White Paper

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Clean Energy and Sustainability Analytics Center (CESAC)

Summary

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Summary



Energy tourism is a type of special interest tourism that includes visits by tourists to current, retired, or regenerated production sites. Offshore wind tourism is one subset that has gained attention over recent years. Such tourism can involve boat tours or sightseeing flights to offshore wind farms, or can be facilitated through onshore viewing platforms. Virtual ways of exploring these attractions also exist in various countries.

Whereas most studies focus on tourists' motivations for and experiences from visiting energy sites, there remain gaps in the body of research in the context of offshore wind tourism. There are also gaps in assessing the challenges this type of tourism faces and the possible solutions that may be considered. Further, as many of these attractions are found in Europe, very little work has focused on the United States (US). It is important to address these gaps given the rapidly growing investment in offshore wind energy in the US in general and New Jersey in particular. The Clean Energy and Sustainability Analytics Center (CESAC) at Montclair State University, assessed the following:

- 1. Determining and describing existing offshore wind attractions
- 2. Identifying the challenges facing offshore wind tourism as well as suggesting possible solutions
- 3. Synthesizing the existing literature on offshore wind tourism
- 4. Assessing Ocean City's suitability for harnessing the tourism potential of the offshore wind farms currently being developed in southern New Jersey: Ocean Wind 1 and Ocean Wind 2.

Existing Attractions

Our assessment shows that several offshore wind tourism sites exist in the Baltic Sea and the North Sea in countries such as Denmark, Belgium, Sweden, Germany, and the United Kingdom. While some of these developments offer boat tours to the offshore wind farms, others offer onshore viewing platforms or virtual tours. The various ways these experiences are packaged demonstrate offshore wind tourism's flexibility and adaptability to both environmental and economic conditions, which can benefit both tourists and operators.

This flexibility is further demonstrated by the variety of ownership structures apparent among current offshore wind tourism operators. Whereas some are owned and operated by the company that runs the turbines, others are either totally independent or have a cooperation between the utilities and NGOs, local communities, and/or municipalities.

These offshore wind attractions also offer various financial, educational, and social opportunities. Existing operations are not only economically viable have created jobs and brought technological novelty to regions with limited tourism diversity. Moreover, offshore wind tourism sites offer opportunities for local communities to be involved in their operation in various ways, ranging from submitting art to be displayed on turbines to creating career development opportunities, which can generate public support and financial investments that bolster such operations.

Challenges Facing Offshore Wind Tourism

Offshore wind tourism is not without its challenges. Critically, few of these sites are currently in operation, with none in the United States. Tourism operators have limited capacity, and there is persistent uncertainty regarding applicable regulations, business models, and operationalization requirements. These can be exacerbated by factors such as the seasonal nature of the demand for offshore wind tourism, the need to invest in marketing the tourism package, and the need for an early adopter to lead the way.

Thus, active collaboration and coordination among developers, local businesses, tourists, municipalities, and other stakeholders are needed to address the issues of limited awareness about offshore wind tourism business opportunities. Further, the limited capacity of tourism operators must be addressed, potentially with legislative and administrative measures to deal with possible challenges associated with the applicable regulations and the insurance implications of recreational activity close to the turbines. Moreover, assistance programs similar to the ones that aim to encourage investment in the offshore wind industry supply chain may be required to encourage first adopters of offshore wind tour operations.



Synthesizing the Existing Literature

Focusing specifically on offshore wind energy tourism and relying on peer-reviewed papers published in the US and elsewhere, this white paper also summarizes the public's attitude towards offshore wind and its contributions to tourism. These opinions on the contributions of wind energy to tourism are divergent; whereas it can be aesthetically unappealing to some, it has also been known to enhance tourism for those interested in the technology. Better understanding these divergent opinions is important because they can affect public acceptance and have considerable economic implications.

The results of bibliometric analyses indicate that research regarding offshore wind energy projects' impact on tourism and their role as attractions is generally positive. Tourist attitudes often result from the substantive and symbolic importance that offshore wind energy projects have for beach goers. Such projects are considered aesthetically appealing to many, and more importantly, possess 'warm-glow' type effects, wherein tourists value the act of doing something beneficial for the environment as well as for others.

Ocean City's Suitability for Harnessing the Tourism Potential of Offshore Wind Farms

Focusing specifically on New Jersey, we also assessed the tourism potential of the

upcoming offshore wind farms, Ocean Wind 1 and Ocean Wind 2. Ocean Wind 1 has a capacity of 1,100 MW and will be able to power more than half a million homes starting in late 2024. Ocean Wind 2, recently awarded lease, has a capacity of 1,148 MW and will be able to power a similar number.

Our findings show that the size and nature of Ocean City's tourism economy and of Ocean Wind's planned operations are well positioned to not only address some of the challenges mentioned above, but also to build on possible opportunities. The city's preexisting popularity as family-based tourism destination, for instance, will help to mitigate the need for large marketing campaigns. The large number and variety of attractions and service sector businesses also show potential for synergy and for lowering costs.

Ocean Wind's existing network and activities, including weekly virtual port hours, mariner briefings, and a first-of-itskind weekly offshore wind training program for high school students, can be built out easily to resemble the educational component of the packages being offered by current tourism sites elsewhere. These activities, combined with various tourism features of the city, suggest that offshore wind tourism is a viable business to consider. In this white paper, we also discuss other aspects of offshore wind development that may be used to attract new and greater numbers of tourists.



1. Introduction

The global offshore wind energy market has shown considerable growth in recent years, and is projected to continue this growth in the coming decades. A significant portion of renewable energy, which is expected to grow by 20% and could meet 30% of total electricity demand in 2023, will come from offshore wind farms in the US (Smythe et al., 2020). Currently, Europe leads the offshore wind energy industry, with most of these projects being located along the coasts of eleven countries (Smith et al., 2018). Other countries such as Japan, China, Egypt, New Zealand, and Vietnam have also entered the offshore wind energy market and are making considerable investments (Smith et al., 2018; Smythe et al., 2020).

The US has lagged behind Europe and Asia in terms offshore wind development. Currently, US offshore wind accounts for only 0.03% of the 96.5 GW of installed wind capacity in the country (Carr-Haris and Lang, 2018). At the end of 2020, the only operational offshore wind energy installations in the country were the 30 MW Block Island Wind Farm project and the pilot 12 MW Coastal Virginia Offshore Wind Project (Russel et al., 2020; Parsons et al., 2020; Smythe et al., 2020). There is, however, considerable potential for offshore wind generation in the US, with the Biden administration establishing a target of deploying 30 GW of offshore wind by 2030 (The White House, 2021). On the east coast alone, a region that features high energy prices and demands, dense populations, high wind speeds, shallow waters, and supportive state policies, several projects are in development. Connecticut, Maryland, Massachusetts, New Jersey, New York, and Virginia collectively have commitments or goals by March 2021 for reaching more than 30 GW of offshore wind by 2035, representing billions in capital investment over the next decade (State of New Jersey, 2019; Russell et al., 2020; Center for Strategic and International Studies, 2021).

The existing and proposed federal lease areas located off the coast of New Jersey alone could support up to 12.5 GW of offshore wind energy, and the state has committed to reaching 100% clean energy by 2050 (State of New Jersey, 2019) (Figure 1). Wind energy is projected to become the state's largest renewable energy resource, with 23% of the state's energy coming from offshore wind and 19% from out-of-state wind (State of New Jersey, 2019).

Governor Murphy has signed two Executive



Figure 1: Offshore Wind Lease Areas off the New Jersey Coast (Source: Bureau of Ocean Energy Management's Commercial Wind Leasing Offshore New Jersey website)

Orders, No. 8 and No. 92, moving the state toward its goal of 3,500 MW of offshore wind energy generation by 2030 and 7,500 MW by 2035 (Figure 2). New Jersey's Board of Public Utilities (NJBPU) has also approved rules for the Offshore Wind Renewable Energy Certificates (ORECs) funding mechanism, paving the way for implementation.

In September 2018, NJBPU opened one of the nation's largest single-state solicitations for 1,100 MW of offshore wind, and awarded it to Ørsted for Ocean Wind 1. A second solicitation was awarded to Ørsted for Ocean Wind 2 shortly thereafter. Ocean Wind 1 has a capacity of 1,100 MW and will be able to power more than half a million homes starting in 2024; Ocean Wind 2 will produce 1,148 MW from the remaining portion of its Ocean Wind federal lease area. These projects are located on a 160,000-acre area leased by Ørsted (MARCO Mid-Atlantic Ocean Data Portal, 2021).

New Jersey also hosts a 183,000-acre area that comprises the Atlantic Shores project, leased jointly by EDF Renewables and Shell. Additional solicitations scheduled through 2035 are also being developed by the NJBPU. These developments come along with various legislative measures and capital investments that are being made by the state to showcase its commitment to offshore wind energy.

Despite the growing investment and attention offshore wind farms are receiving, the tourism potential of these developments in the state has not been studied. The challenges that exist for offshore wind tourism operations, what possible solutions can be considered to address those challenges, and the suitability of the coastal regions around these offshore farms for offshore wind tourism have not been studied.

It is, thus, critical to study existing attractions to learn what packages could be developed. It is also important to identify challenges and possible best practices that could be used as solutions. Finally, it is important to determine the suitability of coastal communities around the areas being developed. Such insights will be useful in developing plans that will maximize benefits from the opportunities offered by offshore wind tourism. This white paper attempts to answer these questions.

Solicitation	Capacity Target	Capacity Awarded	lssue Date	Submittal Date	Award Date	Estimated COD
1	1,100	1,100	Q3 2018	Q4 2018	Q2 2019	2024-25
2	1,200	2,658	Q3 2020	Q4 2020	Q2 2021	2027-29
3	1,200		Q3 2022	Q4 2022	Q2 2023	2030
4	1,200		Q2 2024	Q3 2024	Q1 2025	2031
5	1,342		Q2 2026	Q3 2026	Q1 2027	2033
Capacity Awarded + <u>Capacity Target</u> Total	7,500					

Figure 2: Offshore Wind Current and Projected Targets and Awards. (Source: Clean Energy Program, New Jersey Board of Public Utilities)

Chapter 2

Offshore Wind Energy Tourism

2. Offshore Wind Energy Tourism

Offshore wind tourism has been gaining attention over recent years and can be experienced in various ways, including boat tours, sightseeing flights, and onshore viewing platforms. These experiences can be combined with preexisting tourist activities such as fishing or done independently either in person or virtually. Information centers can also provide opportunities for a more detailed exploration of offshore wind by offering one-on-one interaction with onsite personnel. This diversity of options offers flexibility to both tourists and tour operators.

2.1 European Offshore Wind Tourism

Tourism based on offshore wind farms is already in operation in the Baltic and North Seas, and additional projects are under consideration or in development in countries such as Denmark, Belgium, Sweden, Germany, and the United Kingdom. For instance, Thorntonbank in Belgium is operational and attracts approximately 10,000 people per year for boat tours to local offshore wind farms (Bocci et al., 2018).

The Bremerhaven Economic Development Company (BIS) in Germany (North Sea) offers a guided excursion called 'Tour de Wind' which includes boat tours to visit offshore wind farms and bus tours connecting entire supply chain of offshore wind energy. The program also includes an on-land observation platform, and an information board and multimedia terminal, where the hosts post information describing the benefits of offshore wind energy (Franzén et al., 2017). The "Tour de Wind" sightseeing tour



Figure 3: Tour de Wind in Bremerhaven (Source: BIS Bremerhaven)

in Bremerhaven connects 20 stations related to onshore attractions and offshore wind energy, including a tour of the turbines (Franzén et al., 2017; Varona et al., 2017b) (Figure 3). In Middelgrunden, Denmark, tourists have the option to climb a 60-meter tower on one of the turbines among other activities, including an offshore information center and boat tours (Varona et al., 2017a; Bocci et al., 2018) (Figure 4). On National Turbine Day, which takes place every two years in Denmark, members and guests are also given the opportunity to tour inside the turbines.

The offshore wind exhibition center at Klimahaus Bremerhaven, Germany offers visitors a "virtual helicopter ride" around offshore wind farms. Lillgrund, Sweden, provides exhibitions including a model of the Lillgrund wind farm combined with written information and a reference to the website (Figure 5). These exhibitions are well received, with 2,000-4,000 daily visitors (Varona et al., 2017b; Franzén et al., 2017).

Stiftung Offshore-Windenergie, Germany, features information center onboard a tour ship, and is visited by an average of 29,000 visitors per year. Due to the overwhelmingly positive feedback received on the touring exhibition, a permanent exhibition, the "Offshore Info-Center Rostock", was also developed on a museum ship in Rostock Harbor. The temporary exhibition "Info Point Offshore Base Cuxhaven", Germany, was also upgraded into a permanent exhibition due to the large number of visitors and the positive feedback it received (Baedeker, 2011).

Nysted, Denmark, also features a permanent exhibition, "The World of Wind", which resulted from the high number of visitors that came to visit the Nysted Offshore Wind Farm's turbine construction phase (DONG Energy, 2006; FreeJournal, 2020). Nysted



Figure 4: Middelgrunden Offshore Wind Farm (source: Siemens press image)

features a number of interactive elements, including a movie about the offshore wind farm, a chance to browse the offshore wind farm website, a simulation that recreates a virtual helicopter ride through the wind farm, and a miniature wind tunnel (DONG Energy, 2006). Hvidovre, Denmark established demonstration turbines that people can view up close to learn, for instance, how more advanced offshore wind turbines do not produce problematic noise levels, thus helping to address possible misconceptions and fostering social acceptance.



Figure 5: Lillgrund Wind Turbine (source: Siemens press page)

Features:	Middel- grunden	Nysted	Scroby Sands	Rostoc k	Alpha Ventus	Bremer- haven	Cuxhave n	Hvidovr e
Offshore information center								
Onshore viewing platform with telescope and information board		•	•					٠
Boat tours								
Sightseeing fights								
Combined offshore and onshore wind energy tour						•	•	٠
Routes for sailing boats								

Table 1: Packages Featured by Existing Offshore Wind Attractions

These attractions can be experienced in various ways, resulting in a flexibility that can quicken the timing of the attraction's launch. For example, Scroby Sands Wind Farm Information Centre, located on the seafront esplanade at Great Yarmouth, UK, opened months ahead of the wind farm's power generating activities (Karlson et al., 2017; Bocci et al., 2018; Go2Sea, 2021). Whereas the more tactile types of tours can start after the site is operational and construction related safety concerns have been addressed, the information centers and onshore viewing platforms can begin serving tourists even before the site is operational.

2.2 Other Offshore Wind Tourism

With 16.3 GW of installed capacity, Europe is the world leader for offshore wind energy. The investment on offshore wind in all of Asia is only 9% of the investment in Europe; most of the installed capacity in Asia is found in China (2.4 GW), followed by Vietnam (183 MW) and Japan (41.3 MW) (Díaz & Soares, 2020). In addition to existing capacity, China is also responsible for the majority of offshore wind investment on the continent (DeCastro et al., 2019).



These numbers show that the offshore wind market itself is still in an early stage of development in Asia. The tourism potential of these farms, thus, has not been explored, as studies are in an exploratory phase that to focus on analyzing and tends characterizing offshore wind speed in the region (Díaz & Soares, 2020). The low-depth seas on the Asian continental platforms, which are the optimal location for these installations, however, can have implications for its future tourism potential. Díaz & Soares (2020) estimated that the global averages of distance to shore and water depth are 18.8 km and 14.6 m, respectively, while the averages of distance to shore and water depth for the

respectively. Since these farms are relatively close to the shore, they can be more easily accessed and toured. 2.3 **Operationalization Approaches**

The offshore wind tours can be operated by a diverse set of funding sources and ownership structures, including partial private ownership, private and public partnerships, and offshore wind developers. The offshore wind tour businesses in Thorntonbank, Belgium and Scroby Sands, United Kingdom, for instance, are owned and operated by the same company running the

turbines (Varona et al., 2017a; Bocci et al., 2018).

Middelgrunden, Denmark, however, represents another type of ownership (Middelgrundens, 2021). It follows a cooperative ownership structure whereby ten turbines are owned by the offshore wind company, Ørsted, and another ten turbines belong to the Middelgrunden Wind Turbine Cooperative. About 10,000 investors own the 50% of the offshore wind farms in the Middelgrunden Wind Cooperative and the rest are owned by the municipal utility company (Bocci et al., 2018). Hvidovre Offshore Wind Farm has another partnership featuring collaborative structure, а partnership between Hvidovre Wind Turbine Cooperative, DONG Energy, and an NGO (Hvidovre WindMill Guild, 2021). Hvidovre

Wind Turbine Cooperative itself is organized as a typical NGO organization with considerable participation from the local county, including representatives from established local companies and other similar NGOs sharing best practices.

The Exhibition ship "MS Greundiek", which is part of the German OSW Energy Foundation, is partly financed by the German Ministry of Environment. This shows yet another type of collaboration where state and federal resources are used. Promoting cooperative ownership structure enables effective involvement of local communities and ensures that revenues generated from tours circulate in the local economy, further garnering support from the local communities (Varona et al., 2017b; Franzén et al., 2017; Karlson et al., 2017).



3. Benefits of Offshore Wind

Offshore wind tourism offers various economic, employment, educational, and social benefits. Whereas these opportunities are not always mutually exclusive of one another, they represent a spectrum of potential benefits to tour operators, tourists, and the local community.

3.1 Economic Benefits

Offshore wind tourism can provide economic benefits because the presence of an offshore wind farm can add value to existing boat tours and make them more attractive. The revenue from the sale of power and tour operations in Middelgrunden and Hvidovre offshore wind farms in Denmark are anticipated to have an 11% return on the investment the first 7 years. For a period of 25 years, the return is 6.7% and the payback time is 11 years. Thorntonbank's tour operation in Belgium also makes up 5% of the company's total turnover (Karlson et al., 2017). An increased number of tourists would also benefit related local services, such as restaurants and gas stations, and diversify tourism activities. Wind Float Atlantic, a new floating offshore wind project in Portugal, for instance, at is expected to bring technological novelty in a region where the diversification of tourism activity is currently struggling (Franzén et al., 2017; Karlson et al., 2017; Bocci et al., 2018). Such synergy can also provide financial benefits to offshore wind farms from sectors outsourcing some affiliated operational activities, such as environmental monitoring and data collection.

The flows of spending associated with wind energy tourism also have several downstream effects. For instance, immediate effects of changes in tourism expenditures can result in production changes called direct effects. This includes an increase in the number of tourists staying overnight in hotels, resulting in increased revenues in the hotel sector, which in turn can affect hotel payments for wages, salaries, and taxes. Production changes are also generated, resulting in various rounds of re-spending in the hotel industry's receipts and other auxiliary industries such as products and service delivery to hotels. These indirect effects can include changes in sales, jobs, and income in these businesses. The additional economic activities in terms of sales, income, and jobs generated by tourism spending of this type are called induced effects.

The total economic impact of offshore wind tourism, which is the sum of the direct, indirect, and induced effects, thus, can be considerable and can reach individuals and businesses that are not even directly or immediately affiliated with tourism or offshore wind projects. Through the higher direct and indirect tax revenues, offshore wind tourism could also further contribute to the region and its ability to attract more tourists (Weickmann, 2005; DENA, 2008).

3.2 Employment Benefits

The effects mentioned above would be reflected in jobs created, labor income generated, value added, and output gains obtained. Jobs can be created in various sectors, including lodging, restaurants, recreation industries, transportation, retail, and groceries. Thus, offshore wind tourism will provide employment benefits in terms of the jobs it creates directly and the value it adds, which in turn, produce ripples of economic benefits. The job new opportunities created will result in higher employment rates and thus a higher purchasing power in the region.

3.3 Educational Benefits

Fascination with technology is a known driver of tourism demand. Curiosity about offshore wind energy could, thus, be expected to lead to an increased number of visitors and day-trippers (Hilligweg and Kull, 2005, Hübner and Pohl, 2012). The fascination with the technical aspects of how offshore wind energy works can be a distinctive or niche segment of the tourism industry (DENA, 2008b). Moreover, the design of the wind farm can make the site a landmark and an attraction. Middelgrunden's distinctive offshore wind design, for instance, makes it a landmark of the Copenhagen harbor, and was even featured on a Danish postage stamp (Schultz-Zehden et al., 2018).

This synergy of education and entertainment can not only give background information on offshore wind energy, but also make the trip into an adventure. This could take the form of "wind holidays" that feature offshore wind energy, kite flying, and sailing, or "zero emission holidays" that can be linked to major events related to wind farm construction phases (DENA, 2008. Hauschild et al., 2008). Hübner and Pohl (2012) show that 32 % of the respondents would be interested in offshore wind tourism features, including an information center, and that 15% of respondents would be interested in boat tours. Almost three times the number of people who visited the onshore information center in Büsum in Germany visited the offshore wind turbines aboard the exhibition ship "MS Greundiek" (Schultz-Zehden et al., 2018) (Figure 6). This suggests that there is higher demand for a closer, more tactile experience. The educational component is, thus, valuable not only on its own merit but also as a means of driving



Figure 6: Exhibition Ship "MS Greundiek" (Source: German Offshore Wind Energy Foundation)

interest in the other aspects of the tourism experience and in retaining customers (Hilligweg and Kull, 2005).

The types of visitors to Thorntonbank, Belgium, further confirm the recreational and educational aspects of such attractions (Varona et al., 2017b, Franzén et al., 2017). Whereas some of the tourists are active seniors and employees on teambuilding activities from companies nearby, the remainder is comprised of visitors from schools, whose attendants are targeted as a viable market segment. Lecture type sessions are also held during trips to Middelgrunden offshore wind farm, with a guide from the cooperative on board. These sessions are adjusted to the specific audience's background, ranging from tourists with a general interest, who get presentations on the background of the offshore wind farm and the ownership of Middelgrunden Wind Turbine Cooperative, to students or visitors with more advanced interests, who get supplemental sessions. information The presentations/lectures are held in English and Danish to reach a broader set of audiences (Varona et al., 2017).

The offshore wind tourism can also give tour operators an opportunity to offer additional promotional products or offshore wind related educational content, which can increase local knowledge about the importance of renewable energy and provide an opportunity to derive long-term benefits for local communities by promoting innovation.

The beneficiaries of such a synergy can also include other offshore companies and individuals seeking employment in such companies. For instance, the Info Point Offshore Base in Cuxhaven, Germany provides visitors with the latest information on the topic of offshore wind energy as well as training opportunities in the industry (Franzén et al., 2017; Bocci et al., 2018) (Figure 7). Mainstreaming such synergistic solutions in local development policies can also be a learning opportunity for neighboring communities and project developers. This can take the form of engaging the public in a citizen science program or by developing collaborations with K-12 students and local university students.



Figure 7: "Fascination Offshore" an Onshore Information Center (Source: German Offshore Wind Energy Foundation)

3.4 Social Benefits

Offshore wind tourism can create opportunities and lasting mutually beneficial contributions for the local tourism sector and residents. For instance, the Art on Windmills project in the Netherlands elicited applications from artists to display their art and designs (Varona et al., 2017a; Bocci et al., 2018). The Windlicht project connected a row of wind turbines with a neon green laser and transformed the wind farm into a light show in strong winds. These collaborations have a unique opportunity to create a sense of place and pride among locals (Wizelius, 2007). Such synergies can also mitigate potential conflicts and increase acceptance of offshore wind projects. Visual impacts of offshore wind farms on the natural landscape, for instance, can negatively affect the

acceptance of such projects in the coastal areas. The chance to visit such sites, however, could potentially overcome issues related to offshore wind projects' acceptance and the "NIMBY" (Not In My BackYard) phenomenon (Bocci et al., 2019).

The Middelgrunden and Hvidovre offshore wind facilities in Denmark have a cooperative arrangement for local engagement. Hvidovre's demonstration turbine itself is used as a proactive type of a communication strategy for making the technology tangible for locals and tourists. The offshore wind farm is positioned in shallow water close to the shore, where it is possible to reach and to walk around on a footbridge. Its establishment has been deemed a success not only in reducing protests but also in building a high degree of acceptance (Bocci et al., 2019). The more tactile and up-close experience has been responsible for addressing resident concerns and helped raise funds for operations (Sorensen. 2009). То this end. Middelgrunden and Hvidovre offshore wind farm sold 10,700 shares, financing one of the turbines and engaging the public during a hearing related to its environmental impact assessment. 20% of the shares were sold to residents of the county where the turbines are established, further highlighting the considerable potential such arrangements can have on mitigating opposition, engendering community support, and generating local interest.

The social benefits of offshore wind tourism attractions, in cases, are considered significant enough that the operators may not charge any fees. In Scroby Sands, United Kingdom, for instance, the content at the permanent exhibition is provided for free and the costs for the building and the displays are paid for by the owner of the offshore wind farm (Varona et al., 2017a; Bocci et al., 2018). The tour of Hvidovre Offshore Wind Farm demonstration turbine is also offered free of charge. Others charge modest prices; Bremerhaven, Germany, charged $9 \notin$ for adults and 7.50 \notin for children to visit offshore wind farms, while Alpha Ventus, Germany, charged 35 \notin for boat tours that lasted approximately 3.5 hours (Albrecht et al., 2013).

There are various opportunities for local businesses, community members, and utilities to benefit from offshore wind energy tourism (Franzén et al., 2017, Karlson et al., 2017). Offshore wind developers that do not have their own tour operations, for instance, can collaborate with other developers that have tour operations to have their sites included in the existing tour schedule. "MS Greundiek", belonging the German Offshore Wind Energy Foundation, now features sites being developed by E.ON, RWE AG, and WindMW.

Community involvement projects have been carried out by developers in Europe to reinvest some of their revenue into development projects. Such outreach has the potential not only to have ripple effects in the local economy and community but also to mitigate concerns about environmental harm or exploitation. By engaging the public to suggest possible causes to support, the developer/tour operator can also play an active part in the creation of new opportunities and ideas which can be realized with the support of the operation itself. Blekinge Offshore, Sweden, for instance, intends to annually reinvest 1% of total revenues from its wind farm in a fund for local environmental and economic development projects (Bocci et al., 2018).

Chapter 4

Challenges and Solutions

4. Challenges and Solutions

Although offshore wind tourism offers various benefits, it also faces some operational challenges. Here, we list some of the most common ones and describe possible solutions that could be considered to address them.

4.1 Lack of Awareness about Offshore Wind Tourism Opportunities

Most institutions have limited experience regarding offshore wind tourism, as most existing operations are recent and located in Europe. The lack of a similar experience in the US means there are fewer examples of successful operations from which to glean insights on best practices. Most of the studies that have looked at this topic perform ex-ante analyses, asking respondents to state how their spending will change in response to a hypothetical offshore wind that does not yet exist. Very few ex-post studies, which assess observed changes in tourist behavior such as spending patterns, exist, limiting practical information (Carr-Haris and Lang, 2018; Smythe et al., 2020).

Dialogue and cooperation between the various stakeholders, including academic institutions, policy makers, local businesses, and local NGOs, can be considered to encourage cooperation among different sectors that are important for developing offshore wind tourism. Communication and social awareness campaigns can also be considered to engage local stakeholders for effective dissemination of results and existing knowledge. Research and data production measures can also be undertaken to encourage a transdisciplinary approach to gather information on offshore wind tourism.

4.2 Limited Capacity of Tourism Operators

Existing tourism operators may have to change their route or the distances they travel. Thus, it might take some time for such an operation to become profitable. The price for a tour, for instance, would depend on the number of customers, duration of trip, time of day, and the availability of boats. Developers can explore this option and discuss it in their stakeholder interactions. If demand isn't known, then scheduling the right number and size boats and personnel could be challenging. Early adopters would need some form of assistance to mitigate the risks of initiating and sustaining such an operation so that others can follow suit.

The state can facilitate this through an incentive program. The state, through the New Jersey Economic Development Authority, is offering an Offshore Wind Tax Credit, which provides a \$100 million pool of tax credits to support major cluster-anchoring investments in manufacturing and portrelated facilities. This program provides eligible reimbursement for capital investments in a qualified wind energy facility. The current program focuses only on energy facilities that make a capital investment of at least \$50 million and create at least 300 new full-time jobs for manufacturers, suppliers, and installers. Either this program can be expanded to include investments in offshore wind tourism, or a similar type of initiative could be considered specifically for offshore wind energy tourism related businesses. Other funding opportunities can also be sought to ensure economic support for starting up and for maintaining pilot project activities long enough to gather valuable insights on the potential of offshore wind tourism.

The kind of assistance offered by the state can also be technical in nature. The state is capitalizing on the economic development opportunities of offshore wind by establishing the WIND Institute to coordinate and connect resources, train the workforce, conduct research and development, and make capital investments. The institute can add the tourism component of offshore wind tourism to its mandate.

4.3 Regulations and Insurance Implications

Tourism and offshore wind energy sectors both occupy the same space in the ocean, but share little else, which complicates licensing procedures and other matters. Licensing boat tours within the offshore wind zone, for instance, could become a challenge due to safety risks if not coordinated beforehand, and such lack of clarity could have insurance implications. Who has to pay the premiums among the two businesses involved, and how much those premiums will be will require further exploration.

Measures that limit risks should be needed to address this challenge. Developers, in this respect, can commit to using bigger turbines on their project. This will reduce the farm's overall physical footprint and contain the risk of collision to a limited area. Other legal and administrative measures can also be taken to clarify potential legislations and rules for regulating the combined use of the affected marine resources (Franzén et al., 2017).

Tour operators that already have insurance may only need to add this feature to their policy. As such, this solution may not represent a large adjustment. Regulators, developers, tour operators, towns and municipalities, and other stakeholders will need to coordinate and work together towards this solution.

4.4 Coordination for Offshore Wind Tourism Operation

Running offshore wind tourism operations will require coordination between the offshore wind farm owners and tour operators. In times of turbine maintenance, for instance, tours of the facility might not be possible. Such information has to be collected and exchanged well ahead of time so that arrangements can be made for its accommodation. How that information will be collected and administered should be established. The extent of the interest and the willingness required from offshore wind owners and tour operators to make this work will be critical. A mechanism, thus, needs to be created for such purposes. A coordinated approach, including offshore wind developers, the fishing industry, and other stakeholders could explore the issues of licensing and insurance practices and ways to motivate developers to consider arrangements to be made on the project level.

4.5 Seasonal Nature of Tourism

Interest in offshore wind tourism could be seasonal. Seasonal conditions, such as heavy winds, could force the tours to be cancelled for safety reasons. The Scroby Sands, United Kingdom, for instance, is operational only from May to October. The seasonal nature of its suitability and interest could affect the operation's ability to be economically viable throughout the year. However, such seasonal adjustments are not uncommon in coastal community tourism industries in general.

In areas where the overall interest for such boat tours or other tourism developments in relation to offshore wind might not be high enough, it would be important to have a detailed demand analyses. Such analyses will be able determine the size of the interest that exists and to develop the types of packages to which customers will respond. They will also be able to explore the different ways in which existing businesses such as water sports and fishing boat tours can be synergized with offshore wind tourism.

4.6 The Possible Requirement of Marketing Campaigns

Although this is common with any emerging industry, an active marketing campaign may be critical in raising awareness and interest in the attraction, especially early on. As with any other attraction, high and sustained interest is critical in maintaining a profitable tour operation. Thorntonbank, Belgium, for instance, was marketed as the largest wind farm in Belgium, which played a role in building its reputation and in attracting visitors (Bocci et al., 2018).

Proactive communication and information strategy such as running exhibitions and information centers, however, can also be effective in attracting attention. Tourists visiting these attractions and sharing the experience by posting about it on their social media accounts will also increase the attractions' exposure.



Chapter 5

Lessons Learned from Existing Offshore Wind Tourism

5. Lessons Learned from Existing Offshore Wind Tourism

The existing attractions and their popularity illustrate that offshore wind tourism is a viable operation. The discussions above also show that it is possible to address the common challenges that these operations face with adequate planning, an active stakeholder engagement, and a supportive policy environment.

The review of the literature on offshore wind tourism below shows the themes that come up in the published works focusing on offshore wind tourism and describes two reasons why tourists like these attractions: the 'warm-glow' effect and the enhanced beach-going experience.

5.1 Review and Bibliometric Mapping of Existing Studies

Considerable expansion in offshore wind energy projects is expected to occur in the US, and the implications of these expansions on tourism are notable, especially on the regions that directly depend on it. Little synthesis, however, exists regarding research dealing with offshore wind tourism.

5.1.1 Our Approach for Bibliometric Mapping

We analyzed the themes that are common in the existing set of studies focusing on offshore wind tourism using a quantitative approach. This approach provides а comprehensive picture of a specific subject area by mapping scientific publications and facilitating an objective categorization of works and items in numerical terms (Kayser and Shaler, 2014; Cookey et al., 2017). Quantitative reviews encompass text mining, systematic reviews, longitudinal reviews, and bibliometric mapping, each of which provides unique benefits. Text mining, for instance, is the process of deriving high quality information from text by devising patterns and trends through means such as statistical pattern learning (Kayser and Shala, 2014; Cookey et al., 2017). Bibliometric mapping is similar to text-mining, but the information retrieval is focused on the title, keywords, author, type of journal, year of publication, and abstract. It enables the extraction of information from large amount of textual data to give an overview of the subject area (Liew et al., 2014). Bibliometric techniques, on the other hand, have two aspects that involve construction and the

graphical representation of these maps (Van Eck & Waltman, 2009).

In this study, we used VOSviewer, software designed for quantitative review bv constructing and viewing bibliometric maps (Van Eck and Waltman, 2009). VOSviewer facilitates construction and clustering of themes providing visual representation by showing important terms in titles, keywords, and abstracts of publications (Van Eck & Waltman, 2009; Zeraatkaer, 2017). This approach also allows us to extract the most frequently used keywords that can be used to identify the key issues in wind energy tourism research and provide insights regarding current geographic and sectoral hotspots in offshore wind energy research.

The literature search for this quantitative review and bibliometric mapping encompassed publications from leading subscription-based, professionally curated collections provided by Science Direct, Web of Science, Scopus, and Springer link. We included a wide range of publications, defined as original research, commentaries, symposiums, reviews, case reports, and short communications to conduct a comprehensive compilation of publications in this field. The study papers included those written in English between 2007 and 2021, capturing significant developments in research on offshore wind tourism. Data was retrieved in May 2021, and thus articles published after this month were excluded. The search was refined to capture publications in offshore wind tourism by using the term, 'offshore wind tourism'. The search criteria was restricted to capture only articles that included offshore wind tourism research in the title and abstract. In the first step, we actively filtered any papers that had titles that did not involve either offshore wind or tourism. In the second step, we monitored the

abstracts to ensure that the article focus was on offshore wind tourism as described by Losse and Geissdoefer (2021) and Niknejad et al. (2021).

We applied filters on title, keywords, and abstracts. After applying the abovementioned exclusivity criteria, our final analysis corpus consisted of 74 out of the original 160 retrieved publications (41.25%). Science Direct had the most comprehensive peer-reviewed studies associated with the topic with 68.92%, followed by Web of Science (21.62%), Scopus (6.75%), and (2.75%). The 74 selected Springer publications were categorized based on the geographical distribution, publication dates, methods used, and name of journal.

The 74 study publications were distributed across 18 different journals. Energy Policy and Energy Research & Social Science had the largest share of publications at 14.03% each, followed by Renewable and Sustainable Energy Reviews at 10.52% each, and Ocean and Coastal Management at 5%. Twelve journals had less than 4% of the total publications.

For geographic distribution of publications in the corpus, we color-coded the countries using the software Tableau 10.0 to map the number of publications per country. The next section, presents the geographic distribution of the focus of these studies, as well as the number of publications over time, which was used as a proxy of research interest in the topic. For bibliometric mapping, the portable document format (pdf) files were downloaded and converted into text files and analyzed using VOSviewer 1.5.4. Using this technique, we identified a list of 'words' commonly encountered in offshore wind tourism research over the past 14 years. We used network visualization and density

visualization to illustrate specific word patterns that appeared most frequently in the literature.

5.1.2 Results

Vosviewer creates term maps that focus on network and density visualization, which are useful tools for presenting an overview of general structure and drawing attention to key areas of the map (Van Eck & Waltman, 2009). Network visualization works by displaying a term with varying text size, clusters with color coding, and scaled distance between items denoting contributions in the map. Terms occur in clusters depending on their relevance to the corpus; those with greater relevance occurred in higher ranked clusters and terms having lesser relevance occurred in lower clusters. The link strength is a relative measure of how terms are connected to other terms in the abstract. Our network visualization clusters were represented by a range of colors to display significance, with red indicating greater relevance and blue indicating lesser relevance to the corpus.

Analysis of the published works on offshore wind tourism revealed six clusters of considerations. Specifically, the offshore wind tourism corpus had 2029 terms, of which 195 met the threshold of a minimum occurrence of four repetitions. Terms occurred in clusters depending on their relevance to the corpus, with those with greater relevance occurring in higher ranked clusters and terms having lesser relevance occurring in lower clusters.

Cluster 1 had a total of 238 terms to form 47.7% of the cluster. It included terms such as 'acceptance,' 'aesthetic,' 'attitude,' 'belief,' 'conflict,' 'knowledge,' 'public opinion,' 'opposition,' and 'public support,' These terms had an average link strength of 42.54 and were mainly applied in studies such as qualitative interviews, surveys, contingent valuation, and choice experiments.

Other key terms included 'offshore wind energy,' 'offshore wind farm,' 'wind,' and 'wind energy,' which had an occurrence of 48.29% of the total in Cluster 1 with the greatest link strength of 222. This indicated how such terms were central in the discussion of offshore wind energy tourism. Cluster 2 had a total of 214 items (91.2%) with terms such as 'preference,' 'recreation,' 'tourism,' 'trip,' 'project,' and 'visual' having an average link strength of 88. Cluster 3 had 207 items, dominated with terms such as 'tourist preference,' 'choice experiment,' 'visual disamenity,' and 'social sustainability' with an average link strength of 28.8. Cluster 4 had 181 items, including terms such as 'concern,' 'ecosystem service,' 'impact,' 'perception.' 'risk,' and 'survey' with an average link strength of 545.

Cluster 5 had 55 items, with a link strength of 106 had terms such as 'assessment,' 'environmental impact,' 'tradeoff,' and 'public engagement'. Finally, Cluster 6 had a total of 76 items, with the most relevant terms being 'community,' 'effect,' 'focus group,' and 'stakeholder' (Figure 8). It has a link strength of 372. This result indicates how central various terms are in the discussion of offshore wind energy tourism.

The network and density visualizations in Figures 8 and 9 offer different perspectives on the frequency of terms in offshore wind literature. These take the form of heat maps, in which terms in warmer colors are more common and more important than those with cooler colors.



Figure 8: Network Visualization for Offshore Wind Tourism

The

density visualization works in a similar way as the network visualization, and uses heat maps to demonstrate areas with the greatest importance in offshore wind tourism research. The color-coding in density visualization follows a red, green, and blue format in decreasing orders of prominence as Table The hot points noted in 2. demonstrated the themes with the prominent trends in offshore wind tourism research with 'attitude,' 'area,' 'experience,' 'wind 'experience,' 'visual impact,' energy.' 'environmental impact,' 'benefit,' 'conflict' with highest order of prominence. Themes

like 'tourism,' 'recreation,' 'survey,' 'respondent,' and 'beach' have been less prominent, suggesting a need for surveybased tourism research.

In Figure 9, we can see that there are a cluster of nine hotspots that centered around words such as 'offshore wind farm,' 'project,' 'wind farm,' 'attitude,' and 'impact'. Other terms such as 'study,' 'tourism,' 'wind energy,' 'preference,' 'experience,' and 'recreation' appeared as orange hotspots. The terms represented in the network and density visualization, at first glance, show mixed results on the contributions of offshore wind energy projects to tourism. Some studies, for



Figure 9: Density Visualization of Peer Reviewed Publications of the Themes in Offshore Wind Tourism Research

Table 2: Clus	sters and Th	neir Respec	tive Color	Codes
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Cluster	Color code
Cluster 1	Red
Cluster 2	Green
Cluster 3	Blue
Cluster 4	Yellow
Cluster 5	Lilac

instance, report concern about the visual impact of offshore wind projects on tourism. Parsons et al. (2020) used a contingency analysis to assess the effect of offshore wind power project on beaches from Massachusetts to South Carolina and found that that proximity to the shore increases the negative effect.

The distribution of the publications across time can be found in Figure 10. There is a relatively even distribution of publications across the years, with highest being in 2018 with 10 publications and the lowest being 2013 with just one publication. It is apparent



Figure 10: Number of Peer Reviewed Publications for the Topic of Offshore Wind Tourism Between 2007 and 2021

that the topic of offshore wind tourism has been gaining attention within the last one and half decades. This trend, combined with the results, below show that there has been sustained interest in the topic. Global distribution of publications is mapped in Figure 11. Currently, fewer empirical studies on offshore wind farms have been conducted in the United States as opposed to Europe, as our analysis shows that European-based studies form the bulk of the corpus (61%). Global spatial distribution of offshore wind tourism research indicates that the hotspots for research are in the United States (21.31%), Denmark (11.48%), Germany (9.84%), UK and France (8.20%), Spain and Sweden (7.38%).

The 74 selected publications were categorized based on the geographical distribution, publication dates, methods used, and name of journal. The criteria for reporting geographical distribution of renewable energy studies were based on the country the research focused on. For geographic distribution of publications in the corpus, we color-coded the countries using the software Tableau 10.0 to map the number of publications per country.

5.1.3 Review Insights

Some of the studies reviewed suggest that offshore wind energy projects tend to have positive contributions to tourism. For instance, Landry et al. (2012), examined the impact of coastal wind turbines on tourism and recreation for residents in North Carolina. Using discrete choice experiments, they found that about 50% of their respondents supported offshore wind development and found no evidence of aversion to windfarms when they were placed 4 miles out in the ocean. Ladenburg (2010) applied an ordered probit model and reported that positive attitudes towards offshore wind farms are influenced by the type of visit to the beach and the proximity of the turbines from residences. Westerberg et al. (2013) conducted a choice experiment study in the French Mediterranean to elicit tourist preferences for wind turbine attributes



No of publications

1

Figure 11: Illustrating Geographical Distribution Using Color Coding That Represents the Frequency of Peer Reviewed Publications Focusing on Offshore Wind Tourism Studies *Map based on longitude and latitude (generated). Color shows sum of publications. Details are shown by country.

such as distance, reef-recreation, and environmental policy. They found that wind farms can be sited 5 km or more away without a loss of tourism revenue, provided there are coherent environmental policies and connections to associated reef-recreation activities. Observations from European offshore wind sites also indicate that offshore wind power boosts local economies by drawing more tourists and revitalizing other tourism sectors (Lilley et al., 2010; Smith et al., 2018). Another study suggests that offshore wind farms act as attractive feature for tourism, as there was a 19% increase in nightly reservations and a \$3,490 increase in monthly revenues for AirBnB properties in the peak tourism summer month on Block Island (Carr-Harris and Lang, 2019). A Bates and Firestone (2015) survey in Atlantic City, New Jersey and coastal Delaware found that increased public support for offshore wind came as a result of benefits to wildlife,

reduced electricity costs, and job creation, while reasons for opposition included wildlife impacts, aesthetics, tourism, and user conflicts.

Lilley et al. (2010) surveyed 1,000 randomly selected out-of-state tourists who had visited Delaware beaches in 2007. By using wind turbine photo-simulations at several distances, they tested tourist's willingness to visit and/or switch beaches based on the location of wind turbines. 25% of the respondents indicated they would switch beaches if wind project was located 10 km from the coast, and the avoidance diminished with greater distance. This same study also showed that some respondents would pay for a boat tour to view the offshore wind turbines.

These results show that the possible negative effects are not reported as consistently. Smith

et al. (2018), for instance, conducted a mixed approach method involving media content analysis, ethnographic participant observation, and stakeholder focus group analyses on Block Island. They found that despite the heightened concern by communities and policy makers in the planning and permitting process for offshore wind power, little evidence existed regarding what offshore wind impacts were considered negative.

Reported resource use conflicts with fisheries have not been quantified or proven sufficiently (Smith et al., 2018; Smythe et al., 2020). Even when negative effects are reported, a considerable share of the respondents are willing to visit the sites. Smith et al. (2018) showed the existence of opportunities for recreational fishing communities, resulting in jobs for boat and helicopter tour operators. Russell et al. (2020) questioned the long-term persistence of presumed negative effects. They argued against these presumed negative impacts of proximity, positing that acceptance would increase over time as residents became accustomed to offshore wind farm aesthetics.

Furthermore, Parsons and Firestone (2018) argued for the existence of positive attitudes towards offshore wind farms and break down the specific reasons for such an attitude. They reported that 52% of their respondents indicated that offshore wind farms would improve their beach experience, which results from the notion that something good is being done for the environment, while 11% of the respondents cited the aesthetic appeal of the turbines themselves. Smythe et al. (2020)found that tourists were heterogeneous, and recreation that motivations, past experiences, beliefs about renewable energy, among others, affected tourists' preferences. Smythe et al. (2020) noted that offshore wind tourism attracted

additional business opportunities such as offshore wind farm ferries, boat tours, and fishing experiences in Rhode Island's Block Island offshore wind farm. Our review, thus, shows that a generally positive attitude exists towards offshore wind tourism.

5.2 Weighing Offshore Wind Tourism Opportunities in New Jersey

As noted above, New Jersey is growing its offshore wind energy capabilities, and various legislative measures have been taken towards this objective. A supportive policy environment, including the establishment of the Offshore Wind Renewable Energy Certificates (OREC) funding mechanism and the WIND institute, are in place to facilitate These investments growth. this and supportive policy measures will be crucial in developing offshore wind energy and offshore wind tourism in the state.

In addition to these state level measures, there are various local capabilities and features that showcase the suitability of Ocean City as a site and Ørsted as the ideal developer for such an operation. Ocean City's tourism economy and Ørsted's current operations both have considerable potential not only to address some of the challenges mentioned above but also to build on available opportunities.

5.3 Suitability of Ocean City and the Ocean Wind Projects:

5.3.1 Ocean City as a Tourism Hub

Ocean City is an ideal area for launching offshore wind tourism, owing to its geographic location, existing tourism industry, and existing management infrastructure. The city features various attractions, including entertainment, beaches



and boardwalks, dining, shopping, golf, arts and culture, and adventure experiences. The city is also very accessible given its proximity to large metropolitan areas; it is about 60 miles from Philadelphia, 130 miles from New York, and 190 miles from Washington, DC. It is also a 60-minute drive from Philadelphia International Airport, and only a few minutes' drive from The Atlantic City International Airport, with shuttle, taxi, transportation and rental car readily available.

Trends in tourism for the state provide further City's evidence for Ocean suitably. especially when put in perspective against one of New Jersey's most popular tourist areas: Atlantic City. Cape May, where Ocean City is located, had an average visitation rate of 8.7% with an average 9.44 million visitors per year from 2015 to 2019, second only to Atlantic County. Tourism is growing in the area, as Cape May has enjoyed a 3.6% fiveyear average percentage change in total visitors. Tourist spending in the county is also high (OCNJ, 2019); the five-year average tourist spending in the county is \$6.43 billion, generating 11.1% of state and local tax receipts totaling \$550.18 million annually. These trends highlight the area's performance, as one of the state is largest and fastest growing draws both in terms of the number of tourists and revenue. This growth supports significant number of jobs; while the tourism constituted only 9.7% of the state's employment in 2019, it accounted for 60.4% of total employment in Cape May, showing the significance of tourism to the county.

There are also interesting spending trends to consider. The amounts spent by the tourists in Ocean City and on what they spend on are different as compared to both the state average and the average spending in Atlantic City; for every dollar spent by a tourist in Atlantic County, tourists in Cape May spend two dollars. Thus, even though fewer tourists visit the Ocean City, they spend far more per capita in relative terms. The unique per capita spending levels and the corresponding patterns of spending combined with the city's

ability to create jobs in tourism demonstrate how a unique attraction such as an offshore wind farm could have a positive economic impact on the city, the county, and the state in general. As this higher tourist spending circulates within the local economy, the benefits will also trickle down to other stakeholders, including individuals and businesses who are not themselves directly involved in the tourism sector. Because of the positioning unique and infrastructure available in Ocean City, there are a number of opportunities available.

5.3.2 Adapting Offshore Wind Tourism and Synergizing Efforts

As an existing tourism hub, Ocean City could rapidly assimilate offshore wind tourism into its business efforts. The existence of current and the city's preexisting attractions popularity could make large marketing campaigns for offshore wind energy tourism less necessary. Should marketing campaigns be undertaken, the novelty of the site as a family destination and as the first of its kind in New Jersey could become key, as other towns in Europe have adopted similar strategies that have proven successful. For example, the reputation of the offshore wind farm in Thorntonbank, Belgium, as the largest wind farm in the country was an important part of the marketing strategy used and the campaign was successful in building interest.

The wealth of existing tourist attractions also highlights opportunities for synergizing efforts. Offshore restaurants and merchandising products could also be opportunities for the tourism industry in terms of joint marketing and publicity campaigns. Fascination Offshore, Germany, for instance, had a series of kickoff events in different harbors and featured offshore windrelated talks organized in cooperation with local partners and politicians at local and regional, state, and federal levels. These events were used productively as the backdrop for several press conferences and panel discussions, leading to 35 press releases and over 170 articles in newspapers, magazines, and on the internet (EASME, 2016; Bocci et al., 2018). In addition to serving as opportunities for joint marketing and publicity, these events, publications, and information dissemination could help mitigate some of the offshore wind challenges mentioned above, particularly regarding lack of awareness about business opportunities coordination and the requirement for operational interactions.

Ocean City can also synergize offshore wind information centers and tours with preexisting ones. The Fascination Offshore, Germany, for instance, features its offshore wind exhibition at a site that is home to exhibitions dedicated to shipbuilding and maritime operations, covering the entire spectrum of seafaring and shipbuilding tradition in the area. This can also be expanded to include other businesses in the service sector, such as restaurants. For instance. offshore wind tours in Middelgrunden, take about 1.5-2 hours, and the tour operators collaborate with external companies featuring dinner either on board or in a restaurant (EASME, 2016; Franzén et al., 2017). The Offshore Wind Energy Centre for Bremerhaven is also integrated into the Klimahaus Bremerhaven, an existing tourist attraction. Such a practice could lower costs and benefit all parties involved.

Ocean City can also utilize virtual components of their tours. Ocean Wind currently has the network and the applicable systems in place to create virtual components of a broader tour operation. Ørsted hosts weekly virtual port hours to engage with the maritime and fishing community, which can be expanded to reach and educate a broader audience. These expanded briefings could include descriptions of current operational activities at the wind farm and information about the vessels being used. This could be similar to the ones developed for the offshore wind farms in Bremerhaven, Germany, which feature similar topics, including an introduction to 'Wind as Energy Source,' the site's 'Material and Dimension,' as well as 'Construction, Operation & Maintenance' (Franzén et al., 2017).

5.3.3 Management and Safety

Often, unclear regulations can occur due to a lack of communication between the offshore wind and tourism sectors, which can hamper growth and damage trust. Ocean City, however, has local intermediaries and clusters such as tourist boards and local councils that can play key roles in initiating and supporting the long-term functioning of offshore wind tourism. These tourism associations can empower the sector by gathering relevant tourism stakeholders and maintaining a network of local tour operators. They can also facilitate the collection and exchange of critical information that will allow for the smooth operation of business for all the parties involved. The tourism infrastructure and system in Ocean City, thus,

could not only prevent possible cross-sectoral conflicts, but possibly harness them for each sector's benefits. Existing synergies can also facilitate the transfer of good practices such as coordination of operations across the relevant businesses.

Regarding safety zone issues, operators of tourist adjacent businesses in Ocean City can also consider adopting safety zones at the wind farms to minimize the risk of injuries and the associated uncertainty regarding insurance premiums irrespective of which business bears the liability. By using larger turbines instead of the smaller turbines initially proposed for Ocean Wind 1, Ørsted has limited the physical footprint of its offshore wind farms. By keeping the tourism activity limited in the immediate offshore wind zone, Ocean Wind will be able to minimize the risk of collisions. For example, sailing boats are allowed into the wind farm on certain routes in Nysted, Denmark, which has allowed the site to gain increasing popularity (Weickmann, 2005). Bv identifying the balance between safety and the ability to explore the offshore wind farms more closely, Ocean Wind can enjoy similar increases in popularity. Ørsted can also adapt its current practice of providing a 300-meter



berth to survey vessels for mariners transiting or fishing in the survey area to potential visitors touring the completed wind farm. This distance falls between the range of numbers that exist currently - between the 50meter safety zone around Thanet offshore wind farm in Ramsgate, UK, and the 500meter safety zone in Bremerhaven, Germany.

5.3.4 Community and Stakeholder Benefits

While economic incentives are helpful, community benefits must be realized to bring a project success. Currently, Ocean Wind 1 has an active community involvement effort that offers small, women-owned and minority owned businesses support. It has funding infrastructure for resiliency improvements and provides emergency financial assistance for electric customers. Ørsted also works with the Fisheries Liaison and the Responsible Offshore Development Alliance to strengthen communications with the local fishing community (OceanWind, 2021). Ocean Wind 2 has also established a new 10-year \$1.5 million scholarship and career development program to create new opportunities for engineering and computer science undergraduate students. By building

on the Pro-NJ Grantor Trust provided by Ocean Wind 1, Ocean Wind 2 will allocate additional funds for businesses, including veteran-owned businesses, who wish to enter the offshore wind industry. Ørsted can expand these efforts and engagements to reach the broader population of potential tourists.

Regarding the use of educational content as a feature of the attraction, the Ocean Wind project has a first-of-its-kind weekly offshore wind training program for high school students in Atlantic City (OceanWind, 2021). This program can expand over time to reach out to younger or more advanced students in Ocean City, and eventually the general public in the region and beyond. The educational component and system, thus, is already in place, and can be further enhanced and scaled up to reach more people.

The various operation structures such as offshore wind owner operating tourism activities, partnerships with tourist operators, partnerships with NGO, and cooperatives with local participation can also be considered in Ocean City. This can also help the economic viability of that project and provide incentive for similar projects.

Chapter 6



6. Conclusion

This white paper reviewed existing offshore wind energy tourism attractions, described the benefits they offer, listed the challenges they face, and detailed what could be done to address those challenges. It also made the case for Ocean City as a suitable site for launching offshore wind tourism in the context of the offshore wind farms being developed nearby.

Our findings shows that offshore wind tourism exists in various countries in Europe and that it can be experienced in various ways, ranging from onshore viewing platforms to boat tours to virtual tours. Some of these ways of experiencing offshore wind tourism can be combined with existing water sports or fishing activities, which makes it easy to integrate into existing fishing or water sporting businesses. This suggests considerable flexibility that benefits both tourists and tour operators. Offshore wind tourism offers several benefits. The economic benefits include opportunities for generating revenue for tour operators and for local businesses such as restaurants, curio shops, and gas stations. New streams of income could also be such activities generated from as environmental monitoring and data collection.

These flows of revenue will also lead to downstream benefits through the indirect and induced effects. Thus, even individual and businesses who are not directly involved with tourism or offshore wind projects could benefit from offshore wind tourism. The employment benefits will include various sectors as lodging, restaurants, recreation industries, transportation, retail, and grocery.

In addition to raising revenue, tourists' fascination with offshore wind technology could also have educational benefits and lead to synergies between education and

entertainment. This could attract and benefit students as well as create an opportunity for an even greater exploration of the topic and a possible entry into a career in offshore wind.

Opportunities also exist for creating a mutually beneficial arrangement between local communities and developers/tour operators. These social benefits of offshore wind tourism will include opportunities for local artists to display their art and design. These experiences create a sense of place and pride among locals and build social acceptance. By allowing tourists to come up close, inspect the turbines, and see firsthand how they operate, these tours can also remove possible misconceptions, further building social acceptance. This also creates opportunities for local communities to invest in these farms and operations, which reinforces the economic benefits offshore wind tourism provides.

Although offshore wind tourism faces certain challenges, adequate planning, active stakeholder engagement, and a supportive policy environment can be applied to mitigate these challenges. The lack of

awareness about offshore wind tourism opportunities, for instance, can be addressed by dialogue and cooperation between the various stakeholders, including academia, policy makers, local businesses, and local NGOs. The limited capacity of tour operators can be addressed by creating a supportive policy environment that helps first movers. Existing programs that train the workforce, conduct research and development, and make capital investments can add to the tourism component of offshore wind farms. Legislative and administrative measures that deal with safety zones can also address risk and insurance considerations for operators. Better coordinating the operation of local tourists, tour businesses, operators, municipalities and other stakeholders could also address the possible need for coordination of offshore wind tourism operations.

The seasonal nature of the operation and its requirement of marketing efforts, especially early on, are features common to all coastal community tourism operations and new attractions. The uniqueness of the experience in an era of social media could minimize



these challenges and could possibly transform them into opportunities.

The result of the existing literature shows positive opinions regarding offshore wind tourism. Although some studies report negative reactions such as wanting to change rooms in hotels within the view shade of offshore wind turbines, tourists are also interested in observing these attractions from onshore platforms and from boats.

In addition to having an opportunity to build on the lessons from existing attractions, Ocean City and Ørsted have features that are ideal for building on positive tourist sentiments.

New Jersey has an aggressive renewable energy goal where offshore wind will play a considerable role. To this end, the state has created a supportive policy environment that supports investors and trains the labor force to work in this industry. Ocean City is also an already established tourist destination, which reduces the need for a marketing campaign. The existence of various attractions makes it easy to synergize this new industry with existing attractions and businesses.

Existing local intermediaries and business councils can address regulatory challenges and facilitate communication among the relevant stakeholders. In addition to the city, Ørsted also works with Fisheries Liaison and the Responsible Offshore Development Alliance to strengthen communications with the local fishing community. This network creates opportunities for coordinating efforts, among other benefits.

Ocean Wind 1 and 2 also have an active community involvement effort that supports small, veteran, women, and minority owned businesses. Ocean Wind 1 has funding for infrastructure resiliency improvements and provides emergency financial assistance for electric customers. Such initiatives will build social acceptance and possibly drive interest for offshore wind tourism in the area.

Ocean Wind 1 also has a weekly offshore wind training program for students. Ørsted can build on this not only to increase the social impact it has, but also to convert this program into one component of the attraction itself, which is a practice existing attractions feature.

Further studies are required to determine the scale of the interest that exists for such an attraction. Such studies are required to assess the specifics of how tourists feel about offshore wind tourism as a potential attraction, how it affects their spending decisions, and what that will mean to the regional economy. Such studies are also required to determine the types of packages to which tourists would respond and to determine the amount they would willing to pay. Such information will be useful in determining the overall size of the market and in starting to make the plans for making offshore wind tourism a reality in the state.

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