Project Development Report

Gulf Coast Wind

California State University Maritime Academy

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Background/Mission Statement:

The Cal Maritime CWC Project Development Team has set out to develop a 154MW wind farm in the waters adjacent to the Port of Galveston. This project will operate under the name "Gulf Coast Wind." The Gulf Coast Wind development will serve as a pilot project to determine the feasibility of a large-scale wind farm off the coast of Galveston. The lease block selection of this wind farm was determined through an analysis of siting considerations and has resulted in a full-scale wind project plan. In addition, this report will contain a financial analysis, environmental mitigation plan, local, state, and federal policy, and our farms' impact on the local community. Gulf Coast Wind seeks to provide the Galveston coastal community with not only a clean source of energy, but opportunities for economic development.

Chapter 1: Site Selection

Gulf Coast Wind has selected two lease blocks in the Southwest corner of the lease area for the location of our site. The selected site location avoids shipping lanes and existing oil infrastructure, reducing risk to ocean users and pushback from the local community. In addition, this site location will allow for transmission from the offshore substation to the Freeport point of interconnection without overlap of existing pipelines and cables. At this site, the Gulf Coast Wind Farm will be 25 nautical miles from Galveston, and 41 nautical miles from Freeport. The selected lease area is 11,520 acres, based on industry averages of $9,600 per acre, the cost of the land lease will be $110,592,000.

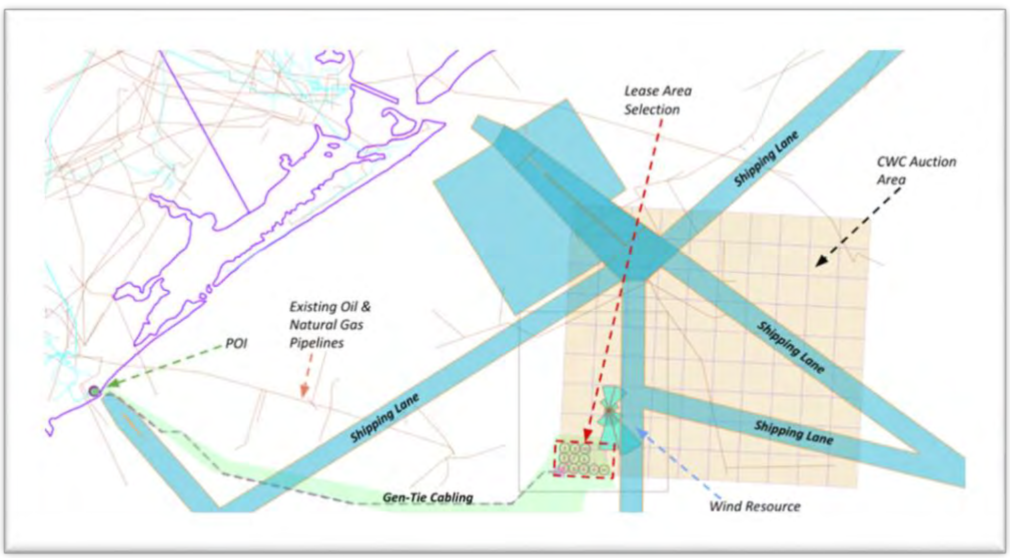


Figure 1: Openwind software displaying lease area blocks selected with shipping channels and existing oil and natural gas pipelines shapefiles layered.

Chapter 2: Site Design:

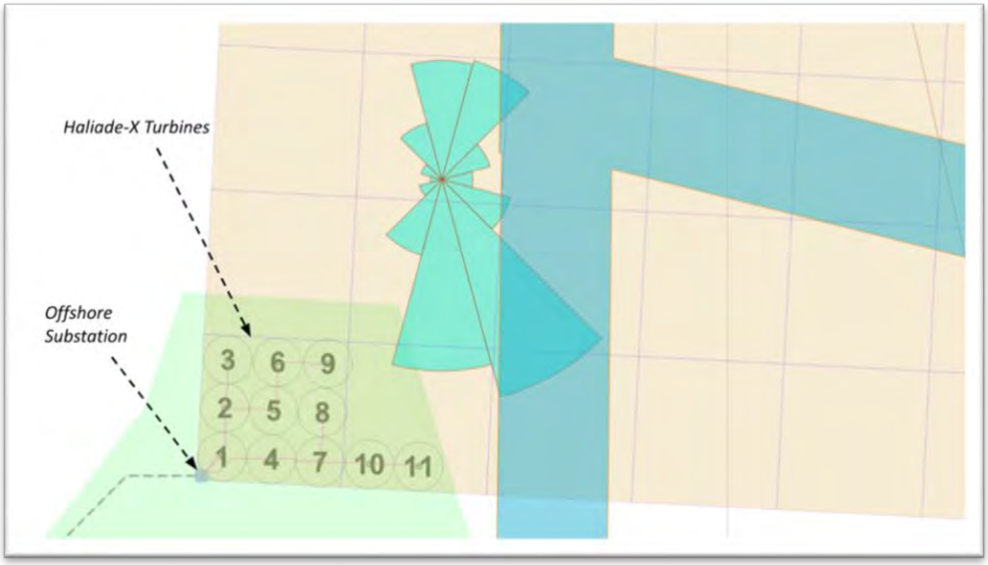


Figure 2: OpenWind software displaying turbine *layout of eleven GE Haliade-X 14MW turbines spaced 1 nm apart to mitigate wake effect with an array efficiency of 95.6.*

Chapter 3: Site Characteristics

3.1 Site Preparations

The Gulf Coast Wind site is going to require minimum site preparation during the first three stages of the project. This is due to the foundation selection, and geotechnical features of the site location. Unlike a gravity-based foundation, the twisted-jacket foundation does not require extensive site preparation. In preparation for installation of the jacket foundation, large seabed objects must be identified and removed from the site location to prevent interference with installation [6].

3.2 Wind Resource:

The average wind speed at the site location is 7.1 meters per second. One-site wind speed experiences limited variation, and there are no immediate obstacles on site. Wind direction varies throughout the year, with the winds moving Northward for approximately seven months of the year [41].

3.3 Bathymetry & Geotechnical Data:

The Gulf Coast Wind Farm is located on the Texas-Louisiana shelf, which has broad and shallow features. Due to the shallow bathymetric composition, it has an average depth of 21 meters. Our site is not located on the continental slope, therefore considerations for seafloor rises and salt domes will not need to be made. The seafloor at our site location is made up of a combination of mud, clay, and sand [19]. Gravel and rock substrates are known to appear at the outer edge of the continental shelf, but the Gulf Coast Wind farm is located 53 nm from the shelf edge.

3. 4 Significant Wave Height & Hurricane Impacts:

Wave heights at the site location average between one and three feet in height [22]. As a result of these conditions, wave height will not interfere with construction, installation, or site operation.

The risk of hurricanes and tropical storms is minimal at the site location. Regionally, wind speeds greater than Category 1 rarely occur, with Category 2 storms occurring every thirty years. Although most storms have been Category 1 or less, there have been four storms reported since 1851 that have caused extensive damage [22]. Twisted jacket foundations have been proven successful in preventing damage to offshore turbines. Twisted jacket foundations were successful in the oil and gas industry, enduring the Category 5 winds of Hurricane Katrina [12].

Chapter 4: Site Challenges

4.1 Local Ocean Activity & Industry Mitigation

The Gulf of Mexico has extensive ocean activities, including a large oil and gas industry, as well as developed shrimp fisheries. The Gulf of Mexico is riddled with drilling platforms, pipelines, and boreholes which Gulf Coast Wind avoided during the siting of our farm. Additionally, the Gulf is home to a well-developed shrimp fishery with a market value of $363 million [19]. To mitigate the negative impacts that Gulf Coast Wind may have on local fishers and coastal businesses, Gulf Coast Wind will establish a direct compensation fund for fishers and shoreside businesses that can prove that they have lost income as a direct result of Gulf Coast Wind operations. Gulf Coast Wind will create an equipment loss system for local fishers. Local fishers can complete a gear loss claim form, which will put them in direct contact with the Gulf Coast Wind Fishery Liaison. Our liaison will ensure that lost or damaged equipment is compensated accordingly. Gulf Coast Wind will work alongside local fishers and the National Marine Fisheries Service throughout all phases of the project.

4.2 Military & Airspace

Gulf Coast Wind aims to reduce impacts on aviation safety and local military facilities as much as possible. One of the major safety concerns of offshore wind farms is aviation radar interference. Aviation radar is specifically designed to present only moving objects on a pilot's screen. The spinning blades of the turbine can appear as false echos on radar due to the movement associated with the blades. Also, due to the density and size of wind farms, radar interference can be generated, which can desensitize radar and lead to the 'disappearance' of legitimate echos on screen. Gulf Coast Wind has taken measures to mitigate these radar interference issues. The centerpiece of our safety measures is the installation of transceivers at our site. Transceivers, such as the Terma Scanter 4002, are specifically designed to detect and separate small air objects from large surface objects [30]. The second measure taken to enhance aviation safety is the installation of incandescent lights. Often, LED (Light Emitting Diodes) lights do not appear through night vision goggles, and this could present various safety concerns for low-flying helicopters ferrying crew to and from oil platforms in the gulf [4]. The installation of transceivers and incandescent lights will drastically reduce the chances of an aircraft collision with our turbines and enhance aviation safety.

Regarding military interference, the Gulf Coast Wind Farm will have minimal impact on local military installations. The nearest military facility is a small Coast Guard station, which our farm will impact minimally. Additionally, Gulf Coast Wind is happy to cooperate with the military in all aspects of aviation and marine safety.

4.3 Federal, State, and Local Policy

Throughout the duration of the Gulf Coast Wind project, partnership with government officials at the local, state, and federal level is of the utmost importance.

On the local level, the Galveston Coastal Resources Division is involved in the approval process of our farm. To ensure the approval of the wind terminal and point of interconnection, all construction plans must be submitted to the local government. Once an application is submitted, it must be reviewed by the Galveston Coastal Resources Division, and Texas General Land Office to ensure that it is consistent with the coastal protection and beach access plan. Because the Gulf Coast Wind terminal is over 5,000 sq feet and classified as large-scale construction, terminal and port plans must undergo a thirty-day minimum review period [34]. Once the application is approved, the construction phase can begin.

The Texas General Land Office will be involved in the port operations and transmission aspects of the project. This is because the authority of the Texas GLO extends nine nautical miles off the coast [20]. The approval of the Gulf Coast Offshore Wind Terminal and point of interconnection are dependent on state review. Texas law states that deep-water license applications must not only be approved by the federal government, via the Deepwater Port Act (MARAD) but also by the Texas governor, all while under the authority of state and local agencies throughout construction and during operation. In addition to state and federal approval by the Deepwater Port Act, applicants must complete a Draft Environmental Impact Statement through the Department of Energy [29]. It is unlikely that the Gulf Coast Offshore Wind Terminal will submit a deep-water approval application, but a review may begin if port construction or additional dredging occurred at a later stage of the life cycle. As of 2020, Texas was the leader in wind energy generation, and the Texas GLO is seeking to diversify its energy portfolio. In 2007, the Texas GLO signed two lease agreements authorizing the construction of two offshore wind farms, one being in Galveston. The Texas state government is supportive of wind energy developments, which will be especially important in the approval of our project [8].

On the federal level, many more permits and applications must be approved before construction, and operations at Gulf Coast Wind can begin. In the planning and production phase of the project, five applications must be approved by the Bureau of Ocean Energy Management [5]. This includes a commercial lease of submerged lands for renewable energy development, and approval of the Site Assessment Plan, Construction and Operations Plan, Facility and Design Report, and Fabrication and Installation Report. Additionally, as mentioned in the state reports, port construction may need to be approved for the Department of Transportation Deepwater Port License [11]. The approval of our farm by BOEM, the DOT, and the DOE is likely due to the extensive support of wind energy by the federal government.

Extensive cooperation and adherence to local, state, and federal policy is going to be of the utmost importance during all five phases of the Gulf Coast Wind life cycle. Gulf Coast Wind is eager to maintain contact and provide project updates to government officials at all levels.

4.4 Environmental Considerations

Gulf Coast Wind has made various environmental considerations to avoid negative impacts on the local environment as a direct result of the construction and operation of our farm. Substantial attention has been devoted to local aerial, benthic, and pelagic communities.

One of the most significant environmental challenges posed by offshore wind farms is the negative impact that operations may have on local aerial communities. If aerial considerations are not made, offshore wind farms can obstruct breeding grounds and migratory paths, leading to increased collisions with turbines. Brown Pelicans, and Least and Royal terns, populate the coastal zone near the site location, but none of these populations have been identified as endangered or species of concern [19]. Although there are no sensitive bird populations near our site, careful site considerations have still been made. Gulf Coast Wind has avoided seabird migratory and breeding grounds and incorporated careful marine spatial planning to minimize impacts on the local bird community [27]. Turbines are spaced 1 nm from one another, providing ample space for local bird populations. Additionally, turbine lighting will utilize shorter wavelengths and pulse durations to avoid aerial collisions.

Offshore wind farms are known to have a variety of positive and negative impacts on local benthic communities. The Gulf Coast Wind site location does not overlap any sensitive benthic habitats, and our farm may in fact benefit these communities. Wind turbines utilizing a jacket foundation have been observed to improve biodiversity amongst local benthic communities by functioning as an artificial reef. Turbine foundations are often home to muscle, barnacle, and anemone populations [10]. Despite positive environmental impacts, foundation installation may disturb soft-sediment habitats throughout the site [14]. To mitigate these negative impacts, and promote biodiversity around our farm, Gulf Coast Wind will incorporate eco-designed scour protection measures, by utilizing rocks of a variety of sizes and shapes [1].

These measures will not only improve fish habitat and restore benthic populations but also will organically enrich surrounding sediments, effectively mitigating the negative impacts of foundation installation.

As previously stated, offshore wind turbines can cause increases in fish abundance due to the artificial reef provided by the foundation. Although this is true, construction and operations procedures can have negative impacts on pelagic populations. During the turbine installation phase, associated noise can disturb local fish and porpoises within two kilometers of the site. Additionally, migratory fish species such as tuna can be disturbed by operational noise and vibrations [10]. To mitigate these impacts, Gulf Coast Wind will install foundations utilizing the pile-jacking method. Pile-jacking is a low-noise alternative to the pile-driving method, and the installation of our foundation and turbines will have a much less detrimental impact on local pelagic communities [17].

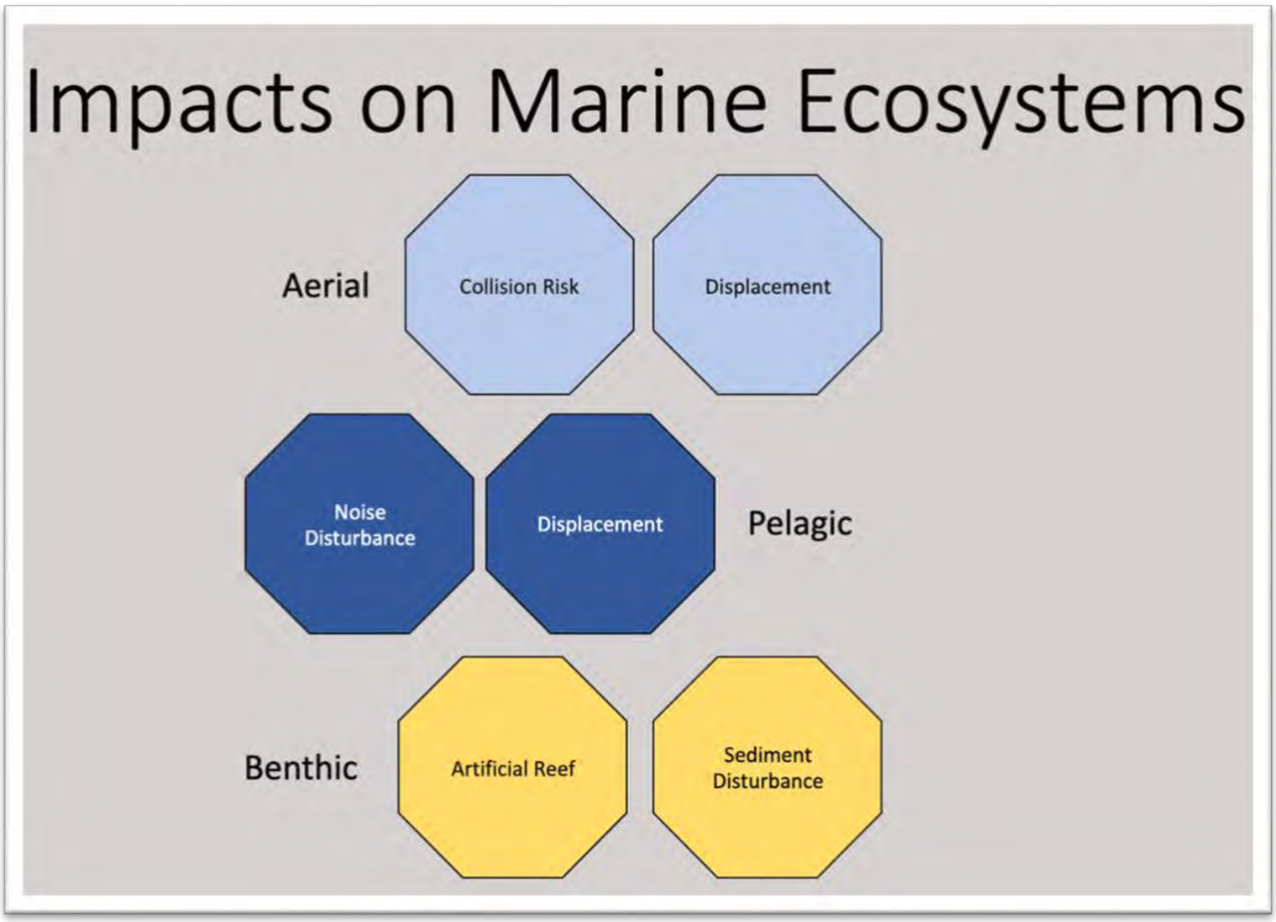


Figure 3: Farm Impacts on Marine Ecosystems

Chapter 5: Balance of Plant Considerations

5.1 Turbine Selection

Gulf Coast Wind will be deploying General Electric's Haliade-X 14MW rated turbine at our site. This turbine will provide the greatest energy output, reducing the total number of turbines at our farm. The cost per turbine is $9,136,993 with a total turbine cost of $105,731,925.

5.2 Foundation Type

Gulf Coast Wind has selected the twisted jacket as the optimal foundation type for our site location. There are various features of the jacket foundation that make it ideal for our site design and location. One of the most significant factors when selecting the foundation type is seafloor soil composition. As stated in the geotechnical report, the seafloor at our project site is composed of mostly mud, clay, and sand [19]. Twisted jacket is the premier foundation type for a variety of soil types including medium-to-dense sands. Jacket foundations also require minimal site preparation, which will reduce the construction and installation cost [12]. Before foundation installation can occur, a transitional piece will need to be placed on the foundation to offset any possible leveling inaccuracies that may occur during installation [16]. Additionally, the twisted jacket is an economical foundation choice. Jacket foundations have straightforward manufacturing methods, which results in an individual unit cost of $475,000, with a total foundation cost of $5,225,000.

5. 3 Coastal Interconnection

Gulf Coast Wind's point of interconnection will be in Freeport, TX. This will be located at the Velasco switchyard, next to a 345Kv substation. This is a desirable POI because the yard facilitates eight 138 kV and two 69 kV transmission lines. The distance from the offshore substation to the POI is approximately 40 miles. The HVAC transmission line will avoid major shipping lanes and known oil infrastructure. The total cost of the offshore substation will be $20,040,636 and the onshore substation will be $5,010,000. The total cost of transmission will be $117,673,274.0. Gulf Coast Wind will work in conjunction with ERCOT to ensure our POI meets regulatory requirements for interconnection. Specifically, after an interconnection agreement (IA) is signed by the TSP and the IE; ERCOT is obligated by Protocol section 16.5 (3) to review the proposed resource and assess whether the Resource, as proposed, would violate any operational standards established in the Market Guides [43].

5.4 Staging, Construction, O&M Ports

The development of an all-encompassing staging, construction, and operations and maintenance port facility is paramount to the success of the Gulf Coast Wind project. As a result of the large operating capacity of the port facility, 32 acres of land must be acquired to accommodate terminal facilities and provide ample operational space to ensure safe and efficient operations [38].

One of the facilities that must be developed is a 2,100 linear feet heavy lift marine terminal. This terminal will facilitate the turbine assembly and transportation process, and must incorporate a wharf, associated berth, and substation fabrication area. The substation fabrication area must include fabrication and assembly structures, gantry cranes, and an assembly dock with crane. In addition to these facilities, the terminal must consist of a yard storage and staging area, turbine storage space, and a loading berth. The heavy lift terminal will contain four operational sectors. Including staging, assembly, repair, and decommissioning [38].

In addition to the heavy lift terminal, designated manufacturing and administrative sectors must be established. The manufacturing sector will include approximately 600,000 sq feet of manufacturing and warehouse space, as well as specific areas for turbine blades, tower modules, and nacelles [38]. The administrative sector will require the construction of 20,000 sq feet of office space to ensure effective operations during all phases of the project.

To ensure the success of port and terminal operations, the Port of Galveston must be prepared for weather conditions, and assembly and transportation operations. Certain protective measures will be taken to ensure the terminal facility is prepared for rising sea levels, and the possibility of storm surges and hurricanes. This includes the installation of storm surge barriers and floating barges at the Galveston navigational gate [38]. These measures will not only protect the Galveston Coast Wind terminal from local weather conditions, but they will also benefit other sectors of the Galveston port area. To effectively facilitate terminal operations, extensive port dredging must occur. Approximately 270,000 cubic yards of marine sediment must be removed between the federal navigation channel and the heavy lift terminal to ensure fluidity of operations. The port facility must also include unrestricted overhead clearance which will allow turbine components and cargo to move freely while entering and exiting the terminal. As a result of the variety of port facilities and protective measures, the heavy lift terminal and Galveston port facility must possess a strong bearing capacity [38]. This will ensure safe and efficient operations throughout the duration of the project life cycle, and after decommissioning.

5.5 Installation and Commissioning Process

The Gulf Coast Wind Farm will be installed and commissioned in three major phases. This includes the site survey, installation of foundations, and finally the assembly and commissioning of turbines. All three phases will require the utilization of specific vessels to facilitate effective operations at our site.

Stage I: Data Collection & Survey

During the planning and production phase of the project, in-depth data collection and environmental surveying must occur on site. Data collection will examine the site location's wind output, humidity, pressure, and temperature data. Environmental surveying will occur simultaneously and will require the utilization of geophysical, geotechnical, ornithological and mammal surveying vessels [16]. Total cost for the data collection and survey phase will be $1,301,328.

Stage II: Foundation Installation

Upon the completion of the data collection and surveying stage of the project, turbine foundations can be installed. Gulf Coast Wind has decided to install its foundations utilizing the pile-jacking method. Piles will be driven into the seafloor as an installation frame, providing a template structure for the jacket [38]. After piles are installed, the jacket is lifted from a crane barge and connected to the frame. Finally, the gap between the pile and pile sleeve is filled with concrete, and once concrete has cured, turbines may be erected. Additionally, Gulf Coast Wind will utilize locating cones, and underwater sensors to ensure the success of foundation installation [16].

Stage III: Assembly and Commissioning of Turbines

Once foundation installation is complete, wind turbines may be assembled and erected at the site. Gulf Coast Wind will conduct offshore turbine assembly, which will require multi-lift operations to fully erect each turbine. Installation of the tower will involve the lifting, placement, and connection of individual tower pieces onto the foundation. After tower placement is complete, the pre-assembled rotor hub and nacelle units will be attached to the tower [38]. This process will require a transport frame, lift wires, a crane hook, and tugger lines to ensure the tower and nacelle are properly aligned. Nacelle installation must be facilitated by a specialized installation crew, operating an offshore crane with high lift capacity [16]. The last step in turbine assembly is the installation of blades. Gulf Coast Wind will utilize single-blade installation methods, where each blade is individually lifted and attached to the rotor hub. This process will also require tugger lines, and motion tracking systems to avoid motion-induced blade damage [16]. Once all steps of assembly are complete, offshore turbines are ready for commissioning. The total cost for the installation and construction of the Gulf Coast Wind farm will be $105,731,925.

Required Vessels: Foundation & Turbine Installation [37]:			
Vessel Type:	Specifications:	Crane Capacity: (Tonnes)	Day-rate: (USD)
Tugboat	Large tow capacity	N/A	$1,000-5,000
Crane barge	Large crane capacity, rotating crane	1,000-4,000	$80,000-100,000
Heavy lift cargo vessel	Large main deck, optimized for loading and discharging of heavy objects	N/A	$30,000-50,000
Semi-submersible crane vessel	Self-propelled, large crane capacity and lift height	3,000-20,000	$280,000-500,000
Wind turbine installation vessel (WTIV)	Self-propelled, dynamic positioning system, large main deck, large crane capacity	800-1,500	$150,000-$250,000

Figure 4: Vessels associated with foundation & turbine installation

5.6 Project Life Cycle

The Gulf Coast Wind project will undergo five phases throughout the entirety of its life cycle. This includes planning and production, production and acquisition, installation and commissioning, operations and maintenance, and finally decommissioning. The total life cycle of Gulf Coast Wind will be twenty-five years.

Chapter 6: Additional Considerations

6.1 Legal and Engineering Consultancy

The project will require a legal team along with engineering counsel who will oversee the farm's development and operation. The total cost of these resources is around will be $650,886.

6.2 Development & Project Management

Development and Project Management will be handled by a team consisting of Managers, Engineers, and Field Technicians. These members will operate locally to the farm and will be on hand 24 hours a day. The total cost for these services will come to around $19,519,380.

6.3 Permits

Gulf Coast Wind will need to acquire various permits. This includes permit for subsea cables under the Clean Water Act (USACE), permit for navigational lighting (USCG), permits for air quality and pollution prevention (EPA, USACE), incidental take or harassment under the Marine Mammal Protection Act, Endangered Species Act, Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Magnuson-Stevens Fishery Conservation and Management Act (NOAA Fisheries, USFWS). Additional consultations to Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, National Historic Preservation Act, Endangered Species Act, and NOAA Fisheries, USFWS, Advisory Council on Historic Preservation.

6.4 Operational & Construction Insurance

Gulf Coast Wind must acquire two types of insurance. The first type of insurance will be construction insurance, applying to employees and assets in the event of an accident during installation. The second type is operations insurance, which will protect against hurricanes and vessel accidents. Gulf Coast Wind will need an All-Risk level of insurance to protect against any type of accident of legal action. The total cost for insurance will be $25,037,373.90.

6.5 Decommissioning

Decommissioning the Gulf Coast Wind farm will consist of four phases. This includes turbine, foundation, cable, and substation decommissioning projects. The total cost of decommissioning will be $23,100,000.

Chapter 7: Triple Bottom-Line

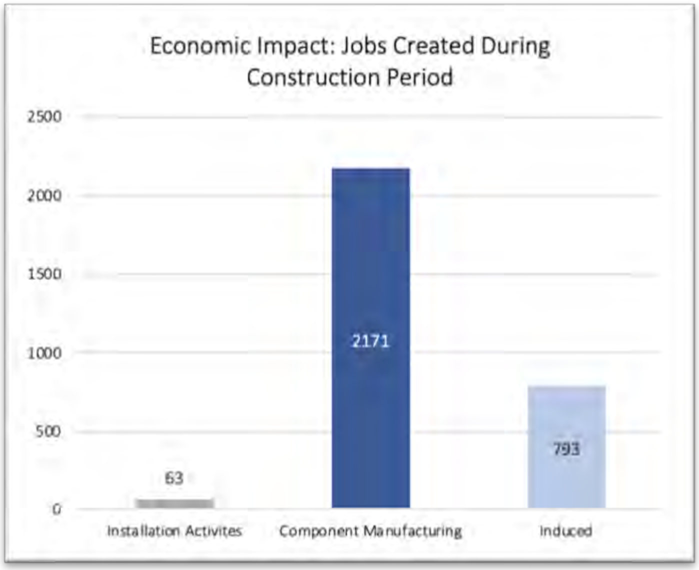
Gulf Coast Wind wishes to serve not only as an energy provider, but a beacon of economic and educational development in the Galveston-Freeport region. With local economic development at the forefront of our Triple-Bottom-Line strategy, Gulf Coast Wind will work closely with postsecondary educational institutions, specifically Galveston College, to achieve these goals. As of 2022, Galveston College does not provide any degree or certificate program that is directly related to the field of wind energy. Even though Gulf Coast Wind will not be able to recruit wind turbine technicians from local institutions directly, Galveston College does provide an Associate of Applied Science in Welding Technology as well as Instrumentation Technology [40]. Due to the application that these programs provide in our field, Gulf Coast Wind promises to hire welders and instrumentation technicians directly from Galveston College. This will not only provide Gulf Coast Wind with certified technicians for all phases of our project, but it will also provide local individuals with an excellent opportunity for career development in the wind energy sector. Furthermore, throughout the duration of the siting and construction phase of this project, Gulf Coast Wind will encourage and assist Galveston College in the development of a Wind Turbine Technician Training Program. If our efforts are successful and a local program is successfully developed, Gulf Coast Wind promises to create a scholarship program for any individuals that pledge to work at our farm directly.

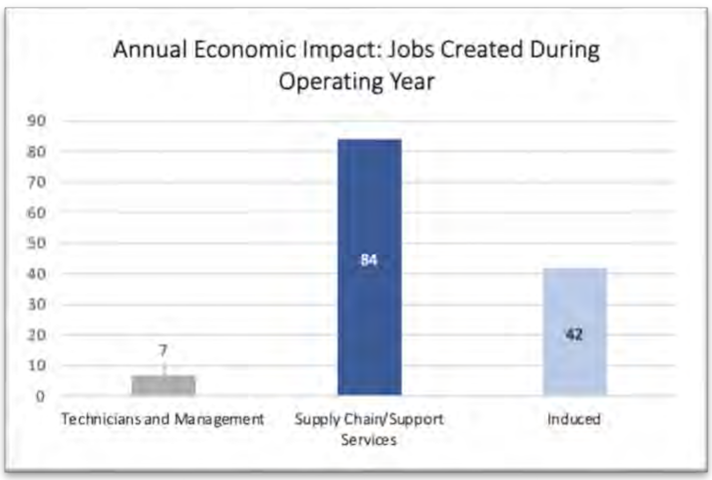
Development of the Gulf Coast Wind heavy lift terminal will positively impact the Port of Galveston throughout the duration of the life cycle and after decommissioning. As a result of the Panama Canal Expansion, ports across the Gulf have experienced an increase in marine traffic. Various ports around the region have had to invest in new cranes, larger facilities, and increased dredging due to the surge in activity. The presence of the Gulf Coast Wind heavy lift terminal will provide the Port of Galveston with the proper equipment and facilities to accommodate increases in marine traffic and port activities [39].

Preservation of the environment and positive climate impacts are of the highest priority for the Gulf Coast Wind team. The presence of the Gulf Coast Wind farm will offset 106,000 metric tons of carbon per year, not only benefiting the local community, but also the global environment. In addition, specific measures and techniques will be implemented that will benefit and protect local ecosystems and living communities throughout all phases of the project.

7.1. Jobs and Economic Development Impact:

The Gulf Coast Wind development team utilized the National Renewable Energy Laboratory's JEDI (Jobs and Economic Development Impact) model to determine the positive economic impact our farm would have on the local community. Through this model, it was determined that the Gulf Coast Wind Farm would generate over 3,000 jobs. We estimate that Texas residents will fill 52% of jobs associated with site construction, and 88% of jobs associated with operations and maintenance.





Figures 5 & 6: Jobs created during Construction Period & Operating Year

Chapter 8: Operations Cost

Based off industry reports instituted by NREL (National Renewable Energy Laboratory), the operations and management overall cost is estimated to be $784,000 dollars per Megawatt which equates to $117,600,000 over the span of 20 years [49]. This covers Insurance, service, repair, spare parts, and other costs. In addition, preventative maintenance is $14,112,000, corrective maintenance is $41,160,000 and spare parts is $8,232,000 [43].

cited with the operations budget include Insurance and scheduling costs, cost of maintenance of the vessel over the lifespan of the farm, other contingency money in case of accident or other unexpected repairs or liabilities over the lifespan of the farm. These costs are a packaged number coming from the optimizing offshore wind farm maintenance cost report from the department of energy. [49]. The cost for the contents listed above is $55,538,714.

Chapter 9: Financial Plan

9.1 Pre-Construction Financing

During the survey phase of the project, funding is to be provided by DOE grants. These grants instituted by the Department of Energy will provide funding from $750,000 to $7.5 million [45].

9.2 Construction Financing

Investment for Gulf Coast Wind will come from a variety of sources. Construction will be financed by the Title 17 Loan, instituted by President Joe Biden to fulfill the goal reaching 30GW of offshore wind energy by 2030. This loan will supply $150 million for the construction of the Gulf Coast Wind farm. The loan has an application fee of $150,000 if the loan amount is less than $150 million [46].

9.3 Tax Equity

Gulf Coast Wind will have a wide variety of private investors. Investors include Bank of America, J.P. Morgan, BBVA, NatWest, Credit Agricole, Natixis, BNP Paribas and MUFG Bank [47]. These banks are currently invested in Vineyard Wind 1 offshore wind farm off the coast of Massachusetts. It is likely that these companies will invest in Gulf Coast Wind. These investments are expected to cover any outstanding finances not supplied by the Title 17 loan and DOE grants.

9.4 Income Tax

Gulf Coast Wind must consider various state and federal taxes. Texas has a corporate income tax; however, this tax is voided for companies that invest solely in renewable energies such as Gulf Coast Wind [44]. Federal income tax still applies to the project with a rate of 21% [51]. Texas sales tax for business has a rate of 6.25% [51]. The sales tax is applied to the revenue of the generation of electricity. The total revenue over 20 years is $1,039,632.41 and with 6.25% sales tax this comes to $64,977,026. We are unsure if we fall under the county sales tax

9.5 Budget Breakdown

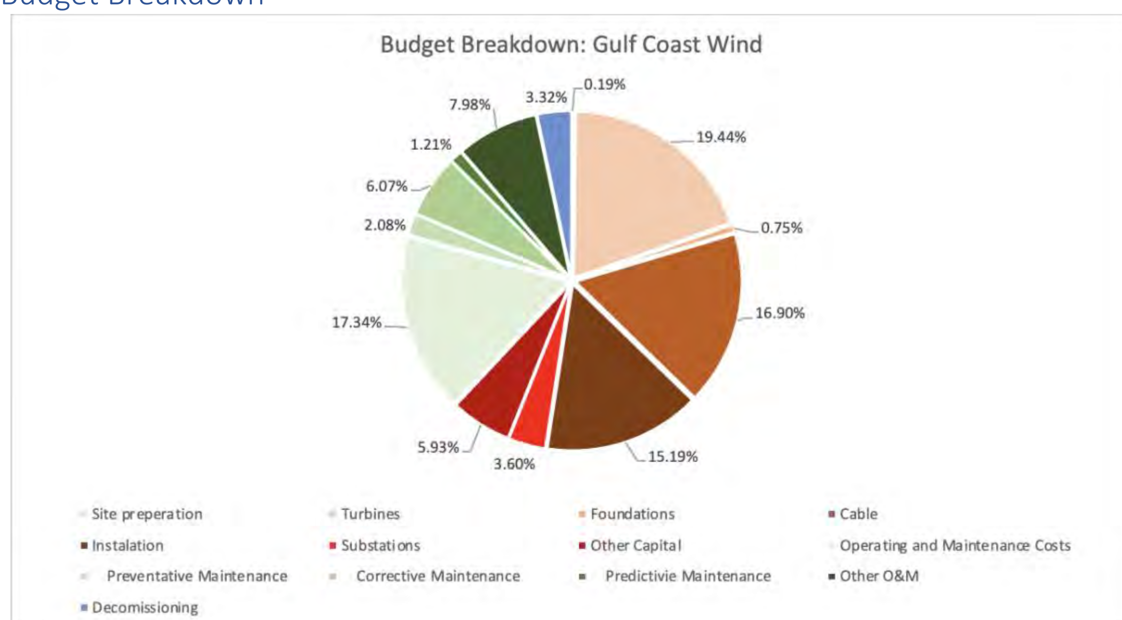


Figure 7: Budget Breakdown

Chapter 10: Tax Incentives

10.1 Regional Incentives

The state of Texas currently has a corporate tax exemption for companies that engage solely in the business of manufacturing, selling, or installing solar or wind energy devices [44]. Gulf Coast Wind engages solely in offshore wind installation and therefore is exempt from Texas state income tax.

10.2 National Incentives

Gulf Coast Wind applies for production tax credits (PTC) of 1-2 cents per kilowatt hour for the first 10 years of electricity generation. There is also an investment tax credit (ITC) of 12-30 percent of the project development [48]. Only one tax credit is allowed, and Gulf Coast Wind has elected to choose the ITC tax credit due to the lower initial capital cost.

10.3 Carbon Credits

Gulf Coast Wind is a carbon free source of energy. Carbon Credits gathered from production provide Gulf Coast wind the ability to write off carbon emitted from vessels associated with construction and operations. Therefore, Gulf Coast Wind is a carbon net neutral energy provider.

Chapter 11: 20 Year Cash Flow

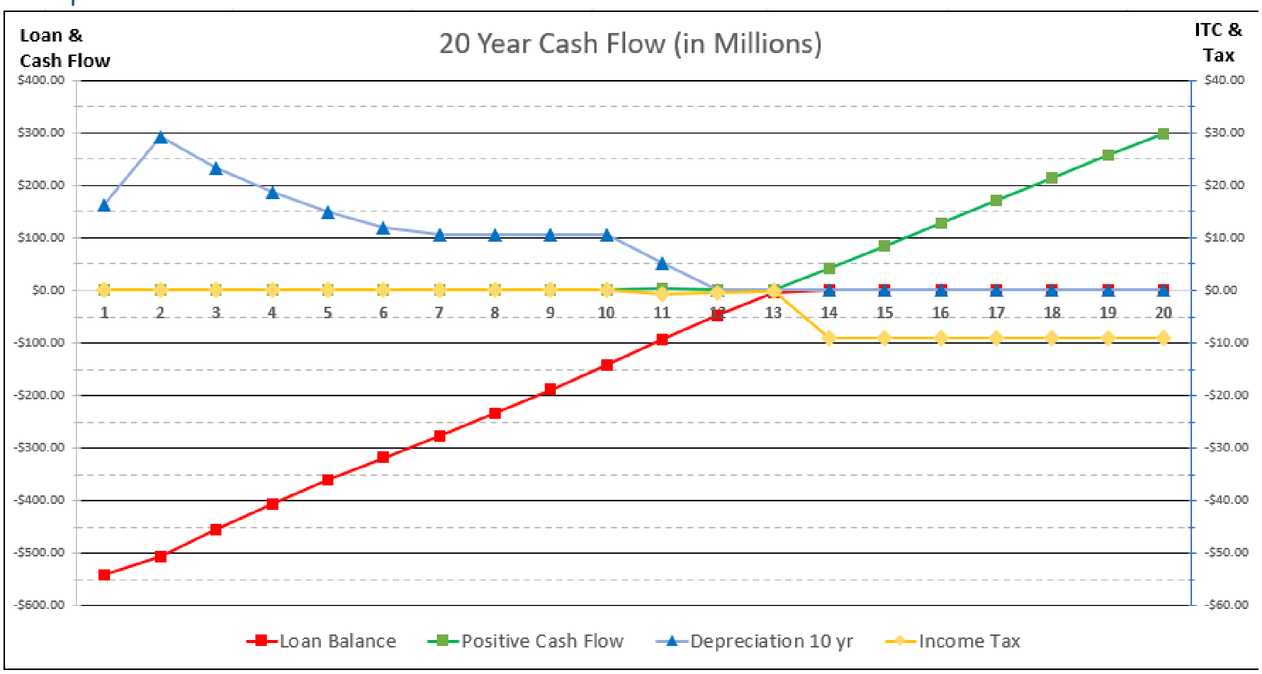


Figure 8: 20 Year Cash Flow Model

Gulf Coast Wind is to be financed by a 15-year bank loan from various equity partners listed in the Tax Equity section of the report. The loan is scheduled to be paid back in 15 years through an amortization schedule. However, each year a margin of capital will be left over after minimum payments are made. This will be allocated to reduce interest and pay the principle of the loan. The loan is expected to be paid back in the initial months of year 13. Once the loan is paid, remaining capital is to be accumulated as extra contingency and financing for further developments. Gulf Coast Wind will not have profits until the loan is paid. Once the loan is paid, Gulf Coast Wind will generate around $33.7 million in profit. The ITC (Investment Tax Credit) is utilized to cover negative cash flow in the early stages of the project. The ITC tax credit is represented in blue while the income tax on profits after year 13 is represented in yellow.

Chapter 12: LCOE

Gulf Coast Wind projects an LCOE of $80.82 per MWh. This was calculated from the overnight capital cost of $540,877,170, the total project operations and maintenance cost of $185,933,594, and a PPA price of $115.60 per MWh over 20 years, generating 449,668 MWh. The PPA is high due to the 15-year repayment plan through the bank loan. Once the bank loan is paid a lower PPA value can be negotiated into the PPA contract. Gulf Coast Wind's net revenue is $235,075,165 after $63,907,884 in income tax. The value of the taxes paid near the end of the project will be used to invest in future developments while taking advantage of port investment for Gulf Coast Wind.

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