



GÖTEBORGS UNIVERSITET
HANDELSHÖGSKOLAN

PPA

*Greenwashing or Financial Incentives for
Investments in Offshore Wind Power?*

A qualitative study on power purchasing agreement and its
effect on investment decisions and corporate image in the
offshore wind power industry

Bachelor's Thesis in Corporate Sustainability

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Abstract

The government of Sweden is currently looking to expand one of the unexploited natural resources, offshore wind. Offshore wind power has for several years been stagnated in terms of production, and the funding of projects has been one of the major issues. Getting bank loans with a lower interest rate demands a steady cash-flow. PPA has increased substantially in the last few years within renewable energy projects, as a way to show investors an income for many years. The purpose of the thesis is therefore through interviews with relevant stakeholders in the industry, to investigate PPA's possible role in expanding offshore wind power in Sweden and the effect it can have on corporate image. Previous studies within the subject are used along with empirical results to discuss and analyze the research questions. The thesis concluded that PPA has a role to play in future investment decisions, but it will depend on several aspects, with three of them being: 1) If companies can avoid using PPA, they will. 2) The development of spot market prices will determine whether it is worth the risk of PPA. 3) Depending on the demands from the shareholders of the producing company, PPA might not be of interest. Furthermore, with the current electricity system, if producing companies allocate and produce the correct amount of renewable electricity onto the market it is not greenwashing and if they are using PPA with a guarantee of origin, they can claim to be 100 percent renewable without any real legitimacy problems.

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Keywords:

PPA, Greenwashing, Green Energy, CSR, Offshore Wind Power

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1. Introduction

This introductory chapter presents a background to the subject, followed by a problem discussion, highlighting why the subject is of importance. Lastly, the purpose and research questions of the study followed by a few delimitations will conclude the chapter.

1.1 Background

Sweden is facing one of its biggest challenges ever when adapting to zero net emissions by 2045 and after reaching that target only have negative emissions in the forthcoming years (Naturvårdsverket, n.d.). To help reach this mission, the government has set the goal that by the year of 2050, Sweden aims to have a production of at least 167 TWh that comes directly from wind power (Svensk Vindenergi, 2021). Furthermore, the government decided on the 15th of February in 2022 about new marine spatial planning that will allow expansion of offshore wind power (Regeringen, 2022). Suitable areas for offshore wind power have been pinpointed which creates a faster opportunity to increase electricity production by 20-30 TWh per year. The marital spatial plans include The Baltic Sea, The Gulf of Bothnia and Västerhavet. The government of energy has been given the task of mapping out further potential locations for offshore wind power along with the Swedish agency for marine and water management to further increase Sweden's production of electricity by 120 TWh (Regeringen, 2022).

1.1.1 Current and Future Demands

Sweden's production of electricity stemming from wind power reached 27,5 TWh in 2020, compared to 19,8 TWh in 2019 (Energimyndigheten, 2022). The increase amounts to approximately 38 percent and is a consequence of Sweden's continual transition to the 100 percent renewable energy target by 2040. The amount of wind turbines had reached 4286 units by 2020 with offshore based plants responsible for only approximately 1,9 percent of them. (Energimyndigheten, 2022).

Sweden is divided into four different electricity areas as made visible in *Figure 1*. The deficit in electricity is highest in the south of Sweden while the north generally has a surplus of

resources (Energimarknadsbyrån, n.d.). Offshore wind power will most likely only affect sector three (SE3) and sector four (SE4) with the current electricity grid and marital spatial plans. The difference in prices is made even more visible in the mean average of each respective area in 2021. SE1 and SE2 have a mean average of 43,2 öre/KWh, respectively 43,3 öre/KWh. SE3 and SE4 have a lot higher with a mean average of 67 öre/KWh and 81,7 öre/KWh (Energimarknadsbyrån, n.d.).

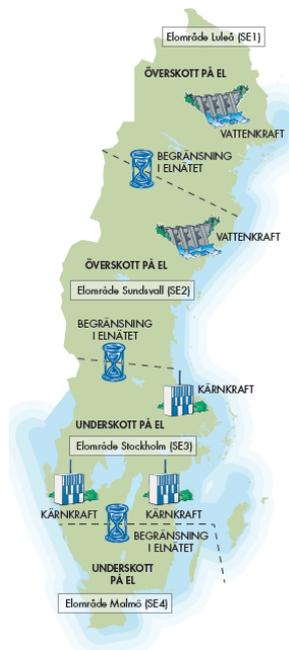


Figure 1. The different electricity sectors and their limitations. (Energimarknadsbyrån, n.d.).

The current demand and usage of electricity in Sweden is estimated to 140 TWh per year (Svensk Vindenergi, 2021). Wind power energy subsequently is responsible for approximately 19,6 percent of the total amount (Svensk Vindenergi, 2021). By 2045 the estimated demand will reach 310 TWh (Sweco, 2022). The increasing demand will put pressure on both new and existing energy sources to improve their capacity, technology, and efficiency. While onshore wind power plants have adapted and increased their efficiency as made visible in *Figure 2*, offshore wind power remains somewhat unchanged and unexploited in Sweden (Energimyndigheten, 2022). The number of plants has decreased between 2010 and 2021 and the production of energy has been quite volatile over the years, as made clear in *Figure 3* (Energimyndigheten, 2022).

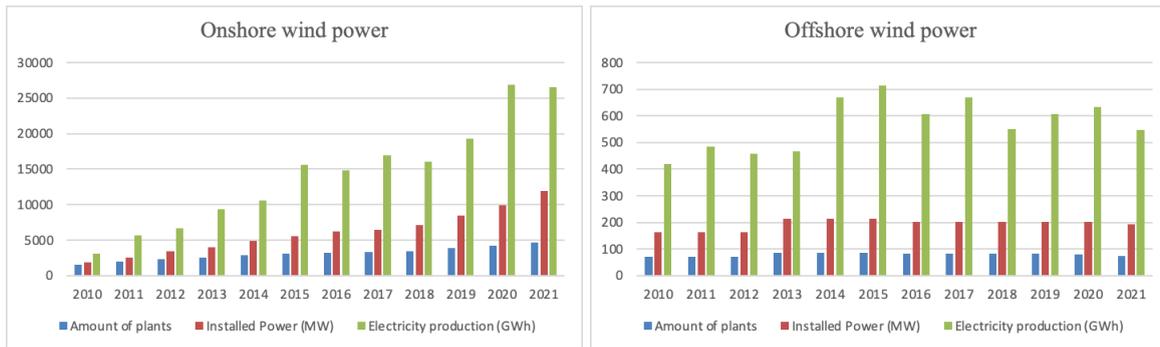


Figure 2. Onshore wind power. (Energimyndigheten, 2022).

Figure 3. Offshore wind power. (Energimyndigheten, 2022)

1.1.2 The Use of PPA in Investments

The reason for the stagnation in development of offshore wind power could be down to various reasons. Onshore wind power is cheaper on a KWh basis according to reports that estimated a 58 percent difference in 2005, which was again confirmed by the European Wind Energy Association in 2009 when their study showed that it was 50 percent cheaper (Valentine, 2011). While the gap has closed between the prices, incentives are presumably still not sufficient for actors in Sweden to invest in offshore wind power. An estimated 77 percent of all offshore investments in the EU have been financed by large companies (Karlton, 2016). The reason is most likely that smaller actors lack the possibility of financing offshore wind power projects with regards to their balance sheet, which in turn makes them dependent on project financing (Karlton, 2016). The expensive nature of offshore wind power investments and the dependence on project finance, subsequently leads to reliance on bank loans (Karlton, 2016). The capital costs related to the initial phase of the investments associated with wind energy projects are approximately 70-80 percent of the total cost, however while the front-end costs are high, further costs are arguably negligible (Valentine, 2011). Furthermore, Hvelplund and Djørup (2017) argue that only a few very large established companies can enter bidding on the offshore wind power projects.

Companies in the offshore wind power business might require risk minimization and a steady cash flow, which could be less of an issue with the help of power purchasing agreement (PPA). In 2021, organizations invested in 31,1 gigawatts of clean energy by PPA, which meant an increase of nearly 24 percent compared to 2020 (BloombergNEF, 2022). The large tech companies are responsible for over half of the deals with Microsoft and Amazon being the two largest investors in clean energy using PPA. The pressure is mounting on big tech

companies to decarbonize, which is reflected in their increasing investments in clean energy. One reason for the positive development could be that they had the backing of large companies to support their growth (BloombergNEF, 2022).

The contracts often stem from 8 to 15 years with one PPA-contract in Sweden even reaching 29 years with the company Norsk Hydro (Sweco, 2020). Since the contract length guarantees a certain income for investors, it has subsequently meant that investments in wind power almost prerequisites a PPA-deal (Sweco, 2020).

1.1.3 Actors on the Wind Power Market

Most of the companies that are responsible for being project developers tend to sell the wind power turbine or park to investors (Engstrand, 2017). The investors could either be industrial actors that own and operate the facility on their own or financial investors that hire a third party for maintenance (Engstrand, 2017).

While projects to build wind power turbines previously tended to be completed before investors invested, the market has changed (Eolus, 2022). It will become more common to buy the rights for the project and then hire the company for maintenance. The investors would then handle the funding of building themselves (Eolus, 2022).

Foreign investors have increased as owners of wind power in Sweden from 36 percent in 2016 to 66 percent in 2024 (SVT, 2022). Public pension insurance funds have through changes in law been given the opportunity to invest directly in wind power but are only responsible for a small percentage of the ownership. 85 percent of 117,5 billion of all investments are coming from foreign investors (SVT, 2022).

Moreover, Engstrand (2017) argues that since the demand for wind power has increased and a lot of capital has been invested, it will allow for funding with low interest rates and required rate of return. Investors that seek low risks want to make sure that there is a steady cash flow throughout the years. There is a risk regarding building of the wind turbine or park that will affect the investment if investors buy the project before its completion. Public pension insurance funds and other investors looking for long term, low risk investments can instead choose to invest upon completion of building the park or turbine (Engstrand, 2017).

1.2 Problem Discussion

Below are a few of the reasons why offshore wind power could be a necessity for Sweden in the coming years and why it is of importance to investigate how PPA can affect the industry's investment decisions.

1.2.1 Wind Capacity

Offshore wind power brings up a few financial question marks that have arguably been the denominator that is responsible for the lack of investments and production compared to onshore wind power. However, offshore wind turbines do produce the highest average power generation capacity (Greentech Media, 2020), which is an incentive for financial investments in offshore wind power. Along with the average energy price that brings less volatility, offshore wind power differs from onshore, which is made clear in *Figure 4* (Greentech Media, 2020).

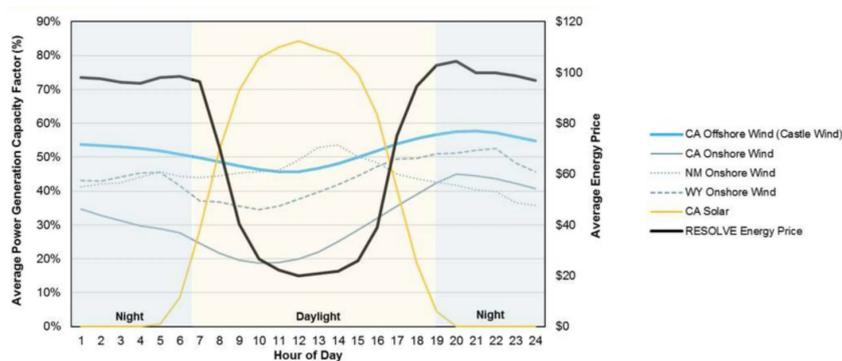


Figure 4. Comparing different renewable energy sources. (Greentech Media, 2020).

Another reason for why offshore wind power can be more lucrative than onshore wind power is the wind conditions. Wind speed is often better and increases even more the further from shore where the wind turbine is placed (Esteban et al., 2011). There are arguably much stronger and constant winds over the ocean than over the land. The data stated in *Figure 5* is the average amount of wind that has been collected during a ten-year long time-period (Global Wind Atlas, n.d.).

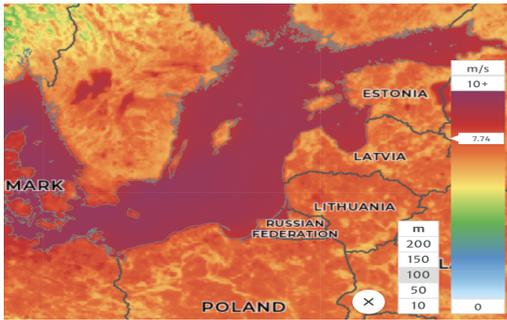


Figure 5. Average amount of wind in the past ten years. (Global wind Atlas, n.d.).

The reason why offshore average wind amount is important for the PPA market is because it can help the buyer and the supplier to agree upon which of the different PPA options would be the most profitable. It is also evidence of how offshore wind power's wind capacity is, compared to onshore wind power.

1.2.2 Permits and Electricity Grid

The Swedish government has tried to make the permit process easier, but it remains a costly investment for companies that are interested in investing in offshore wind power. With permit applications often taking several years, technology could improve during the process and disrupt planning. While Sweden does not have laws or regulation that directly applies to offshore wind power, there are several laws that indirectly affect the permit process (Svensk Vindenergi, 2021). Projectors that seek permits must develop an environmental impact assessment which for example adapts the localizational rule, which demands that the wind turbines are located at the best possible environmental location (Söderholm & Pettersson, 2011). Furthermore, they need permits for environmental hazardous activity and water operations. Söderholm & Pettersson (2011) argues that offshore wind power projects within the economic zone offer a more straightforward permit process than onshore wind power since there is not the issue of territorial planning. The authors claim that while the same environmental assessments from Swedish environmental law are applicable, projectors only need one permit from the Swedish government. Since there are areas pinpointed by the government, as mentioned above, the process of getting permits should arguably be more straightforward at present time.

While permits present a time consuming and expensive process (Svensk Vindenergi, 2021), another bottleneck is Sweden's electricity grid. The electricity grid in Sweden is congested due to the lack of possibilities of transferring electricity from sectors one and two in the

northern part of Sweden to sectors three and four in the south (Svensk Vindenergi, 2020). The problems stemming from the unevolved electricity grid can subsequently affect both consumers with higher prices, and companies who are arguably less likely to invest in the industry (Svensk Vindenergi, 2020). Sweden needs to make large investments with regards to their electricity grid to meet the future demand of electricity as well as the production of offshore wind power (Sweco, 2022).

1.2.3 Price Volatility

Electricity is sold at market price from a lot of the companies (Energimyndigheten, n.d.) which in turn means that the producing company is dependent on how the market price is evolving when deciding to invest in e.g., offshore wind power.

Electricity prices in the different sectors in Sweden differ and the simple explanation is supply and demand (Energimyndigheten, n.d.). When the demand is lower, producers lower their production and halt investments. If the prices are low, there is no real incentive for financial investors to enter the market. When the demand increases, there is no balance between supply and demand which subsequently leads to higher electricity prices and increased production and investments. The electricity prices are, when high, a signal to the market to invest and build more facilities. With more facilities the reliance on other countries' exports of energy would decrease (Energimyndigheten, n.d.).

The mutual European electricity market is responsible for trading of electricity and the trading is mainly completed on the different electricity stock markets, e.g., NordPool (Energiforsk, 2021). The main volume is bought on the market the day before delivery, and it is traded every hour. A new intraday market has emerged and increased along with the expansion of renewable energy sources, mainly wind power (Svenska Kraftverk, 2022). The market is a way for electricity actors, buying and selling, to achieve balance between production and consumption current day. When the supply is different from the calculations the day before, intraday market is a way of addressing the problem, especially with regards to weather-based energy sources, e.g., wind power (Svenska Kraftverk, 2022; Energiforsk, 2021).

Nordic countries (Sweden, Denmark, Finland, and Norway) are going to change to fifteen minutes as their settlement period for imbalances, which is due to be implemented in 2024 (Svenska Kraftverk, 2022). The change to fifteen minutes is a way of maintaining operational

reliability in the Nordic power system and to be less dependent on weather changes that affect renewable energy sources (Svenska Kraftverk, 2022). The changed settlement period could be a way for renewable energy sources to be even more profitable for producing companies.

Sweden is currently a net exporter of electricity due to them having a positive energy balance (higher supply than demand) (Svenska Kraftverk, 2022). The prediction is that the demand for electricity will increase, mainly due to industrial companies moving away from non-renewable sources of energy and using more electricity. While the raised demand could change the energy balance in Sweden, building of wind power systems is likely to increase the supply (Svenska Kraftverk, 2022).

PPA can be used as a way to make the electricity prices become more stable. Since the PPA price is set to a decided price the consumer will not notice the volatility in prices. The supplier on the other hand will notice the price volatility since if the wind is not strong enough for one day less electricity will be produced. The supplier will then have to look elsewhere for the electricity needed and perhaps buy it for the market price in order to transfer the correct amount of electricity to the buyer (Bruck et al., 2018).

1.2.4 Corporate Image and Greenwashing

The electrification has meant that companies have accelerated their need for renewable energy (O'Shaughnessy et al., 2021). With the costs for renewable energy continuing to decrease along with societal pressure on corporate social responsibility within the companies, the demand is expected to increase even more (O'Shaughnessy et al., 2021). The reason for companies deciding to invest in renewable energy is many times to enhance their corporate image to increase consumer demand and entice investors (Whelan & Fink, 2016). Large companies tend to invest more money and time in corporate sustainability reputations (Whelan & Fink, 2016), which is also accurate when looking at the largest investors in the PPA-market (Bloomberg NEF, 2022).

Companies tend to proclaim that they are 100 percent renewable, which in turn means that they buy the same amount of electricity that they use from renewable energy sources (Miller, 2020). The statement does however not cover at what time they are buying the electricity. Since electricity cannot be stored, the demand would have to match the supply every second of every day (Miller, 2020). One of the descriptions of greenwashing is the space in between

substantial action and symbolic action (Walker & Wan, 2011), and PPA does not necessarily mean that the company obtains 100 percent renewable energy. Depending on which type of PPA is used (Bruck et al., 2018) and the contractual agreement, PPA could arguably be a way for companies to improve their corporate image without taking any real action to improve society.

1.3 Purpose

This report aims to increase knowledge of what role PPA can have on offshore wind power investment decisions in Sweden and how PPA can help to finance offshore wind power projects. Furthermore, it will investigate in what way PPA can be used to improve firms' corporate image and if the connected actions can be regarded as greenwashing.

1.4 Research Questions

With offshore wind power being discussed frequently as the solution for future electricity demands and to decrease the difference in prices between the Swedish electricity sectors, these questions are designed to review PPA's impact in the industry.

- How can PPA affect offshore wind power investment decisions in Sweden?
- How is PPA being used to improve firms' corporate image, and can it be regarded as greenwashing?

1.5 Delimitations

The thesis expects to provide an accurate picture of Sweden's electricity consumption and demand. Therefore, the primary focus is on the wind power that is related to Sweden. The legislation regarding permits and offshore wind power in general differs a lot compared to other countries e.g., Great Britain, Netherlands and so forth, which makes it difficult to assess all countries. Even though the electrical grid today is connected with the rest of Europe, the report will mainly focus on Sweden's electricity grid. Decision making with regards to offshore wind power is moving forward rapidly, and new decisions are expected to be made in the near future. Offshore wind power is a sleeping giant in the Swedish energy business and perhaps, PPA could be the instigator for its awakening.

2. Literature Review

This chapter is divided into two parts. The first section will provide definitions from previous research and secondary sources to PPA, greenwashing and the not in my backyard problem. The second section will include previous studies and theories used as a basis to complement and understand the results from the thesis. This section lays the foundation for the discussion and selecting and motivating the research questions for the interviews.

2.1 Definitions

The definitions below are considered important and necessary to provide background and understand the study.

2.1.1 PPA

A PPA, also known as an electricity power agreement, is a contract that is signed by two different parties. The contract states that one party wants to buy electricity from the other party. The price of the electricity is set to a fixed price that is decided by the two parties (Bruck et al., 2018).

There are four options of different PPA that the two parties can consider, and these are stated below (Bruck et al., 2018):

1. The amount of electricity is sold and bought after the amount that is being produced. Moreover, there are no energy limits.
2. There is a minimum delivery limit. This means that an electricity supplier must deliver a minimum amount of electricity each year.
3. There is a maximum delivery limit. This means that the party that is buying the electricity only is allowed to buy a certain amount.
4. The final option includes both the minimum and the maximum limit. This means that the party that is buying electricity must buy an amount that is in between the minimum and maximum limits.

Bruck et al. (2018) discuss the four different options of PPA and the different opportunities and disadvantages. It is important for both parties to choose the option that suits them best. For instance, if a certain party does not know how much electricity that they require from their supplier option number one would be preferable. The offtaker would then buy the exact amount that they need (Bruck et al., 2018).

Another example would be if the buyer party wants to buy a very large amount of electricity and the supplier has the possibility to offer the right amount option two would be the best choice. This is because this option states that the buyer requires a large amount of electricity, and the supplier has the possibility to deliver. If the situation were the opposite, option three would be the best choice, since the buyer requires a smaller amount of electricity and then the supplier does not have the obligation to deliver a certain amount of electricity (Bruck et al., 2018).

The fourth option would be the best option in a situation when the buyer knows exactly what amount of electricity that they are going to need. They can set the maximum and minimum amount of electricity already from the beginning (Bruck et al., 2018).

A power purchase agreement comes with many opportunities, but it also has some disadvantages for the buyer. The disadvantages are important for the buyer to be aware of before signing a power purchase agreement. One disadvantage of PPA is that it is both time consuming and expensive to organize the contract and negotiate a deal that is suitable for all parties (Solar United Neighbors, 2017). Another disadvantage is that it is usually a third party that is installing and owns the energy systems. This can lead to problems later when it comes to questions such as who is responsible to make sure that everything works. All these aspects must be made clear in the contract. At the end of the PPA contract there are usually three different options. One is that the buyer of the electricity purchases the wind turbines at a fair market price. The second option is that the expiry date of the PPA is extended. The third option is that the agreement cancels, and the buyer is disconnected from the wind turbines and searches after other electricity sources (Solar United Neighbors, 2017).

2.1.2 Greenwashing

PPA and the renewable energy business allows for discussions to be had about greenwashing and if it is used in PPA. Below follows a few definitions of greenwashing and its effect on corporate image.

Greenwashing is a process where a company is providing false and/or misleading information about how they work with environmental questions. Today greenwashing is considered to be something that companies do to deceive their consumers into believing that the products that they are buying are more environmentally friendly than they actually are (Zhang, 2022).

Walker and Wan (2011) defines greenwashing as the space in between substantial action and symbolic action. Furthermore, they describe greenwashing companies' motives with regards to green talk as a way of handling their corporate image.

Delmas and Burbano (2011) uses another description of what defines a greenwashing company. The company would simultaneously have a poor environmental performance as well as a positive communication about their environmental performance. The authors also describe the different drivers for greenwashing. There are market external drivers (i.e., consumer and investor demand), organizational drivers (i.e., firm characteristics), nonmarket external drivers (i.e., NGO's, media, and regulations), and individual psychological drivers (i.e., narrow decision framing).

2.1.3 Not in my Backyard Problem

NIMBY is an acronym that stands for not in my backyard (Hubbard, 2009). Onshore wind power faces the problem of municipalities and neighbors intervening in permit decisions. Offshore wind power however, can arguably avoid the NIMBY problem and therefore avoid a few of the stakeholders. While offshore wind power in general often is more costly, NIMBY could be one less time-consuming problem to allocate cost towards.

NIMBY is a regular problem that a lot of different organizations face when it comes to building new constructions that interfere with the rest of the area. The NIMBY problem can be materialized when a new wind turbine park is being built to produce more energy. The people that live in the surrounding area do not want the production of electricity to happen close to where they live, even though they are not necessarily opposed to the idea of clean energy (Hubbard, 2009).

NIMBY does not necessarily need to be about a new building that will disturb the local area, but it can also regard social questions. For example, it has been shown that people usually oppose the construction of prisons, mental homes, and alcohol rehabilitation centers. People want the facilities to exist, but they do not however want it close to where they live. A metaphor referring to humans wanting to not only eat the cake, but also keep it (Hubbard, 2009).

The arguably largest problem regarding NIMBY and its relationship with wind turbines, is the decrease in house pricing. Wind turbines that are built near people's houses have decreased the value of their properties (Joly & De Jaeger, 2021). The reason why the value of the house is decreasing is because wind turbines can make disturbing noises, they cast a big shadow and interfere with the view of the landscape. People are in general more caring about the environment today than ever before. Lots of people want energy to come from clean energy sources but they do not want the production to happen close to where they live in order to avoid losing the value on their property. It is first after a distance of three kilometers away from the wind turbines that it is no longer possible to show that the wind turbines have any effect on the value of the residence. To get this result a regression model was made where pricing of houses and publishing dates of when wind turbine park was supposed to start being built was made. In the regression model it was clearly stated that there was a correlation between the decreased value of houses and when the information about the new wind turbine park was announced (Joly & De Jaeger, 2021).

The best way to overcome the NIMBY problem that is related to physical construction questions, e.g., building a wind park is to include the people that live in the nearby area in the planning of the construction project (Hubbard, 2009). If the population in the nearby area is allowed to take part in the planning of the project, they get a feeling that they can influence the process and thereby the chances of getting an approval from the local authorities increases. They are also less likely to complain afterwards (Hubbard, 2009).

2.2 Sustainability Theories

Below follows articles that relate to corporate sustainability and green energy, and while they are not investigating PPA or wind power directly, they are considered relevant in this study to gain a general understanding for the mindset within organizations and amongst the public opinion.

2.2.1 CSR and Regulations

Barney (1991) discusses in his article “Firm resources and sustained competitive advantage” the role of first mover advantage. Moreover, the author describes competitive advantage as implementing a value creating strategy that is not implemented by a competitor at the same time. Barney (1991) adds that the first firms that implement a strategy can gain a sustained competitive advantage. The first mover would gain access to distribution channels, while increasing their reputation and developing good-will with customers. The article also states that in order for first mover advantage to happen in an industry there have to be heterogeneous firms with regards to the resources they control (Barney, 1991).

Porter and van der Linde (1995) argue in their article “Green and competitive” that properly designed environmental standards can trigger innovations that eventually lower costs of a product or increase its value. Furthermore, they describe that these innovations can improve the environmental impact while also reducing costs, and therefore reaching a point where economy and ecology are working together toward profitability. Regulators tend to set regulations in a way that deter innovations which results in companies delaying and opposing regulations instead of innovating to address them. Moreover, the authors argue that good regulation enhances competitiveness and bad damages it (Porter & van der Linde, 1995).

Kramer and Porter (2011) discuss the role social improvement can have on long-term value in their article “Creating shared value”. The principle of shared value involves creating economic value in a way that also creates value for society by addressing its needs and challenges. They also describe regulations that enhance shared values three types of characteristics:

1. Set a clear and measurable social goal
2. Set performance standards but do not prescribe the methods to achieve them
3. Define phase-in periods for meeting standards

Kitzmueller and Shimshack (2012) categorize corporate social responsibility (CSR) in three parts in their article “Economic perspective on corporate social responsibility”.

1. Strategic - “we do good because then we serve the firm’s stakeholders”
2. Not-for-profit - the company accepts that they must reduce value to stakeholders in order to reduce negative externalities
3. Moral hazard - managers or employees engage with CSR beyond laws and regulations, with the motivation of feeling better or make friends

Furthermore, the authors divide the classic, monetary preferring and the socially driven stakeholders and shareholders into four different categories. Strategic CSR and profit maximization is reached when shareholders have classic preferences and stakeholders have social preferences. Intrinsic motivation and extrinsic incentive can lay a foundation for CSR in a company. Moreover, CSR can be viewed as an investment or an expenditure depending on the company (Kitzmueller & Shimshack, 2012).

2.2.2 Green Energy

Renewable energy sources are today getting more attention than ever before, with the reason being that environmental awareness has increased a lot in recent years (Kim et al., 2018). Governments are expanding their renewable energy sources and are trying to leave the area of using fossil fuel as a source of energy behind. However, to change the source of energy for an entire country takes time. Therefore, it is of importance to investigate how the acceptability of changing the energy source of a country looks. It is also important to investigate what the driving factors are for the individuals to change the energy sources. Perhaps, some people only want energy from green energy sources even though they must pay more, and some people prefer a mix that originates from different kinds of energy sources in order to pay a smaller price even though the effect on the climate will be larger (Kim et al., 2018).

Another factor that affects the perception of the population is the level of education. If the education level is high, then the demand for green energy will also be higher and if the education level within a population is lower than the demand of green energy sources within the population will also be low (Kim et al., 2018). Since the level of education is increasing all over the world today, so is the demand for green and clean energy. With a higher education level, the more aware people are of climate changes and therefore understands the need for

change. Another factor that is important for the individual person when it comes to changing their energy source is the price that they would have to pay for the new energy (Kim et al., 2018).

2.2.3 The Willingness to Pay More for Green Energy

The price of green energy sources is rapidly decreasing all over the world, due to international subsidies and new technology (Liobikienė & Dagiliūtė, 2021). However, the awareness of climate change within the private sector is also motivating the innovation process within the area to keep moving forward. Nevertheless, in some places the energy stemming from green energy sources is still higher compared to the price for energy that originates from unsustainable sources (Liobikienė & Dagiliūtė, 2021).

In many well-developed countries it is up to the private person to decide what kind of energy they want to buy. There are a lot of people that are willing to pay a higher price to get energy that comes from sustainable sources, while there are also people that are more opposed to the idea (Liobikienė & Dagiliūtė, 2021). There are some socio-demographic factors that are correlated with the willingness to pay for electricity that comes from renewable sources. The factors that play the biggest part and have the biggest impact on a private person's willingness to pay more for green energy is education, age, and income, while gender insignificantly determines this intention. Also, the awareness of climate change was a big factor when it comes to the willingness to pay a higher price for green energy (Liobikienė & Dagiliūtė, 2021).

If a person was highly aware of climate change and how to work to diminish the problem of climate change, they were more likely to pay a higher price for their energy if it comes from a green energy source (Liobikienė & Dagiliūtė, 2021). It was also shown in the survey that the younger a person was the more willingly he or she was to pay a higher price to get green energy even though he or she did not have the same amount of capital as an older person might have had. It has also been shown that the willingness to pay a higher price for energy that comes from renewable sources has increased a lot all over the world. For example, there was a recent study that was made in China that showed that 76 percent of the Chinese were willing to pay up to 10 percent more to get energy from renewable sources. Similar willingness to pay a higher price for cleaner energy has been shown all over the world everywhere from America, Europe to Asia (Liobikienė & Dagiliūtė, 2021).

2.3 Summary of Literature Review

The definitions in the chapter provided background with regards to the four different options of PPA-deals. This provides options for both sellers and buyers of PPA to put together the best possible contract for both parties. Moreover, disadvantages are discussed with one being that it is time consuming and expensive to put resources into. Greenwashing is then discussed and concretized as deceiving customers by saying one thing and doing another with the company's environmental work. Lastly, NIMBY is discussed in order to nuance one of the advantages that offshore wind power has compared to onshore wind power.

The second part of the chapter contains different CSR-studies, discussions about green energy and the willingness to pay for it. Later it will be used to form the research questions and nuance the answers from the interview in the discussion. First mover advantage (Barney, 1991) is used to explain the possible advantages from being one of the first large actors in the offshore wind power market in Sweden. Creating shared value (2011) and Green and competitive (1995) are used to discuss how regulators can affect the market as a whole. Economic perspectives on corporate social responsibility (2012) is used to discuss how shareholders and stakeholders preferences can affect both their environmental work and their profits. The last two parts of the chapter contains valuable discussions on what role green energy can have on society and more importantly society's willingness to pay more for green energy.

3. Methodology

The chapter begins with the research approach of the thesis, which argues why the selected approach was preferred. Furthermore, it contains selection of respondents and transparency surrounding the approach of the interviews. Moreover, data gathering is described along with an ethical consideration, and lastly the reliability and validity of the thesis is discussed.

3.1 Research Approach

Since offshore wind power and the PPA-market has a large number of stakeholders and a knowledge gap in previous research, it was decided to use a qualitative study to answer the research questions. The reason for this is because the offshore wind turbines and the PPA market are quite newly introduced to the market and therefore they are not that known to the public. A qualitative method is about investigating the personal view and information of the person that is being interviewed (Repstad, 2007). The research questions were formed in order to fit with the literature review and aswell create the opportunity for relevant actors in the industry to use their personal view.

Moreover, it was decided with regards to the arguments mentioned above that an abductive approach was going to be used in the study. In the selected topic for the study, it was decided that using both empirical findings and the theoretical framework was the best way to reach a qualitative conclusion (Davidsson & Patel, 2019). The result of the thesis is based upon interviews with large actors in the Swedish wind power industry. After initial mail contact with the respondents directly, it was concluded that for both parties, an online meeting was the preferred option. It was decided that in order to lower the possibility of company bias, we contacted the interviewees directly rather than the company itself. Depending on the available time, the interviews were held between 30 to 45 minutes. The answers were during and after the interview transcribed in order to maintain an accurate description of the respondents' answers. The primary data from the company's answers were afterwards combined with secondary data mainly from their own websites to provide relevant information and a comprehensive result. See *Appendix* for a detailed interview guide.

3.2 Selection of Respondents

When the interviewees were selected and contacted, it was a target to get different inputs from different people with different lines of work within the industry. The companies were carefully selected, and the respondents were chosen to provide different input to nuance the thesis. In order to get good results from performing qualitative research there is a need for variety within the respondent group (Davidsson & Patel, 2019). Different people carry different stories and come from different backgrounds. Therefore, they will have different views and knowledge about the topic that the author of the report wants to investigate. If the need for differences is fulfilled the results of the quantitative research will be higher (Davidsson & Patel, 2019). In this report it was chosen to interview three organizations that are active in or analyzing the area of: offshore wind turbines and the PPA market. Although all three of the respondents were part of on the selling side of the PPA-market, it was concluded that their answers would provide sufficient and differentiated insight in the subject. Below are the motivations why these actors were selected for the thesis.

3.2.1 *SR Energy*

The reason why SR Energy were chosen is because they were able to give a clear picture over how a company that has large capital behaves on the PPA market that is related to offshore wind turbines. They were especially relevant in order to gain an understanding of why offshore wind power and PPA is not profitable according to their calculations. The information provided by SR Energy was used to extend the data of this report but also to give other perspectives that made this report more nuanced. Since they have chosen to not use PPA they provided a different input compared to the other respondents.

3.2.2 *Eolus Vind*

The reason Eolus were chosen as a respondent in this report is because they are a company that actively is working with offshore wind power, mainly as a projector. Moreover, they are a smaller actor compared to the other companies, and could thereby provide a different view and opinion about the PPA-market. Eolus has increased the value of this report since they have provided us with the process of how PPA relates to the wind power market. They have also brought valuable insight within the area of the PPA market since they tend to use it in their projects.

3.2.3 Vattenfall

The reason why Vattenfall were chosen in our report is because they are one of the largest actors in the European market when it comes to offshore wind power. They are also an actor that is using PPA agreements even though they are a large company and arguably have the capital to invest in offshore wind turbines even without PPA. Another reason that makes Vattenfall interesting in this report is that they are a state owned Swedish company that operates in supporting other countries with electricity.

3.3 The Interviews

3.3.1 Structure of the Interviews

This study is built upon semi structured interviews. Semi structured interviews are categorized as a qualitative method. The characteristics of a semi structured interview is that the questions are specified but they still give room for open discussions, which was a necessity for the thesis and the abductive approach that follows. The purpose of open discussion is that it gives the room necessary for both parties to discuss the topic freely (May, 2013). The questions that were used as a foundation for the interview can be found in *Appendix*, where they are written in the same language as they were used during the interviews, Swedish.

The results that will be generated from the interviews will be analyzed in the most objective way possible. Furthermore, the answers will be clarified and developed in such a way that it fits with the report and correlates with the information provided by the person that will be interviewed, in order to increase the reliability of the thesis. By developing the answers given, the thesis can provide a deeper understanding of the selected research area (May, 2013). The qualitative method entails a flexibility in order to adapt the interview with follow up questions which is necessary to give the most accurate picture of the research area (Repstad, 2007).

3.3.2 Quality and Language

Furthermore, Alvesson (2003) is discussing the difficulties of getting a trustworthy answer from a semi structured interview. The method is quite complex and really language sensitive. It can also be hard to get consistent and clear answers to the questions that are being asked to the respondent. This is something that Alvesson (2003) is highlighting in his book especially

when the language might prove to be an obstacle. Therefore, there was a need for clarity towards the respondent during the interviews in order to avoid misunderstandings. After the interviews it was also experienced that when the language was allowed to move more freely a better conversation was held and the quality of the answers given by the respondents was higher. During the interviews there is a need for good dialogue and flexibility in order to get answers that are of the highest quality. The dialogue and flexibility also allowed for an approach towards the respondent in a professional way to become closer to the respondent's explanations.

In order to keep a high quality on the interviews it was also a necessity to be familiar with the subject that is being addressed in this report. Through the theoretical background within the subject, the questions in the interview were formed to be able to correlate with the chosen theories. Since this thesis is built upon a semi-structured interview, the questions were subject to change depending on the situation.

3.4 Data Gathering

3.4.1 Primary Data

The primary data in the thesis was gathered from the different interviews. It was reasoned that, since the three companies were so different, they could provide a comprehensive qualitative result. Two of the interviews were conducted via Zoom and one via Microsoft Teams. When discussing the best possible way of conducting the interviews, it was concluded that online meetings were the preferred options. All respondents were clear that their views on certain aspects did not necessarily correlate with the respective company's view, which is an important aspect to take notice of in this report.

3.4.2 Secondary Data

In order to provide background information about each of the three companies, secondary data from their respective websites were gathered and used in the empirical result. Mainly to show the readers of the thesis, the different sizes of the companies.

3.5 Ethical Considerations

It is also important to mention that the information that comes from the interviews with the companies is from private persons that are working in the company and not from the entire

company. One person has been selected in every company to represent the company's point of view and interests. The focus has mainly been to select a person that can contribute with the right information that holds a high quality rather than asking several people and getting quantitative responses. Therefore, the choice of person for each company has been an essential part of the report in order for them to represent the other employees and provide the most qualitative information.

3.6 Reliability and Validity

Objectivity is an essential part of the report. A lot of the information is biased, since wind power and electricity in general is discussed frequently in Sweden. Factors that must be evaluated and considered is for instance, that it is election year in Sweden, which creates incentives for the government to expand the energy industry. There will be a continuous discussion within the group with regards to the legitimacy of the collected information, and if the data could be interpreted in an unbiased way. By collecting views and data from competing theories and sources, the report can become unbiased and strengthen the legitimacy. The respondents' answers could as well be biased, which is something to consider in the thesis.

Problems can arise in qualitative interviews when the respondent is actively choosing to hide or avoid giving certain kinds of information. The reason why the respondent could be choosing to do so is because the answers might not be socially desirable and are therefore left outside of the content (Wibeck, 2010). This also means that there is a big chance that the respondent angles the truth of the answers so that it becomes more socially accepted and politically correct. Therefore, it is important for the researcher to reflect upon the context of the interview (Wibeck, 2010).

All the interviews were performed online through different digital platforms. Afterwards this is something that could have been done differently. By rather having the interviews to be held on site, the accuracy of the interview could have increased since the interaction between the respondent and the researcher would have been more accurate. If interviews are held in an environment that both the researchers and the respondent appreciate, the conversations will have a higher quality and therefore the answers given will also have a higher quality (Wibeck, 2010). It was experienced through the majority of the interviews that were held there was a desire to hold the interviews on site but because of the short time limits that

applies to the report and the traveling distance, it became impossible due to scheduling reasons. If the interviews were to be held on site instead of online the dynamic between the researchers and the respondents could have been different and therefore perhaps more information could have been collected. Moreover, the study could have contained either actors from the buying side of PPA or more actors from the selling side in order to nuance the answers.

4. Empirical Result

Below follows a summary from the three different interviews, containing the most important and relevant aspects and answers. Every section is divided into three separate subsections: the first part contains a short background of the company, the second and third part contains their answers about PPA with regards to offshore wind power and its effect on corporate image. When referring to the different companies' answers it is worth noting that the respondents' answers could be subjective and not necessarily represent the view of the company as a whole.

4.1 Scandinavian Renewable Energy

Scandinavian Renewable Energy, henceforth referred to as SR Energy, are projecting, building, and managing wind power parks with a long-term view. They currently manage 151 wind parks almost exclusively in SE3 and SE4. The company has to date invested approximately five billion SEK and are expecting to invest the same amount in the coming three years (SR Energy, n.d.). The empirical result of SR Energy is based upon an interview with their investment manager.

4.1.1 SR Energy's View on PPA's Impact on Corporate Image

Most of the PPA requests that SR Energy obtains, searches for agreements that demand a predetermined amount of electricity since it is best for both parties. Wind power is dependent on the weather conditions which means that a producer can most likely not guarantee that the agreed amount of produced electricity comes from the same source of wind park. The PPA would however mean that they sell the electricity along with a guarantee of origin. The guarantee of origin does however only mean that the electricity that is agreed upon is released to the market and into the electricity grid. The buyers of the guarantee of origin do not necessarily obtain the wind power produced electricity, since it is mixed in the electricity grid. SR Energy means that with the current electricity system, the only solution to guarantee that you are using 100 percent renewable energy is to directly connect to the wind power park. Furthermore, they argue that in the electricity grid, no one can see where the electrons are stemming from and henceforth it should not be described as greenwashing.

4.1.2 SR Energy's View on PPA and Offshore Wind Power

SR Energy has a clear idea of wanting to own the facilities that produce wind power and earn their profits by selling the electricity on the spot market. The company is not currently interested in entering the market of offshore wind power, because of the yield demands of the owners. They also mentioned that they want to build facilities with the lowest possible risk, which at the moment means onshore wind power. Moreover, the company admits that it is difficult to obtain permits for offshore wind power as well as connecting to the electricity grid and the cost related to that. While the profits currently do not seem to attract SR Energy, they are monitoring the development closely and are cautious and aware that they might miss the opportunity to establish themselves on the offshore wind power market if they wait too long. SR Energy attracts a lot of potential PPA customers, but has not, as it stands, entered any form of PPA contract. They argue that discussions regarding PPA are very structured in Sweden today and that the volumes being asked for are often low. Furthermore, they argue that since their main source of income is stemming from the spot price of electricity, there are no real incentives to enter PPA with customers. The owners of SR Energy demand a certain yield which would not be reflected if they used PPA according to the calculations made by the company.

SR Energy estimates that the service agreements for offshore wind power costs around 20 öre/KWh, compared to onshore wind power prices at 5 öre/KWh. Moreover, the costs of building offshore are significantly higher. The company wants to sell electricity at market price which according to them means they can build onshore wind power facilities by themselves, while using their own balance sheet. Unlike other actors in the wind power industry, SR Energy does not need to use loan funds from the bank to invest in onshore wind power. If their investments would be funded by project financing rather than their own regular balance sheet, the company argues that they would have to settle for PPA lower than the market price and that they would be dependent on loans from the bank. They mentioned that the yield offshore would according to their calculations be lower than onshore, which in turn would perhaps demand PPA. Offshore wind power is still appealing since the wind conditions are more stable and would allow a higher production of electricity. Lastly, SR Energy argues that the profit per KWh is lower when entering offshore wind power which in turn means that it is more favorable for projectors using project finance rather than large companies.

4.2 Eolus Vind

Eolus Vind, henceforth referred to as Eolus, are establishing, managing, and evolving renewable energy projects within on- and offshore wind power, solar energy, and energy storage. They have been active for 30 years and describe themselves as one of Scandinavia's leading wind power projectors (Eolus, n.d.). The empirical result is based upon an interview with the Head of Offshore at Eolus.

4.2.1 Eolus View on PPA's Impact on Corporate Image

Eolus has observed that there almost always only large companies buying PPA's. Furthermore, they believe that PPA is a price hedging. It is possible to buy electricity from only one source and the demand for those types of contracts is increasing. PPA could also be a way of increasing the amount of wind power parks. When there is a deficit in electricity reaching the offtaker, the producer of a PPA deal must buy electricity at spot price from a different source than agreed upon. The electricity could therefore have originated from anywhere in the electricity grid. Moreover, Eolus argues that greenwashing can be avoided if companies buy guarantees of origin. They are bought over time rather than per hour.

4.2.2 Eolus View on PPA and Offshore Wind Power

Offshore wind power will most likely increase along with the future increased demand of electricity. There are currently quite few offshore wind power projects, which subsequently means that investment companies want to enter the frame early to obtain lower prices from the projectors. There has been quite high demand for PPA in recent years according to Eolus. It does however depend on the current market spot prices which means that when electricity prices increase, there is a lower demand for PPA. Volatile prices that we have seen the past year rather correlates with onshore wind power. Offshore wind power offers more stability with electricity production since the winds are more stable and reliable than on land. The building process is very expensive and highly risky. The logistics regarding building and maintenance is also expensive. The permit process is a large bottleneck according to Eolus, with the Swedish armed forces as one of the stakeholders complicating the process.

Furthermore, PPA-prices are negotiated with regards to the market price and all agreements can look different depending on the conditions regarding each unique situation. They will however never be higher than the market price of electricity. Banks have high demand on

security and reporting, PPA is however a very good way to show a steady cash flow. Banks are more inclined to give out loans to offshore wind power projects since they can see large profit opportunities. The market will also lower their time limit of purchasing and selling from one hour to fifteen minutes, which would allow for more production of offshore wind power and renewable energy in general.

4.3 Vattenfall

Vattenfall is an energy company with markets in Sweden, Germany, Denmark, Netherlands, and Great Britain. They currently have 18000 employees across the company (Vattenfall, n.d.a.). Vattenfall produces electricity stemming from wind, hydro, nuclear, solar, natural gas, coal, waste, and biomass (Vattenfall, n.d.b.). They are operating within both on- and offshore windpower and are currently building the first subsidy-free offshore wind power park in the world (Vattenfall, n.d.c.). The empirical result of Vattenfall is based upon an interview with their Head of Business Area Wind.

4.3.1 Vattenfall's View on PPA's Impact on Corporate Image

Vattenfall have a responsibility when they have signed a baseload PPA, which is to deliver potential deficits in produced electricity. When they are signing PPA's, they always use guarantees of origin in order to establish companies getting 100 percent renewable electricity. Vattenfall guarantees that when there are deficits in e.g., the wind power, they will for example, produce the correct amount with hydraulic power and allocate the electricity on to the market. Furthermore, the current electricity system consequently leads to all electrons being mixed in the grid, which cannot be changed. Therefore, it should not be viewed as greenwashing. However, if PPA's were to be sold without guarantees of origin it would allow the producing companies to use non-renewable sources to address deficits in the agreed electricity production, which would be problematic and described as greenwashing. If a company produces the correct amount of renewable electricity and delivers it onto the market, it should not be viewed as greenwashing.

4.3.2 Vattenfall's View on PPA and Offshore Wind Power

Vattenfall is looking to be the company that builds the most offshore wind power in Europe from now until 2030. They are more interested in the European market since Sweden has enough renewable electricity with regards to demand and supply despite recent development

with electricity prices. If the world wants to replace non-renewable sources, the focus should be on other countries rather than Sweden. Offshore wind power in Sweden demands seven to eight different parallel permit processes. There is not currently a high demand for electricity that allows for a large expansion of offshore wind power, but that will most likely change when companies “go green”. Offshore wind power is however the obvious answer to the demand in SE4 and SE3 since the transfer between the north and south of Sweden is not sufficient. Furthermore, in order for offshore wind power to increase, all stakeholders that are involved in the permit process need to be pleased, which is easier said than done. The wind power parks are however often outside of the economic zone, which at least removes the veto from municipalities and could speed up the process somewhat.

All offshore wind power in Europe has different types of subsidies, which means the producing companies get paid for the amount of electricity they produce. The more wind power that enters the market, the more hours during the year without payment will occur. When the winds are very strong and the supply exceeds the demand, the price of electricity will move down to zero. With different subsidies it could even get lower than zero, which means producing companies need to pay in order to move electricity on to the market. Companies would therefore like to arrange for wind power parks without subsidies. This however comes with higher risk, more expensive, and higher interest in projects. Investors see these risks and a way to address the problem is by using PPA. The agreement shifts risk between producer and offtaker, which in turn means there is always a winner and a loser in every PPA-deal. Vattenfall never plans for PPA, and it is only used when there is a need in a project. Moreover, the respondent argues that PPA is a way of betting how the future will look. While electricity prices are high today, they can decrease a lot in the coming years, which could be a reason for PPA not being used. PPA-prices can always be lower or higher than the market price.

If a market is supposed to function properly, the electricity must be introduced onto it, which is not the case with PPA. Otherwise, it would not be a fair market. Vattenfall believes that a lot of offshore wind power will be built in Sweden but argues that must be the right timing with production and the demand of different industries. They also look for partnerships in order to lower the risks and expenses. Furthermore, the respondent argues that it at times is a lot better to look at the market price and forecasts rather than using PPA. With the investment of e.g., PPA the process of getting investors and start building could be quicker. Everyone involved knows the risks but are willing to take it.

5. Analysis & Discussion

Down below follows previous studies and articles that will be compared and analyzed with the results from the interviews. Analysis and discussion will be held with regards to the empirical result and the research questions in this thesis. This discussion is also the foundation upon which the conclusion is resting. When referring to the different companies' answers it is worth noting that the respondents' answers could be subjective and not necessarily represent the view of the company as a whole.

5.1 PPA's Relationship Towards Investments and CSR

5.1.1 Permits Stagnating Investments in Offshore Wind Power

Renewable energy in the form of offshore wind power can be viewed as a way of creating shared value. The needs and challenges of society (Kramer & Porter, 2011) is an increasing demand of electricity in the coming years which can be addressed with an increased offshore wind power production. The shared value principle does however not necessarily consider the expenditure of offshore wind power (Kramer & Porter, 2011). SR Energy's calculations implies that offshore wind power is less profitable than onshore, and that PPA would not change the outcome in a significant way at present time. Eolus, while working with offshore wind power, are using project financing and PPA when conducting projects. Vattenfall are working with large offshore projects, while using partnerships with other companies and PPA in order to fund these, they have even created a wind park with no subsidies.

One large difference between the companies is that Eolus can sell their projects or parts of them, while SR Energy wants to own every part of the production. It should also be noted that Vattenfall is investing in other countries than Sweden, compared to SR Energy. Perhaps the regulations by the Swedish government can be set rather to enhance shared value (Porter & van Der Linde, 1995; Kramer & Porter, 2011) and create an economic value without subsidies and PPA, to entice companies like SR Energy and Vattenfall to invest in offshore wind power in Sweden. Porter and van Der Linde (1995) also describes that regulators tend to set regulations that deter innovations. All three interviews mentioned that the permit process remains one of the largest bottlenecks while working with offshore wind power. Even if PPA

would allow a higher production of wind power offshore, permits still delays projects and demands time and money. A different type of regulation (Porter & van Der Linde, 1995) could allow for more offshore projects being built and therefore more incentives to use PPA as a way to address future cash flows and lower interests.

5.1.2 Shareholders Influence on Investments in Offshore Wind Power

A big aspect being described in this report is the need for change within industries in order to be prepared for the green energy wave. SR Energy has chosen to mainly focus on wind power projects that are based onshore since this strategy is connected with a lower risk according to their calculations. The results from the interview suggested that the company's shareholders were looking for low risk returns, which in turn would arguably create strategic CSR (Kitzmueller & Shimshack, 2012). Even if the stakeholders are socially driven and would approve of investments in offshore wind power, the classic monetary driven shareholders demand a profit that is not currently obtainable with offshore wind power (Kitzmueller & Shimshack, 2012). Vattenfall who are government owned have a yield demand from their stakeholders that is supposed to correlate with the markets. The interview suggests that from a socially and monetary driven standpoint (Kitzmueller & Shimshack, 2012), Vattenfall should be investing in offshore wind power in other countries rather than Sweden. According to the respondent, there is not a sufficient demand currently to match a potential large production. Since the permit process is more time consuming in Sweden there is more expenditure compared with building abroad, which increases the monetary incentives to use PPA with projects, but not in Sweden at present time. Eolus describes the market process as investors wanting to enter the frame early (Barney, 1991), in order to obtain lower prices. Once again, their description does not really create a monetary argument for offshore wind power, but it does however increase the potential demand for PPA when a project is created.

5.1.3 Views on PPA and Fear of Missing out on a First Mover Advantage

Out of the three respondents, only two of them are using PPA. SR Energy refers to PPA as a deal not worth taking at present time. They would rather sell their electricity at the spot market and will not compromise regarding setting a PPA price that could end up being lower than the market price. This correlates with Vattenfall's view of there always being a winner and a loser in every PPA-deal. With a company focused on a safe yield with low risk like SR Energy, there is no real incentive for them currently to 1) enter the offshore wind power market 2) use PPA and potentially lose money compared to selling on the spot market. They

are however monitoring the situation closely and are well aware of them possibly losing out on a first mover advantage (Barney, 1991). Vattenfall also mentioned the importance of timing between demand from the industry and production of energy happening at the same time, key to increasing offshore wind power in Sweden. Eolus agreed with the demand looking to increase in the coming years, along with the change of time limit when purchasing and selling electricity, as factors when increasing offshore wind power production. The first company to enter the market of offshore wind power at the right time could establish themselves with a first mover advantage (Barney, 1991) and become the leading actor in Sweden.

With regards to PPA, Eolus argues that it is a very good way for banks to see a steady cash flow in order to lower the interest rates on loans. They also mentioned that banks see offshore wind power as a good profit opportunity. Vattenfall, while not actively looking to use PPA in their projects, are also using it to finance different projects and guarantee a steady cash flow with the same basic argument as Eolus. Eolus moreover mentions that with increasing electricity prices, the demand for PPA decreases. With the recent development of electricity prices, there are arguably incentives in SE3 and SE4 to not use PPA, since the electricity prices are high. It is however next to impossible to predict the price volatility of electricity, which most likely will for the coming years create a demand for PPA. One argument for offshore wind power is that it could help lower the spot prices in SE3 and SE4, which in turn could increase the demand for PPA. While not necessarily a wanted precaution by the three companies, PPA remains a guarantee of cash-flow and a possible contributor to increase the amount of offshore wind power projects in Sweden in the future.

5.2 Green Energy and Greenwashing Within the Industry

5.2.1 Increased Prices for Green Energy and Avoiding Onshore Issues

If consumers indeed are more willing to pay a higher price for green energy, (Liobikienė & Dagiliūtė, 2021) calculations made by the companies should consider it when entering offshore projects in Sweden. The calculations made by SR Energy have shown that it is not profitable at present time, which they perhaps could revise when considering the yield potential. Given that the amount of capital is not the biggest factor for individuals choosing their energy source (Liobikienė & Dagiliūtė, 2021), but rather their age, education, and awareness of climate change (Liobikienė & Dagiliūtė, 2021; Kim et al., 2018), one could

argue that companies should invest more in offshore wind power. With the demand for green energy already high, producing firms might miss out on an opportunity that could be funded with PPA.

If an ordinary consumer would get the choice between getting energy from a wind turbine that is placed offshore or having the wind turbine placed right next to their house, they will most likely choose to have the wind turbine placed offshore even if they would have to pay a higher price for that electricity (Hubbard, 2009; Liobikienė & Dagiliūtė, 2021). Furthermore, with property value decreasing if a wind turbine is built nearby (Joly & De Jaeger, 2021), incentives for moving wind power production to offshore increases. Companies like Eolus can use NIMBY as an argument for building offshore projects in Sweden and avoid the municipality veto mentioned by Vattenfall.

5.2.2 Guarantees of Origin and the Possibility of Greenwashing

Something that is being addressed in the empirical results in this report is the guarantee of origin. It was concluded in all interviews that a popular way for buyers to get green energy was to purchase a guarantee of origin. This means that the offtakers can choose to pay an extra price for getting energy from a green energy source (Liobikienė & Dagiliūtė, 2021). However, it was also clarified by all respondents, but especially nuanced by SR Energy that there is no way of knowing for certain where the electrons in the power grid originates from.

With purchasing companies willing to pay more for green energy as well, it could perhaps open up opportunities for greenwashing. The offtakers essentially pay for more electrons stemming from green energy sources to enter the power grid rather than it being used by themselves. This puts pressure on the producing and selling company of PPA and the guarantees of origin to produce the correct amount of green electricity and for it to enter the power grid. All three of the companies stressed the importance of the guarantees of origins removing the obstacle of greenwashing. However, the description of the buying companies that they are using 100 percent renewable energy is debatable. With the same renewable electrons not necessarily being used by the purchasing company, and especially if there is no guarantee of origin, the statement would be misleading (Zhang, 2022). PPA and the 100 percent renewable energy statement could also be described as symbolic action (Walker & Wan, 2011), if the producing company is not putting the correct amount of green electricity into the grid.

The result made it clear that all three companies, while agreeing that PPA with a guarantee of origin cannot be considered as greenwashing, had somewhat different approaches towards the possible issue. SR Energy claimed that in order to make sure that 100 percent renewable electricity is being used by the company, they need to connect the facility directly to the wind park. Eolus argued that with guarantees of origins, there is no risk of greenwashing. Vattenfall further nuanced that if the producing companies measure the deficit of electricity and then put the same amount into the electricity grid stemming from other renewable sources it cannot be considered greenwashing.

6. Conclusion

This chapter contains the conclusion of the thesis, with the headlines being divided into the two different research questions. Lastly, it will provide a short text providing a foundation for future research.

Offshore wind power in Sweden remains unexploited and is somewhat of a sleeping giant at present time. While the wind conditions are arguably better than onshore, the complicated permit process along with the demand not being quite high enough yet is two of the reasons production of offshore wind power is yet to increase substantially. The government has however pinpointed suitable areas for production and the power grid is going to be connected to sea. Not in my backyard is a problem that will be avoided, and price volatility could stabilize with offshore wind power mainly being used in SE3 and SE4.

PPA is being sought out by many companies in order to reach their 100 percent renewable target as well as meeting the demands of their production. Mainly the large companies are investing in PPA and creating a demand that is noticeable for the actors in the market. While PPA is not necessarily wanted by the producing company, it is at times a necessity to fund investments and guarantee a steady cash flow.

How can PPA affect offshore wind power investment decisions in Sweden?

This report has shown that whether organizations use PPA or not, it is an important component that allows for discussions around investment decisions. Especially projectors seem to need PPA in order for them to fund their project financing. Without the steady cash flows stemming from PPA, they cannot get the same loans and subsequent interest rate from the banks. Furthermore, the companies are in somewhat of a stalemate looking to establish their offshore wind production at the same time as the demand from the industry increases.

Depending on the different companies and the shareholders that are connected to these, they have spread yield demands and targets within their organization. If a company wants and has the ability to acquire funds for offshore wind power without PPA, there is no real incentive to enter such an agreement. With PPA subsequently creating a winner and a loser, a company

looking for stable profits is probably not interested in it. At times, PPA is necessary to either guarantee lower interest from the bank or just a steady income. It remains a risk for loss in revenue for the producing company and depending on the electricity market it could create a substantial loss.

To conclude, PPA is being used by both smaller (Eolus) and large (Vattenfall) companies when creating offshore wind power projects. PPA has a role to play in future investment decisions, but it will depend on several aspects, with three of them being: 1) If companies can avoid using PPA, they will. 2) The development of spot market prices will determine whether it is worth the risk of PPA. 3) Depending on the demands from the shareholders of the producing company, PPA might not be of interest.

How is PPA being used to improve firms' corporate image, and can it be regarded as greenwashing?

Greenwashing has quite a few definitions, but if it is summarized with regard to this thesis, it could be described as a company deceiving the public with their environmental work. PPA allows for companies to obtain green energy and thereby proclaim that they are 100 percent renewable to the public. Since wind power is not always reliable, the correct amount of electricity cannot always be produced at the same source. PPA can always lead to deficits and therefore calls for contractual agreements for the offtakers to obtain their electricity.

One main aspect with the electricity grid is that every electron gets mixed together, whether it is renewable or non-renewable. For it to be avoided the offtakers facility needs to be connected directly to the electricity source, which is a lot of the time unrealistic. In this report there have been discussions around whether PPA can be seen as a form of greenwashing or not. If the producer combines the use of PPA with a guarantee of origin then it is difficult to consider it as any form of greenwashing, since then they have a guarantee that the electricity that the offtakers have paid for is getting produced at a renewable source.

To conclude, with the current electricity system, if producing companies allocate and produce the correct amount of renewable electricity onto the market it is not greenwashing. Companies that are using PPA with a guarantee of origin can claim that they are 100 percent renewable without any real legitimacy problems. The guarantee of origin is however needed, and the producing company must be able to produce the correct amount of renewable electricity. If not, it is arguably greenwashing created by both the producer and the offtaker.

Future research

This report aims to bring clarity to the subject of PPA and how companies can be using different kinds of PPA in order to find capital for their offshore wind power. Different buyers are requesting different kinds of PPA's, and some stakeholders do not request any form of PPA at all. Therefore, the aim of this report is to give a clearer view of how PPA can affect companies' images and the investment situation regarding offshore wind power.

It is our hope that this report can contribute to the existing research in the field by providing a clearer picture of the opinions of different stakeholders in the PPA and offshore wind power market. We also hope that our report can lay a foundation for future research. However, it could be subject to change since the developments in this area are progressing fast as new technology will change the prospects for how PPA can be used to finance offshore wind power.

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8. Appendix

Interview guide:

Company	Title of Respondent	Duration of Interview	Date of Interview
Eolus Vind	Head of Offshore	30 minutes	April 21, 2022
SR Energy	Investment Manager	45 minutes	April 21, 2022
Vattenfall	Head of Business Area Wind	45 minutes	May 5, 2022

Investment Questions:

- Hur tänker ni när det kommer till en prisbild? Hur sätts priset och vad ungefär skulle du säga att PPA priset ligger på per kWh idag?
- Kräver banken PPA-avtal vid lån inför investeringarna? Hur mycket påverkar ett konstant kassaflöde?
- Beror ett PPA-pris på prisutvecklingen på marknaden?
- Vilken typ av PPA är den vanligaste sorten?
- Har PPA ökat antalet investeringar generellt?
- Finns det planer hos er på att investera i havsbaserad vindkraft i Sverige?
- Hur ser framtidsutsikterna för havsbaserad vindkraft i Sverige ut?
- Vad är fördelarna med havsbaserad vindkraft kontra landbaserad?
- Kan PPA öka andelen havsbaserad vindkraft i Sverige?
- Hur mycket påverkar tillståndsprocessen huruvida ni börjar bygga havsbaserade vindkraftverk i Sverige? Är detta något som du tror vi kommer se mer av i framtiden?

Corporate Image Questions:

- Levereras den mängd el som bestäms i ett avtal helt av vindkraft eller köps obalanser på marknaden? Vad händer när det blir ett underskott?
- Vad är incitamenten för att sälja ett PPA?
- Finns det en risk att företagen köper PPA som en form av greenwashing? Ser ni det som ett problem?
- Hade ett stort företags t.ex. Googles PPA-avtal varit ett incitament för att investera i havsbaserad vindkraft?
- Varför köper stora företag som Google och Amazon PPA? Vad lockar dem?
- Hur kan PPA påverka hur man ser på ett företag?
- Kan ett företag verkligen titulera sig som 100 procent förnybara om de använder sig av PPA?
- Räcker ursprungsgarantier för att säkerställa att det inte kommer bli greenwashing?