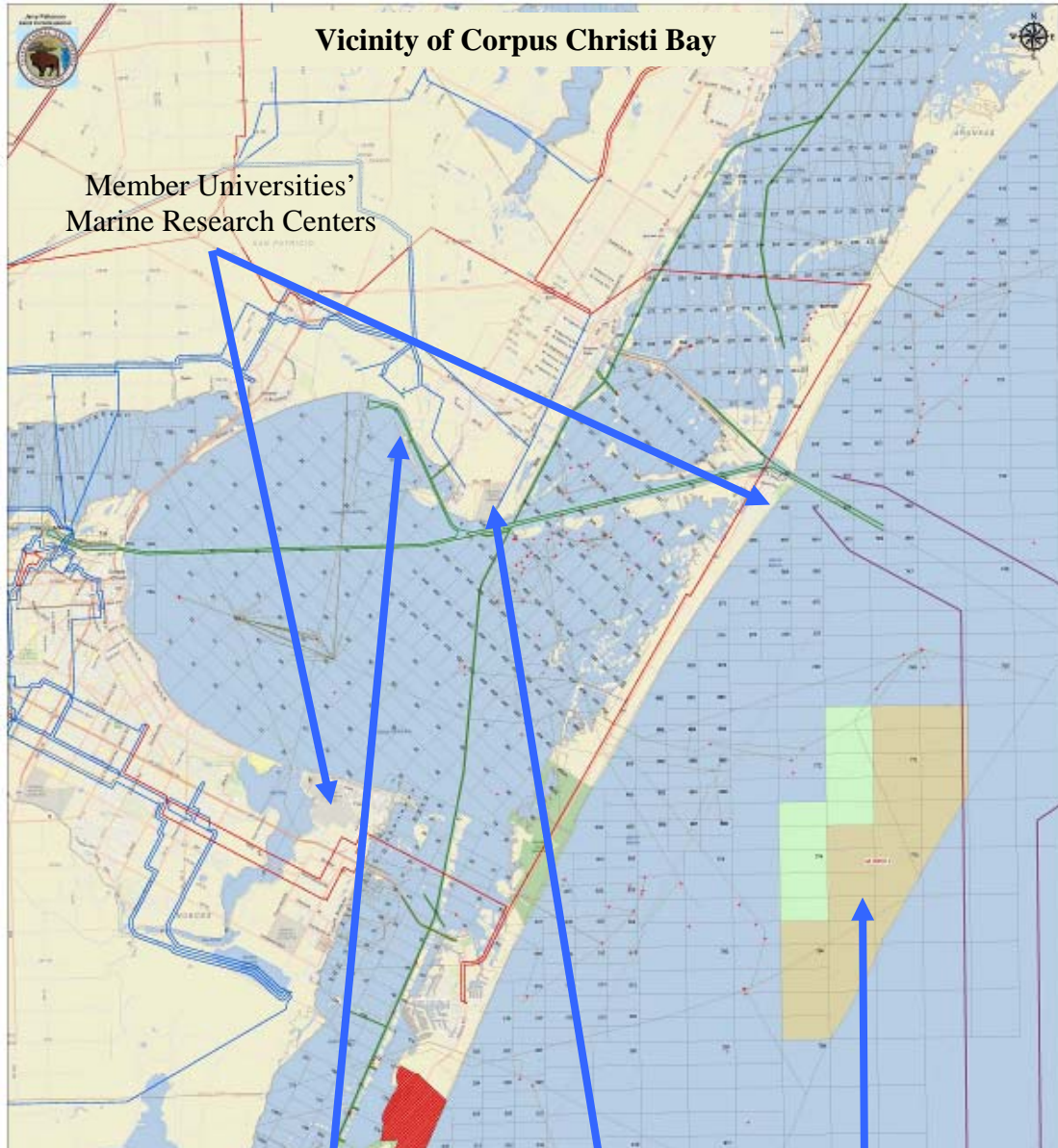


## A Comprehensive R&D Plan to Accelerate Industrial Offshore Wind Development



Member Universities' Marine Research Centers

World's largest offshore exploration platform and other industry infrastructure

Offshore wind farm leases managed uniquely by the Texas General Land Office

Former Naval Station Ingleside available for offshore wind center focusing on research, development and demonstration projects

## I. EXECUTIVE SUMMARY

The U.S. has an opportunity to change the game. The way to efficiently support the advancement of offshore wind technology, mitigate risk, overcome cost barriers and open the market for offshore wind is to establish a *National Offshore Wind Technology & Demonstration Center*. The focus of the Center will be a nearby *Offshore Wind Technology Demonstration Platform*. Next generation research, development and demonstration projects will be performed at the *National Offshore Wind Technology & Demonstration Center* and on the *Offshore Wind Technology Demonstration Platform*. This Center and related activities will be located near a wind and offshore technology hub, which includes *major* industrial port facilities that will contain fabrication, assembly and test space along with adjacent large docking and lift capabilities. This comprehensive plan has the ability to launch wind development and demonstration projects aimed specifically at reducing the cost of wind energy production and accelerating the installation and delivery of offshore wind power.

The infrastructure for a *National Offshore Wind Technology & Demonstration Center* exists and is available. Naval Station Ingleside, recently reverted to and managed by the Port of Corpus Christi, includes 72,000 square feet of heavy industrial space with a high-bay, a large area for manufacturing and a large space for testing. The infrastructure also includes valuable existing utilities.

In addition, there is a strong opportunity for synergy due to the regional presence of premier research universities, NASA and the offshore exploration industry which, together, could radically impact the course of offshore wind.



Figure 2. Capital-ship class 1,100-foot pier and the wharf area with its heavy load/unload capabilities.



Figure 3. Aerial view of Naval Station Ingleside

The comprehensive plan will have three major impacts:

- Information collected from a demonstration turbine will reduce risk for the industry by presenting actual, in-place performance statistics. The practical knowledge gained by this activity will encourage and expedite the wind industry to enter the offshore U.S. market.
- Demonstration and R&D projects will collect data to facilitate future and more aggressive 3<sup>rd</sup> generation turbine design, leading to radical reduction in the cost of energy.
- Convert the skilled Gulf offshore oil workforce to green energy jobs in the U.S. offshore wind industry.

The support needed over a 3-to-5 year period is:

- Center development (to support industry and research): \$10M
- Demonstration platform (turbine in the water): \$25M
- Research, development and demonstration projects: \$15M
- Workforce development, education and training: \$6M

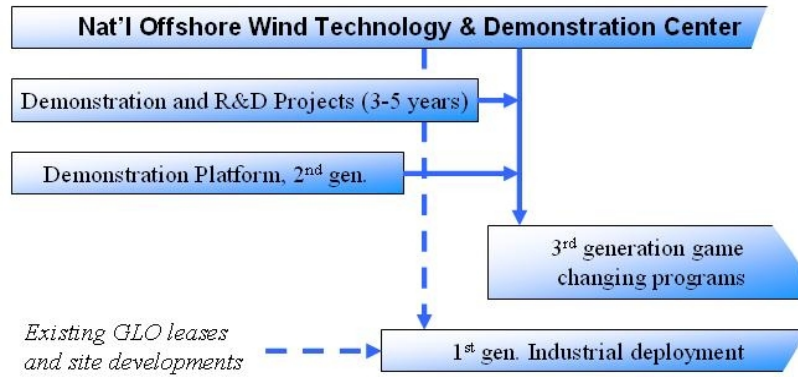


Figure 4. National Offshore Wind Technology & Demonstration Center.

A vision of this national asset is laid out in Figure 4. The key to establishing these capabilities and opening the U.S. offshore wind market is the ability to immediately start construction of the **Offshore Wind Technology Demonstration Platform**. This means that prior to program inception significant design and planning for such a platform must have been completed – the offshore lease for this platform must be identified and available, any EIS or exemption must be in place, and Army Corps of Engineers and FAA permits and approvals must be completed. Figure 5 shows a schedule for this plan. Example technology demonstration projects are included to show how these projects would fit with the mission of the **Offshore Wind Technology Demonstration Platform** and the start-up of the **National Offshore Wind Technology & Demonstration Center**.

The ability to leverage established industry and infrastructure in a non-landlocked location will make offshore wind in the United States a reality. Offshore wind is shovel-ready in the Gulf of Mexico. Additionally, The Wind Alliance members are poised to carry out this comprehensive plan due to the unparalleled collection of national assets and capabilities of its members.

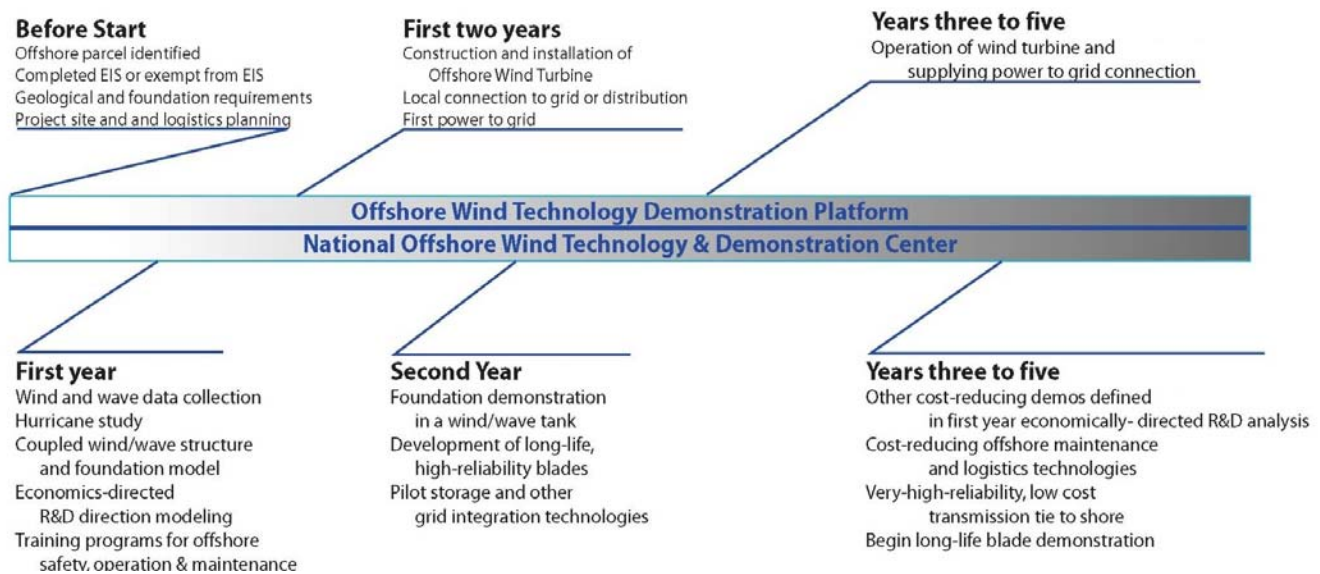


Figure 5. Comprehensive Plan Schedule

## II. NATIONAL OFFSHORE WIND TECHNOLOGY & DEMONSTRATION CENTER

A *National Offshore Wind Technology and Demonstration Center* co-located with an *Offshore Wind Technology Demonstration Platform* will be a synergistic alliance of national and local resources that will break down technological and market barriers and spur the development of third-generation offshore wind turbines.

Proper location of the *National Offshore Wind Technology and Demonstration Center* at Naval Station Ingleside on Corpus Christi Bay will provide an excellent framework and infrastructure for the development and demonstration of advanced, cost-effective offshore wind technology. The location contains a capital-ship class pier, extensive industrial high-bay space with adjacent lifting and moving capabilities, industrial utility connections, and is a stone's throw to the wind leases controlled by the State of Texas. The proximity of these leases and the availability of the in-place logistics and heavy offshore resources will minimize the cost of deploying equipment and workforce to perform technology demonstrations. Consequently, resources can be focused on advancing technology rather than getting equipment out to sea, dealing with NIMBY issues, or other infrastructure and regulatory obstacles.

Because of the facility's location and its proximity to established transportation routes, large quantities of large components for the wind turbine and subsea turbine support structures can be brought together and assembled at the port. Components will be delivered via ocean-going shipping and land-based transportation. Research, development and demonstration opportunities exist to optimize installation procedures and to minimize deployment time and cost. Processes and procedures will also be developed to cost effectively modularize and stage components in order to reduce the staging area required at the port.

The site is 130 miles south of San Antonio and 175 miles south of Houston. It is also served by a commercial airport so it is easily accessible to industry and university partners nationwide.

## III. OFFSHORE WIND TECHNOLOGY DEMONSTRATION PLATFORM

In order to effectively grow an industry, increase energy independence, and reduce energy costs, aggressive R&D programs are needed to facilitate a strong pipeline of pre-competitive technology development, foster risk-taking and innovation, and develop talent. Demonstrating technology and requiring deliverables relevant to the wind power industry will focus these efforts and expedite the opening of the U.S. offshore wind market.

A proven method for achieving these goals is through innovative and industry-led demonstration projects. An *Offshore Wind Technology Demonstration Platform* would enable and promote advanced technology and accelerate wind energy deployment in the Gulf of Mexico.

The global wind industry has already proven that wind energy technology can be deployed in harsh environments such as the North and Irish Seas. These are challenging environments in both marine and wind terms. The Gulf of Mexico differs in that the average peak wind speed is lower than that found in the North Atlantic, but the area is frequented by hurricanes. Learning to deal with hurricanes will always be a component of the U.S. offshore wind market. Having an *Offshore Wind Technology Demonstration Platform* will enable *relevant* technologies to be demonstrated in a *relevant* environment. The outcome of this real-world demonstration in the Gulf will result in dependable technologies and thus lower the cost of wind energy.

Over a five-year period, the *Offshore Wind Technology Demonstration Platform* will have a major impact on breaking down technological and market barriers including:

- Development of cost effective foundations for low and medium depth waters with known OEM turbine technology, ready for first deployment.
- Provide a test and demonstration center for R&D projects that address local environmental and/or infrastructure issues blocking first deployment.
- Support R&D programs which initiate deliverables of 3<sup>rd</sup> generation offshore technology.
- Initiate offshore wind workforce development education and training activities leading to jobs in this new wind energy sector.

The early installation of the demonstration platform will act as a resource to advance technology research for current initiatives in offshore wind and provide the basis for designing and deploying 3rd generation offshore technology solutions.

#### **IV. DEMONSTRATION PROJECTS**

Projects that demonstrate advancements in offshore technology will grow the wind industry and lower the cost of energy. Broadly, this research falls into the following four areas:

- Environmental Impact Assessment & Research
- Structure Research & Development
- Utility Connection & Energy Storage
- Workforce Development & International Academic Research Exchange

#### **V. THE GULF OF MEXICO**

The Gulf of Mexico region provides the United States with critical resources. Unfortunately, the region is susceptible to deterioration due to human and environmental impacts. Offshore wind energy farms in the Gulf of Mexico will significantly help in maintaining healthy and resilient communities in the Gulf region.

Offshore wind is shovel-ready in the Gulf of Mexico due to the existing physical, political and geographic capital in the Texas Gulf Coast region.

The physical capital within the Gulf region is substantial. Logistically, six of the nation's 10 leading ports are located in the Gulf region, as well as the largest crane in the world (located in Ingleside, Texas). Offshore expertise and logistics, including crews, barges, tools, docks and maintenance capabilities from the oil and gas industry can immediately be deployed for offshore wind opportunities. NASA is regionally positioned on the Texas Gulf Coast and capable of providing weather characterization and forecasting studies, among other areas of expertise, for offshore wind. Naval Station Ingleside (NSI) is an ideal location for an offshore wind center.

The political backing for onshore and offshore wind in Texas is extraordinary. This has been demonstrated by the tremendous wind capacity installed onshore and the current offshore wind campaigns and leases in the Texas Gulf Coast. Texas' General Land Office (GLO), the federally approved manager for the 376-mile Texas coastline, is a leading supporter of offshore wind and the landlord of coastal offshore leasing in Texas. The innovative GLO leases offer many advantages, including speed of deployment (each owner/operator will only need to work with one landlord; multiple offshore leases have already been expeditiously issued), siting (leases exist no more than 10 miles offshore in shallow water,

only 75 – 80 feet in depth, near barrier islands. Shallow depth and close proximity to land lead to cost effective installation, transmission and maintenance), and cost sharing for funding opportunities.

Figure 7 provides an aerial view of the Gulf of Mexico and the land around it. Geographically, the Texas Gulf Coast is poised for offshore wind energy. Corpus Christi, Texas is a major port with large docking and lifting capabilities. Offshore wind siting opportunities are located close to major load centers, including Houston, Galveston and Corpus Christi, Texas. The Gulf offers a mild climate and, historically, no ice. Wind blows in the Gulf during peak need, which maximizes profit potential. Wave data already exists and is available from the Gulf offshore oil and gas industry. Existing right-of-ways and pipelines can potentially be used for electrical transmission. Additionally, and very importantly, the Gulf Coast is flush with companies in the wind industry that strongly support acceleration of the offshore wind market opening in the Gulf of Mexico.

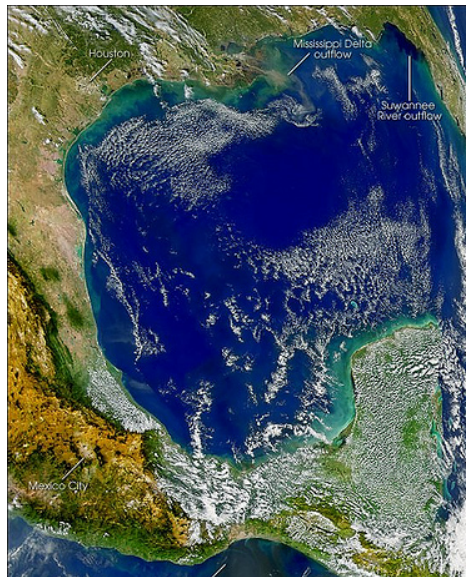


Figure 7. Aerial view of the Gulf of Mexico

## VI. THE WIND ALLIANCE

The Wind Alliance (TWA) ([www.TheWindAlliance.org](http://www.TheWindAlliance.org)) is an established collection of industrial, academic and public-sector entities that collaboratively focus on continuous pre-competitive improvement of workforce, infrastructure and technology within the wind industry. Headquartered in Houston, Texas, TWA’s members are capable of developing cost-effective offshore wind within the Gulf of Mexico.

TWA is a 501(c)(3) non-profit organization that has multiple functions. TWA serves as a think-tank vehicle to identify game-changing solutions to strategically move the United States’ wind industry forward. TWA also serves as a project manager, successfully coordinating, allocating funding, and administering collaborative projects. The unique structure of TWA allows for efficient allocation and management of resources, speed of project execution and, in the end, ground-breaking deliverables.

TWA is made up of first-class, innovative project developers, economic development corporations, non-governmental public organizations, manufacturers and developers of advanced technology, and technical research organizations. Its members span the nation from coast-to-coast and throughout the wind corridor. TWA is comprised of premier wind research institutions across the nation. The efforts of these institutions are driven by our industrial members’ needs. Members have well established working relationships through the execution of previous projects and access to an unparalleled collection of physical assets and technical capabilities.

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