billion tons of carbon dioxide-equivalent emissions, increasing the company’s environmental responsibilities.

Despite mounting pressure for action, Woodside’s progress on emissions reduction measures has been poor, if not non-existent. Glenn Walker, head of Greenpeace Australia Pacific’s campaigning and strategy, has been vocal about the organization’s lack of meaningful success in this area.

6.3.7. Scope 1 Emissions

Table 6.3.7.1. Evolution of Woodside Energy’s scope 1 emissions in Kilotons of CO₂eq.

2018	Percentage Variation	2019	Percentage Variation	2020	Percentage Variation	2021	Percentage Variation	2022	2018-2022 Percentage Variation
3,535	-7%	3,302	9%	3,598	-2%	3,541	51%	5,357	52%

Source: Author’s elaboration, Excel

From 2021 to 2022, there is a significant increase of 51% in Scope 1 emissions due to the increase in fuel combustion, flare, and venting activities.

In the remaining years, these activities also oscillated from 2018 to 2019, and decreased from 2020 to 2021. Therefore, Scope 1 emissions decreased respectively to the previous years. Between 2019 and 2020, these activities increased, leading to an increase of 9% of Scope 1 emissions.

The activity with greater weight for the variations felt year after year was the fuel combustion activity. Overall, from 2018 to 2021, it was registered 52% increase of Scope 1 emissions.

6.4. NextEra Energy

6.4.1. Net Zero Goal

One NextEra’s most ambitious targets is to achieve 100% carbon neutrality by 2045. This desire to confront climate change has fueled the company’s continued investment in decarbonizing its operations.

NextEra Energy began its path towards a greener future in the 1980s when it launched its first solar and wind projects. Since then, the company has made great advances in renewable energy generation and has made substantial headway on its “Real Zero” strategy. This effort aims to transition away from traditional carbon-emitting energy sources and towards cleaner and more sustainable alternatives.

The company has also decreased substantially their carbon footprint throughout the years. Notably, Woodside has reduced CO2 emissions by 58% when compared to a 2005 adjusted baseline. This accomplishment demonstrates a commitment to combating climate change and developing a more environmentally friendly energy landscape.

In addition, NextEra Energy has taken significant steps in order to strengthen its efforts to reduce emissions, including transitioning the Gulf Clean Energy Center to natural gas. This switch has resulted in a 40% reduction in CO2 emissions. Also, the company has adopted a proactive approach to closing its coal-fired power facilities in Florida, showing its dedication to reducing reliance on coal as a source of energy.

NextEra intends to shut down three of its four remaining coal-fired power units by 2024, indicating a deliberate move towards greener energy choices. It has invested in natural gas generation as part of its diversification strategy, recognizing the potential of this cleaner energy source to lessen reliance on oil and coal.

6.4.2. Corporate Responsibility

In 2021, NextEra Energy provided an amazing \$2.6 billion to different state and local taxes, as well as business fees. This money is used to support vital services provided by local governments, police agencies, fire departments, schools, and other community groups.

Over a 10-year period, the corporation has also made active measures to interact with communities by supporting over 30 community and youth outreach organizations. This long-term commitment has been strengthened by a \$6 million increase in overall financing every year. To bolster these efforts even further, NextEra Energy committed \$30 million to the NextEra Energy Foundation, providing long-term support for community activities.

The company also embraces diversity and inclusion, and it has made significant advancements in developing a more diverse workforce and promoting opportunities for Black talent. When it comes to concrete numbers, NextEra Energy has worked with over 50 professional groups to boost

the pipeline of Black talent into their ranks. In addition, it launched a rotational development program and a mentoring/sponsorship program expressly geared to help and empower Black employees in their professional development.

NextEra Energy was selected to Forbes magazine's renowned list of "America's Best Employers for Diversity" in 2021 as a result of their initiatives. However, the company's commitment does not end there; NextEra has launched a company-wide supplier diversity initiative with the goal of doubling spending with Black-owned businesses by 2022, contributing to economic development. Additionally, NextEra Energy committed more than \$145 million to venture capital, private equity, and real estate initiatives in 2021, making substantial progress in aspects such as diversity, equity, and inclusion.

NextEra Energy has also shown its support for those who served in the nation's military services, recognizing their effort and dedication. To be more precise, veterans make up 13% (or 2,000 people) of the company's workforce now. This act of recruiting veterans demonstrates NextEra's confidence in the value that these individuals bring to the workforce.

Furthermore, the company prioritizes early identification of talent from varied backgrounds. To find applicants for its summer intern program and early-career rotational programs, the corporation recruits from institutions all around the country, including Historically Black Colleges and other institutions. These measures have resulted in the successful recruitment of 163 interns for the NEXT summer intern program in 2021, with more than 78% of them being women and minorities, demonstrating NextEra's commitment to diversity.

6.4.3. Environmental Responsibility

NextEra has shown its dedication to animal conservation by developing site-specific improvement and preservation strategies for its Florida solar energy centers. These plans guarantee that important habitat chances for diverse animal species are provided, hence fostering biodiversity and ecological balance.

The company's significant reduction in freshwater use is also a defining achievement. In 2021, NextEra's producing plants drew 74% of its water from saltwater sources, a strategic decision that has been critical in reducing the burden on freshwater supplies which is a necessary step in tackling water shortages and environmental degradation.

Moreover, NextEra Energy has adopted cutting-edge technology to improve its water management procedures. A once-through cooling technology is used to extract around 98% of the water used at its natural gas facilities. This method reduces water waste and guarantees that water returned to its source is not harmed, demonstrating the company's dedication to sustainability.

Besides these aspects, NextEra has made significant investments in water-free power generation from wind and photovoltaic (PV) solar sources as part of its commitment to a greener future. By using the power of these renewable resources, the company is able to minimize its reliance on water-intensive energy production methods, helping to conserve this valuable resource.

As part of its environmental responsibility, NextEra Energy is also working to improve the energy generating efficiency at its steam turbine installations. In fact, the company has been able to achieve considerable advances in boosting the efficiency of its energy generation processes via research and development. This effort minimizes not just trash but also the entire environmental footprint of NextEra's activities. Also, NextEra has significantly reduced its oil use as part of its commitment to decreasing environmental impact. Over time, the corporation has reduced reliance on oil to produce energy from an amazing 41 million barrels in 2001 to a meager 100,000 barrels of low-sulfur diesel. This amazing reduction reflects its commitment to a greener, more sustainable energy future.

Finally, NextEra Energy has created a corporate recycling and services center, which has proven to be a critical component of the company's sustainability initiatives. By reconditioning and diverting \$4.7 million in equipment back into inventory, NextEra demonstrates its dedication to circular economy concepts of eliminating waste and extending usable life of valuable resources.

6.4.4. Workforce Conditions

NextEra Energy is a prominent energy firm that has received widespread acclaim for its great work culture and dedication to employee development. The company was named one of America's Best Employers by Forbes magazine for the sixth year in a row in 2022.

The organization values employee development and education, and it offers a fantastic chance for self-improvement. In fact, NextEra Energy's internal continuous education platform, NextEra University, provides a varied selection of over 1,500 courses to empower its workers and guarantee they remain equipped with the most up-to-date knowledge and skills in the energy business.

NextEra Energy has also shown a great commitment to safety and since 2003, the organization has achieved an incredible 85% improvement in safety performance.

6.4.5. Sustainability Goals and Accomplishments

NextEra's track record is outstanding, with substantial contributions to renewable energy sector. The company has added about 2.007 MW of wind energy, 1.547 MW of solar energy, and 1.017 MW of battery energy storage. Furthermore, it repowered 435 MW of wind producing capacity, reviving, and optimizing existing resources.

Another of NextEra Energy's significant accomplishments is its collaboration with FPL (Florida Power & Light), through which they are now building 50% of 30 million solar panels ahead of schedule. This enormous project is expected to be completed by 2025, considerably increasing the region's solar energy capacity.

Another achievement that should be mentioned in this chapter is the renewable energy behemoth owned by NextEra Energy, based in Florida, with 300 MW of wind capacity, 50 MW of solar capacity, and 30 MW of battery capacity. With this outstanding infrastructure, the company is able to satisfy the energy demands of over 100,000 families, thus demonstrating their devotion to providing clean and sustainable energy to communities.

Moreover, NextEra Energy has grown its presence in the renewables industry over the last 25 years through smart acquisitions and the construction of new projects across North America. As a result, they are pleased to have the world's greatest wind and solar producing capacity. NextEra Energy has also benefited from a renewable energy investment push that received substantial regulatory backing with the passage of the 2022 U.S. Inflation Reduction Act which contains some significant measures targeted at reducing carbon emissions, adding on to NextEra Energy's commitment to sustainable solutions.

NextEra is researching green hydrogen technologies aggressively and has been devising a strategy to unleash 100% carbon-free electricity as well, by combining lengthy battery energy storage with solar power, and ultimately contributing to a cleaner and more sustainable energy future.

6.4.6. Red Flags

In 2019, investor-owned utilities in the United States emitted the sixth-most CO₂ and generated the second-most power. While NextEra plays a big role in the energy sector, the company's carbon footprint remains a worry owing to its reliance on traditional energy sources.

Additionally, over 100 GW of new gas plants have been developed in the previous ten years (2010-2019). While increasing potential for energy output, it also generates environmental issues since increased gas generation increases emissions, adding to climate change and air pollution. Also, this investment in new gas plants may represent a risk, considering it diverts cash that might be better invested on other clean energy sources.

6.4.7. Scope 1 Emissions

Table 6.4.7.1. Evolution of NextEra Energy's scope 1 emissions in Million tonnes of CO₂eq.

2018	Percentage Variation	2019	Percentage Variation	2020	Percentage Variation	2021	Percentage Variation	2022	2018-2022 Percentage Variation
48,7	-6%	45,65	-5%	43,25	-2%	42,35	-	-	-13%

Source: Author's elaboration, Excel

In the analyzed timeframe, it is possible to verify that NextEra Energy was the only organization that has been decreasing its Scope 1 emissions continuously due to multiple combined factors, such as the significant increase in the use of renewable energies (with wind and solar being the most relevant sources of energy), and the significant decrease in the use of coal.

It should also be noted that it was not possible to find data for 2022. However, from 2018 to 2021, there is a 13% decrease of Scope 1 emissions.

6.5. ENEL – Ente nazionale per l'energia elettrica

6.5.1. Net Zero Goal

ENEL's ultimate goal is to generate 100% of its energy from renewable sources by 2024. And to achieve effective decarbonization, the company developed a comprehensive plan that addressed both direct and indirect emissions throughout its entire value chain. This plan, which includes four major objectives to reduce greenhouse gas emissions, was carefully constructed in accordance with

the Science-Based objectives program (SBTi). By joining the SBTi effort, ENEL has shown its commitment to using science-based approaches and new initiatives in order to mitigate the effects of climate change.

Aligned with the worldwide agreement on the urgent need to reduce global warming to 1.5°C, the Italian company announced a clear strategy to abandon coal-fired power stations by 2026 as part of its unshakable commitment to sustainability and appropriate energy practices. Recognizing the negative environmental repercussions of coal-based electricity, this decision was a big step taken towards cleaner and greener energy sources.

Furthermore, ENEL recognized the necessity to gradually phase out gas-fired power units. With a long-term view, they set a clear goal of totally replacing gas-fired facilities with renewable energy sources by 2040.

6.5.2. Corporate Social Responsibility

ENEL has implemented over 2,300 sustainability initiatives, benefiting over 6.3 million people. Recognizing the value of cooperation, the company has formed over 1,200 active collaborations with non-profit groups, social entrepreneurs, start-ups, and universities throughout the world. Through these agreements, ENEL has been able to use different skills and resources to address urgent social concerns.

The company has also proved its commitment to the communities in which it works in 2022 by providing over €120 million, a significant 31.6% increase over the previous year. This financial commitment has boosted rural and suburban infrastructure development, education, vocational training, cultural and commercial activities, energy access, and electrification. Additionally, one of ENEL's notable accomplishments in Colombia was the construction of a micro aqueduct, which provides a consistent supply of 600,000 liters of drinking water every month. This initiative was able to improve considerably local populations' access to clean water, thus positively influencing their well-being.

Moreover, the Italian company has prioritized technology developments to improve public grid's dependability and efficiency. ENEL regularly monitors grid performance and swiftly repairs any defects through a properly structured program, assuring a seamless and uninterrupted electricity supply to its consumers.

On another note, ENEL's leadership and personnel demonstrate a commitment to diversity and inclusion. Its SpA's Board of Directors (BoD) has an exceptional 44.6% female representation, evidencing the company's increasing dedication to gender balance in decision-making positions. Furthermore, ENEL carefully analyzes its selection processes to guarantee a balanced gender balance in candidate pools. But that is not all. As a worldwide corporation, the company promotes diversity with pride, with a staff of 86 nationalities and 24 languages. ENEL deliberately fosters cultural blending, cultivating an environment of mutual tolerance and understanding.

In addition, the corporation understands the value of developing new talent and has created a Talent Engagement Program aimed at graduates from prominent international universities. This program intends to give these individuals possibilities for cross-functional development and progress within the firm.

6.5.3. Environmental Responsibility

With its Bettercoal project, ENEL has been actively engaged in promoting corporate responsibility in the international coal business. The main goal of this program is to foster continual improvement in industry processes, resulting in a more sustainable and responsible approach to coal production and consumption.

Another aspect worth mentioning is the circular management system for digital assets that has been introduced throughout ENEL's Group, marking the firm's commitment to environmental sustainability. This solution allows workers and other parties to engage in extending the service life of equipment while assuring correct disposal in accordance with recycling standards. As a result of this endeavor, 33 tons of electronic equipment was safely managed and recycled in 2022 alone.

6.5.4. Workforce Conditions

ENEL has released an extensive Diversity and Inclusion (D&I) Policy emphasizing the company's uncompromising position against discrimination, guaranteeing equal opportunity for all workers, and encouraging dignity, work-life balance, and inclusion throughout the business.

Recognizing the importance of dealing with workplace harassment, ENEL took a big step forward in 2019 by implementing a Workplace Harassment Policy. This policy stressed the key

principles of respect, integrity, and individual dignity, with the goal of creating a safe workplace where all employees feel protected from harassment of any kind.

The company also recognizes the need for investing in its personnel to achieve development and excellence. In 2022, ENEL set aside a significant budget of roughly €30 million for staff training programs, resulting in an average of €455 per employee.

6.5.5. Sustainability Goals and Accomplishments

ENEL's major goal is to increase renewable capacity by 21 GW by 2025, with 4 GW dedicated to energy storage devices. This pledge demonstrates the company's commitment to offering clean and efficient energy solutions. Also, ENEL intends to invest >80% of its capital expenditures (Capex) from 2023 to 2025 on sustainable projects, in accordance with the European Taxonomy Regulation, evidencing its commitment to ecologically friendly investments that can benefit the worldwide fight to tackle climate change.

Another important goal for the Italian company is to produce 70% of its energy from renewable sources by 2025. Despite the geopolitical setting and the energy crisis caused by the Ukraine war, ENEL has managed to generate around 124 TWh of power from renewable sources in 2022, thus demonstrating their resilience and commitment to renewable energy. For instance, Campos del Sol, one of Chile's largest solar installations, is able to generate around 1,200 GWh of renewable energy each year.

Moreover, the company is dedicated to realizing its long-term objective of 100% renewable power facilities by 2040. ENEL is aggressively creating additional renewable energy capacity in order to help with this transition, and it expects to phase out coal-fired electricity by 2027, and gas-fired generation by 2040.

Besides these aspects, the company is also focusing on boosting its capacity to meet such demand in order to support the growing proportion of dispersed generation and to cater to new subscribers. This involves grid digitization and constant upgrades to ensure efficient and dependable electricity distribution. In addition, ENEL is encouraging the use of electric vehicles (EVs) by constructing 31.4 thousand owned public charging outlets by 2025. Also, the Italian company aims to service around 13 thousand electric buses by the same year, increasing these sustainable transportation alternatives even further.

ENEL is dedicated to enhancing urban infrastructure and energy efficiency as well. The company hopes to contribute to a cleaner and more sustainable urban environment by controlling 3.3 million street lighting spots by 2025. Moreover, ENEL has recognized the relevance of behind-the-meter storage systems and intends to install around 352 MW of them by 2025. These systems are critical in balancing energy supply and demand, especially as renewable energy becomes more common. But that is not all. Enel is committed to improving service quality, as it intends to lower the average duration of system outages in order to provide a more dependable and steady energy supply to its consumers. Additionally, the company has been actively pushing the integration of smart metering technology, with the goal of reaching 48.3 million active smart meter consumers by 2025. This technology enables customers to monitor and improve their energy use, hence improving overall energy efficiency.

Finally, ENEL is committed to increasing demand response capacity to 12.4 GW by 2025. This strategy enables the organization to properly control changes in energy demand, improving grid stability and overall system efficiency.

6.5.6. Red Flags

In 2019, a Nuveen representative accused ENEL of greenwashing its green bonds. This charge cast doubt on the company's environmental promises and procedures.

ENEL Energia S.p.A, an Enel subsidiary in Italy, faced a hefty penalty levied by the Italian data protection regulator, Garante, in 2022. Enel Energia was fined €26,513,977 by the government for several violations of the General Data Protection Regulation (GDPR) and Personal Data Protection Code. The transgressions included infringement of several provisions in both regulations, namely data processing principles, data subjects' rights, and data security measures. The sum was imposed in response to many complaints filed by individuals who had been impacted by Enel Energia's data processing practices.

In addition, ENEL has also been chastised for its reporting procedures. The corporation has been accused of deliberately selecting and reporting solely on "relevant indicators". This reporting strategy has raised concerns regarding Enel's transparency and accuracy in disclosing information to stakeholders and the general public.

6.5.7. Scope 1 Emissions

Table 6.5.7.1. Evolution of ENEL's scope 1 emissions in Million tonnes of CO₂eq.

2018	Percentage Variation	2019	Percentage Variation	2020	Percentage Variation	2021	Percentage Variation	2022	2018-2022 Percentage Variation
95,23	-27%	69,98	-35%	45,57	13%	51,57	3%	53,07	-44%

Source: Author's elaboration, Excel

In the analyzed period of Scope 1 emissions, it is possible to see that ENEL has been decreasing its emissions from 2018 to the year 2020. These decreases were due to the increase of renewables and decreasing use of coal-fired generation.

From 2020 to 2021, there was an increase of 13% due to the increase in CO₂ emissions from electricity production and heat. Another increase was registered in CO₂ emissions from the use of diesel in auxiliary engines, as well as CH₄ leak emissions from gas-fired power plants, N₂O and CH₄, as a result of the combustion of fossil fuels, and NF₃ and SF₆, in addition to refrigerant gases expressed as CO₂ equivalent. These also led to an increase in the following year from 2021 to 2022.

The overall perspective, from 2018 to 2022, is that there is a 44% decrease of Scope 1 emissions.

Chapter 7

Discussion

In terms of corporate social responsibility and corporate environmental responsibility, the findings are in accordance with the literature review. When comparing the present study with the Mapelli's et al. (2016) study, it is possible to see that both studies show that corporate social responsibility practices can be characterized by partnerships through external projects with the aim of promoting and benefitting society; internal projects for promoting diversity between nationalities and equity between genders; and also a strong promotion of talent programs. As far as environmental responsibility is concerned, main practices include projects related to the repair and preservation of fauna and flora, and also to the concern with ethical sourcing and resources management. However, this study also shows that there is a need to make significant progresses when it comes to the practices in natural resources management and recycling activities, considering that these initiatives are still lacking on many organizations.

Regarding workforce conditions, companies, in general, tend to invest and promote the continuous improvement of skills and safer conditions as highlighted by Chernyaev and Rodionova (2017).

When it comes to sustainability goals and achievements, results are also in line with McKinsey (2022), as companies more linked to the oil and gas market are seeing hydrogen as a solution to decarbonize heavy industry. On the other hand, regarding renewable energies, the present study leads to findings that are different from the study by Bell and Stellingwerf (2012) given that these authors defined as primary source of renewable energies the hydroelectric and geothermal energy, which are not mentioned by these five companies (either in its practices or business model). The renewable energies most mentioned are solar and wind.

Chapter 8

Conclusion

By carrying out the investigation proposed by the research question – What practices are currently being implemented in the energy sector in the Sustainability field? – it is possible to conclude that energy companies are aiming to improve their sustainability in five different areas: Net Zero Goal, Corporate Responsibility, Environmental Responsibility, Workforce Conditions, Sustainability Goals, and Accomplishments. In addition, it was possible to find several practices that businesses have taken into consideration in order to move toward a more sustainable route.

With this being said, all the companies studied have set ambitious targets to achieve the net zero status. This means that they are committed to reducing greenhouse gas emissions and ensuring that any remaining emissions are offset by CO₂ removal actions, until the zero emissions objective is reached (Crawley et al. 2009).

To achieve this ambitious goal, companies in the energy sector typically adopt two main practices, each playing a key role in the journey towards net zero. The first involves substantial investment in renewable energies, or the decrease coal usage. This implies making a gradual and responsible transition from more traditional energy sources, such as coal and natural gas, to cleaner and more sustainable energy sources, namely solar energy, wind energy, hydroelectric energy, and hydrogen. This replacement is crucial to the drastic reduction of carbon emissions which are associated with energy generation since renewable energies produce energy without emitting greenhouse gases. In addition, now more than ever, we live in a world where technology is constantly evolving, making these energy sources more efficient and accessible. The second strategy for reaching net zero, on the other hand, involves obtaining green credits. These credits work as certificates that prove that a given company is financing carbon mitigation projects or CO₂ removal actions like reforestation, carbon capture and storage, or other sustainable solutions. By purchasing green credits, companies are able to offset some (or all) of their remaining carbon emissions.

In terms of corporate responsibility, main practices include the investment in local community's education, health, and well-being initiatives, as well as the support of non-profit organizations and community development projects. Other actions consist of contributing to charitable purposes, the launching of talent attraction programs, and setting goals to help promote

equity and diversity. Regarding environmental responsibility, main practices concern projects to restore and preserve fauna and flora in the countries in which the companies operate.

When it comes to workforce conditions, the companies are focusing in giving opportunities to the employees to upgrade their skills through continuous learning programs. On top of that, they are also implementing more practices that recognize individual dignity and that promote safety at the workplace.

As far as sustainability goals and accomplishments are concerned, there is a general increase when it comes to the investment in renewables, specifically in solar and wind energy. Also, in order to revolutionize heavier industries like shipping and aviation, companies are focusing on hydrogen. Other investments being done by companies include the replacement of fossil fuel-powered fleets with fully electric ones, providing new charging points for both hybrid and electric vehicles, and improving grids.

Regarding bad practices, the main one detected among the five companies concerns the increase in CO₂ due to multiple factors, such as the war between Russia and Ukraine, the addition of new gas projects to the companies' portfolio, and even the fact that although the amount of energy that can be collected in a given time is limited, renewable energies can be infinite (Moseley, 2014). In addition, it is also important to note that apart from Woodside Energy, which has increased Scope 1 emissions in 52% from 2018 to 2022, all companies had negative variations of Scope 1 emissions over the five years considered for the analysis.

In sum, energy businesses aim to improve their sustainability in four areas: decarbonization, social, environmental, and investment in renewables energies. The findings reveal numerous actions that firms have adopted to move toward a more sustainable path and to get them closer to the goals they have set for the future, thereby maintaining its core sustainability characteristic: to be dynamic and forward-thinking (Ruggerio, 2021).

The findings show evidence of limitations and obstacles on energy sector's sustainability methods the reason why the concept of sustainable practices in this sector is such an oxymoron. These tensions are relevant for the present study, so that corporations in this sector can learn from earlier failures and avoid engaging in misleading actions like greenwashing, corruption, and bad practices in general. The majority of the techniques discovered in the findings chapter could also be applied by other energy businesses to better align their road to sustainability, even though some of them can represent a significant investment in terms of time and capital for the organizations.

Nevertheless, those can be quite beneficial, as the owners of energy companies should evaluate how customers' sustainability expectations might affect their purchase intentions.

Notwithstanding a major constraint while conducting this research concerns the fact that there is no universal accounting reporting standard, which leads to some difficulties when it comes to obtaining information on certain practices and establish comparison among economic actors. Additionally, it would be useful for this comparative study to extend the number of cases studied to verify how far the observed patterns also verify. Therefore, future studies would include a much larger number of cases, in order to verify if these patterns remain accurate; and the selection of the companies would take into consideration the accounting standard used to produce the reports, so that the sample is more homogeneous in terms of their reporting.

References

- Abdel-Rahman, A. A. (1998). On the emissions from internal-combustion engines: a review. *International Journal of Energy Research*, 22(6), 483-513.
- ACCR - Australian Centre for Corporate Responsibility. (2023, March 15). "Time's up": Institutional investors call for Woodside directors to be held to account on climate strategy [Press release]. <https://www.accr.org.au/news/%E2%80%9Ctime%E2%80%99s-up%E2%80%9D-institutional-investors-call-for-woodside-directors-to-be-held-to-account-on-climate-strategy/#:~:text=The%20Australasian%20Centre%20for%20Corporate%20Responsibility%E2%80%8B%20%28ACCR%29%2C%20along,-%20a%20failure%20that%20raises%20genuine%20governance%20concerns>
- Alcântara, L. A., Silva, M. C. A., & Nishijima, T. (2012). Educação ambiental e os sistemas de gestão ambiental no desafio do desenvolvimento sustentável. *Revista Eletrônica em Gestão, Educação e Tecnologia Ambiental*, 734-740.
- Anders, G., & Vaccaro, A. (2011). *Innovations in power systems reliability*. Springer Science Business Media.
- Arvidsson, S., & Dumay, J. (2022). Corporate ESG reporting quantity, quality and performance: Where to now for environmental policy and practice?. *Business Strategy and the Environment*, 31(3), 1091-1110.
- At least upper secondary educational attainment, age group 20-24 by sex*. (2023). Eurostat.
- Battersby, A. (2023, June 22). Australia's offshore regulator issues direction to Woodside after platform fatality. *Upstream Online*. <https://www.upstreamonline.com/safety/australia-s-offshore-regulator-issues-direction-to-woodside-after-platform-fatality/2-1-1472137>
- Bell, J., & Stellingwerf, J. (2012). Sustainable entrepreneurship: The motivations and challenges of sustainable entrepreneurs in the renewable energy industry.
- Bobrovskiy, S., Buchmüller, W., Hajer, J., & Schmidt, J. (2011). Quasi-stable neutralinos at the LHC. *Journal of High Energy Physics*, 2011(9), 1-29.
- Bottoff, C., Ver Beek, N., & Stokes, L. C. (2022). The Dirty Truth About Utility Climate Pledges [Version 2]. In *Sierra Club*. Sierra Club. https://www.sierraclub.org/sites/www.sierraclub.org/files/2022-09/sierra_club_the_dirty_truth_report_v2_2022_0.pdf
- Brown, L. R. (2015). *The great transition: Shifting from fossil fuels to solar and wind energy*. WW Norton & Company.

- Chernyaev, M. V., & Rodionova, I. A. (2017). Analysis of sustainable development factors in fuel and energy industry and conditions for achievement energy efficiency and energy security. *International Journal of Energy Economics and Policy*, 7(5), 16-27.
- Chmielewski, A. G. (2010). Dreams or reality-fossil fuels, renewables or nuclear power?. *Ecological Chemistry And Engineering S*, 17(3).
- Cochran, I., & Pauthier, A. (2019). A framework for alignment with the Paris Agreement: why, what and how for financial institutions. *Institute for Climate Economics*. <https://www.i4ce.org/download/framework-alignment-with-paris-agreement-why-what-and-how-for-financial-institutions>.
- Costa, R. C. D., & La Rovere, E. L. (2002). *Sustainable development indicators for the Brazilian energetic sector; Indicadores de sustentabilidade para o setor energetico brasileiro*.
- Crawley, D., Pless, S., & Torcellini, P. (2009). *Getting to net zero* (No. NREL/JA-550-46382). National Renewable Energy Lab.(NREL), Golden, CO (United States).
- DataGuidance. (2022, January 20). Italy: Garante fines Enel Energia €26.5M for multiple data protection. *DataGuidance*. <https://www.dataguidance.com/news/italy-garante-fines-enel-energia-265m-multiple-data>
- Delbeke, J., Runge-Metzger, A., Slingenberg, Y., & Werksman, J. (2019). The paris agreement. In *Towards a climate-neutral Europe* (pp. 24-45). Routledge.
- Diesendorf, M., & Diesendorf, M. (2007). *Greenhouse solutions with sustainable energy* (Vol. 20, No. 1). Sydney, Australia:: University of New South Wales Press.
- Dudin, M. N., Ivashchenko, N. P., Gurinovich, A. G., Tolmachev, O. M., & Sonina, L. A. (2019). Environmental entrepreneurship: characteristics of organization and development. *Entrepreneurship and Sustainability Issues*, 6(4), 1861.
- Eccles, R. G., & Mirchandani, B. (2022). We need universal ESG accounting standards. *Harvard Business Review*, 15.
- ECO. (2022, July 25). EDP e Engie suspeitas de fuga aos impostos em venda de barragens no Douro. *ECO*. <https://eco.sapo.pt/2022/07/25/edp-e-engie-suspeitas-de-fuga-aos-impostos-em-venda-de-barragens-no-douro/>
- Edenhofer, O., & Madrugá, R. P. (2012). *Renewable energy sources and climate change mitigation: Special Report of the Intergovernmental Panel on Climate Change*.
- EDP. (2023). *Capital markets day 2023* [Slide show]. Capital Markets Day 2023. https://www.edp.com/sites/default/files/2023-03/BP23-26%20EDP%20CMD_0.pdf

- EDP. (2023). Integrated Annual Report 2022. In *EDP*. <https://www.edp.com/sites/default/files/2023-08/Integrated%20Report%202022%20-%20website%20version.pdf>
- Emas, R. (2015). The concept of sustainable development: definition and defining principles. *Brief for GSDR, 2015*, 10-13140.
- Enel.(2022). Sustainability Report 2022. https://www.enel.com/content/dam/enel-com/documenti/investitori/sostenibilita/2022/sustainability-report_2022.pdf
- Enel. (2023). Strategic Plan. <https://www.enel.com/investors/strategy>
- Farmer, J. D., & Trancik, J. (2007). Dynamics of technological development in the energy sector. *London Accord Final Publication*, 1-24. Chandler, D. (2020). *Sustainable value creation*. Routledge.
- Fernandez-Feijoo, B., Romero, S., & Ruiz, S. (2014). Effect of stakeholders' pressure on transparency of sustainability reports within the GRI framework. *Journal of business ethics*, 122, 53-63.
- Goldemberg, J. (2000). Energy and sustainability.
- Goodwin, J. (2012). SAGE secondary data analysis. *SAGE secondary data analysis*, 1-1408.
- Gorjão, L. R., Anvari, M., Kantz, H., Beck, C., Witthaut, D., Timme, M., & Schäfer, B. (2020). Data-driven model of the power-grid frequency dynamics. *IEEE access*, 8, 43082-43097.
- Grant, R. M. (2021). *Contemporary strategy analysis*. John Wiley & Sons (10th ed.). Consult. 20th September 2022
- Greenwashing de EDP. (2020, February 16). *Barracuda*. <http://www.lygeum.es/2020/02/16/greenwashing-de-edp/>
- Haid, J., Käfer, G., Steger, C., & Weiß, R. (2002, August). A co-Processor for real-time energy estimation of system-on-a-chip. In *The 2002 45th Midwest Symposium on Circuits and Systems, 2002. MWSCAS-2002*. (Vol. 2, pp. II-II). IEEE.
- Hannam, P. (2023, February 27). Woodside's latest report a 'fail' despite profit more than tripling, climate activists say. *The Guardian*. <https://www.theguardian.com/australia-news/2023/feb/27/woodside-climate-report-fail-activists-say>
- Herzig, C., Kleiber, O., Müller, J., & Schaltegger, S. (2006). Concepts and instruments for facing the challenges of corporate sustainability management. *Journal of the Asia Pacific Centre for Environmental Accountability*, 12(1), 9-12.
- Hoang, A. T., Nižetić, S., Olcer, A. I., Ong, H. C., Chen, W. H., Chong, C. T., ... & Nguyen, X. P. (2021). Impacts of COVID-19 pandemic on the global energy system and the shift progress to

renewable energy: Opportunities, challenges, and policy implications. *Energy Policy*, 154, 112322.

Holden, E., Linnerud, K., & Rygg, B. J. (2021). A review of dominant sustainable energy narratives. *Renewable and Sustainable Energy Reviews*, 144, 110955.

Holton, J. A. (2007). The coding process and its challenges. *The Sage handbook of grounded theory*, 3, 265-289.

Horowitz, C. A. (2016). Paris agreement. *International Legal Materials*, 55(4), 740-755.

Houghton, C., Murphy, K., Shaw, D., & Casey, D. (2015). Qualitative case study data analysis: An example from practice. *Nurse researcher*, 22(5).

Huus, K. (2022, November 21). NextEra's trifecta of renewable energy rises in the wheat fields of Oregon. *GreenBiz*. <https://www.greenbiz.com/article/nexteras-trifecta-renewable-energy-rises-wheat-fields-oregon>

IEA (2007), *Energy Efficiency Policy Analysis at the IEA 2007*, IEA, Paris.

Jensen, K. L., & Caspersen, L. K. (2019). *The rebranding of DONG Energy to Ørsted - Wind-Wind situation or just hot air?* [MA Thesis]. Copenhagen Business School. https://research-api.cbs.dk/ws/portalfiles/portal/59792330/663600_The_rebranding_of_DONG_Energy_to_Orsted.pdf

Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education*, 118(2), 282-292.

Julian Birkinshaw, Mary Yoko Brannen, & Rosalie L. Tung (2011). From a distance and generalizable to up close and grounded: Reclaiming a place for qualitative methods in international business research. *Journal of International Business Studies*, Vol. 42, 573- 581.

Kaplan, R. S., & Ramanna, K. (2021). Accounting for climate change. *Harvard Business Review*, 99(6), 120-131.

Kelly, J. (2023). Enel Green Power Chile to commission Campos del Sol project. *Power Technology*. <https://www.power-technology.com/news/enel-campos-del-sol/>

KPMG. (2022). Big shifts, small steps: Survey of Sustainability Reporting 2022. In *KPMG*. <https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2022/10/ssr-small-steps-big-shifts.pdf>

Lee, A. H., Chen, H. H., & Chen, S. (2015). *Suitable organization forms for knowledge management to attain sustainable competitive advantage in the renewable energy industry*. *Energy*, 89, 1057-1064.

- Lu, J., Ren, L., Qiao, J., Yao, S., Strielkowski, W., & Streimikis, J. (2019). *Corporate social responsibility and corruption: Implications for the sustainable energy sector*. *Sustainability*, 11(15), 4128.
- Lund, H. (2014). *Renewable energy systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions*. Academic Press.
- Lusa. (2023, March 28). Caso EDP: Ministério Público pede que todos os arguidos sejam levados a julgamento. *Público*. <https://www.publico.pt/2023/03/28/sociedade/noticia/caso-edp-ministerio-publico-pede-arguidos-levados-julgamento-2044186>
- Maione, G. (2023). An energy company's journey toward standardized sustainability reporting: addressing governance challenges. *Transforming Government: People, Process and Policy*. <https://doi.org/10.1108/tg-05-2023-0062>
- Mapelli, Francesca, Marika Arena, and Giovanni Azzone. "What drivers determine CSR strategies in the energy industry? Evidence from Italy." *Proceedings of the European conference on sustainability, energy & the environment*. 2016.
- Martikainen, V. (2021). *Greenwashing in Nordic Electricity Companies* [BSc Thesis]. Savonia University of Applied Sciences. <https://www.theseus.fi/bitstream/handle/10024/509701/GreenwashingInNordicElectricityCompanies.pdf?sequence=2>
- McKinsey & Company. (2020, July 10). *Orsted's renewable-energy transformation*. McKinsey Sustainability. <https://www.mckinsey.com/capabilities/sustainability/our-insights/orsteds-renewable-energy-transformation>
- McKinsey & Company. (2022, April 26). Global Energy Perspective 2022. McKinsey & Company. <https://www.mckinsey.com/~media/McKinsey/Industries/Oil%20and%20Gas/Our%20Insights/Global%20Energy%20Perspective%202022/Global-Energy-Perspective-2022-Executive-Summary.pdf>
- McKinsey & Company. (2022, April 26). Global Energy Perspective 2022. McKinsey & Company. <https://www.mckinsey.com/industries/oil-and-gas/our-insights/global-energy-perspective-2022>
- McKinsey & Company. (2022). Global Energy Perspective 2022 - Executive Summary. In McKinsey & Company.
- Morse, J. (2020). *The changing face of qualitative inquiry*. *International Journal of Qualitative Methods*, 19, 1609406920909938.
- Morton, A. (2023, July 12). Woodside LNG: Australia's 'biggest' contribution to climate crisis a step closer to 50-year extension. *The Guardian*. <https://www.theguardian.com/environment/2023/jul/13/australias-biggest-contribution-to-climate-change-50-year-extension-woodside-burrup-fossil-fuels-lng-wa>

- Moseley, P. T. (Ed.). (2014). *Electrochemical energy storage for renewable sources and grid balancing*. Newnes.
- NatWest. (2023, April 4). *Orsted: Strong ESG Credentials Boost Investor Appetite for Green Bond*. NatWest. <https://www.natwest.com/corporates/about-us/case-studies/orsted-strong-esg-credentials-boost-investor-appetite-green-bond.html>
- NextEra Energy Inc. (2022). Environmental, Social and Governance Report 2022. NextEra Energy. https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2022_NEE_ESG_Report_Final.pdf
- NextEra Energy Services LLC. (2022). *Building Your Sustainability Blueprint – 4 Steps to Developing a Roadmap to Decarbonization* (855.639.8189). https://www.nexteraenergyservices.com/content/dam/nees/us/en/pdf/NES_white%20paper_Sustainability%20Blueprint_2022.pdf
- U.S. Securities and Exchange Commission. (2022). NOTICE OF EXEMPT SOLICITATION. https://www.sec.gov/Archives/edgar/data/753308/000138713122005493/nee-px14a6g_042922.htm
- Nisipeanu, S., Damian, G. S., Cârțana, C., Bantaș, A., & Serafim, A. (2011). CSR CONTRIBUTION TO SUSTAINABLE DEVELOPMENT IN THE ENERGETIC SECTOR. *Journal of Sustainable Energy*, 2(2).
- Oliveira, A. B. (2023, March 2). EDP planeia investir 25 mil milhões até 2026. 85% são para energias renováveis. *ECO*. <https://eco.sapo.pt/2023/03/02/edp-planeia-investir-25-mil-milhoes-ate-2026-85-sao-para-energias-renovaveis/>
- Orsted. (2023). Orsted Sustainability Report 2022: Green energy to power lasting positive impact. <https://orstedcdn.azureedge.net/-/media/2022-annual-report/orsted-sustainability-report-2022.pdf?rev=eda5465ba5784866b6cea99e58088f94&hash=3BFD5F72E676043FA33114647E7C8C4D>
- Orsted. (n.d.). *Our Vision & Values*. <https://orsted.com/en/who-we-are/our-purpose/our-vision-and-values>
- Owusu, P. A., & Asumadu-Sarkodie, S. (2016). A review of renewable energy sources, sustainability issues and climate change mitigation. *Cogent Engineering*, 3(1), 1167990.
- Porter, M., & Kramer, M. (2011). La creación de valor compartido. *Harvard Business Review*, 89(1), 32-49.
- Radhakrishnan, S., Munuswamy, D. B., Devarajan, Y., & Mahalingam, A. (2018). Effect of nanoparticle on emission and performance characteristics of a diesel engine fueled with cashew nut shell biodiesel. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, 40(20), 2485-2493.

- Roosa, S. A. (2008). *Sustainable Development handbook*. The Fairmont Press, Inc.
- Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. *Science of the Total Environment*, 786, 147481.
- Rynes, S. L., & Bartunek, J. M. (2015). It just keeps getting more interesting. *Handbook of qualitative organizational research: Innovative pathways and methods*, 9-23.
- Schaltegger, S., Bennett, M., & Burritt, R. (2006). *Sustainability Accounting and reporting*. Springer Science & Business Media.
- Silvestre, B. S., & Țircă, D. M. (2019). *Innovations for sustainable development: Moving toward a sustainable future*. *Journal of cleaner production*.
- Simabukulo, L. A. N., da Silva Correa, L. F., dos Santos, M. M. O., & Martins, M. (2006). Energia, industrialização e modernidade: história social. *Energia e Saneamento. Disponível em:* < <http://www.museudaenergia.org.br/media/63129/03.pdf> > Acesso em, 7.
- Singh, A. (2023, July 25). NextEra Energy results beat estimates on renewables boom. *Reuters*. <https://www.reuters.com/business/energy/nextera-energy-beats-quarterly-profit-estimates-renewables-boom-2023-07-25/>
- Sovacool, B. K. (2013). *Energy and Ethics: Justice and the Global Energy Challenge*. Palgrave Macmillan.
- Tenny, K. M., Greco, K. V., van der Heijden, M., Pini, T., Mularczyk, A., Vasile, A. P., ... & Brushett, F. R. (2022). A comparative study of compressive effects on the morphology and performance of carbon paper and cloth electrodes in redox flow batteries. *Energy Technology*, 10(8), 2101162.
- The Geological Society. (2020, July 30). *Energy In Society: Myth of Utopia with Richard Norris* [Video]. YouTube. <https://www.youtube.com/watch?v=pVEgnOTZ1As>
- Tinoco-Zermeño, M. Á. (2023). *Energy consumption, financial development, CO2 emissions, and economic growth in 23 developing economies*. *Revista Mexicana de Economía y Finanzas Nueva Época REMEF*.
- Twidell, J., & Weir, T. (1996). Renewable energy resources, 2006. *Taylor and Francis, ISBN 0-419-25330-0*. Schirmer, P., et al., *Experimental investigation of the performance of the solar tunnel dryer for drying bananas*. *Journal of Renewable Energy*, 2, 119-129.
- United Nations. (2021). UNDP Annual Report 2021. *United Nations Development Programme: Home*.
- Until, E. (2013). *World Population Prospects: 2012 Revision*. United Nations Department of Economic and Social Affairs: New York, NY, USA.

- Wackernagel, M., & Beyers, B. (2019). *Ecological footprint: Managing Our Biocapacity Budget*. New Society Publishers.
- Walton, T. G. (2022, February 17). Green Bonds Without Greenwashing. *Seven Pillars Institute*. <https://7pillarsinstitute.org/green-bonds-without-greenwashing/>
- White, B. & Rayner, S. (2014), *Dissertation Skills for Business and Management Studies*, 2nd Edition, UK: Cengage Learning.
- Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, 15(1), 45-55.
- Woodside Energy Group Ltd. (2023). 2022 Reconciliation Action Plan Report. In *Woodside*. https://www.woodside.com/docs/default-source/sustainability-documents/indigenous-peoples/final-2022-reconciliation-action-plan-report---woodside.pdf?sfvrsn=17fa8c62_10
- Woodside Energy Group Ltd. (2023). Sustainable Development Report 2022. In *Woodside*. [https://www.woodside.com/docs/default-source/investor-documents/major-reports-\(static-pdfs\)/2022-sustainable-development-report/sustainable-development-report.pdf?sfvrsn=c239d9b9_7](https://www.woodside.com/docs/default-source/investor-documents/major-reports-(static-pdfs)/2022-sustainable-development-report/sustainable-development-report.pdf?sfvrsn=c239d9b9_7)
- Yin, R. (2018), *Case Study Research and Applications*, 6th Edition, Sage.
- Zhukovskiy, Y. L., Batueva, D. E., Buldysko, A. D., Gil, B., & Starshaia, V. V. (2021). Fossil energy in the framework of sustainable development: analysis of prospects and development of forecast scenarios. *Energies*, 14(17), 5268.
- Zikmund, W.G., Quinland, C., Griffin, M., Babin, B. & Carr, J. (2019), *Business Research Methods*, 2nd Edition, Cengage.

Appendix

Appendix A. Case Data Table – ENEL

Type of Data	Title of the Document	Author	Name of Organization	Date of Publication	Source Origin
Sustainability Report	Sustainable Development Report	ENEL	ENEL	2023	Internal
Newspaper Article	Enel Green Power Chile to commission Campos del Sol project	Jadon Kelly	Power Technology	2023	External
Newspaper Article	Green Bonds Without Greenwashing	Thomas G. Walton	Sevenpillarinstitute	2022	External
Newspaper Article	Italy: Garante fines Enel Energia 26.5M for multiple data protection violations	Data Guindace	Data Guindace	2022	External
Single Case Study	An energy company's journey toward standardized sustainability reporting: addressing governance challenges	Gennaro Maione	University of Salerno	2023	External

Appendix B. Case Data Table – EDP

Type of Data	Title of the Document	Author	Name of Organization	Date of Publication	Source Origin
Annual Integrated Report	EDP	EDP	EDP	2023	Internal
Newspaper article	EDP e Engie suspeitas de	ECO	SAPO	2022	External

	fuga aos impostos em venda de barragens no Douro				
Newspaper article	Caso EDP: Ministério Público pede que todos os arguidos sejam levados a julgamento	Lusa	Publico	2023	External
Blog	Greenwashing de EDP	Lygeum	Lygeum	2020	External
Newspaper article	EDP planeia investir 25 mil milhões até 2026. 85% são para energias renováveis	Ana Batalha Oliveira	SAPO	2023	External

Appendix C. Case Data Table – NextEra Energy

Type of Data	Title of the Document	Author	Name of Organization	Date of Publication	Source Origin
Sustainability Report	Sustainable Development Report	NextEra Energy	NextEra Energy	2023	Internal
Notice of Exempt Solicitation	NextEra Energy, Inc. [NYSE:NEE]: Due to the Company's Failure to Set Net Zero Targets, Make the Near-Term Shifts in Capital Allocation and Investment Necessary to	Majority Action	Majority Action	2022	External

	Decarbonize in Alignment with a 1.5°C Pathway (...).				
Newspaper Article	Next Era’s trifecta of renewable energy rises in the wheat fields of Oregon	Kari Huus	GreenBiz	2022	External
Newspaper Article	NextEra Energy results beats estimates on renewables boom	Arshreet Singh	Reuters	2023	External
Report	THE DIRTY TRUTH About Utility Climate Pledges	John Romankiewicz Cara Bottorff Leah C.Stokes	SierraClub	2021	External

Appendix D. Case Data Table – ORSTED

Type of Data	Title of the Document	Author	Name of Organization	Date of Publication	Source Origin
Sustainability Report	Green energy to power lasting positive impact	ORSTED	ORSTED	2023	Internal
Master Thesis	GREENWASHING IN NORDIC ELECTRICITY COMPANIES	Veeti Martikainen	Savonia University of Applied Sciences	2021	External
Master Thesis	The rebranding of DONG Energy to Ørsted Wind–Wind situation or just hot air?	Kristian Lindved Jensen Lucas Kanne Caspersen	Copenhagen Business School	2019	External
Interview	Orsted’s renewable energy transformation	McKinsey Sustainability	McKinsey Sustainability	2020	External

Case Study	Orsted's strong ESG credentials boost investor appetite for multi-tranche green bond	NatWest	NatWest	2023	External
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Appendix E. Case Data Table – Woodside

Type of Data	Title of the Document	Author	Name of Organization	Date of Publication	Source Origin
Sustainability Report	Sustainable Development Report	Woodside	Woodside	2023	Internal
Newspaper Article	Woodside's latest report a 'fail' despite profit more than tripling, climate activists say	Peter Hannam	The Guardian	2023	External
Newspaper Article	Woodside LNG: Australia's 'biggest' contribution to climate crisis a step closer to 50-year extension	Adam Morton	The Guardian	2023	External
Newspaper Article	"Time's up": Institutional investors call for Woodside directors to be held to account on climate strategy	ACCR	Australasian Centre for Corporate Responsibility	2023	External
Newspaper Article	Australia's offshore regulator issues direction to Woodside after platform fatality	Amanda Battersby	Upstream Energy Explored	2023	External

Appendix F. Conceptual table for categories and dimensions

Conceptual Category	Aggregate Dimensions
Goals to reduce CO2 emissions	Net Zero Goal
Steps to reduce CO2 emissions	
Corporate responsibility	Corporate Responsibility
Embracing social causes	
Promoting diversity and equity	
Employment opportunities	
Embracing environmental causes	Environmental Responsibility
Ethical sourcing	
Water management	
Waste management	
Resource Management	
Recycling activities	
Employees rights and benefits	Workforce Conditions
Specific training	
Efficient work conditions	
Inefficient work conditions	
Investment in renewables energies	Sustainability Goals and Accomplishments
Electrification	
Hydrogen investments	
Greenwashing	Red Flags
Signs of bad practices	
Increase of CO2	

Appendix G. ENEL's case – conceptual categories and respective quotations.

Conceptual Category	Empirical Themes – Findings
Goals to reduce CO2 emissions	“We have therefore set ourselves the ambitious goal of generating 100% energy from renewable sources by 2024.”
	“Enel’s decarbonization roadmap covers both direct and indirect emissions along the Group's entire value chain, and consists of four targets by the Science Based Targets initiative (SBTi), in line with limiting global warming to 1.5°C.”
Steps to reduce CO2 emissions	“Exit from coal-fired by 2027 and gas-fired by 2040.”
	“Exit from gas retail by 2040.”
Embracing environmental causes	“The second contest, focused on SDG 15 and dedicated to the conservation of biodiversity, featured Brazil’s initiatives on food and water security, agricultural production, sustainable fishing and mining that contribute to the fight against global warming. The project has restored more than 610 hectares with the planting of local flora. A total of more than 1,200 animal species – 26 of which are threatened and 80 endemic – were recorded in the areas covered by the various projects.”
	“Enel is actively supporting the Commission’s activities, promoting the synergy between the restoration of degraded areas and the development of renewable energies, as well as stimulating the participation of stakeholders. We have also proactively integrated EU principles into our Environmental(2) and Biodiversity(3) Policies in order to continuously improve the management of our assets and services.”
Embracing social causes	“In 2022 our contribution to the social and economic development and growth of the territories resulted in more than 2,300 sustainability projects in the various countries where we are present, involving more than 6.3 million beneficiaries, (2) in line with the sustainable development goals (SDGs).”
	“In realizing our commitment to communities, we are not alone: we have more than 1,200 active partnerships internationally with non-profit organizations, social enterprises, start-ups and institutions.”
	“In 2022, Enel’s total contribution to the communities in which it operates was about 120 million euro, 31,6% increase compared to the last year.”
	“To the development and social and economic growth of local communities by promoting infrastructure development, education and vocational training, cultural and economic activities, energy access, rural and suburban electrification, the fight against energy poverty, and social inclusion for the most vulnerable population groups.”
	“2022, Enel Colombia built the Amalipa micro aqueduct, which provides 600,000 liters of drinking water per month to more than 2,450 Wayuu indigenous people from 22 communities in Maicao and Uribia.”
	“(…)4,000 municipalities connected on the YoUrban platform in 2025.”

Promoting diversity and equity	“With 86 nationalities and 24 languages, Enel considers cultural and ethnic diversity to be an extraordinary asset and is committed to promoting and enhancing knowledge, relationship and intermingling among different cultures.”
	“Selection processes are closely monitored to ensure a fair balance of the two genders in the candidate pools, with a rising trend in the last five years (52.2% in 2022 compared to 39.0% in 2018).”
	“The Board of Directors (BoD) of Enel SpA consists of 44.4% women.”
Employment opportunities	“the Energie per la Scuola program was launched for final year students attending technical and vocational schools. The training includes a basic course lasting 120 hours and a further specialized course lasting 40 hours and geared towards the profiles ‘most wanted’ in the e-distribuzione sector. Training is provided by certified training institutions in partnership with schools. The first edition of the program (school year 2020/2021) involved 11 schools, 8 suppliers of e-distribution and a total of 100 students who were all hired by Enel’s suppliers at the end of the training. The second edition, aimed at 2022/2023 school year students, is currently underway. (...)and it involves over 60 schools and some 500 students.”
Ethical sourcing	“Together with major European electric utilities, we are engaged in Bettercoal – a global initiative to promote the continuous improvement of corporate responsibility in the international coal industry. Bettercoal has released a code of conduct based on existing and agreed standards of social responsibility in the mining sector. The Code provides detailed guidelines to mining companies in the definition of their social, environment and ethical policies.”
Recycling activities	“The circular management of digital assets in the Group’s various countries is achieved by safeguarding both the extension of the devices’ service life, by selling them to employees or third parties (13,427 devices sold in 2022), and disposing of these devices in line with recycling principles, amounting to a total of 33 tons of equipment in 2022; devices categorized as electronic waste are disposed of at certain suppliers, who will then recycle the devices themselves.”
Employees rights and benefits	“in 2013 with the publication of the Policy on Human Rights, followed in 2015 by Enel’s adherence to the seven Women’s Empowerment Principles (WEP) promoted by UN Global Compact and UN Women and the simultaneous publication of the Diversity and Inclusion (D&I) Policy. This policy makes explicit the principles of non-discrimination, equal opportunities, dignity, work-life balance and inclusion of every person, beyond all forms of diversity. 2019 also saw the addition of the Workplace Harassment Policy, which introduced the themes of respect, integrity and individual dignity in the workplace in the prevention of all types of harassment, principles that were the basis of the Statement against Harassment in the workplace, published on Enel’s website(3) in 2020. In 2021.”
Specific training	“During 2022, the cost dedicated to training was approximately 30 million euros, with an average cost per employee of 455 euros.”

	<p>“In 2022, implementation of the environmental training program continued, targeted at increasing the skills of the Group’s technical staff and people with operational responsibilities (Environmental Competence Building Program), particularly in the field of water management and climate change.”</p>
Efficient work conditions	<p>“Decrease in the number of injuries and illnesses among contractors, thanks to improved safety culture.”</p>
Investment in renewables energies	<p>“21 GW additional renewable capacity in the period 2023- 2025, of which 4 GW Energy Storage System.”</p>
	<p>“>80% of investments (Capex) planned for 2023-2025 aligned with the European Taxonomy Regulation.”</p>
	<p>“ (...) 70% energy production from renewable sources in 2025.”</p>
	<p>“Despite the difficult geopolitical context and the energy crisis triggered by the war in Ukraine, the Group generated around 124 TWh of electricity from renewable sources in 2022 (119 TWh in 2021).”</p>
	<p>“Development of new renewable energy sources capacity to have 100% renewable generation facilities by 2040.”</p>
	<p>“The transition to decarbonization is supported by the growing development of renewable energies, reaching 53.6 GW(3) of installed capacity in 2022, and by the phaseout of coal-fired generation by 2027 and gas-fired by 2040.”</p>
	<p>“Located in the Atacama region, the 375MW Campos del Sol project is one of the largest solar facilities in Chile.It has the capacity to generate around 1,200GWh of clean energy a year, which will be fed into the country’s National Electric System.”</p>
Hydrogen investments	<p>“Replacement of thermal production plants with renewable or hybrid plants, i.e. a combination of green technologies like, for example, renewables, storage, hydrogen.”</p>
Electrification	<p>“The digitalization and upgrading of grids are key objectives to ensure the reliability and security of the energy system. Capacity allows to handle an increasing share of distributed generation and the increase in the number of connections with new users.”</p>
	<p>“ Install 31.4 thousand owned public charging points in 2025.”</p>
	<p>“ Serve approximately 13 thousand electric buses in 2025.”</p>
	<p>“Manage 3.3 mil lighting points (street lighting) in 2025.”</p>
	<p>“ (...)behind-the-meter storage systems of about 352 MW in 2025.”</p>
	<p>“Improve service quality by reducing the average duration of system interruptions: SAIDI ~150 min. in 2025.”</p>
	<p>“Achieve 48.3 mil users with active sma⁽¹⁾ meters in 2025.”</p>
<p>“Improve demand response solutions: 12.4 GW in 2025.”</p>	
Greenwashing	<p>“In 2019 a representative of Nuveen, an American asset manager, accused Italian electricity giant Enel of greenwashing their green bonds. The allegation claimed Enel’s green bond was linked to a commitment to increase the coupon by 25 basis points if the company failed to meet its renewables capacity development targets by the end of 2021.”</p>

Signs of bad practices	“The Italian data protection authority ('Garante') published, on 19 January 2022, its decision in case No. 443, as issued on 16 December 2021, in which it imposed a fine of €26,513,977 to Enel Energia S.p.A, for violations of Articles 5(1)(a), 5(1)(d), 5(2), 6(1), 12, 13, 21, 24, 25(1), 30, and 31 of the General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR'), and Articles 130(1), 130(2), 130(4) of the Personal Data Protection Code, Containing Provisions to Adapt the National Legislation to General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR') ('the Code'), following numerous complaints submitted by individuals.”
	“This flexibility, coupled with the Standards’ modular nature, allowed the company to select and report on relevant indicators, providing a clear and focused account of its sustainability initiatives and progress.”

⁽¹⁾SMA is a producer and manufacturer of solar inverters for photovoltaic systems with grid-tied, grid-independent and standby operation.

Appendix H. EDP’s case – conceptual categories and respective quotations.

Conceptual Category	Empirical Themes – Findings
Goals to reduce CO2 emissions	“As an overarching target, providing access to electricity to the entire global population is critical to clean and energy-efficient demand.”
	“It has also committed to achieving carbon neutrality by 2030 for its scope 1 and 2 emissions.”
Steps to reduce CO2 emissions	“As part of a green leadership position, the company is firmly committed to the energy transition and will work towards being coal-free by 2025.”
	“The impact of the portfolio was 10.8GW of renewable energy capacity, 24.8 TWh of annual renewable energy production and the avoidance of 15.0 MtCO2 of emissions.”
Corporate responsibility	“EDP is committed to addressing the United Nations' Sustainable Development Goals (SDGs) and has set concrete goals for nine of the 17 SDGs.”
	“EDP started implementing ESG Due Diligence in 2017, in accordance with the United Nations Ruggie methodology. As of 2020, with the approval of amendments to the Human Rights Policy and the ESG Protocol for Suppliers, the Due Diligence process was extended to all business units.”
Embracing social causes	“In 2022, the EDP Y.E.S - You Empower Society - brand was created in order to make the general public aware of the various social investment projects supported by EDP in the countries where it operates, ensuring an integrated narrative for the EDP group's social investment.”
	“With the main focus on a Just Energy Transition, we will invest in initiatives targeting the fight against energy poverty, promoting the access to energy and energy efficiency, and implementing solutions for access to solar energy or electrical mobility. A target where we are investing more than 300 million euros until 2030 via our new global social investment programme.”

	<p>“all the different actions and projects promoted throughout 2022, 3,626 volunteer employees participated (27% of the company's HC), contributing 10,551 hours during working hours and 2,699 hours outside working hours.”</p> <p>“In 2022, of all the voluntary contributions recognised by the B4SI methodology, EDP supported projects that contributed to the SDGs with an investment of € 15 million (48% of total voluntary contributions) supporting projects of 512 entities, resulting in 1.7 million direct beneficiaries.”</p> <p>“Voluntary investment in the EDP group's communities was 31.2 million, supporting the projects of 634 entities, resulting in 3.2 million direct beneficiaries. Of this amount, 94% was classified as strategic, 3% as not strategic and 3% as commercial initiatives. Monetary contributions were the main form of contribution (90%), followed by in-kind contributions (9%) and time contributions (1%).”</p>
Promoting diversity and equity	“Female employees 27.5% (2022) to 30% in 2025.”
Employment opportunities	“Support office was put together with the Municipality and the National Institute for Skilling and Employment (IEFP): 111 registrations were held there, from 128 ex-workers that were registered at the IEFP. 67% are now working; 4% still under support from the Institute; 9% retired or are under health leave, and 20% undertook reskilling programs.”
Ethical sourcing	<p>“EDP also commits to "not building new electricity production facilities in areas that are part of Natural Sites on the UNESCO World Heritage List", to ensure that it continues to have no presence in these territories, and made a global commitment in 2022 to become positive for nature by 2025, which means going further and anticipating the "No Net Loss" commitment already made for 2030, and achieving a Net Gain of biodiversity in all new projects with significant residual impacts by 2025.”</p> <p>“EDP continues to invest heavily in improving technologies and in initiatives to prevent and mitigate the environmental impacts of its operations, totaling EUR 105.5 million by 2022.”</p>
Water management	<p>“The specific consumption of fresh water changed in 2022 (-25% compared to 2021), with the decrease in the EDP group's coal-fired electricity generation (10% vs. 2021), which is justified by the fact that the Pecém thermoelectric power station in Brazil has been shut down.”</p> <p>“Since 2010, EDP has responded to the CDP Water Security, where it provides a detailed description of its ongoing initiatives.”</p>
Employees rights and benefits	“Some EDP Group companies grant post-employment benefits to employees under defined benefit and defined contribution plans, namely pension plans that grant complementary retirement benefits for age and early retirement pensions.”
Specific training	“In addition, training and awareness-raising events on emergency response are also held for employees, service providers and others involved such as the local community (when applicable).”
	“Renewables EBITDA (wind, solar and hydro) increased 10% vs. 2021 to 2,528 million euros.”

Investment in renewables energies	“The plan foresees an investment of 25 million euros in the period between 2023 and 2026, of which 21 million euros in renewables — 85% of the total — and four million euros (15%) in electricity networks.”
	“The Group's wind and solar generation portfolio corresponds to a total of 14.7 GW of installed capacity, an increase of 1.2 GW (+9%) explained by the growth of the portfolio of EDP Renováveis (“EDPR”) net of deconsolidations resulting from the asset rotation strategy.”
	“Through its core business, the company is directly impacting SDGs 7 (Clean and affordable energy), 9 (Industry, innovation and infrastructure), 11 (Sustainable cities and communities), and 13 (Climate action). In particular, the €24 billion investment program in the 2021-2025 period highlights the company's commitment to these goals.”
Hydrogen investments	“An ambitious target of 20 Mton of green hydrogen by 2030 was also set in the plan, which foresees 10 Mton of internal EU production and 10 Mton of imports.”
Electrification	“Generation is the first activity in the value chain of the electricity sector. Power plants transform the various energy sources into electricity. These energy sources may be of renewable or non-renewable origin. In EDP, 75% of the energy produced comes from renewable sources.”
	“It should be noted that EDP has assumed a commitment to electrify more than 40% of the light vehicle fleet in 2025 and 100% in 2030.”
Greenwashing	“(…)escandalosa de aves en su parque eólico Rabosera en Aragón (España) que gestiona EDP Renovables.”
	“(…)the coal-fire plants closing because of the unemployment.”
Signs of bad practices	“The established procedures ensured that, throughout 2021, as in previous years, the EDP group was not subject to accusations or suspicions of violations of fundamental human and labour rights. However, occasional occurrences, which were neither structural nor recurrent, were recorded and dealt with, often related to individual behaviours, and translated into individual complaints that were endorsed and solved within the framework of the ethical process and, when justified, gave rise to corrective measures, penalties or reinforcement of procedures.”
	“In terms of emergency and incident response capacity in 2022, 99 small oil spills were recorded, containment and remediation measures were taken, also recorded were 101 environmental near-accidents and 270 simulations were carried out. The corrective and prevention measures implemented resulted in zero accidents with environmental damage.”
	“EDP allegedly sold six dams for €2.2 billion to the consortium led by Engie, but did not pay stamp duty for the operation carried out in December 2020.”
	“EDP case: Public Ministry asks that all defendants be brought to trial. The former Minister of Economy (between 2005 and 2009) Manuel Pinho was accused in the EDP case of a crime of passive corruption for an unlawful act, another of passive corruption, a crime of money laundering and a crime of tax fraud.”

Appendix I. NextEra Energy’s case – conceptual categories and respective quotations.

Conceptual Category	Empirical Themes – Findings
Goals to reduce CO2 emissions	“Our goal is to be completely carbon emissions free by no later than 2045.”
	“We’ve been prudently investing in decarbonizing our own operations for decades and this is an extension of our core values.”
	“At NextEra Energy, we began our journey to Real Zero in the 1980s when we invested in our first solar and wind projects.”
Steps to reduce CO2 emissions	“NextEra Energy has been working to reduce our carbon dioxide (CO2)-emissions rate for decades, and as of 2021 has achieved a 58% reduction, compared to a 2005 adjusted baseline.”
	“In 2020, we converted the Gulf Clean Energy Center, formerly Plant Crist, to natural gas, cutting its CO2-emissions rate by 40%.”
	“As of 2021, NextEra has closed its coal-fired power plants in Florida, and has announced plans to close three of its four remaining coal units outside of Florida by January 2024.”
	“FPL has invested in natural gas generation to reduce dependence on oil and coal.”
Corporate responsibility	“In 2021, NextEra Energy paid \$2.6 billion in various state and local taxes and business fees that support local governments, police, fire, schools and other local organizations within the communities where we operate.”
Embracing social causes	“Support 30+ community and youth outreach organizations over a period of one to 10 years. Increase total funding by \$6 million annually, funded \$30 million to the NextEra Energy Foundation to support these efforts, contributed more than \$3.1 million in 2021.”
Promoting diversity and equity	“Partner with 50+ professional organizations to increase pipeline of Black talent, including Management Leadership for Tomorrow, National Black MBA Association, National Association of Black Accountants, HBCU Connect, etc. – Implement rotational development program and mentoring/sponsorship program for Black employees.”
	“In 2021, NextEra Energy was named to Forbes magazine’s list of “America’s Best Employers for Diversity.”
	“Supplier diversity and venture investment: Staff company-wide supplier diversity program to triple our spending with Black-owned businesses by 2022; Committed more than \$145 million in 2021 to venture capital, private and real estate to advance diversity, equity and inclusion.”
	“We are proud that nearly 2,000 NextEra Energy employees – 13% of our workforce – are veterans of our nation’s armed forces.”
Embracing environmental causes	“Support 30+ community and youth outreach organizations over a period of one to 10 years. Increase total funding by \$6 million annually, funded \$30 million to the NextEra Energy Foundation to support these efforts, contributed more than \$3.1 million in 2021.”
Ethical sourcing	“At our Florida solar energy centers, we work with Audubon Florida and other local organizations to craft site-specific enhancement and preservation

	plans focused on providing habitat opportunities for birds, pollinators and other wildlife.”
Water management	“Nearly 74% of the water NextEra Energy generating facilities withdrew in 2021 came from saltwater sources, which are non-potable and not subject to drought.”
	“98% of water withdrawn for use at our natural gas plants is withdrawn via a once through cooling system.”
	“We continue to take measures to reduce our water consumption, including investing in both water-free power generation from wind and PV solar, and in more efficient generation at our facilities that use steam turbines.”
Resource management	“We reduced our use of oil to generate electricity from 41 million barrels in 2001, the most in the country, to only 100,000 barrels of low-sulphur diesel, a fuel used as emergency backup, in 2021.”
Recycling activities	“In 2021, our corporate recycling and services facility reconditioned and redirected \$4.7 million worth of equipment back into inventory.”
Employees rights and benefits	“In 2022, NextEra Energy was recognized by Forbes magazine as one of America’s Best Employers for the sixth year.”
Specific training	“We offer more than 1,500 courses through NextEra University, an internal continuous education platform available to all employees.”
Efficient work conditions	“Since 2003, we have seen an 85% improvement in safety performance as of year-end 2021.”
Investment in renewables energies	“Through continued investments and innovation in wind, solar, storage and green hydrogen projects.”
	“Added approximately 2,007 MW of wind, 1,547 MW of solar, 1,017 MW of battery energy storage, and repowered 435 MW of wind generating capacity.”
	“FPL installs 50% of 30 million solar panels ahead of schedule. Completion is now expected by 2025.”
	“(NYSE: NEE), a renewable energy giant built out of a century-old Florida utility. This is a large plant — with 300 megawatts (MW) of wind capacity, plus 50 MW solar and 30 MW battery capacity — enough to meet the energy needs of some 100,000 households.”
	“ In the past 25 years, NextEra has jettisoned nearly all of the legacy coal-fired capacity that once dominated FPL’s portfolio and aggressively expanded into renewables through acquisitions and new projects across North America. It boasts the largest wind and solar generating capacity in the world.”
	“The company has gained from a clean energy investment push that has received strong policy support following the 2022 U.S. Inflation Reduction Act which includes major provisions for cutting carbon emissions.”
Hydrogen investments	“FPL announces plan for first green hydrogen pilot project.”
	“In the future, we plan to adapt FPL’s natural gas power generation fleet to use zero-carbon-emissions green hydrogen.”

	<p>“We are excited about green hydrogen technology, which will be key to unlocking 100% carbon free electricity through long battery energy storage created with solar power.”</p> <p>“Through continued investments and innovation in wind, solar, storage and green hydrogen projects.”</p>
Increase of CO2	<p>“NextEra Energy, Inc. (NextEra) emitted the sixth-most CO2 and generated the second-most electricity among U.S. investor-owned utilities in 2019.”</p> <p>“In the last 10 years (2010-2019), over 100 GW of new gas plants have been built across the US.³³ There are already large amounts of fossil fuel infrastructure that must be retired and replaced by clean generation, and utilities are making things worse by continuing to plan for and build even more gas plants. New gas generation increases emissions and misdirects funds that would be better spent on clean energy.”</p>

Appendix J. Table: ORSTED’s case – conceptual categories and respective quotations.

Conceptual Category	Empirical Themes – Findings
Goals to reduce CO2 emissions	<p>“To move towards net-zero, we have committed to procuring at least 10% ‘near-zero’ concrete by 2030, signed an agreement on the world’s first service operation vessel (SOV) that can run on 100% green fuels, and expanded the expectation to use 100% renewable electricity by the end of 2025 to all our tier 1 suppliers, marking an industry first.”</p>
	<p>“Our end goal is to build practices that regenerate nature and society. Our actions should contribute to fully decarbonising the world’s energy systems – including sectors that are more difficult to decarbonise, such as steel, concrete, and shipping – while reviving and rewilding our oceans and lands.”</p>
	<p>“We will continue driving out emissions across scope 1-2, with the aim to reduce our emissions intensity as much as possible, even beyond our 98% reduction target.”</p>
Steps to reduce CO2 emissions	<p>“We issued DKK 28.4 billion in green bonds and green hybrid bonds in 2022, bringing our total issuances to DKK 62.9 billion. In 2022, we allocated 8 billion, which is our largest amount allocated in one year.”</p>
	<p>“We have reduced the GHG intensity of our energy generation and operations by 87% since 2006, reaching 60 g CO2e/kWh in 2022. Since remaining emissions primarily come from the use of coal, which will be phased out by 2025, we maintain our target of reducing our GHG intensity by at least 98% by the end of 2025 and reach 10 g CO2e/kWh.”</p>
Corporate responsibility	<p>“To increase transparency of our supply chain emissions, we began using asset-specific life cycle assessments (LCAs) of our offshore assets in our external scope 3 reporting, and we established a joint industry programme together with ten energy peers and the Carbon Trust to develop a common standard for measuring emissions.”</p>
	<p>“Almost all our strategic suppliers disclosed emissions data to CDP (>90%). 40% have set or committed to setting a science-based target (up from 0% in</p>

	2020). More than 69% have adopted 100% renewable electricity or committed to doing so by the end of 2025 (up from 21% in 2020).”
Promoting diversity and equity	“At the end of 2021, we set an ambition to improve our gender balance and are aiming for a 40:60 (women:men) ratio by 2030.”
Embracing environmental causes	“We have partnered with Lincolnshire Wildlife Trust and Yorkshire Wildlife Trust to create the Humber Seascape Restoration Programme, restoring salt marsh, seagrass, and oyster beds. The project is part of our broader efforts to make a positive contribution to both climate and nature, with the Humber being one of the most important conservation sites in the UK.”
	“We have launched the ReCoral project to test whether corals can grow on the jacket foundations of our offshore wind turbines. Corals usually grow in shallow, nearshore waters, where high surface temperatures can cause coral bleaching. But in the deeper waters where offshore wind farms are installed, the temperature should remain relatively stable, hopefully limiting the risk of coral bleaching.”
	“We launched a five-year global partnership with WWF, the World Wide Fund for Nature, to set a new standard for biodiversity protection and restoration in offshore wind development. Together, we will identify, develop, and advocate initiatives and approaches that can enhance ocean biodiversity.”
	“Net-positive biodiversity impact from all new renewable energy projects commissioned from 2030 at the latest.”
Water management	“2025: 40% reduction in freshwater withdrawal intensity (m ³ per GWh).”
Waste management	“Zero wind turbine blade waste directed to landfill.”
Recycling activities	“We have already recycled over 4,000 damaged modules in the US, thereby recovering 140 metric tonnes of materials, and we are currently in the process of establishing more long-term agreements with reuse and recycling companies across North America.”
	“We aim to reach 100% recyclability of our renewable energy assets, but we still face challenges with the recycling of solar PV modules and wind turbine blades.”
Employees rights and benefits	“We created a new global policy on parental leave that came into effect in January 2023 to provide more flexibility and support for all parents employed by Ørsted. Primary caregivers are granted a minimum of 18 weeks of fully paid leave, and secondary caregivers 12 weeks of fully paid leave.”
Specific training	“We are maturing our employees’ understanding of DE&I. More than 1,850 employees attended live trainings, and over 600 completed our dedicated e-learning on inclusion.”

Efficient work conditions	<p>“2025: Achieve a total recordable injury rate (TRIR) of 2.5 per million hours worked. The Total recordable injury rate (TRIR) per million hours worked is 3.1 in 2022.”</p> <p>“2023: Develop external human rights reporting and track our most salient human rights risks.”</p>
Investment in renewables energies	<p>“At Ørsted, we have been growing our solar portfolio in the past couple of years with the ambition of reaching a 50:50 wind and solar PV capacity mix for our global onshore portfolio by 2030.”</p>
Hydrogen investments	<p>“We entered a pioneering agreement with one of our suppliers to invest in the world’s first service operation vessel (SOV) that can operate entirely on green fuels.”</p>
Electrification	<p>“We expanded our expectation for strategic suppliers to cover their electricity consumption with 100% renewable electricity by the end of 2025 to apply to all tier 1 suppliers and developed guidelines to support them.”</p>
	<p>“We no longer buy or lease fossil-fuelled vehicles, and by the end of 2025, our entire light vehicle fleet will be fully electric. Currently, 51% is electric (including plug-in hybrids), up from 41% last year.”</p>
Signs of bad practices	<p>“Nonetheless, as it is right now Ørsted does still produce some energy based on coal (Ørsted, n.d.-q), putting Ørsted in a sort of grey area. This is also due to its vision, as mentioned before, is to create a world that runs entirely on green energy.”</p>
	<p>“Steel represents over 50% of the supply chain emissions from our offshore assets. Using scrap steel is a short to medium term solution, but also a scarce resource.”</p>
Increase of CO2	<p>“The company’s CO2 intensity is surprisingly high since Ørsted produces 90% of its electricity from renewables.”</p>
	<p>“2022 was a bump in the road. The scope 1 emissions increased as we temporarily had to resume coal use at Studstrup Power Station, Denmark. This was due to global scarcity of wood pellets following a ban on imports from Russia and a wood pellet fire at Studstrup.”</p>

Appendix K. Table: Woodside’s case – conceptual categories and respective quotations.

Conceptual Category	Empirical Themes – Findings
Goals to reduce CO2 emissions	<p>“Woodside’s new energy strategy is centered on building relations across the value chain and aligning solutions to meet customer requirements to deliver profitable solutions with the ability to scale to match the pace of the energy transition.”</p>
	<p>“Woodside has also announced an aspiration of net zero equity Scope 1 and 2 greenhouse gas emissions by 2050 or sooner.”</p>
Steps to reduce CO2 emissions	<p>“(…)US\$100m spent to date towards the US\$5 billion investment in new energy products and lower carbon services.”</p>

	<p>“The Native Reforestation Project is expected to sequester approximately 1,100 kt CO₂-e over 25 years. The Australian Carbon Credit Units generated from this project will be used to offset Woodside’s carbon emissions.”</p>
Corporate responsibility	<p>“Woodside paid A\$2,702 million (A\$2.7 billion) in Australian taxes and royalties to the Commonwealth and State governments in 2022, a substantial increase from 2021.”</p>
Embracing social causes	<p>“In 2022, Woodside invested globally A\$25.5 million in communities through social investment, of which 8.6% was required by government regulations or First Nations contractual agreements. We spent the remaining A\$23.3 million (91.4%) on voluntary social investment.”</p>
	<p>“Woodside’s funding in 2022 has contributed to an additional vehicle for the program, which supports them to produce and deliver almost 8,000 nutritious soy-based breakfast meals through its 68 distribution points across the region.”</p>
	<p>“A partnership with Enseña por Mexico and the Ministry of Education aims to improve education for over 3,000 children in the Tamaulipas region by providing high quality training to local teachers.”</p>
	<p>“Woodside funded vehicle upgrades to Orange Sky’s Perth service vans Karla and Koorda. The services support the most vulnerable community members through access to clean clothes, warm showers and friendly conversation.”</p>
Promoting diversity and equity	<p>“In the fourth quarter of 2022, work commenced on a refresh of the Racial Equity Strategy and Plan, which will be finalized in 2023. This strategy aims to drive equity in our workplace and to reduce professional and career barriers for individuals who are Black, Indigenous, or People of Colour (BIPOC) in communities in which we operate.”</p>
	<p>“In 2022, the overall representation of First Nations Australians in the Woodside workforce increased to 5.4% compared to the 2021 figure of 5.2%.”</p>
Employment opportunities	<p>“We had 33 Pilbara based apprentices and trainees who successfully converted to permanent Woodside employment during 2022.”</p>
Embracing environmental causes	<p>“Woodside has been supporting pygmy blue whale research since the early 2000s through partnerships with AIMS, the Australian Antarctic Division and the CWR. AIMS is Australia’s tropical marine research agency and renowned for its global science excellence.”</p>
Ethical sourcing	<p>“To support the risk assessment process and Woodside’s determination of acceptability, our health, safety and environment risk management procedures include the use of a decision support framework based on principles set out in the Guidance on Risk Related Decision Making (Oil and Gas UK 2014). This is to confirm activities do not pose an unacceptable environmental risk.”</p>
	<p>“A General Direction on the RTM⁽¹⁾ was issued by NOPSEMA⁽²⁾ in late 2022. Woodside will comply with the requirements of the General Direction including taking all reasonable measures to continue to monitor the status of the RTM and mitigate any risks to the environment and other marine users.”</p>

	<p>“In 2020, NOPSEMA accepted the OPP⁽³⁾ for the Scarborough project. The OPP presents the assessment of the potential environmental impacts and risks associated with the Scarborough project.”</p>
Water management	<p>“During the 2022 financial year, Karratha Gas Plant and Pluto LNG in Western Australia, met their respective water efficiency targets set the previous year. While King Bay Supply Facility slightly exceeded its water efficiency target, overall water usage decreased by 12% from 2021.”</p>
Waste management	<p>“At the end of quarter three in 2022 the amount of waste diverted from landfill is tracking at 79.6%, compared to 83.8% for 2021.”</p>
	<p>“Improving waste segregation in Trinidad and Tobago is a main area of focus, as there is still comingling of waste and/or contamination of recyclable waste (e.g. with food) resulting in waste being disposed of in landfill.”</p>
Recycling activities	<p>“Around 50% of our waste generated in 2022 has already been processed for recycling despite the new treatment facility not being operational yet.”</p>
Employees rights and benefits	<p>“In 2022, a flexible public holiday trial was conducted in Australia to allow employees to flex up to five public holidays for other days of personal significance.”</p>
	<p>“In 2022, we made improvements to the support provided in relation to family and domestic violence with ten days paid leave made available to all employees directly impacted by family and domestic violence.”</p>
Specific training	<p>“During 2022, we held workshops with selected leaders in Australia facilitated by global safety experts to deepen our understanding of HOP (Human and Organizational Performance).”</p>
Efficient work conditions	<p>“High potential incidents (HPIs) decreased to ten from 14 in 2021.”</p>
Inefficient work conditions	<p>“Our total recordable occupational illness frequency (TROIF) increased to 0.72 per million hours worked from 0.36 in 2021.”</p>
	<p>“Our total recordable injury rate (TRIR) of 1.80 increased with 30 recordable injuries in 2022 compared to 27 in 2021.”</p>
Investment in renewables energies	<p>“Woodside is progressing the proposed Woodside Solar project, a facility which would initially generate electricity from a solar photovoltaic farm approximately 15 km south-west of Karratha in Western Australia, complemented by a battery energy storage system. The facility is expected to supply up to 100 MW of solar energy with potential expansion to a maximum of 500 MW.”</p>
Hydrogen investments	<p>“H2Perth is a proposed hydrogen and ammonia production facility to be located in Perth, Western Australia.”</p>
	<p>“Woodside signed a memorandum of understanding (MOU) on 29 July 2022 with Murihiku Regeneration, the representatives for the Ngāi Tahu iwi in Murihiku-Southland, to further discussions around a potential large scale green hydrogen production projects.”</p>
	<p>“H2OK is a proposed liquid hydrogen project to be located in Ardmore, Oklahoma with a maximum design capacity of 90 tonnes per day (tpd) of</p>

	liquid hydrogen through electrolysis, initially targeting the heavy transport sector.”
Greenwashing alert	“(…) other regulatory control of emissions.”
Signs of bad practices	“As Woodside has stated it won’t provide shareholders with a second “Say on Climate” vote, investors would have no choice but to consider options for the standing management resolutions at the AGM ⁽⁴⁾ , which include remuneration and director votes.”
	“Over the past three years Woodside has faced successive and record-breaking shareholder votes against its climate plans, yet has refused to change tack.”
	“Australia’s offshore regulator has issued a directive to Woodside Energy mandating the operator comply with certain requirements following the accidental death of a contract worker on its North Rankin platform earlier this month.”
Increase of CO2	“The North West Shelf liquified natural gas (LNG) processing facility be given an extended license. (...) Woodside’s estimate of the annual emissions from the project suggest about 4bn of carbon dioxide equivalent could be released – equivalent to about 10 years of Australia’s total carbon pollution.”
	“Woodside is already one of Australia’s largest greenhouse gas emitters. Critics say projects such as the Woodside-led Burrup Gas Hub will produce as much as 6bn tonnes of carbon dioxide-equivalent pollution, or about 12 times Australia’s current annual emissions.”
	“Glenn Walker, head of Greenpeace Australia Pacific’s advocacy and strategy, said Woodside had made almost no progress on plans to reduce emissions.”

⁽¹⁾ RTM - Riser Turret Mooring

⁽²⁾ NOPSEMA - The National Offshore Petroleum Safety and Environmental Management

⁽³⁾ OPP – Offshore Project Proposal

⁽⁴⁾ AGM – Annual General Meeting

Appendix L. Coding scheme for ENEL’s case

Empirical Themes	Conceptual Categories	Aggregate Dimensions
<ul style="list-style-type: none"> • Goal of generating 100% energy from renewable sources by 2024. • Decarbonization roadmap for direct and indirect emissions along the group’s value chain and 	Goals to reduce CO2 emissions	Net Zero Goal

<p>four targets by the SBTi initiative.</p> <ul style="list-style-type: none"> • Goal of limiting global warming to 1.5°C. 		
<ul style="list-style-type: none"> • Exit from coal-fired by 2026 and gas-fired by 2040. • Exit from gas retail by 2040. 	<p>Steps to reduce CO2 emissions</p>	
<ul style="list-style-type: none"> • Contributed with more than 2.300 sustainability projects in the various countries the company is present, involving more than 6.3 million beneficiaries. • More than 1.200 active partnerships internationally with non-profit organizations, social enterprises, start-ups and institutions. • Contributed to the communities in which it operates with about €120 million in 2022, representing a 31.6% increased compared to 2021. • Promotes infrastructure development, education and vocational training, cultural and economic activities, energy access, and rural and suburban electrification. • Enel Colombia built a micro aqueduct which provides 600.000 liters of drinking water per month. • Developed a program that serves to closely monitor faults in the public grid and as well as its performance. 	<p>Embracing social causes</p>	<p>Corporate Responsibility</p>

<ul style="list-style-type: none"> • Board of Directors (BoD) of Enel SpA consists of 44.6% women. • Selection processes are monitored to ensure fair balance of both genders in the candidate pools. • The company has a total of 86 nationalities and 24 different languages. • Commitment to promote and enhance knowledge, relationship and intermingling among different cultures. 	<p>Promoting diversity and equity</p>	
<ul style="list-style-type: none"> • Launched a Talent Engagement Program which targets talents from the most prestigious international universities. • Aim of ensuring a transversal development and growth path within different areas of the company. 	<p>Employment opportunities</p>	
<ul style="list-style-type: none"> • Has integrated EU principles into our Environmental(2) and Biodiversity(3) Policies. • Has made a project to restored more than 610 hectares with the planting of local flora. A total of more than 1,200 animal species in Brazil. • Has initiatives on food and water security, agricultural production, sustainable fishing and mining that contribute to the fight against global warming in Brazil. 	<p>Embracing environmental causes</p>	<p>Environmental Responsibility</p>
<ul style="list-style-type: none"> • Working on a global initiative to promote continuous improvement of corporate responsibility in 	<p>Ethical sourcing</p>	

<p>international coal industry called Bettercoal.</p>		
<ul style="list-style-type: none"> • The circular management of digital assets in the Group’s enables to employees and third parties to safeguarding both the extension of the devices’ service life, and disposing of these devices in line with recycling principles, amounting to a total of 33 tons of equipment in 2022. 	<p>Recycling activities</p>	
<ul style="list-style-type: none"> • Published a Diversity and Inclusion (D&I) Policy in 2015 with explicit principles of non-discrimination, equal opportunities, dignity, work-life balance and inclusion. • Addition of the Workplace Harassment Policy in 2019 with containing themes of respect, integrity and individual dignity in the workplace in the prevention of all types of harassment. 	<p>Employees rights and benefits</p>	<p>Workforce Conditions</p>
<ul style="list-style-type: none"> • Cost dedicated to training of approximately €30 million during 2022. • Average cost per employee of €455 during 2022. • Has been increasing the skills of the Group’s technical staff and people with operational responsibilities (Environmental Competence Building Program). 	<p>Specific training</p>	
<ul style="list-style-type: none"> • Decrease in the number of injuries and illnesses among contractors. 	<p>Efficient work conditions</p>	

<ul style="list-style-type: none"> • Has the goal of 21 GW additional renewable capacity in 2025, of which 4 GW are planned to be energy storage system. • >80% of investments (Capex) planned for 2023-2025 aligned with the European Taxonomy Regulation. • Has the goal of reach 70% energy production from renewable sources in 2025. • Generated around 124 TWh of electricity from renewable sources in 2022 despite the geopolitical context and the energy crisis triggered by the war in Ukraine. • Development of new renewable energy sources capacity to have 100% renewable generation facilities by 2040. • Transition to decarbonization supported by the development of renewable energies, the phaseout of coal-fired generation by 2027 and gas-fired by 2040. • Reached 53.6 GW(3) of installed capacity in 2022. • Owns one of the largest solar facilities in Chile called Campos del Sol with the capacity to generate around 1.200 GWh of clean energy a year. 	<p>Investment in renewables energies</p>	<p>Sustainability Goals and Accomplishments</p>
<ul style="list-style-type: none"> • Capacity to handle increasing share of distributed generation and increase in the number of 	<p>Electrification</p>	

<p>connections with new users.</p> <ul style="list-style-type: none"> • Digitalization and upgrading of grids. • Install 31.4 thousand owned public charging points in 2025 for electric vehicles. • Serve approximately 13 thousand electric buses in 2025. • Manage 3.3 mil lighting points (street lighting) in 2025. • Behind-the-meter storage systems of about 352 MW in 2025. • Improve service quality by reducing the average duration of system interruptions. • Achieve 48.3 mil users with active sma (1) meters in 2025. • Improve demand response solutions to 12.4 GW in 2025. 		
<ul style="list-style-type: none"> • Has been accused in 2019 by a representative of Nuveen of greenwashing its green bonds. 	Greenwashing alert	Red Flags
<ul style="list-style-type: none"> • In 2022, the Italian data protection authority Garante imposed a fine of €26,513,977 to Enel Energia S.p.A, for violations of Articles 5(1)(a), 5(1)(d), 5(2), 6(1), 12, 13, 21, 24, 25(1), 30, and 31 of the General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR'), and Articles 130(1), 130(2), 130(4) of the Personal Data Protection Code, 	Signs of bad practices	

<p>Containing Provisions to Adapt the National Legislation to General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR') ('the Code'), following numerous complaints submitted by individuals.</p> <ul style="list-style-type: none"> • Has selected and reported only on what it considered to be “relevant indicators”. 		
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Appendix M. Coding scheme for EDP’s case

Empirical Themes	Conceptual Categories	Aggregate Dimensions
<ul style="list-style-type: none"> • Goal of providing access to electricity to the entire global population. • Committed to the energy transition. 	Goals to reduce CO2 emissions	Net Zero Goal
<ul style="list-style-type: none"> • Being coal-free by 2025. • Investment in renewables avoid 15.0 MtCO2 of emissions. 	Steps to reduce CO2 emissions	
<ul style="list-style-type: none"> • Commitment to addressing the UN Sustainable Development Goals (SDGs). • Has set concrete goals for 9 of the 17 SGDs. • Has started to implement ESG Due Diligence in 2017. • Extended the Due Diligence process to all business units in 2020. 	Corporate responsibility	Corporate Responsibility
<ul style="list-style-type: none"> • Created the EDP Y.E.S (You Empower Society) brand to raise awareness of the various social investment projects supported by EDP in the countries where it operates. • Aims to invest in initiatives targeting the fight against 	Embracing social causes	

<p>poverty, promoting access to energy and energy efficiency, and implementing solutions for access to solar energy or electrical mobility.</p> <ul style="list-style-type: none"> • Investing more than €300 million until 2030 via a new global social investment program. • Had 3.626 volunteer employees participating in the different actions and projects promoted throughout 2022, contributing 10.551 hours during working hours and 2.699 hours outside working hours. • Supported projects that contributed to the SDGs with an investment of €15 million. • Supported projects of 512 entities, resulting in 1.7 million direct beneficiaries. • Reached a voluntary investment in EDP group's communities of 31.2 million. • Supported projects of 634 entities, resulting in 3.2 million direct beneficiaries. 		
<ul style="list-style-type: none"> • Aims to increase the percentage of female employees from 27.5% (2022) to 30% in 2025. 	Promoting diversity and equity	
<ul style="list-style-type: none"> • Has put the Support office together with the Municipality and the National Institute for Skilling and Employment (IEFP) resulting in 128 workers. 	Employment opportunities	Environmental Responsibility

<ul style="list-style-type: none"> • Commits to not building new electricity production facilities in areas that are part of Natural Sites on the UNESCO World Heritage List. • Has made a global commitment in 2022 to become positive for nature by 2025. • Invests in improving technologies and in initiatives to prevent and mitigate the environmental impacts of its operations. 	Ethical sourcing	
<ul style="list-style-type: none"> • Specific consumption of fresh water changed in 2022 (-25% compared to 2021) with the decrease in the coal-fired electricity generation (10% vs. 2021). • Has responded to the CDP Water Security with a detailed description of its ongoing initiatives since 2010. 	Water management	
<ul style="list-style-type: none"> • Contribution plans to retirement/pensions plans. 	Employees rights and benefits	Workforce Conditions
<ul style="list-style-type: none"> • Holds training and awareness-raising events on emergency response for employees, service providers and others involved. 	Specific training	
<ul style="list-style-type: none"> • Increased its investment in renewables EBITDA (wind, solar and hydro) to 10%. • Increased its wind and solar generation portfolio in 1.2GW (+9%), corresponding to a total of 14.7 GW of installed capacity. • Directly impacting SDGs 7, 9, 11 and 13. 	Investment in renewables energies	Sustainability Goals and Accomplishments

<ul style="list-style-type: none"> • Has invested €24 billion in the program in the 2021-2025 period. • Investment of 25 thousand millions from 2023 to 2026 of which 21 thousand millions in renewables and the other 4 thousands of millions will be for improve the electrical grid. 		
<ul style="list-style-type: none"> • Target of reaching 20 Mton of green hydrogen by 2030. 	Hydrogen investments	
<ul style="list-style-type: none"> • Has power plants that transform the various energy sources into electricity. • 75% of the energy produced comes from renewable sources. • Assumed a commitment to electrify more than 40% of the light vehicle fleet in 2025 and 100% in 2030. 	Electrification	
<ul style="list-style-type: none"> • Scandalous bird killings at its Rabosera wind farm in Aragon (Spain), managed by EDP Renovables. • See as a risk closing the coal-fire plants due to unemployment. 	Greenwashing	Red Flags
<ul style="list-style-type: none"> • Has recorded 99 small oil spills and 101 environmental near-accidents in 2022 • Has allegedly sold six dams for €2.2 billion to the Engie-led consortium, but did not pay stamp duty for the operation in December 2020. • Has dealt with occasional occurrences, often related to individual behaviors, regarding accusations and suspicions of violations of 	Signs of bad practices	

<p>fundamental human and labor rights.</p> <ul style="list-style-type: none"> Former Minister of Economy (2005-2009) Manuel Pinho was accused in the EDP case of a crime of passive corruption for an illicit act, another of passive corruption, a crime of money laundering, and a crime of tax fraud. 		
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Appendix N. Coding scheme for NextEra Energy's case

Empirical Themes	Conceptual Categories	Aggregate Dimensions
<ul style="list-style-type: none"> Has set the goal to be completely carbon emissions free by 2045. Has an ongoing investment in decarbonizing its operations. Has been making progresses on Real Zero since its first solar and winds projects in the 1980s. 	Goals to reduce CO2 emissions	Net Zero Goal
<ul style="list-style-type: none"> Has achieved a 58% reduction of CO2 emissions compared to a 2005 adjusted baseline. Has converted the Gulf Clean Energy Center to natural gas, cutting its CO2-emission rate by 40%. Has closed its coal-fired power plants in Florida and want to close three of its four until 2024. Has invested in natural gas generation to reduce dependence on oil and coal. 	Steps to reduce CO2 emissions	
<ul style="list-style-type: none"> Has paid \$2.6 billion in 2021 in various state and local taxes and businesses fees that support local governments, police, fire, schools and other local organizations. 	Corporate responsibility	Corporate Responsibility

<ul style="list-style-type: none"> • Supports 30+ community and youth outreach organizations over a period of 1 to 10 years. • Has registered an increase of total funding by \$6 million annually and funded \$30 million to the NextEra Energy Foundation to support these efforts. 	<p>Embracing social causes</p>	
<ul style="list-style-type: none"> • Has partnered with 50+ professional organizations to increase pipeline of Black talent. • Has implemented a rotational development program and a mentoring/sponsorship program for Black employees. • Was named to Forbes magazine’s list of “America’s Best Employers for Diversity” in 2021. • Has started a staff company-wide supplier diversity program to triple its spending with Black-owned businesses by 2022. • Committed more than \$145 million in 2021 to venture capital, private and real estate to advance diversity, equity and inclusion. • 2,000 of the company’s employees (13% of the workforce) are veterans of the nation’s armed forces. 	<p>Promoting diversity and equity</p>	
<ul style="list-style-type: none"> • Recruits from universities across the country, including Historically Black Colleges and Universities to identify candidates for its summer internsprogram and early-career rotational programs. • Has welcomed 163 interns through its NEXT summer intern program in 2021 of 	<p>Employment opportunities</p>	

<ul style="list-style-type: none"> • which more than 78% were women and minority interns. 		
<ul style="list-style-type: none"> • Works with Audubon Florida and other local organizations at its Florida solar energy centers to craft site-specific enhancement and preservation plans for providing habitat opportunities for wildlife. 	Ethical sourcing	Environmental Responsibility
<ul style="list-style-type: none"> • Nearly 74% of the water that NextEra energy generating facilities withdrew in 2021 came from saltwater sources. • Withdraws 98% of water withdrawn for use at its natural gas plants via a once through cooling system. • Invests in water-free power generation from wind and PV solar and in more efficient generation at its facilities that use steam turbines. 	Water management	
<ul style="list-style-type: none"> • Has reduced its use of oil to generate electricity from 41 million barrels in 2001 to 100.000 barrels of low-sulfur diesel. 	Resource management	
<ul style="list-style-type: none"> • Has reconditioned and redirected \$4.7 million worth of equipment back into inventory through its corporate recycling and services facility. 	Recycling activities	
<ul style="list-style-type: none"> • Was recognized by Forbes magazine as one of America's Best Employers for the sixth year in 2022. 	Employees rights and benefits	Workforce Conditions
<ul style="list-style-type: none"> • Offers more than 1.500 courses through an internal continuous education platform called NextEra University. 	Specific training	
<ul style="list-style-type: none"> • Has registered an 85% improvement in safety performance since 2003. 	Efficient work conditions	

<ul style="list-style-type: none"> • Has made continuous investments and innovation in wind, solar, storage, and green hydrogen projects. • Has added approximately 2.007 MW of wind, 1.547 MW of solar, 1.017 MW of battery energy storage and repowered 435 MW of wind generating capacity. • Currently installing (with FPL) 50% of 30 million solar panels ahead of schedule, with completion expected by 2025. • Owns a renewable energy giant in Florida with 300 MW of wind capacity, 50 MW solar, and 30 MW battery capacity with the ability to meet the energy needs of some 100.000 households. • Has been expanding in the past 25 years into renewables through acquisitions and new projects across North America, boasting the largest wind and solar generating capacity in the world. • Has gained from a clean energy investment push that has receives strong policy support following the 2022 U.S. Inflation Reduction Act which includes major provisions for cutting carbon emissions. 	<p>Investment in renewables energies</p>	<p>Sustainability Goals and Accomplishments</p>
<ul style="list-style-type: none"> • Has made continuous investments and innovation in wind, solar, storage, and green hydrogen projects. • Has a plan for green hydrogen technology to help unlock 100% carbon free electricity through long battery energy 	<p>Hydrogen investments</p>	

storage created with solar power.		
<ul style="list-style-type: none"> Emitted the sixth-most CO2 and generated the second-most electricity among U.S. investor-owned utilities in 2019. Has built over 100 GW of new gas plant in the last 10 years (2010-2019) which pose a danger since new gas generation increases emissions and misdirects funds that would be better spent on clean energy. 	Increase of CO2	Red Flags

Appendix O. Coding scheme for Orsted's case

Empirical Themes	Conceptual Categories	Aggregate Dimensions
<ul style="list-style-type: none"> Goal of moving towards net-zero. Commitment to procuring at least 10% 'near-zero' concrete by 2030. Aims to contribute to fully decarbonizing the world's energy systems, including sectors that are more difficult to decarbonize (steel, concrete, shipping). Aims to reduce emissions intensity beyond the 98% reduction target. Commitment to continue driving out emissions across scope 1-2. 	Goals to reduce CO2 emissions	Net Zero Goal
<ul style="list-style-type: none"> Issued DKK 28.4 billion in green bonds and green hybrid bonds in 2022. Allocated a total of 8 billion in green bonds 	Steps to reduce CO2 emissions	

<p>and green hybrid bonds in 2022.</p>		
<ul style="list-style-type: none"> • Began using asset-specific life cycle assessments (LCAs) of offshore assets in external scope 3 reporting. • Established a joint industry program with 10 energy peers and the Carbon Trust to develop a common standard for measuring emissions. • Over 90% of its strategic suppliers disclosed emissions data to CDP. • 40% of the suppliers have set or committed to setting a science-based target. • More than 69% of the suppliers have adopted 100% renewable electricity or committed to it by the end of 2025. 	<p>Corporate responsibility</p>	<p>Corporate Responsibility</p>
<ul style="list-style-type: none"> • Aims to reach a 40:60 (women:men) ratio by 2030. 	<p>Promoting diversity and equity</p>	
<ul style="list-style-type: none"> • Partnered with Lincolnshire Wildlife Trust and Yorkshire Wildlife Trust to create a program that has the aim of restoring salt marsh, seagrass, and oyster beds called Humber Seascape Restoration Program. • Launched the ReCoral project to test whether corals can grow on the jacket foundations of our offshore wind turbines and help limit 	<p>Embracing environmental causes</p>	<p>Environmental Responsibility</p>

<p>the risk of coral bleaching.</p> <ul style="list-style-type: none"> • Launched a five-year global partnership with WWF to set a new standard for biodiversity protection and restoration in offshore wind development. • Advocates for initiatives and approaches that can enhance ocean biodiversity. • Goal of becoming net-positive regarding biodiversity impact from all new renewable energy projects commissioned from 2030 at the latest. 		
<ul style="list-style-type: none"> • Commitment to reduce in 40% freshwater withdrawal intensity (m³ per GWh) by 2025, being at 13% in 2022. 	Water management	
<ul style="list-style-type: none"> • Zero wind turbine blade waste directed to landfill. 	Waste management	
<ul style="list-style-type: none"> • Recycled over 4.000 damaged modules in the US and recovered 140 metric tons of materials. • Currently in the process of establishing more long-term agreements with reuse and recycling companies across North America. 	Recycling activities	
<ul style="list-style-type: none"> • Working on maturing employees' understanding of DE&I. • More than 1.850 employees attended live trainings and over 600 completed the e-learning on inclusion. 	Employees rights and benefits	Workforce Conditions

<ul style="list-style-type: none"> • Has the goal of reaching the injury rate (TRIR) of 2.5 per million hours worked. • The injury rate (TRIR) per million hours worked was 3.1 in 2022.” 	Efficient work conditions	
<ul style="list-style-type: none"> • Solar portfolio has grown over the last years. • Ambition of reaching a 50:50 wind and solar PV capacity mix for global onshore portfolio by 2030. 	Investment in renewables energies	Sustainability Goals and Accomplishments
<ul style="list-style-type: none"> • Entered a pioneering agreement with one of its suppliers to invest in the world’s first service operation vessel (SOV) that can operate entirely on green fuels. 	Hydrogen investments	
<ul style="list-style-type: none"> • Committed to not buy or lease fossil-fueled vehicles. • Expects to have a fully electric light vehicle fleet fully electric by the end of 2025. • 51% of the light vehicle fleet is currently electric, including plug-in hybrids. • Expanded the expectation to cover strategic suppliers’ electricity consumption with 100% renewable electricity by the end of 2025. 	Electrification	
<ul style="list-style-type: none"> • 50% of the supply chain emissions from its offshore assets are represented by steel. 	Signs of bad practices	Red Flags

<ul style="list-style-type: none"> • The company still produces part of its energy based on coal. 		
<ul style="list-style-type: none"> • Scope 1 emissions increased in 2022. • High CO2 intensity. 	Increase of CO2	

Appendix P. Table: Coding scheme for Woodside’s case

Empirical Themes	Conceptual Categories	Aggregate Dimensions
<ul style="list-style-type: none"> • Has announced an aspiration of net zero equity Scope 1 and 2 greenhouse gas emissions by 2050 or sooner. • Has centered its strategy on building relations across the value chain and aligning solution to meet customer requirements to deliver profitable solutions with the ability to scale to match the pace of the energy transition. 	Goals to reduce CO2 emissions	Net Zero Goal
<ul style="list-style-type: none"> • Has spent US\$100m towards the US\$5 billion investment in new energy products and lower carbon services. • Expects to sequester approximately 1.100kt CO2-e over 25 years with its Native Reforestation Project with the Australian Carbon Credit Units generated from the project being used to offset the company’s emissions. 	Steps to reduce CO2 emissions	
<ul style="list-style-type: none"> • Has paid A\$2.702 million (A\$2.7 billion) in Australian taxes and royalties to the Commonwealth and State governments in 2022. 	Corporate responsibility	Corporate Responsibility
<ul style="list-style-type: none"> • Has invested globally A\$25.5 million in 	Embracing social causes	

<p>communities through social investment in 2022, with A\$23.3 million (91.4%) being spent on voluntary social investment.</p> <ul style="list-style-type: none"> • Has supported the produce and delivery of almost 8.000 nutritious soy based breakfast meals through 68 distribution points. • Has partnered with Enseña por Mexico and the Ministry of Education to improve education for over 3.000 children in the Tamaulipas region by providing high quality training to local teachers. • Has funded vehicle upgrades to Orange Sky's Perth service which support the most vulnerable community members through access to clean clothes, warm showers and friendly conversation. 		
<ul style="list-style-type: none"> • Has commenced a Racial Equity Strategy and Plan in Q4 (2022) to drive equity in its workplace and reduce professional and career barriers for individuals who are Black, Indigenous, or People of Colour (BIPOC). • Has increased the overall representation of First Nations Australians in its workforce to 5.4% in 2022. 	Promoting diversity and equity	
<ul style="list-style-type: none"> • Has converted 33 Pilabara based apprentices and trainees to permanent employment in the company during 2022. 	Employment opportunities	

<ul style="list-style-type: none"> • Support the pygmy blue whale research since the early 2000s 	Embracing environmental causes	Environmental Responsibility
<ul style="list-style-type: none"> • Use the framework the Guidance on Risk Related Decision Making (Oil and Gas UK 2014) to support the risk assessment procedure. • NOPSEMA accepted the OPP for the Scarborough project. • Has compromised to comply with the requirements of the General Direction and talking all reasonable measures to continue to monitor the status of the RTM and mitigate risks to the environment and other marine users. 	Ethical sourcing	
<ul style="list-style-type: none"> • Karratha Gas Plant and Pluto LNG met their water efficiency targets set in 2021, while King Bay Supply Facility slightly exceed its water efficiency target. 	Water management	
<ul style="list-style-type: none"> • The amount of waste diverted from landfill was tracking at 79.6% at the end of Q3 (2022), representing a reduction compared to 2021. • Has set a focus on improving waste segregation in Trinidad and Tobago. 	Waste management	
<ul style="list-style-type: none"> • Has maintained its efforts towards recycling in 2022 despite the new treatment facility not being operational yet. 	Recycling activities	

<ul style="list-style-type: none"> • Has conducted a flexible public holiday trial in Australia in 2022 to allow employees to flex up to five public holidays for other days of personal significance. • Has made improvements to the support provided to family and domestic violence with ten days paid leave made available to all employees directly impacted by it. 	<p>Employees rights and benefits</p>	<p>Workforce Conditions</p>
<ul style="list-style-type: none"> • Held workshops with selected leaders in Australia during 2022 to deepen the understanding of HOP (Human and Organizational Performance). 	<p>Specific training</p>	
<ul style="list-style-type: none"> • Has decreased its high potential incidents (HPIs) to ten from 14 in 2021. 	<p>Efficient work conditions</p>	
<ul style="list-style-type: none"> • Has increased its total recordable injury rate (TRIR) with 30 recordable injuries in 2022. • Has increased its total recordable occupational illness frequency (TROIF) to 0.72 per million hours worked from 0.36 in 2021. 	<p>Inefficient work conditions</p>	
<ul style="list-style-type: none"> • Making progresses in Woodside Solar project with the facility expected to supply up to 100 MW of solar energy and potential expansion to a maximum of 500 MW. 	<p>Investment in renewables energies</p>	<p>Sustainability Goals and Accomplishments</p>
<ul style="list-style-type: none"> • Working a proposed hydrogen and ammonia production facility called H2Perth. • Signed a memorandum of understanding (MOU) on 	<p>Hydrogen investments</p>	

<p>29 July 2022 with Murihiku Regeneration to further discussions around a potential large scale hydrogen production project.</p> <ul style="list-style-type: none"> Working on a liquid hydrogen project called H2OK with a maximum design capacity of 90 tonnes per day (tpd) of liquid hydrogen through electrolysis. 		
<ul style="list-style-type: none"> See as a risk the increase of regulatory controls for emissions. 	Greenwashing alert	Red Flags
<ul style="list-style-type: none"> The company stated that it would not provide shareholders with a second “Say on Climate”, leaving investors only with the choice to consider options for the standing management resolutions at the AGM. Australia’s offshore regulator has issued a directive to the company mandating the operator comply with certain requirements following the accidental death of a contract worker on its North Rankin platform. Has faced successive and record-breaking shareholder votes against its climate plans, but has refused to change tack. 	Signs of bad practices	
<ul style="list-style-type: none"> Has an estimate for the annual emissions from the North West Shelf liquified natural gas (LNG) processing facility reaching about 4bn of carbon dioxide release, equivalent 	Increase of CO2	

<p>to about 10 years of Australia’s total carbon pollution.</p> <ul style="list-style-type: none"> • Is pointed out as one of Australia’s largest greenhouse gas emitters, with critics saying that projects such as Burrup Gas Hub expected to produce as much as 6bn tons of carbon dioxide-equivalent pollution. • Glenn Walker, head of Greenpeace Australia Pacific’s advocacy and strategy, has said that the company had made almost no progress on plans to reduce emissions. 		
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Appendix Q. Conceptual table for evolution of Scope 1 emissions

2018	Percentage Variation	2019	Percentage Variation	2020	Percentage Variation	2021	Percentage Variation	2022	2018-2022 Percentage Variation
X_1	$[(X_2 \div X_1) - 1] \times 100 = Y_1$	X_2	$[(X_3 \div X_2) - 1] \times 100 = Y_2$	X_3	$[(X_4 \div X_3) - 1] \times 100 = Y_3$	X_4	$[(X_5 \div X_4) - 1] \times 100 = Y_4$	X_5	$Y_1 + Y_2 + Y_3 + Y_4 = Z_1$