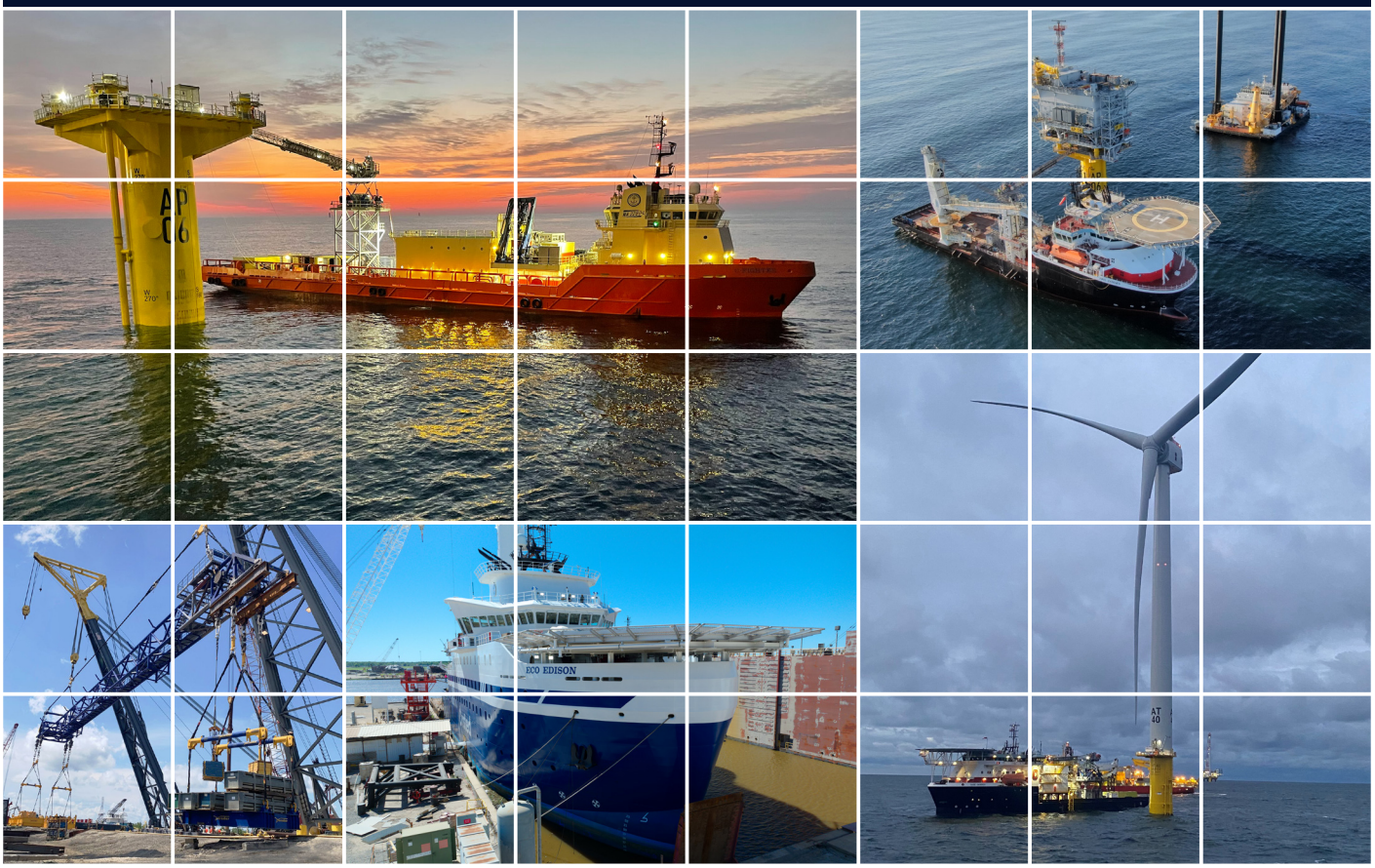
XODUS

LOUISIANA OFFSHORE WIND SUPPLY CHAIN ASSESSMENT

STUDY REPORT
APRIL 2024



Pew

GREATER NEW ORLEANS INC
REGIONAL ECONOMIC DEVELOPMENT

SOUTHEASTERN WIND COALITION

CENTER for PLANNING EXCELLENCE

ABOUT

Xodus is a global energy consultancy with specialist engineers, consultants and scientists working across multiple disciplines, combining skills to provide a truly integrated offering to the energy industry.

Founded in 1948, The Pew Charitable Trusts uses data to make a difference. Pew addresses the challenges of a changing world by illuminating issues, creating common ground, and advancing ambitious projects that lead to tangible progress.

GNO, Inc. is the regional economic development organization for Southeast Louisiana. GNO, Inc.'s mission is to create a Greater New Orleans with a thriving economy and an excellent quality of life, for everyone.

The Southeastern Wind Coalition is a 501(c)(3) that seeks to advance the wind industry in ways that result in net economic benefits to industry, utilities, and residents in the Southeast.

Center for Planning Excellence is a statewide planning and policy non-profit organization that facilitates urban, rural and state planning efforts in Louisiana, by working towards great neighborhoods and quality places; transportation choices; resilient communities; and civic engagement and education.

Acknowledgements
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EXECUTIVE SUMMARY

INTRODUCTION

Louisiana's experience and expertise in offshore energy grants it a unique position to support the burgeoning U.S. offshore wind industry, while attracting new opportunities for existing Louisiana businesses, expanding employment opportunities for Louisiana residents, and capturing significant economic benefits for the State.

The Gulf of Mexico is renowned for its offshore oil and gas sector, much of it delivered using Louisiana's ports, workforce, and expertise. Offshore wind continues to grow as a global industry, and as a nascent market in the United States. With several offshore wind projects being developed in state and federal waters off the coast of Louisiana, the State has the opportunity to expand its energy industry capabilities by leveraging its existing experience to support offshore wind development in the Gulf of Mexico, the U.S. East Coast, and beyond.

Xodus Group, in collaboration with The Pew Charitable Trusts, Greater New Orleans Inc., the Southeastern Wind Coalition, Center for Planning Excellence, and Louisiana stakeholders, has produced this report to assess the industry landscape, supply chain, and workforce opportunities available to Louisiana in the offshore wind industry. As a nationally recognized leader in port infrastructure, maritime construction, and energy production, Louisiana can further diversify and develop new employment and economic opportunities through renewable energy production.

Central findings reveal Louisiana has significant relevant industrial capabilities, port infrastructure, and a skilled workforce adept in advanced manufacturing and marine operations: assets that are necessary for the offshore wind sector's development. This report synthesizes recommended actions based on Louisiana's industrial landscape, the results of a state-wide supply chain and workforce assessment, and an assessment of Louisiana's strengths and opportunities in the offshore wind market. These insights can drive targeted investments to position Louisiana as a key contributor to the national offshore wind industry.

KEY FINDINGS

Manufacturing

Louisiana's manufacturing sector has high potential to support the offshore wind industry. Today, **over 100 fabrication and manufacturing assets have strong potential to support manufacturing for offshore wind development when coupled with investments to reskill, retool, or expand their current operations**. Shipbuilding is a major area of strength; Louisiana companies have already supplied Jones' Act certified vessels to the U.S. offshore wind sector, and the state has an opportunity to be a national hub for shipbuilding as industry demand grows. Significant opportunity exists in the manufacture of jacket foundations for offshore wind turbines and electrical service platforms in the near-term, given their similarity to structures produced for the offshore oil and gas sector.

Export Opportunity

Louisiana does not need to wait for offshore wind development in the Gulf of Mexico to play a leading role in the domestic offshore wind supply chain. **At least 15 Louisiana companies have supplied a variety of services to offshore wind to date**. The U.S. East Coast project pipeline includes over 30 current or proposed projects representing 52 GW of generation capacity, driving considerable demand for domestically manufactured components, vessels, and an expert maritime workforce. Louisiana can capture a significant portion of this export market in the near-term while simultaneously building local capacity for offshore wind development in the longer term.

Offshore Services

Louisiana's offshore services sector includes **at least 175 companies with expertise in planning, installation, operations, and decommissioning for offshore oil and gas**. Many of these companies have the personnel and foundational experience to transition to a similar role for offshore wind. Louisiana's offshore workforce has a long, deep history and track record working in marine industrial environments, and are well-placed to upskill and support offshore wind, both in-state and in the wider U.S. market.

Ports & Marine Assets

Louisiana has several ports in the state with two large ports, Port Fourchon and the Port of Lake Charles, already undergoing upgrades and retrofits to potentially serve as staging and marshalling ports for future offshore wind projects. **Quayside assets such as shipyards, fabrication shops, and manufacturing facilities could serve the offshore wind export market**. Some additional investment in quayside bearing capacity, crane capacity, and dredging will be required for most ports to accommodate the large components associated with offshore wind, but smaller ports may still be able to serve supporting roles for wind farm operation.

Transferable Skills

Workers in marine transportation, offshore oil and gas, and advanced manufacturing sectors have experience and technical expertise in areas including specialty trade contracting, water transportation, and heavy and civil engineering construction, among others. This experience overlaps favorably with offshore wind development, resulting in high transferability of skills and an opportunity for additive employment across energy sectors. **This study identified 10 highly adjacent existing industries and found that 71% of the existing workforce in these industries have transferable skills to support offshore wind**. Southeastern Louisiana had the greatest concentration of workers with high applicability to offshore wind, with clusters in New Orleans, Lafayette, Baton Rouge, Houma, and Morgan City.

Workforce Availability

Over 60,000 workers in Louisiana are currently employed in roles in industries that are highly adjacent to offshore wind. However, employment demand in these adjacent industries is already strong. Investment in additional training and education programs, especially for specialized manufacturing, installation, operations, and maintenance activities, will be necessary to introduce more workers and avoid shortages. Investing in training and education programs, including in diverse communities, can help meet workforce demand. This will be crucial to support local manufacturing for export in the near term, and for broader operations supporting Gulf-based projects over the long term.

Regulatory Landscape

Codifying offshore wind procurement targets into state law, with delegation of authority to relevant state agencies for offtake, would significantly increase confidence in the Louisiana offshore wind industry. Additionally, the State must appropriate funding to support local capabilities to develop and support further studies and identify strategic development targets. These actions will send positive market signals and stimulate investment in Louisiana's offshore wind capability while also building support for further infrastructure development in the Gulf of Mexico. **Continued investment in supply chain awareness and readiness initiatives are key for maximizing supplier competitiveness in national export markets**.

Incentives

The federal government is offering **significant tax relief for renewable energy and port development through the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA)**. Louisiana can signal its support for the offshore wind industry by establishing additional complementary incentives. Louisiana can strategically approach incentive program development by building on existing cross-industry programs, establishing industry-specific business supports and leveraging federal funds.

Innovation

Given the history of offshore industrial activity, and the strength of the marine educational ecosystem in-state, **offshore wind poses an enormous opportunity for Louisiana to establish industry-leading R&D and generate intellectual property**. With extensive local knowledge of offshore oil and gas infrastructure and development activities, the State can support the innovation and advancement of technologies in floating offshore wind, and wind turbines designed for extreme wind speed conditions like those faced in the Gulf. The existing offshore industry in Louisiana can position the State as a thought leader as well as a center for operational excellence.

LOUISIANA OFFSHORE WIND OPPORTUNITY

A scorecard was developed to assess Louisiana's performance in nine key criteria associated with the positive development of the State's offshore wind industry landscape, supply chain and workforce. This study shows that Louisiana generally scores strongly in an assessment of its current standing in the offshore wind sector. However, the State has the capability to achieve even more ahead of the 2035 procurement goal if recommended actions are taken to drive progress in each of these criteria.

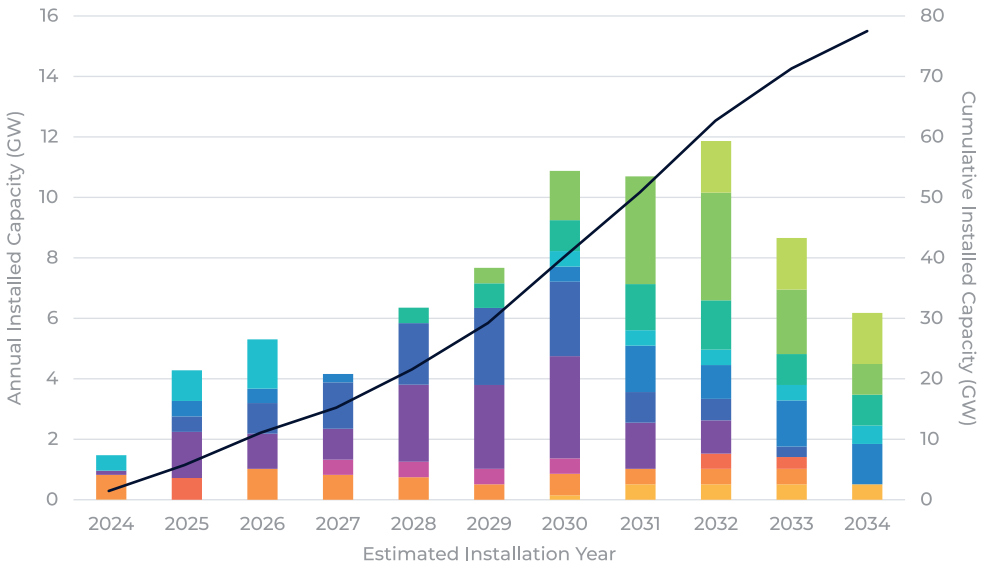
LOUISIANA OFFSHORE WIND SCORECARD ● CURRENT STANDING ● FUTURE OPPORTUNITY

CRITERIA	FOUNDATIONAL	GOOD	STRONG	STRONGEST
INDUSTRY LANDSCAPE				
Regulatory Landscape	●			●
Incentives		●		●
Innovation		●		●
SUPPLY CHAIN				
Manufacturing			●	●
Export Opportunity			●	●
Offshore Services			●	●
Ports & Marine Assets			●	●
WORKFORCE				
Transferable Skills			●	●
Workforce Availability		●		●

OFFSHORE WIND INDUSTRY LANDSCAPE

Over the last five years, the global offshore wind market has seen remarkable growth, with more than 380 GW of capacity in the current development pipeline. Globally, nearly 40 GW of offshore wind capacity has been installed with projections suggesting this will surge to around 140 GW by 2028[1].

Markets in Europe and Asia are at the forefront of this industry growth, but the U.S. is also advancing with 52 GW of proposed projects in the development pipeline representing a strong opportunity for Louisiana companies[1]. This rapid expansion has been driven by strong state and federal renewable energy targets, federal tax incentives, and strong, legislated climate targets at the state and federal level.



U.S. offshore wind capacity pipeline of proposed projects plus additional capacity to meet state targets.

- *Cumulative*
- *LA*
- *CA*
- *NC*
- *VA*
- *MD*
- *NJ*
- *NY*
- *CT*
- *RI*
- *MA*
- *ME*

CURRENT STATE OF OFFSHORE WIND IN LOUISIANA

Louisiana's legacy in offshore oil and gas production creates a strong foundation for the development of the offshore wind industry. Louisiana businesses have already leveraged their nationally recognized maritime and energy expertise to support new offshore wind projects elsewhere.

The Gulf of Mexico is primed for offshore wind development, with two projects underway in Louisiana state waters and a recent multi-million-dollar offshore wind lease auction which resulted in the sale of a commercial lease off Louisiana's coast. With these developments at hand, there is apparent appetite to include offshore wind as part of the State's economic profile. Louisiana' Climate Action Plan proposed a goal of procuring 5 GW of offshore wind capacity by 2035[2]. However, the State has not codified this target in legislation.

State leaders have signaled support for offshore wind energy development as they recognize the opportunity to leverage the State's existing offshore energy skills and track record in this rapidly expanding sector. There is significant potential to create local economic benefits through job creation and industrial expansion in support of regional offshore wind projects. Louisiana's commitment to green hydrogen, building on existing hydrogen generation capacity and as a means of decarbonizing some the State's industrial processes, serves to create another opportunity for the procurement of offshore wind energy. Additional State support and execution of key recommendations would build on the important head-start that Louisiana has in this expanding sector.

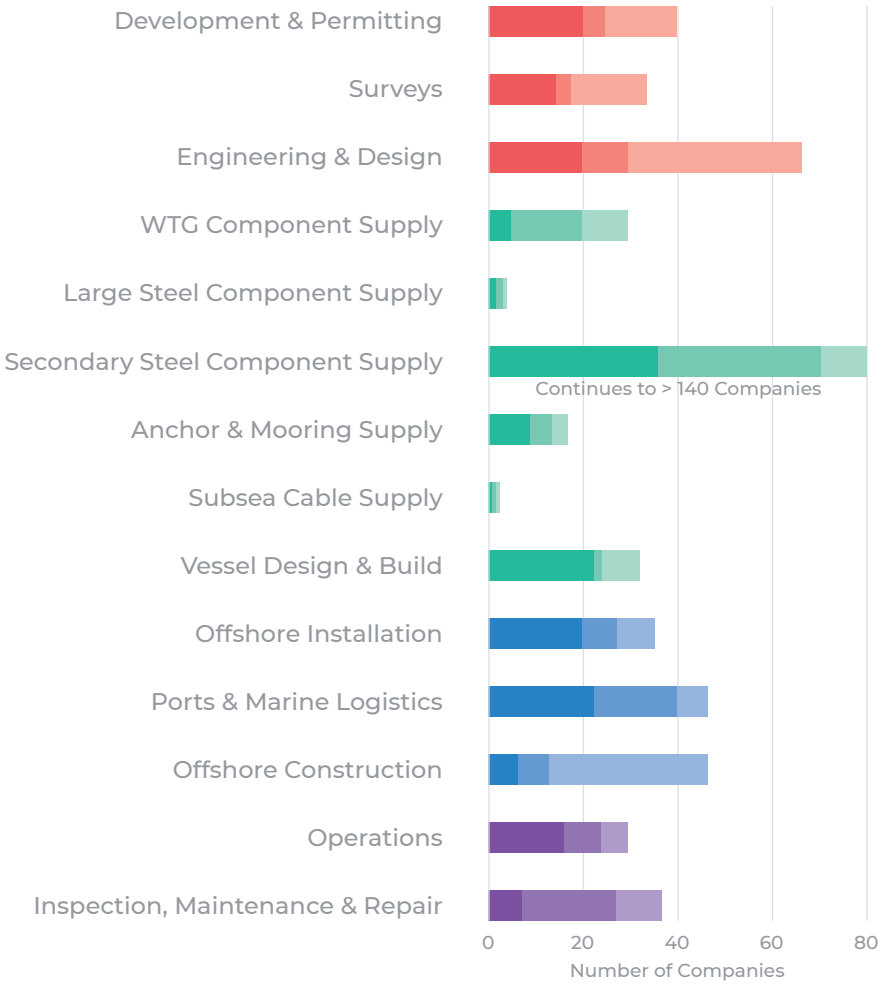
1. U.S. Department of Energy, Offshore Wind Market Report: 2023 Edition, August 2023. 2. Climate Initiatives Task Force, "Louisiana Climate Action Plan," February 2022.

LOUISIANA OFFSHORE WIND SUPPLY CHAIN

The study assessed Louisiana's supply chain readiness for offshore wind by reviewing publicly available databases for state business capabilities and through engagement with local stakeholders finding **458 unique companies with potential applicability to supply products or services in the offshore wind industry**.

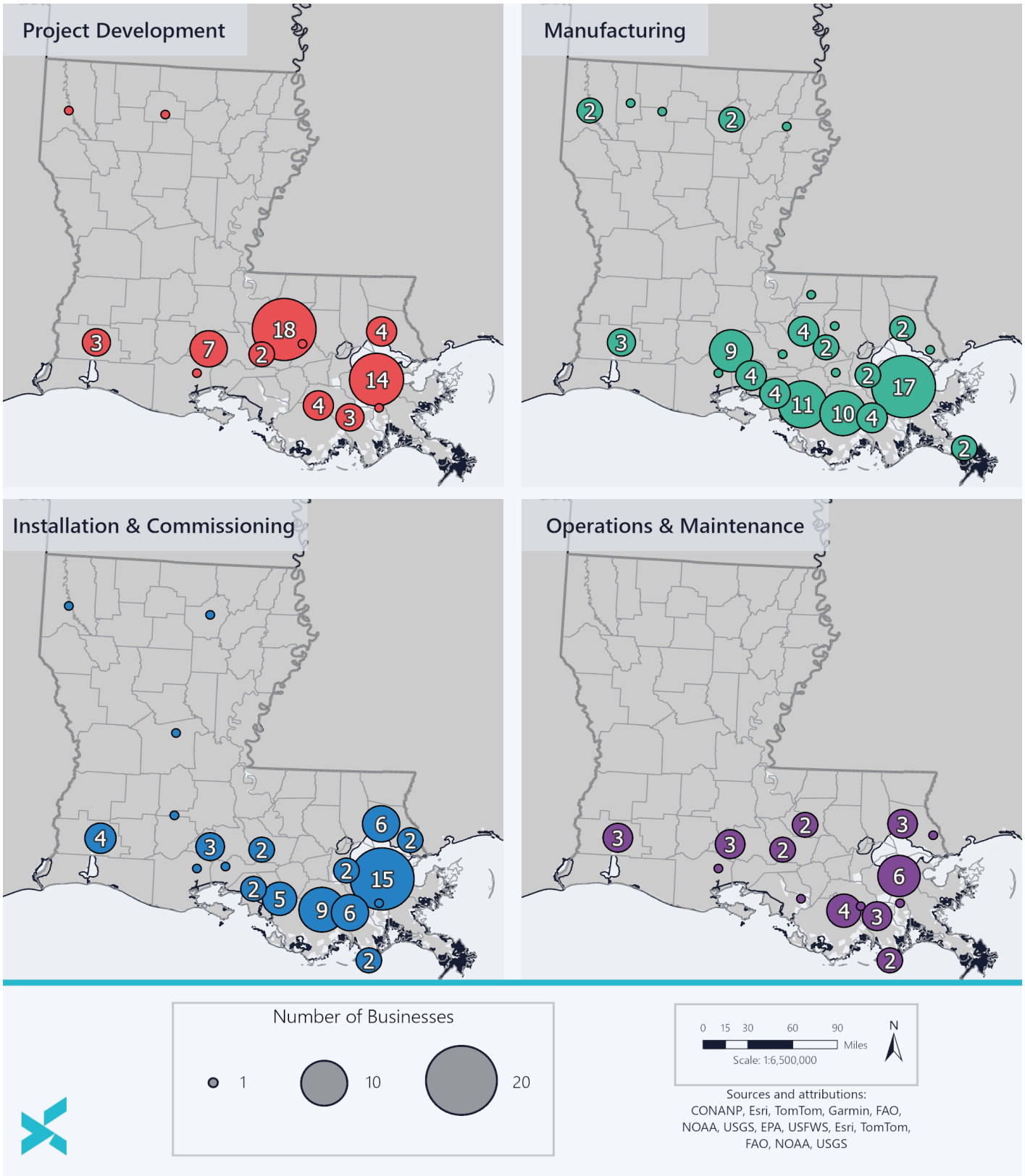
The supply chain analysis found substantial capabilities in engineering and manufacturing for key offshore wind components, particularly for steel structures, which align well with offshore wind industry demand and are primed for export. Over **100 companies were identified with high or moderate applicability to offshore wind** that could be well placed to support the industry following reskilling, retooling, or expanding existing operations.

LOUISIANA OFFSHORE WIND SUPPLY CHAIN CAPABILITY



Louisiana is also primed to supply highly exportable elements such as marine construction and vessel services for East Coast markets and beyond. Supporting Louisiana businesses to meet the near term demand for components and services will increase the State's readiness to support offshore wind projects in the Gulf of Mexico over the long term, providing a robust industry development pathway with immediate opportunities.

Overall, the analysis found companies with strong specialist expertise in technologies applicable to the offshore wind sector, a wealth of capability on supply vessel design and build services, and deep experience in marine logistics. Suppliers across the State were found to have potential capability to support the development of offshore wind projects, but companies with high applicability to support Louisiana's offshore wind supply chain were found to be predominantly concentrated in southeastern Louisiana. This concentration overlaps with Louisiana's substantial port infrastructure, much of which is already preparing to support the offshore wind industry.



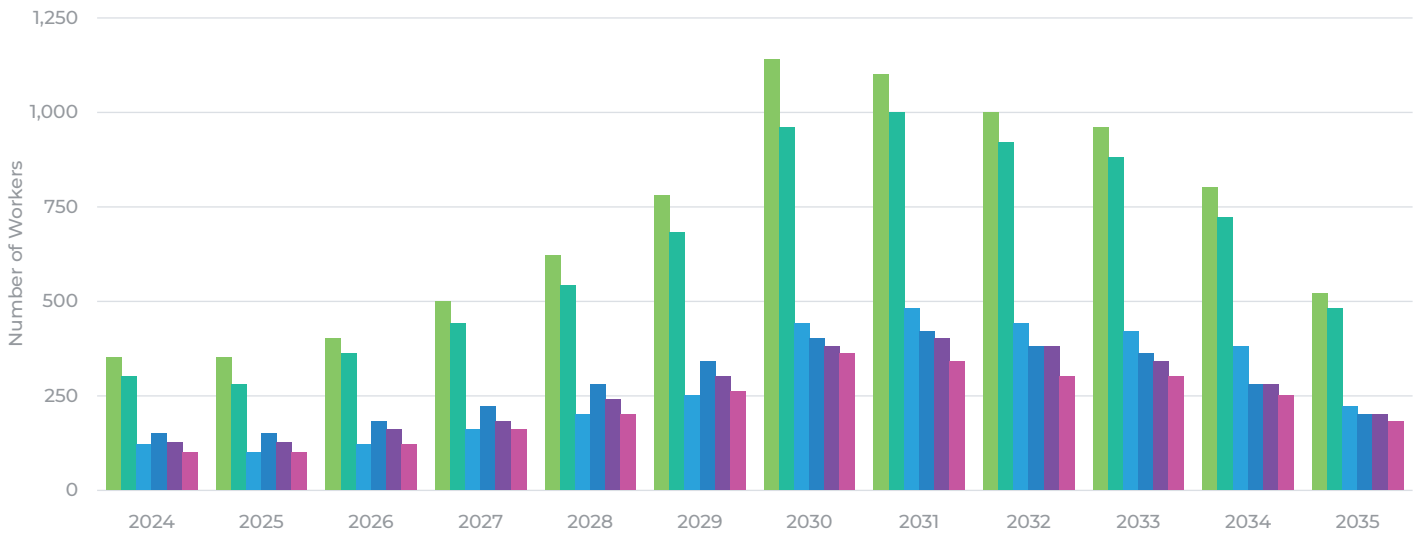
Distribution of Louisiana offshore wind supply chain.

LOUISIANA OFFSHORE WIND WORKFORCE

This study looked at workforce demand under different scenarios to assess Louisiana's opportunity to support both an export market for offshore wind manufacturing, installation, and operations, and a local market serving projects in the Gulf of Mexico.

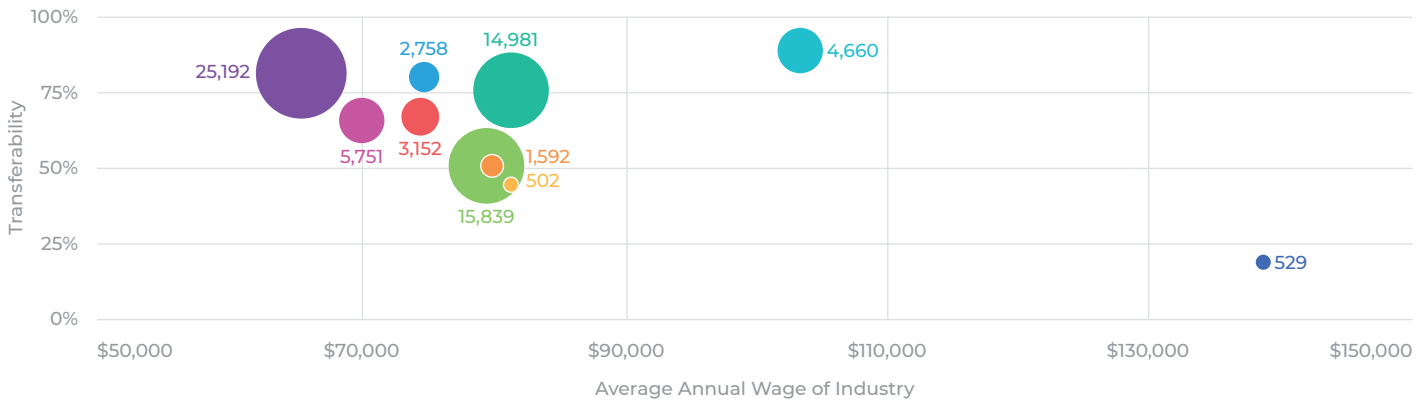
Under the export scenario, Louisiana's workforce would produce components for export and supply installation, construction, and operations expertise through contracts with East Coast projects. This model has already been explored in the state, with a**t least 15 Louisiana companies applying their expertise to the offshore wind market to date**. The export opportunity had higher workforce demand than the expected workforce required to focus exclusively on the Gulf of Mexico.

In a scenario combining a near-term investment in export markets on the East Coast, and a long-term investment in projects in the Gulf of Mexico, job demand was highest. Across the top six job roles, offshore wind could provide employment opportunities for as many as 3,700 workers, and the demands for specialized roles like construction laborers and welders were both over 1,000 workers. These workforce scenarios all peak in 2030 or 2031.



Estimated Louisiana workforce demand in top occupations to meet the combined U.S. East Coast and Gulf of Mexico offshore wind project supply opportunity.

One of Louisiana's strongest opportunities for participation in the offshore wind sector is the high adjacency of the state's existing workforce. The Transportation Equipment Manufacturing and Water Transportation industries had the highest transferability in skillsets and experience. Other industries like the Specialty Trade Contractors industry and the Professional, Scientific, and Technical Services sector also represent large existing workforces with high transferability of experience, skillsets and training. Despite the high adjacency of many roles in the oil and gas industry, there are still many roles that relate directly to the extraction and processing of petrochemicals which do not map directly to offshore wind. **Prioritizing investments in high demand, high adjacency training and industry development will be essential to efficiently prepare Louisiana's workforce to capture this new industry**.



- *Professional, Scientific & Technical*
- *Heavy & Civil Engineering*
- *Water Transportation*
- *Transportation Equipment Manufacturing*
- *Oil & Gas Extraction*
- *Speciality Trade Contractors*
- *Fabricated Metal Product Manufacturing*
- *Machinery Manufacturing*
- *Utilities*
- *Primary Metal Manufacturing*

Size of current Louisiana skilled workforce from adjacent industries with opportunity to support offshore wind project delivery.

RECOMMENDATIONS

Specific, actionable recommendations emerged from the analyses of Supply Chain and Workforce as well as a consideration of the broader Industry Landscape. As there are opportunities to create synergy between individual recommendations, it will be important for these items to be addressed through a holistic approach championed by state leaders with a comprehensive understanding of the offshore wind industry and the State's existing assets.

Louisiana's success in the offshore wind industry to date has stemmed from expertise within the existing supply chain bolstered by powerful leadership models. State government, state-led higher education networks, economic development organizations or agencies (EDOs), grant-funded innovation clusters, and suppliers have consolidated independent efforts into powerful networks to achieve collective success. Each of these groups will continue to play an impactful role as Louisiana capitalizes on its strengths and knowledge to leverage the opportunity presented by the emerging offshore wind industry.

Taking these actions will enable Louisiana to further demonstrate its leadership in offshore energy, strengthen the State's position as a pillar of the domestic offshore wind supply chain, and support expanded employment opportunities for Louisiana residents.

GOVERNMENT EDOs DEVELOPER AND/OR TIER 1 SUPPLIERS TRAINING & ACADEMIA

RECOMMENDED ACTION FOR LOUISIANA OFFSHORE WIND INDUSTRY DEVELOPMENT	OWNER
INDUSTRY LANDSCAPE	
Establish legislation and funding supporting offshore wind industry development	
1. Codify the Louisiana ambition for offshore wind capacity	GOVERNMENT
2. Establish an offshore wind procurement process through State law	GOVERNMENT
Streamline in-State offshore wind development efforts	
3. Designate an organization to oversee offshore wind development in LA	GOVERNMENT, EDOs
4. Support Parish-level EDOs to improve coordination of localized efforts	EDOs
Drive in-State innovation and sector leadership	
5. Build a reputation for technical excellence and innovation in LA by localizing R&D activities	TRAINING & ACADEMIA
SUPPLY CHAIN	
Develop strong supply chain data sources to inform investments	
6. Build on the existing LA Offshore Wind Supply Chain Database	EDOs
7. Conduct targeted surveying of industry-adjacent companies	EDOs
8. Conduct an inventory of ports and infrastructure assets	EDOs
9. Develop a timeline of U.S. offshore wind project supply requirements	EDOs
Strengthen business networks to promote Louisiana offshore wind supply chain export offering	
10. Plan and execute B2B matchmaking events to connect LA companies with opportunities	GOVERNMENT, EDOs, DEVELOPER AND/OR TIER 1, SUPPLIERS
11. Identify and leverage existing supplier relationships between LA companies	GOVERNMENT, EDOs
12. Promote advantages of doing business in LA	GOVERNMENT, EDOs
Position Louisiana for major component supply and shipbuilding contracts	
13. Position LA as a key manufacturing hub for large steel components	GOVERNMENT, EDOs
14. Identify high impact opportunities for investment in supply chain development	GOVERNMENT, EDOs, SUPPLIERS
15. Leverage LA's reputation as a shipbuilding hub	GOVERNMENT, EDOs
WORKFORCE	
Build awareness and drive recruitment for the offshore wind workforce	
16. Increase awareness of job roles in the offshore wind sector	TRAINING & ACADEMIA
17. Secure developer/Tier 1 funding for specialized training programs	DEVELOPER AND/OR TIER 1
18. Target positive outcomes and build diversity in the offshore wind workforce	GOVERNMENT, EDOs, TRAINING & ACADEMIA

INDUSTRY LANDSCAPE

Establish legislation and funding supporting offshore wind industry development

1. Codify the Louisiana ambition for offshore wind capacity including the target of 5 GW of procured offshore wind energy by 2035, with an accompanying funding package. Adopt clean energy initiatives that support the establishment of procurement and designate respective oversight for the process in the State.

2. Clearly establish an offshore wind procurement process through State law, assigning responsibility to appropriate State agencies to develop contracts and oversee a competitive process that aligns with State objectives and industry standards for offshore wind development.

Streamline in-state offshore wind development efforts

3. Designate an organization to oversee offshore wind development in Louisiana. Designating a lead agency will help to create efficiencies in allocating funds, coordinating program development, and more, allowing for a single contact within the industry.

4. Support Parish-level EDOs to improve coordination of localized efforts, including education and awareness of the offshore wind industry. This will allow these groups to better direct local efforts in tracking and engaging suppliers and signposting opportunities. Empower these EDOs to collaborate with statewide entities like the Louisiana Community and Technical College System.

Drive in-state innovation and sector leadership

5. Build a reputation for technical excellence and innovation in Louisiana by localizing R&D activities for offshore wind-related technologies. Fostering collaboration on R&D challenges can result in increased generation of high value intellectual property in the State.

SUPPLY CHAIN

Develop strong supply chain data sources to inform investments

6. Expand on the existing Louisiana Offshore Wind Supply Chain Database to include further relevant companies from high-potential adjacent industries, such as water transportation, shipbuilding, manufacturing and fabrication, oil and gas extraction, and heavy construction.

7. Conduct targeted surveying of industry-adjacent companies to more fully assess offshore wind readiness and determine information gaps. Questions on willingness to participate in this industry, as well as the degree of investment, scaling, retooling and certification required will help to build awareness of overall supply chain readiness. These efforts can further refine the results from supply chain capability assessments.

8. Conduct an inventory of ports and relevant infrastructure assets and features to build a comprehensive understanding of capability and opportunity, alongside evidence that can support further targeted funding. Identifying available space for additional quayside development, manufacturing operations, or office space will help to identify potential offshore wind supply chain hubs as well as provide opportunities for public/private investment and partnership-building. The development of key ports in-state can be a catalyst for creating workforce opportunities in the region.

9. Develop a comprehensive timeline of U.S. offshore wind project supply requirements making informed estimates on when various components will be required and when relevant procurement activities will take place. Louisiana's potential to export goods and services to other U.S. markets is a key opportunity for near-term supply chain development; preparing this timeline will directly support efforts for the State to engage and invest strategically to support export capabilities.

Strengthen business networks to promote Louisiana's offshore wind supply chain export offering

10. Plan and execute Business-to-Business matchmaking events to connect Louisiana companies with developers, Tier 1 suppliers, and potential partner companies. Creating platforms for relationship building increases supplier awareness of requirements and buyer awareness of capabilities while fostering opportunities for innovation. These events can develop strong and diverse supplier-to-supplier networks, both in-state and nationally.

11. Identify and leverage existing supplier relationships between Louisiana companies that are currently participating or have participated in domestic offshore wind projects and/or that have a nation-wide presence to build awareness of the supply opportunity available to Louisiana. This study identified 15 companies which have already supported offshore wind development in some form, which represents a great opportunity to further assess their desire to support the industry locally and leverage and share the experience they've gained.

12. Promote advantages of doing business with Louisiana through the leveraging of tax credits, especially those set to expire under the IRA, which presents a near-term opportunity for Louisiana companies to support offshore wind projects. This study identified tax credits as presenting a significant opportunity to supercharge strategic investment but would require some coordination at the state level to maximize those potential benefits.

Position Louisiana for major component supply and shipbuilding contracts

13. Position Louisiana as a key manufacturing hub for large steel components, such as subsea foundations (including jackets, monopiles, and gravity-based structures), focusing on jacket foundation supply opportunities in the near-term while building capacity for other foundation supply in the future. Localizing Tier 1 manufacturing of subsea foundations opens significant opportunities in Tier 2/3 manufacturing through the production of secondary steel components.

14. Identify high impact opportunities for investment in supply chain development, including opportunities for developing partnerships to meet scale and volume challenges. While a number of companies contacted as part of this scope indicated they were interested in growing their capabilities to meet the needs of the offshore wind industry, none yet possess the ability to produce large steel components like monopile foundations, towers or transition pieces for the current generation of offshore wind turbines.

15. Leverage Louisiana's reputation as a shipbuilding hub and promote tax benefits under the IRA for domestic vessel productions and Jones Act compliance.

WORKFORCE

Build awareness and drive recruitment for the offshore wind workforce

16. Build awareness and drive recruitment for the offshore wind workforce through a coordinated educational campaign. Establishing coordination between existing training and educational institutions will lead to consistent and more impactful messaging and alignment on goals, while avoiding duplication of efforts.

17. Secure developer and/or Tier 1 funding for specialized training programs and formalize collaborations with educational institutions to ensure alignment on skill requirements. By partnering with offshore wind employers, training institutions will have greater insight into requirements and specializations needed to meet their specifications.

18. Target positive outcomes and build diversity in the offshore wind workforce by ensuring recruitment activities take place in designated Justice40 communities, areas with low socioeconomic standing, and regions known to host a disproportionate number of minority residents. Concerted efforts to recruit veterans, women, tribal members, and those with disabilities should also be prioritized by partnering with organizations that represent these populations.

CONTENTS

1 INTRODUCTION

Xodus Group (Xodus), in collaboration with The Pew Charitable Trusts, GNO, Inc., the Southeastern Wind Coalition, Center for Planning Excellence, and Louisiana stakeholders, has produced this report to assess the supply chain and workforce opportunity available to Louisiana in supporting offshore wind development and make recommendations on how to maximize the opportunities presented by this growing industry. This research and analysis were conducted using Xodus' framework for supply chain and workforce assessment, which combines offshore wind industry and energy sector expertise with an analysis of publicly available data and key stakeholder insights.

This study has determined that Louisiana is well-placed to apply its energy sector expertise to the offshore wind industry. As a nationally recognized leader in port infrastructure, offshore construction, and maritime services, Louisiana can further diversify and develop new employment and economic opportunities through participation in supplying local and national offshore wind projects.

1.1 Objectives

The purpose of this document is to provide policymakers, community leaders, and industry professionals with context, analysis, and informed recommendations to guide discussion and decision-making on offshore wind development in Louisiana. Specifically, the key objectives guiding this study were to:

- Analyze the availability and capability of Louisiana's supply chain and workforce to support the development, manufacturing, installation, and operations of local and national offshore wind projects.
- Understand the opportunity for greater diversity, equity, and inclusion across the potential Louisiana offshore wind supply chain.
- Engage with relevant industry stakeholders to capture appropriate breadth and depth of perspectives and insights.
- Generate recommendations for industry and relevant stakeholders to best position Louisiana to receive economic benefits of local and national offshore wind development.

This report primarily focuses on an analysis of Louisiana's existing supply chain and workforce in adjacent industries. Local expertise was solicited through systematic stakeholder engagement, culminating in a recommendations workshop that collected key insights from local policymakers, energy sector experts, community leaders, and wind industry advocates.

1.2 Scope of Document

In each of the following sections, background information about the offshore wind industry will be supported by data and analysis specific to Louisiana to provide context and key region-specific information. This analysis culminates in a series of recommendations, crafted through a synthesis of Xodus' industry expertise, local stakeholder initiatives, and state-specific insight. The document is structured as follows:

- Section 2 - Offshore Wind Industry Landscape provides contextual insight into the current state of the global and U.S. offshore wind markets, as well as a baseline description of the offshore wind supply chain.

- Section 3 - Current State of Offshore Wind in Louisiana provides greater context and clarity around offshore wind and adjacent industries in Louisiana. This section provides background on adjacent industries; proposed offshore wind projects; supply chain experience, investments, and workforce programs in offshore wind to date; existing assets and infrastructure; and the policy and regulatory context in Louisiana.
- Section 4 - Louisiana Offshore Wind Supply Chain describes the supply chain assessment and results. It highlights opportunities for Disadvantaged Business Enterprises (DBEs) and the opportunities for manufacturing, shipbuilding, and marine industrial services.
- Section 5 - Louisiana Offshore Wind Workforce describes the workforce assessment and results, detailing the demand for and distribution of the existing workforce in Louisiana.
- Section 6 - Louisiana Offshore Wind Opportunity Assessment describes the current and future opportunities to develop the Louisiana offshore wind supply chain.
- Section 7 - Recommendations provides action items for the State of Louisiana to develop the offshore wind supply chain.
- Section 8 - Glossary provides a list and explanation of offshore wind industry terms and acronyms used throughout the document.
- Section 9 - References provides the information sources cited in this document.

2 OFFSHORE WIND OVERVIEW

2.1 Industry Overview

Global offshore wind markets have grown considerably over the past five years, underscoring an unprecedented interest in broadening the global portfolio of energy generation sources. Currently there are over 380 gigawatts (GW) of offshore wind capacity slated for development across 32 distinct global markets over the next decade [1]. The U.S. project pipeline includes several projects totaling over 16 GW of procured capacity, with state targets exceeding a combined 70 GW. The current global offshore wind market includes nearly 40 GW of installed capacity (excluding China, whose offshore wind market has largely been insular), but this figure is expected to more than triple to 140 GW by 2028 [1].

European and Asia-Pacific markets are leading the global offshore wind industry in installed capacity, but ambitious commitments from the U.S. have also drawn interest and investment. An analysis of commercial operations to date highlights the current and projected global offshore wind installed capacity.

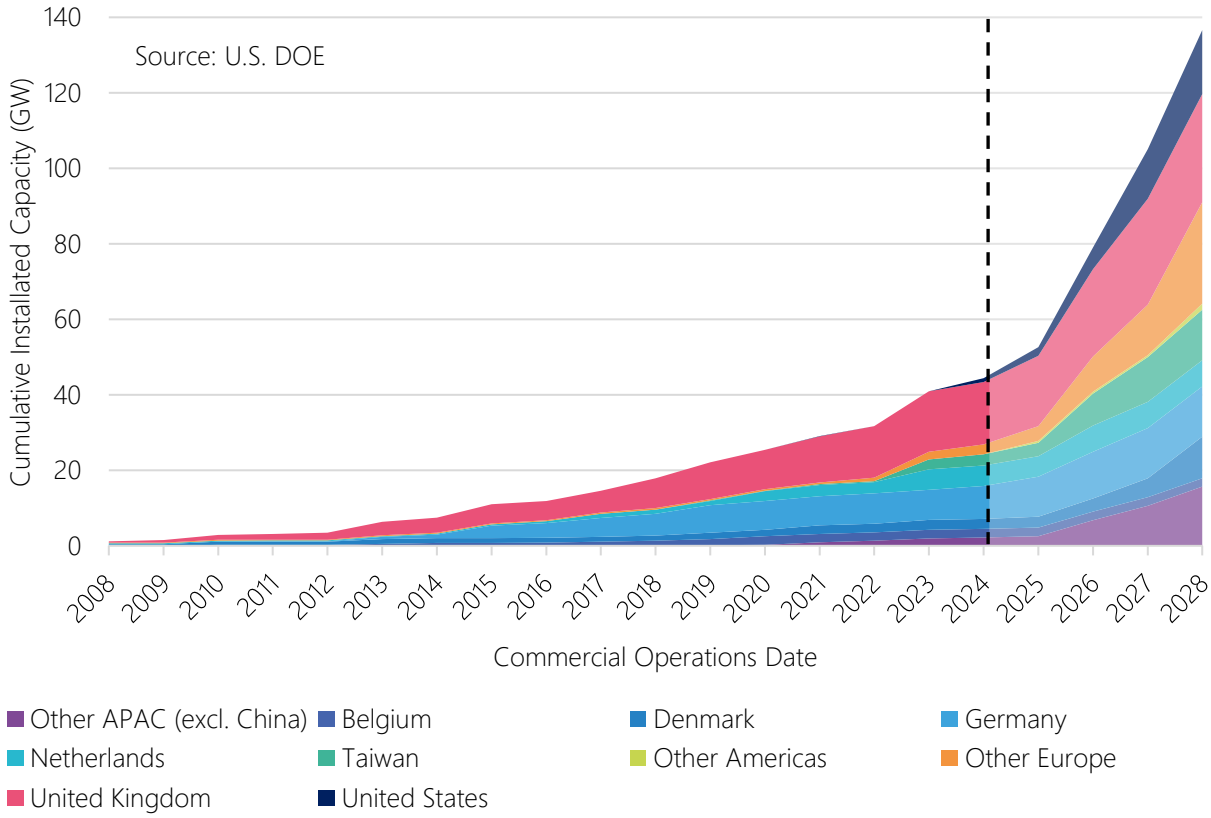


Figure 2-1 – Estimated cumulative offshore wind capacity by country [1]

2.2 U.S. Project Pipeline

Over 16 GW of offshore wind capacity has been procured in the United States, with many more projects still pursuing offtake agreements. Offshore wind development has been largely focused on the Northeast and Central Atlantic regions, with additional markets on the West Coast, the Gulf Coast, and in Hawaii. California leads in terms of state capacity targets with a goal of 25 GW by 2045, despite having no projects with secured offtake. New York, New Jersey and Massachusetts have each secured multiple GW of capacity through several solicitation rounds. However, some previously secured capacity in each state has subsequently terminated their offtake agreements due to market factors impacting these projects' financial viability. In total, declared state targets exceed 70 GW in the U.S., with several states having made significant progress in achieving their offshore wind development goals (Figure 2.2).

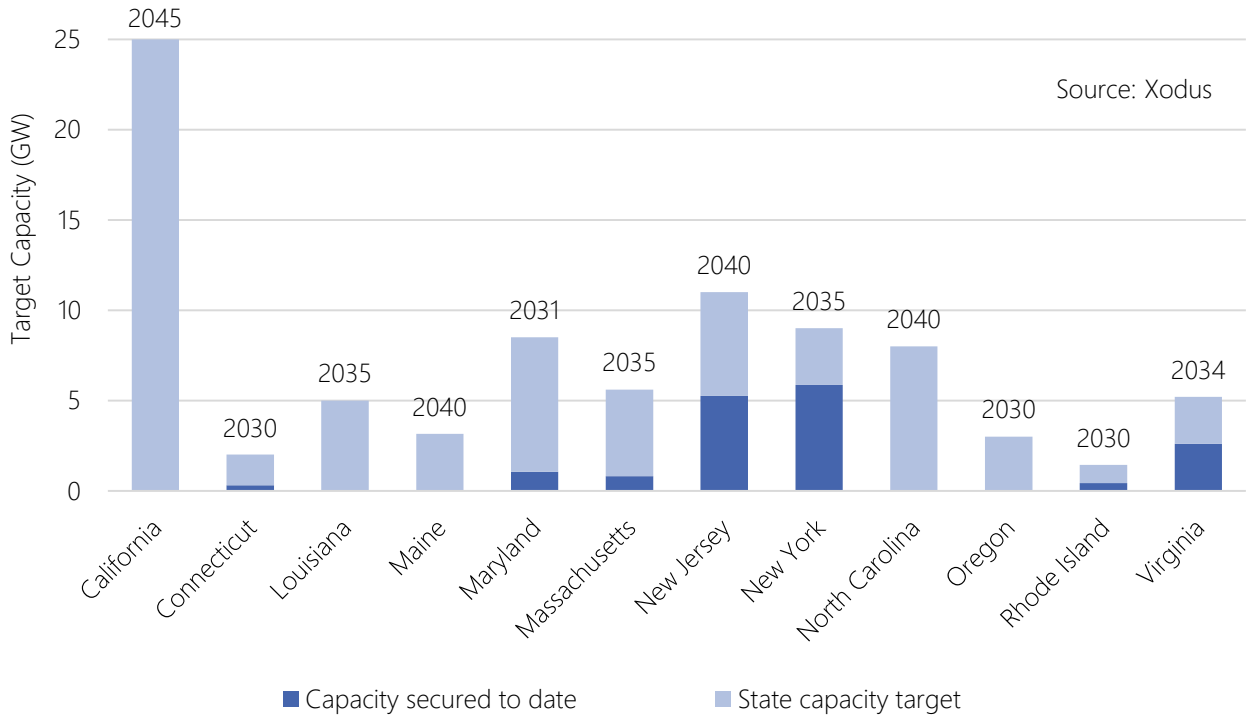


Figure 2.2 – State offshore wind capacity procurement targets and capacity procured to date, with target year for achieved procurement goal

The U.S. offshore wind industry's growth can be attributed to a number of factors, including aggressive state and federal targets for renewable energy commissioning, federal and state tax incentives through the Inflation Reduction Act (IRA) and other state-level laws, and the need to locate renewable generation sources nearer to coastal population and load centers. Figure 2.3 provides the projected timeline of annual and cumulative installed capacity for the U.S. offshore wind industry over the coming decade that would be required for states to meet their current offshore wind capacity goals. Additional capacity may be developed beyond what is required to meet current state goals.

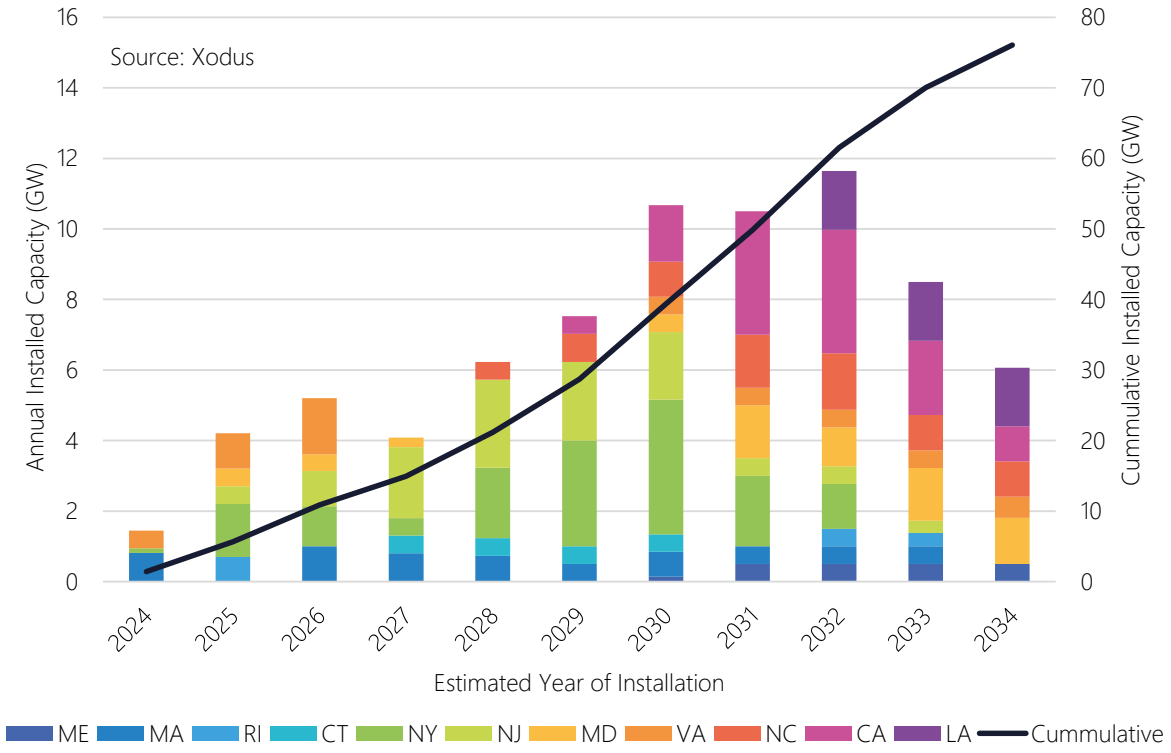


Figure 2.3 – U.S. offshore wind capacity pipeline of proposed projects plus additional capacity to meet state targets

States procuring offshore wind energy typically engage in long-term offtake contracts, mandating offshore wind developers to meet specific quantitative and qualitative criteria. These contracts may reward projects that achieve a certain percentage of local content, imposing detailed reporting obligations for project design parameters to guarantee thorough due diligence from the developers.

The total investment across all phases of a 1 GW offshore wind project may be as much as $5 billion [2]. This amount would be spread out over hundreds of individual contracts, with the majority of these secured before the project enters operations. With such front-loading of capital, the broader economic viability of a project is susceptible to other market factors, including inflation and rising interest rates. Project delays induced due to sequencing of permitting and construction deadlines or availability of components and/or vessels, may inflate project costs or exacerbate additional bottlenecks in the supply chain. These factors make offshore wind projects vulnerable to economic disruptions. With several high-profile U.S. projects making the financial decision to back out of existing offtake contracts in recent years, there has been an increase in the perception of risk for U.S. offshore wind projects. Several states have recognized these sensitivities and begun building inflation mitigation mechanisms into their offtake agreements to reduce risk.

2.3 Offshore Wind Taxonomy

Offshore wind farms include several major components comprised of different raw materials with some specialist design, manufacturing, installation, and operations requirements. Table 2.1 presents a high-level taxonomy for the products and services needed to develop offshore wind projects.

Offshore wind farms are comprised of Wind Turbine Generators (WTGs) placed on large steel towers, supported by either fixed or floating foundations. The majority of offshore wind projects to date use large steel monopile or jacket foundations fixed to the seabed, though future projects in deeper waters will use floating foundations paired with specialized anchor and mooring systems. Electricity generated by the WTGs is transmitted to shore via subsea export and array cables and, typically, an offshore Electrical Service Platform (ESP) (also known as an offshore substation) and associated land-based transmission and distribution infrastructure. The services of ports and specialist vessels are procured to install the offshore components and commission the project, bringing the wind farm online.

Table 2.1 – Offshore wind supply chain taxonomy

Supply Chain Phase	Supply Element
Project Development	Development and permitting
	Surveys
	Engineering and design
Manufacturing	WTG component supply
	Large steel component supply
	Secondary steel component supply
	Anchor and mooring supply
	Subsea cable supply
	Vessel design and build
Installation and Commissioning	Offshore installation and commissioning
	Ports and marine logistics
	Onshore construction
Operations and Maintenance	Operations
	Inspection, maintenance and repair (IMR)

For the purposes of this study the supply elements required to deliver offshore wind projects have been grouped according to four distinct phases.

Project Development

During the first phases of an offshore wind project, developer teams survey the lease area, design the project, secure an offtake agreement, and undergo federal, state, and local permitting and review processes.

Manufacturing

The WTG's nacelles, rotors, blades, and towers are manufactured by Original Equipment Manufacturers (OEMs) and to date have been primarily sourced from production facilities in Europe. The WTG towers include several

secondary steel components, such as ladders and internal platforms. The remaining balance of plant includes the manufacturing of foundations and transmission infrastructure, including substations, export cables, and array cables. ESPs are required to export the electricity generated by the wind farm and share similar characteristics to specialized modules for offshore oil and gas installations. Offshore WTGs and ESPs utilize custom-designed fixed or floating foundations. Typically, these foundations are made from steel, though concrete may also be used. Both the foundations and ESPs also require secondary steel components, which can include items like ladders, railings, and landing platforms. Other manufacturing requirements include subsea cables, and anchor and mooring elements for floating foundations. This group also includes the manufacturing of specialty vessels whose services are required for installation and operations phases. There is an appetite for U.S.-flagged vessels due to requirements levied in the Jones Act.

Installation and Commissioning

Installing a fixed-bottom offshore wind farm typically involves pile-driving steel monopiles or installing fixed jacket foundations, adding steel transition pieces atop these foundations, and mounting the WTGs. Wind turbine installation vessels (WTIVs) are specialized ships outfitted with cranes capable of lifting large WTG components. The installation phase will also be supported by feeder vessels, barges, crew transfer vessels (CTVs), and additional heavy lift vessels (HLVs). Cable installation is undertaken by cable laying vessels, which clear the seabed and lay the array and export cables, achieving target cable burial where possible. Installation of floating foundations necessitates the use of anchor handling tug supply vessels.

Operations and Maintenance

Operations and maintenance (O&M) is a continuous practice over the life of the offshore wind farm. Onshore teams monitor the offshore wind farm's performance and facilitate inspection, preventative maintenance, repair, and component replacement campaigns. Additional onshore activities, such as logistics planning, warehousing, and weather monitoring are crucial to support these campaigns. The onshore O&M base will likely host one or two large service operation vessels (SOVs) and/or two to four smaller CTVs, depending on project size. SOVs are equipped with crew accommodations for longer multi-day maintenance campaigns and the capacity for smaller spare components, while CTVs are lighter and used to move technicians to the turbines for single-day trips.

2.4 Federal Funding Incentives

The IRA was signed into law in 2022 and provides significant expansions to renewable energy tax credits for both developers and manufacturers. U.S. offshore wind projects have been enabled in part through the investment tax credits (ITC) program. The clean energy ITC has a base credit of 6% but can reach up to 50% through incremental bonus credits if certain workforce and domestic content requirements are also fulfilled by project developers. The ITC will begin to be phased out in 2030 and will end in either 2032 or once annual greenhouse gas (GHG) emissions from electricity production in the U.S. have decreased by 75% (from 2022 levels), whichever comes later.

While many states already possess prevailing wage requirements, Louisiana does not, so therefore Davis-Bacon Act requirements will likely apply [3, 4]. This requirement may present both a challenge and an opportunity for the local workforce, as wages will likely vary from traditional rates, potentially increasing wages, and in turn, labor costs. Additionally, the IRA's inclusion of a 15% apprenticeship requirement, that can scale up to 25%, may have a large impact on the shaping of project labor agreements, contracting, and workforce development programs.

Additionally, the IRA's incentive to utilize domestic suppliers has already begun influencing developers' procurement and supplier investment strategies. Many developers have decided to seek procurement in states such as New York and New Jersey, which prioritize local content and have invested in planned domestic manufacturing facilities.

New guidance on offshore wind's eligibility for the Energy Community Tax Credit Bonus provides an opportunity for developers to boost credit for locating project transmission systems in communities which have historically seen disproportionate local siting of fossil-fuel-based industries, or where a certain percentage of the tax base is reliant on fossil fuel industries. This bonus credit will likely play a role in determining interconnection locations and port utilization for projects looking to capitalize on this opportunity. While additional clarification is expected, this could prove advantageous for development in Louisiana given the extent of fossil fuel activities in the State. The requirements that developers must satisfy to achieve a given incremental increases in ITC are described in Table 2.2.

Table 2.2 – Investment Tax Credits relevant to offshore wind projects developed in the U.S. [5]

REQUIREMENT	TOTAL INCREMENTAL ITC	DESCRIPTION
Baseline	6%	Construction on the offshore wind project must begin before 2026.
+ Prevailing Wages	30%	All laborers and mechanics must be paid prevailing wages as defined by the Department of Labor for a given locality and job type.
+ Apprenticeships		Qualified apprentices in registered apprentice programs must perform 15% of the total labor hours for projects constructed after 2024.
+ Domestic Content	40%	Steel, iron, and other manufactured products that comprise the project must be produced in the U.S.
+ Energy Community	50%	Project's interconnection and power conditioning equipment and/or supervisory control and data acquisition equipment must be located in a federally-recognized Energy Community.

In addition to the ITC, the IRA established the Advanced Manufacturing Production Credit, which introduced a federal production tax credit (PTC) for domestic manufacturing of offshore wind components. The value of the PTC depends on the type of component being manufactured and the total wattage of the turbine it will support. For example, a nacelle manufactured in the U.S. is eligible for a PTC of 5 cents per watt of rated turbine capacity. As such, a nacelle for a 12-megawatt (MW) turbine would generate a PTC of $600,000. The PTC will be phased out between 2030 and 2032, with components sold in 2030 receiving a PTC equal to 75% of the rate, components sold in 2031 receiving a PTC equal to 50% of the rate, and components sold in 2032 receiving a PTC equal to 25% of the rate. Table 2.3 provides the PTC value for each offshore wind component manufactured in the U.S. It is important to note that the tax credit for the constructed related vessels is based on the sales price of the vessel and not a traditional PTC mechanism.

Table 2.3 – Advanced Manufacturing Production Credits for U.S manufactured offshore wind components [5]

COMPONENT	PTC
Blade	2¢ per watt of rated turbine capacity
Nacelle	5¢ per watt of rated turbine capacity
Tower	3¢ per watt of rated turbine capacity
Fixed Foundation	2¢ per watt of rated turbine capacity
Floating Foundation and Mooring System	4¢ per watt of rated turbine capacity
Construction Related Vessels	10% of sales price

While these PTCs will likely play a role in the decision-making of OEMs looking to develop manufacturing facilities inside the U.S., they will likely not be the primary determining factor. Other variables such as proximity to projects, state-based incentives, material costs and existing supplier relationships will also influence where manufacturing facilities are established.

PTCs will provide significant value, however, to existing suppliers who are currently working, or could work, in the offshore wind industry. Manufacturers of vessels (such as WTIVs, SOVs and CTVs) will be able to get 10% of the sales price credited, which could account for millions of dollars. Additionally, suppliers of jacket foundations, which may become preferable for use on offshore wind projects in deeper waters where monopile foundations would not be technically or economically feasible, would be able to take advantage of the current PTC program.

Additionally, the Infrastructure Investment and Jobs Act (IIJA) (which was passed into law in 2021) provides over $17 billion for port development and upgrades, including $450 million a year until 2026 for the Port Infrastructure Development Program. This program provides grant funding for port development activity, and language in the IIJA states a preference for funding wind ports. Ports throughout the U.S. have already received hundreds of millions of dollars for port development for offshore wind, presenting a potential funding opportunity for Louisiana ports.

2.5 U.S. Offshore Wind Supply Chain

There is growing demand for a further localized offshore wind supply chain in the U.S. driven by state and federal policies that offer incentives for procuring supplies and components from local and domestic sources.

Several major component manufacturing facilities have been announced in the U.S. as described in Table 2.4, though degrees of financial commitment and progress through planning and construction vary across these facilities. The use or construction of some manufacturing facilities is tied directly to the development of specific offshore wind projects, where the manufacturer will look to de-risk their investment by securing a commercial contract for their product. Two to three years ahead of installation, developers will begin entering supply contracts for major components. Those that cannot be sourced from domestic manufacturers will instead be imported from international markets, typically Europe or Asia. However, an increasing global demand for these materials from European and Asian-Pacific markets will continue to present a bottleneck for major component supply.

Shipbuilding capability in the U.S. is of particular importance for the offshore wind industry due to both the number of new vessels required to support the delivery of the planned offshore wind pipeline as well as restrictions relating to the Merchant Marine Act of 1920, more commonly referred to as the Jones Act. The Jones Act is a federal law that requires goods and personnel shipped between U.S. ports to be transported on vessels that are built, owned, and operated by U.S. persons. With some exceptions this means that vessels transporting goods and personnel from U.S. ports to an offshore wind farm site must be Jones Act-compliant. Currently, only one Jones Act-compliant WTIV is under construction in the U.S. As such, projects have been forced to rely on the use of foreign-flagged WTIVs coupled with a U.S.-flagged feeder barge approach to shuttle components for installation. Several U.S. shipbuilders, including Edison Chouest Offshore, Otto Candies, LLC and Gulf Craft in Louisiana, have already supplied SOVs and CTVs to the U.S. offshore wind industry, which is significant not just for the construction phase, but also as a key support element during the full operational lifetime of a project.

At the time of writing, there are 16 WTIVs in operation around the globe, none of which are Jones Act-compliant. Six additional WTIVs are under construction around the globe, one of which (Dominion Energy's Charybdis) will be Jones Act-compliant. The National Renewable Energy Laboratory estimates that the U.S. offshore wind market alone will require five new WTIVs by 2035 [6].

Table 2.4 - Announced U.S. manufacturing facilities to support offshore wind [7]

SUPPLY ELEMENT	SUPPLIER	LOCATION	STATE	OPERATIONS DATE
Nacelle	Vestas	Wind Port	New Jersey	TBD
Transition Piece	Marmen Welcon	Port of Albany	New York	2025 (estimate)
Tower	U.S. Forged Rings	TBD	East Coast	TBD
	TBD	Wind Port	New Jersey	TBD
	Haizea Wind Group	Sparrows Point	Maryland	2025 (estimate)
Foundation	EEW	Paulsboro Marine Terminal	New Jersey	2024
Steel Plates	Nucor Steel	Bradenburg	Kentucky	2022
Secondary Steel	Riggs Distler & Co.	ProvPort	Rhode Island	2023
		Port of Coeymans	New York	TBD
		Sparrows Point	Maryland	TBD
		New Windsor	New York	TBD
	Ljungstrom	Wellsville	New York	TBD
	North Shore Steel	Newburgh	New York	TBD
	Smulders	Ravena	New York	TBD
	Red Ironworks	West Babylon	New York	TBD
Array Cable	Hellenic Cables	Wagners Point	Maryland	TBD
Export Cable	Nexans	Charleston	South Carolina	2021
	Prysmian	Brayton Point	Massachusetts	2026 (estimate)
Onshore Cable	Southwire	Huntersville	North Carolina	2015

3 LOUISIANA INDUSTRY LANDSCAPE

3.1 Adjacent Industry Overview

Louisiana has abundant reserves of offshore and onshore crude oil and natural gas. The State is responsible for 1% of total U.S. crude oil production and 10% of total U.S. natural gas production annually [8]. In 1947, the first U.S. offshore commercial crude oil well was constructed off the coast of Louisiana, where many of the nation's largest oil fields are found. Today, Louisiana is a gateway and refinery for crude oil extracted from federal Outer Continental Shelf (OCS) waters in the Gulf of Mexico.

The oil and gas industry has driven significant economic development in Louisiana, generating thousands of jobs and billions of dollars in revenue. According to Louisiana Economic Development (LED), the industry supports 45,000 direct jobs and 260,000 indirect jobs. The direct industry alone accounts for 6% of the State's gross domestic product and contributes $1 billion in state and local tax revenue [9]. Six decades of offshore oil and gas experience have also yielded mature maritime and manufacturing industries in Louisiana, which provide services ranging from transporting crews, equipment, and supplies to manufacturing and repairing platforms, pipelines, and other infrastructure.

The Louisiana oil and gas workforce has accumulated transferrable skills and experience in areas ranging from engineering design to marine operations. Key existing roles in Louisiana's oil and gas workforce with relevance in the offshore wind sector include onshore/offshore technicians, engineers, vessel crews, welders, heavy equipment operators, compliance officers, health and safety professionals, and surveyors. The growing U.S. offshore wind industry provides Louisiana with a unique opportunity to expand the offerings of its offshore energy sector, diversify work opportunities for a variety of key industry roles, and drive economic benefit in adjacent industries.

3.2 Offshore Wind Industry Overview

The Gulf of Mexico has significant offshore wind development potential, complemented by the large potential capacity for projects offshore and the wealth of existing energy industry experience. The Gulf of Mexico has a total offshore wind energy technical capacity potential of over 1500 GW, with nearly 700 GW in water depths suitable for fixed turbines and over 850 GW in water depths suitable for floating turbines [10]. These relatively shallow water depths, in conjunction with warm temperatures and generally calm sea states in the region, may reduce the cost and difficulty of offshore construction and O&M. However, relatively low wind speeds, sandy seabed conditions, and the prevalence of extreme weather during hurricane season complicate development, requiring adapted WTG and foundation designs.

There are currently three projects under development in federal and state waters off the coast of Louisiana. In 2023, the federal Bureau of Ocean Energy Management (BOEM) held its first offshore wind energy auction in the Gulf of Mexico, offering three lease areas for sale – one off the coast of Louisiana and two near Texas. The lease area off of Louisiana was awarded to RWE Offshore Wind for $5.6 million, while the remaining lease areas off of Texas remained unsold [11]. Expected to be in operation by the mid-2030s, the Lake Charles Lease Area has up to 2 GW of capacity and could power over 350,000 U.S. homes [12]. The State of Louisiana has also awarded two additional leases in state waters for a combined price of over $650,000 [13]. Both state-water projects have secured

offtake through energy royalties (differing from traditional power purchase agreements or offshore renewable energy credit schemes) but have yet to declare an expected Commercial Operation Date (COD).

Table 3.1 – Offshore wind projects in Louisiana [11, 12, 13]

PROJECT	DEVELOPER	LEASE AREA	LEASE PRICE	LEASE SIZE (ACRES)	OFFTAKE PRICE	EXPECTED COD
Lake Charles Lease Area	RWE Offshore Wind	OCS-G 37334	$5,600,000	102,480	Not Yet Secured	Mid-2030s
Cajun Wind	Vestas	State Waters	$357,923	59,653	2.2% of Gross Revenues	TBD
Diamond Offshore Wind	Diamond Offshore Wind	State Waters	$308,101	6,162	1.5% of Gross Revenues	TBD

A Proposed Sale Notice was issued by BOEM in March 2024, initiating the second offshore wind energy auction in the Gulf of Mexico. Four lease areas will be auctioned in the region, representing an area totaling 410,060 acres [14]. Projects developed in these newer leases are anticipated to achieve COD around 2035.

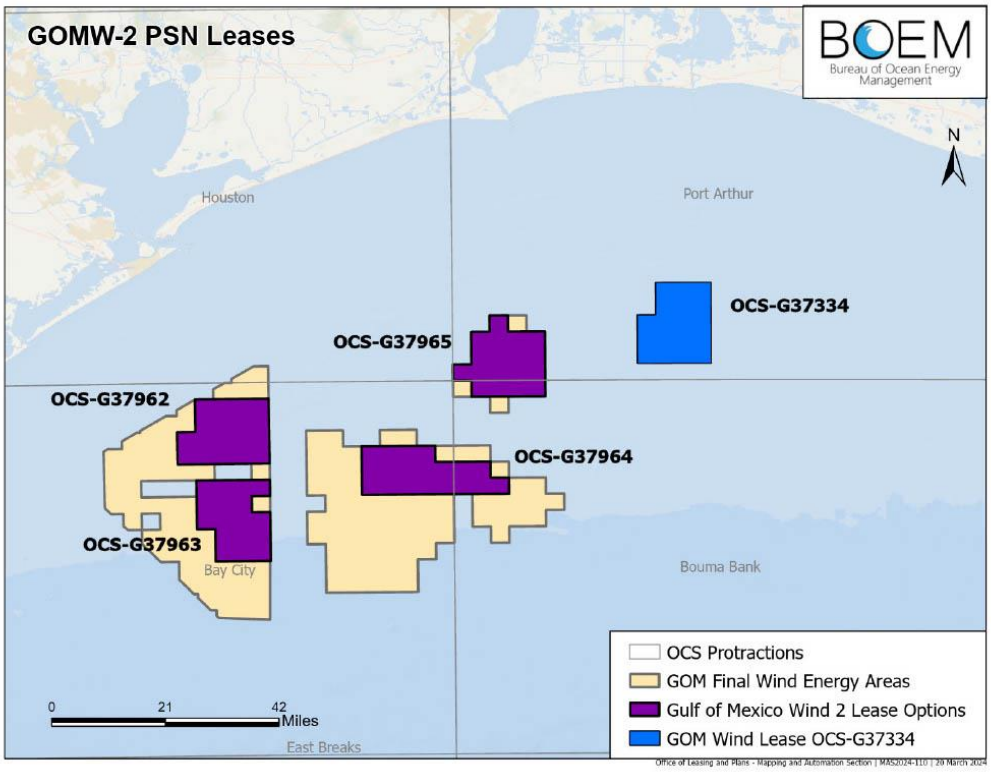


Figure 3.1 - Second round lease areas for Gulf of Mexico [14]

Supply Chain Experience

Louisiana businesses have been integral in developing the U.S. offshore wind industry to date, supplying foundations for the first U.S. offshore wind project, Block Island Wind Farm, as well as the HLVs used to install them. Several Louisiana companies will also fabricate, supply, and operate SOVs and CTVs for six of the offshore wind projects currently under development in the U.S. Table 3.2 shows at least 15 Louisiana businesses and 2 ports across 13 different localities already have experience in the U.S. offshore wind industry.

Table 3.2 - Louisiana businesses with U.S. offshore wind experience to date

COMPANY	LOCATION	PROJECT	DESCRIPTION
Keystone Engineering Inc. [15]	Mandeville	Block Island Wind Farm	Designed the WTG foundations.
Gulf Island Fabrication [15]	Houma	Block Island Wind Farm	Fabricated steel jacket foundations, decks, and piles.
T. Baker Smith [15]	Houma	Block Island Wind Farm	Provided surveying and positioning for foundation installation.
MiNo Marine, LLC [15]	New Orleans	Block Island Wind Farm	Retrofitted 3 HLVs for foundation installation.
Montco Offshore [15]	Galliano	Block Island Wind Farm	Supplied and operated 3 HLVs for foundation installation.
Aries Marine Corporation [15]	Lafayette	Block Island Wind Farm	Supplied and operated HLVs for foundation installation.
Offshore Marine Contractors [16]	Cut Off	Block Island Wind Farm	Supplied and operated HLV for foundation installation.
Blue Water Shipping [17]	Metairie	Block Island Wind Farm	Provided hub logistics services (heavy lift and storage of turbine components, warehouse management).
Otto Candies, LLC [18, 19]	Des Allemands	South Fork Wind, Revolution Wind, Vineyard Wind 1	Retrofitted, supplied, and operated 2 IMR vessels as SOVs for construction.
Morrison [20]	Houma	Vineyard Wind 1	Supplied vertical tower stands for transportation and storage.
Gulf Craft [21]	Franklin	Vineyard Wind 1	Constructed hybrid-ready CTV.
Edison Chouest Offshore [22, 23, 24]	Cut Off	Revolution Wind, South Fork, Sunrise	Constructed and operated SOV and mini-CTV for O&M.
		Empire Wind 1 & 2	Constructed and operated plug-in hybrid SOV for O&M.
2nd Wind Marine [25]	Galliano	TBD	Plans to design, finance, build, and operate 2 jack-up vessels for transportation and installation.
Breaux Brothers [26]	New Iberia	TBD	Constructing CTV.

COMPANY	LOCATION	PROJECT	DESCRIPTION
Gulf Wind Technology [27]	Avondale	Port Fourchon Coastal Wetlands Park onshore wind turbine	Installed and owns the only onshore wind turbine in the State, which demonstrates wind energy and is used to test hurricane-resilient blades and validate software models for future offshore wind applications.
Port Fourchon [28]	Golden Meadow	TBD	Upgrading port facilities to support offshore wind component manufacturing.
Port of Lake Charles [29]	Lake Charles	TBD	Discussing potential offshore wind component assembly, load out, and decommissioning work.

Although not yet suppliers to offshore wind projects, Port of Lake Charles and Port Fourchon are in a good position to capitalize on the opportunity presented by the emergence of the industry. The Port of Lake Charles is currently upgrading its facilities in anticipation of RWE's Lake Charles project; the site is 200 acres and is developing bulkheads with laydown space boasting significant bearing capacity. Port operators have indicated a desire to produce offshore wind components at the site, with the potential to supply jackets, transition pieces, and monopiles.

Port Fourchon is 1,200 acres, and in addition to being the site of Louisiana's first onshore wind turbine, is also poised to support offshore wind industry development. As a deep-water port with a history of serving the offshore oil and gas industry, the port will play a crucial role in the buildout of offshore wind in the Gulf. Global marine transportation company Crowley reached a right of first refusal agreement to lease and develop an offshore wind terminal with assembly, load out, and decommissioning capabilities at the Port of Fourchon. This investment would significantly expand Louisiana's offshore wind support infrastructure and strategically position the State for regional offshore wind development.

Supply Chain and Workforce Programs

Although regional offshore wind development is in its nascency, Louisiana already hosts several key programs and initiatives supporting its development. Following the State's commitment to 5 GW of offshore wind capacity by 2035, the University of New Orleans (UNO) launched the Louisiana Wind Energy Hub in 2022 [30]. The Hub provides support for emerging businesses, hosts seminars and networking events, and provides seed grants for technology commercialization in the offshore wind industry. Similarly, in 2023, Shell invested $10 million in Gulf Wind Technology to create the Shell Gulf Wind Technology Accelerator program, which will co-locate research and development of new technologies with a technology-focused education and training center in Port Fourchon. The collaboration will deploy novel technical solutions to a demonstrator turbine as early as 2024 [31]. Most recently, the Lake Charles Offshore Wind project developer RWE supported the creation of a Louisiana Offshore Wind Supply Chain Database with GNO, Inc. and GNOwind Alliance. The database identified over 120 Louisiana businesses that are operationally ready to enter the offshore wind supply chain [32].

The offshore wind industry has considerable potential to complement Louisiana's existing oil and gas workforce. There are several training facilities and educational institutions in Louisiana that prepare technicians, students, and professionals to enter the industry, with some providing relevant Global Wind Organization (GWO) training. Table 3.3 describes the supply chain and workforce development programs provided by each training facility and educational institution that can be leveraged to enable workforce development in the State.

Table 3.3 – Offshore wind supply chain and workforce development programs in Louisiana

PROGRAM	ORGANIZATION	LOCATION	TYPE	DESCRIPTION
Shell Gulf Wind Technology Accelerator [31]	Shell, Gulf Wind Technology	Port Fourchon	Technology Incubator	Research and development with technology-focused education and a WTG demonstration project.
H2theFuture [33]	GNO, Inc. (lead)	South Louisiana	Technology Incubator	Green hydrogen energy cluster.
GLOW Propeller [34]	Louisiana State University (lead)	New Orleans, Baton Rouge	Technology Incubator	Offshore wind technology hub.
Louisiana Wind Energy Hub [30]	UNO	New Orleans	Technology Incubator	Offers support for the innovation ecosystem, emerging companies, novel technologies, and professionals in training.
Wind Scholars Program [30]	UNO	New Orleans	Educational Program	Awards $5,000 scholarships for engineering students to complete coursework in offshore wind and be placed in paid work experiences with developers and engineering firms.
PACE Offshore Wind Program [30]	UNO	New Orleans	Educational Program	Offers data analytics, economics, entrepreneurship, and programming certificates in offshore wind applications.
Wind Energy Technology Program [35]	Nunez Community College	Chalmette	Educational Program	Offers GWO-certified applied science associate degree in wind energy technology.
Maritime and Industrial Training Center [36]	Delgado Community College	New Orleans	Training Facility	Offers maritime workforce training courses.
FMTC Houma [37]	FMTC Safety Training Center	Houma	Training Facility	Offers GWO-certified offshore safety training courses.

3.3 Policy and Regulatory Context

In 2020, the Climate Initiatives Task Force was established to investigate and reduce the State's GHG emissions. In 2022, the Task Force released a Climate Action Plan for Louisiana, which proposed a goal of 5 GW of offshore wind capacity secured by 2035 [38]. The State has not codified this target in legislation, unlike the other states with offshore wind projects currently under development.

Bill HB165 was signed into law in 2022, establishing a legal framework for offshore wind leasing in state waters and a revenue-sharing mechanism between developers and the State. It did not, however, establish an offtake pathway for offshore wind projects in federal waters [39] and this has not yet been created.

The Climate Action Plan also recommended that Louisiana adopt a Renewable and Clean Portfolio Standard (RCPS) to reduce GHG emissions from electricity generation, but it has yet to be enacted into law. In 2021, the City of New Orleans approved its own RCPS, establishing a goal for the city of achieving net carbon neutrality by 2040 and generating 100% carbon-free electricity by 2050 [40].

In 2023, Louisiana became the 13th state to join the Federal-State Offshore Wind Implementation Partnership [41]. The Partnership aims to accelerate the offshore wind industry by developing a domestic supply chain and skilled workforce for offshore wind and addressing regional challenges like transmission and interconnection, fishing and ocean co-use, and vessel supply. Most recently, the State of Louisiana released a Request for Information to explore the development of a comprehensive offshore wind roadmap.

State Funding Incentives

Louisiana Economic Development (LED) aims to cultivate jobs and economic opportunity for residents by strengthening the State's business environment. LED provides several funding incentives that may apply to businesses within or seeking to enter offshore wind, like a property tax abatement for manufacturing facility investments and a tax credit for in-state research expenditures. Table 3.4 describes LED funding incentives that may be relevant to the offshore wind industry.

Table 3.4 - State funding incentives provided by LED [42]

PROGRAM	TYPE	DESCRIPTION
Enterprise Zone	Tax Credit	Provides state income and franchise tax credits to Louisiana businesses that create permanent full-time jobs and hire 50% or more of those jobs from one of four target groups.
Industrial Tax Exemption	Tax Exemption	Provides Louisiana manufacturers with an 80% property tax abatement for up to 10 years on new facility investments.
FastStart	Recruitment & Training	Provides Louisiana businesses with customized employee recruitment, screening, training development, and training delivery at no cost.
Quality Jobs Rebate	Payroll Tax Rebate	Provides up to a 6% cash rebate to Louisiana businesses that create well-paid jobs and promote economic development.
Research & Development Tax Credit	Tax Credit	Provides Louisiana businesses with up to a 30% tax credit on research expenditures incurred in the State.

Green Hydrogen

In Louisiana, offshore wind has the potential to be a critical power source for the decarbonization of the industrial sector. Energy consumption from Louisiana's industrial sector is the second highest in the nation, accounting for over 70% of the state total. Similarly, almost 60% of Louisiana's carbon emissions are produced from energy-intensive, hard-to-abate sectors like the chemical, petroleum, and natural gas industries [8]. Louisiana also has the

highest per capita demand for hydrogen fuel in the U.S., accounting for 30% of total U.S. industrial hydrogen consumption [43]. This hydrogen fuel is primarily used for refining petroleum, treating metals, producing fertilizer, and processing foods. Generating hydrogen fuel with offshore wind power has the potential to sustain Louisiana's industrial sector while reducing carbon emissions. This could also enable Louisiana to become a global exporter of green hydrogen (hydrogen produced using renewable energy) as the global economy seeks to decarbonize.

Louisiana's private and public sectors have invested significantly in the low-carbon hydrogen industry with four projects under development, as described in Table 3.5. In 2022, H2theFuture received a $50 million grant from the U.S. Economic Development Administration and $24.5 million in matching funds from the State of Louisiana [33]. The project aims to develop a new energy business model with five interconnected workstreams. The project will provide workforce training to displaced oil and gas workers, attract local and regional companies to the hydrogen value chain, conduct research on green hydrogen technologies, establish public-private partnerships for commercial investment, and create a green hydrogen planning hub.

Table 3.5 – Low-carbon hydrogen projects in Louisiana

PROJECT	LOCATION	TYPE	DESCRIPTION
H2theFuture [33]	South Louisiana	Public	GNO, Inc. and other partners received $74.5 million in federal and state funds for a green hydrogen energy cluster.
HALO Hydrogen Hub [44]	Arkansas, Louisiana, Oklahoma	Public	Louisiana formed a regional partnership with Arkansas and Oklahoma to deploy and develop a low-carbon hydrogen network in the three constituent states.
Ascension Clean Energy [45]	Ascension Parish, LA	Private	Clean Hydrogen Works proposed a $7.5 billion green hydrogen-ammonia production facility.
Louisiana Clean Energy Complex [45]	Ascension Parish, LA	Private	Air Products invested in a $4.5 billion blue hydrogen (hydrogen produced with natural gas and carbon capture) energy complex, which will capture and sequester 95% of its carbon emissions.

4 LOUISIANA OFFSHORE WIND SUPPLY CHAIN

4.1 Assessment Approach

The strengths and gaps of the Louisiana supply chain were investigated to identify development opportunities relating to offshore wind. An explanation of the approach to the supply chain analysis methodology is provided in Appendix A.

Companies were categorized according to their relevant supply elements as shown in Table 2.1 and assessed for their current ability to provide products or services to the offshore wind sector on a high, moderate, or low applicability scale:

- High applicability: Company has direct experience in offshore wind or provides products or services that are highly relevant to offshore wind in design, scale, and/or production volume; investment required to transition company into offshore wind is minimal and/or would be directly applied to scaling/qualification operations.
- Moderate applicability: Company has no direct experience in offshore wind but provides products or services that are similar to those relevant to offshore wind in design and scale; investment required is moderate and would be needed to help company retool, meet standards and qualifications, and scale operations.
- Low applicability: Company provides products or services that resemble those needed in offshore wind but would need to significantly change operations to enter the industry; significant investment in retooling, meeting specifications and qualifications, and scaling would be required.

4.2 Supply Chain Landscape

The results of the assessment are given in Figure 4.1. There were 458 unique companies in total assessed as having potential applicability (high, moderate, or low) to supply products or services in the offshore wind industry. Of the 458 unique companies, 122 companies were assessed as high applicability, 108 as moderate applicability, and 228 as low applicability.

The total number of companies noted per supply chain element is not directly indicative of the strength or size of the opportunity for Louisiana supply, rather it shows the number of companies with the potential to contribute that supply chain element within the State. Applicable suppliers are competing for a finite number of contracts with other companies, both from within Louisiana and beyond. The number of high applicability companies gives a better indication of the potential to supply at a higher tier level in that supply chain element. A single strong supplier could have the opportunity to capture a significant portion of the market. Companies that supply at higher tiers will capture the greatest share of the available contract value while typically providing increased opportunities for local companies to subsequently supply lower tier contracts. Companies are categorized in as many supply elements as appropriate, and thus the total sum of the number of companies listed in each element is greater than the total number of companies assessed. Discussion of results are presented by supply area, below.

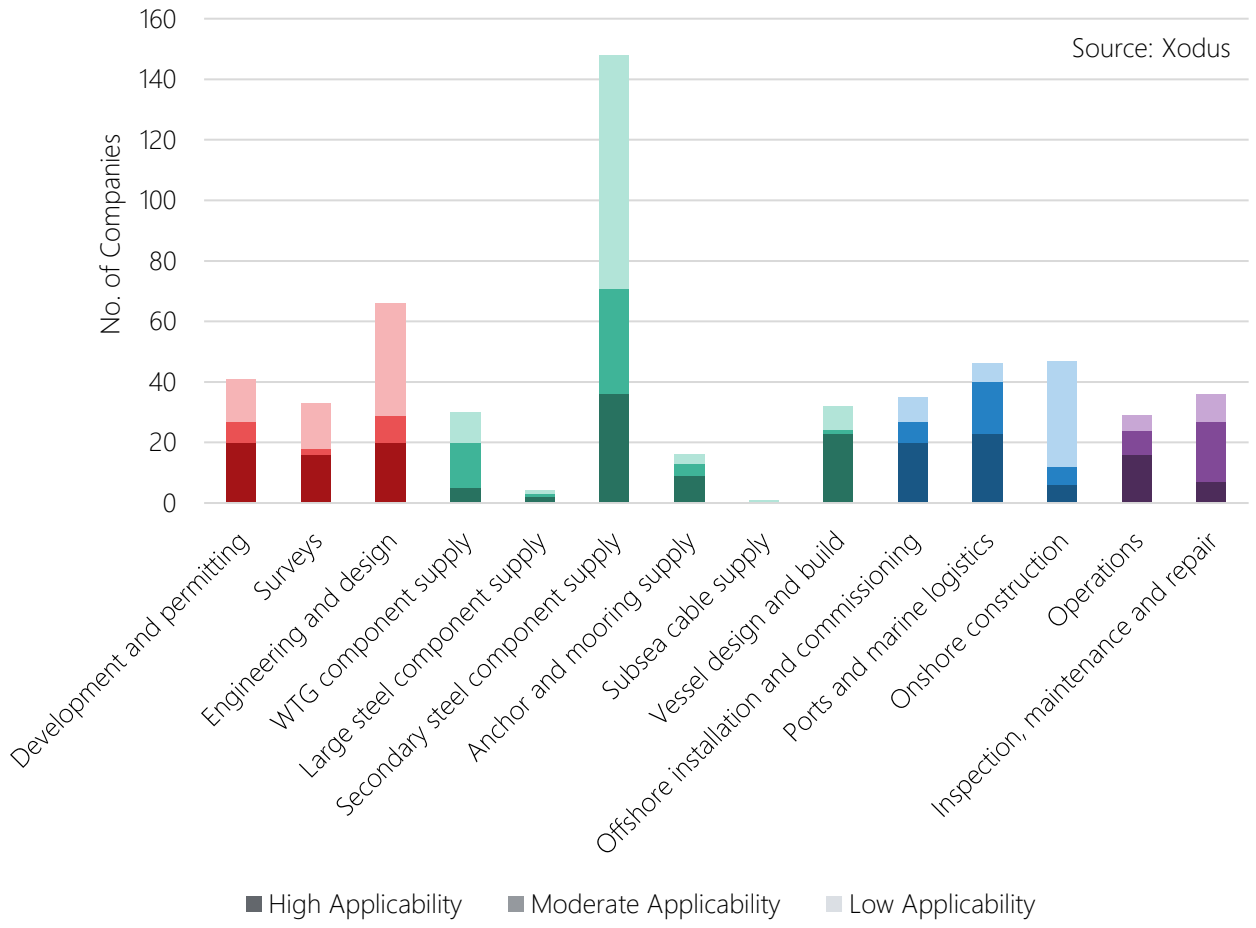


Figure 4.1 - Assessed potential Louisiana offshore wind supply chain by supply element and applicability. High, moderate, and low applicability designations are indicated by color value in the graph, with darkest color representing high applicability, medium color representing moderate applicability, and lightest color representing low applicability

Project Development

Around half of the of the 41 companies with capabilities in development and permitting services, and around half of the 33 companies providing survey services were assessed as high applicability. Similarly, 20 companies providing engineering and design services were assessed as having high applicability demonstrating that Louisiana has strengths across this category. Several offshore engineering companies, such as Keystone Engineering Inc. and Waldemar S. Nelson & Company, were founded to supply the offshore oil and gas industry and have since expanded their services into offshore wind. Likewise, a number of global companies with experience enabling project development in the U.S. offshore wind market have a presence in Louisiana, such as Jacobs, Moffatt & Nichol, and Tetra Tech. Many project development services like permitting and engineering can be delivered independent of project location and thus are highly exportable. Although marine environmental companies with experience in offshore oil and gas can be directly applicable in offshore wind, there can be an advantage to having local site knowledge for surveying and offshore data collection activities, making it less readily exportable.

Manufacturing

Louisiana also has distinct strengths within manufacturing, primarily in vessel design and build, large and secondary steel component supply, and anchor and mooring supply. In total, over 100 companies were identified with high or moderate applicability in these categories. Despite the relatively low number of companies in large steel component supply, heavy industrial steel fabricators like Gulf Island Fabrication and Twin Brothers Marine have extensive experience manufacturing jacket foundations for offshore oil and gas platforms and are equipped to supply jacket foundations for ESPs. Although large fabrication yards may not have the experience producing the volume of offshore foundation structures required to meet the needs of an offshore wind project, such companies can be well-positioned for strategic investment to increase production volume. While several Louisiana companies have indicated an interest in manufacturing monopile style foundations for the offshore wind market the capability does not yet exist within the State to do so at the scale required. Large steel components like jacket foundations could represent significant export potential for the State should this foundation technology be used on East Coast projects.

There was a significant volume and proportion of high applicability companies in secondary steel component supply, representing 36 of 148 companies assessed. The volume of skilled steel fabricators in the State demonstrates that Louisiana is well positioned to supply secondary steelwork like steel transit frames, davit cranes, boat landings, and guard rails for offshore structures. Contracts won by large steel component manufacturers in Louisiana would likely generate increased business for existing steel fabricators. Secondary steel fabrication typically presents an opportunity for local content creation in many states procuring offshore wind energy. However, Louisiana suppliers' extensive experience of producing steel components for the marine environment could put the State at a relative competitive advantage.

While there is a relatively low volume of companies with capability in anchor and mooring product supply, a high proportion of those companies (9 of 16) were assessed to have high applicability, indicating that Louisiana has strong specialist experience in this supply element. Manufacturing anchors and mooring line ancillary components could represent an opportunity to leverage experience from the offshore oil and gas industry as floating offshore wind projects are developed. Given the early development status of floating offshore wind in the U.S., Louisiana could establish itself as a first-mover in the domestic anchor and mooring line space, gaining significant market share and potentially leading to technological innovation within the State.

The majority of the 32 companies providing vessel design and build services were assessed as high applicability, indicating strong capability within this supply element. Naval architecture and shipbuilding companies in Louisiana have supplied vessel design and construction services in the offshore oil and gas industry for decades. Several companies have already been contracted to supply vessels for offshore wind projects on the East Coast, including Edison Chouest Offshore, Gulf Craft, and Breaux Brothers.

Louisiana has an apparent relatively low number of companies with capability in WTG component supply and subsea cable supply. This can be attributed in part to the lack of demand for similar components in adjacent industries in the State. There are thousands of unique components in a typical WTG, many of which require specialized manufacturing processes and precision in meeting tight tolerances. Offshore wind turbine OEMs generally have existing networks of trusted Tier 1 and 2 suppliers with low incentive to take the risk on qualifying new suppliers. Similarly, subsea cable manufacturing requires specialized machinery and quayside access with purpose-built cable-lay vessels, introducing similar barriers to entry.

Installation and Commissioning

Over half of the 35 companies providing relevant offshore installation and commissioning services, and half of the 46 companies providing ports and marine logistics were assessed as having high applicability. This reflects the large volume of companies with experience supplying vessels, crew, and marine logistics for offshore oil and gas operations, including Guice Offshore, Otto Candies, LLC and Odyssea Marine. Louisiana suppliers could have a major role to play in supplying vessels, crew, and real-world experience during the installation and commissioning phase, as they have in several U.S. East Coast offshore wind projects to date. Although decommissioning activities were not assessed in this study they will require similar capabilities to those required in the installation and commissioning phase. Thus Louisiana's capability in decommissioning services can also be assumed to be strong.

There is a sufficient number of companies with capability in onshore construction to support the needs of a Louisiana offshore wind projects despite the low proportion of high applicability companies, resulting from a vetting process that prioritized specialized and marine-focused companies. The majority of companies assessed supplying onshore construction services are categorized as Small Business Enterprises (SBEs) and DBEs, however, these companies generally have lower applicability due to company size. Onshore construction could provide an opportunity for Louisiana to engage DBEs in the offshore wind supply chain.

Operations and Maintenance

Over half of the 29 companies providing services in this phase were assessed as having high applicability due to significant experience in monitoring and deploying assets during offshore oil and gas operations. Several global companies with offshore wind experience have also established locations in Louisiana, including Crowley Wind Services and FMTC Safety. High applicability IMR companies made up only 7 of 36 companies assessed, which is likely due to limits in sourcing data on companies in the marine industrial space. Regularly required offshore O&M services are typically sourced from close to the project location due to the cost of mobilization, although more specialized O&M services may be procured from further afield.

It should be noted that this study found difficulty in sourcing databases of marine industrial companies, like vessel operators and marine logistics services. Such services are critical to the installation and operations phases, and as such, the full extent of Louisiana's capabilities within the marine industrial sector may be underreported in this study. Despite limited company data, stakeholder engagement coupled with analysis results demonstrates that Louisiana has strong marine industrial capabilities.

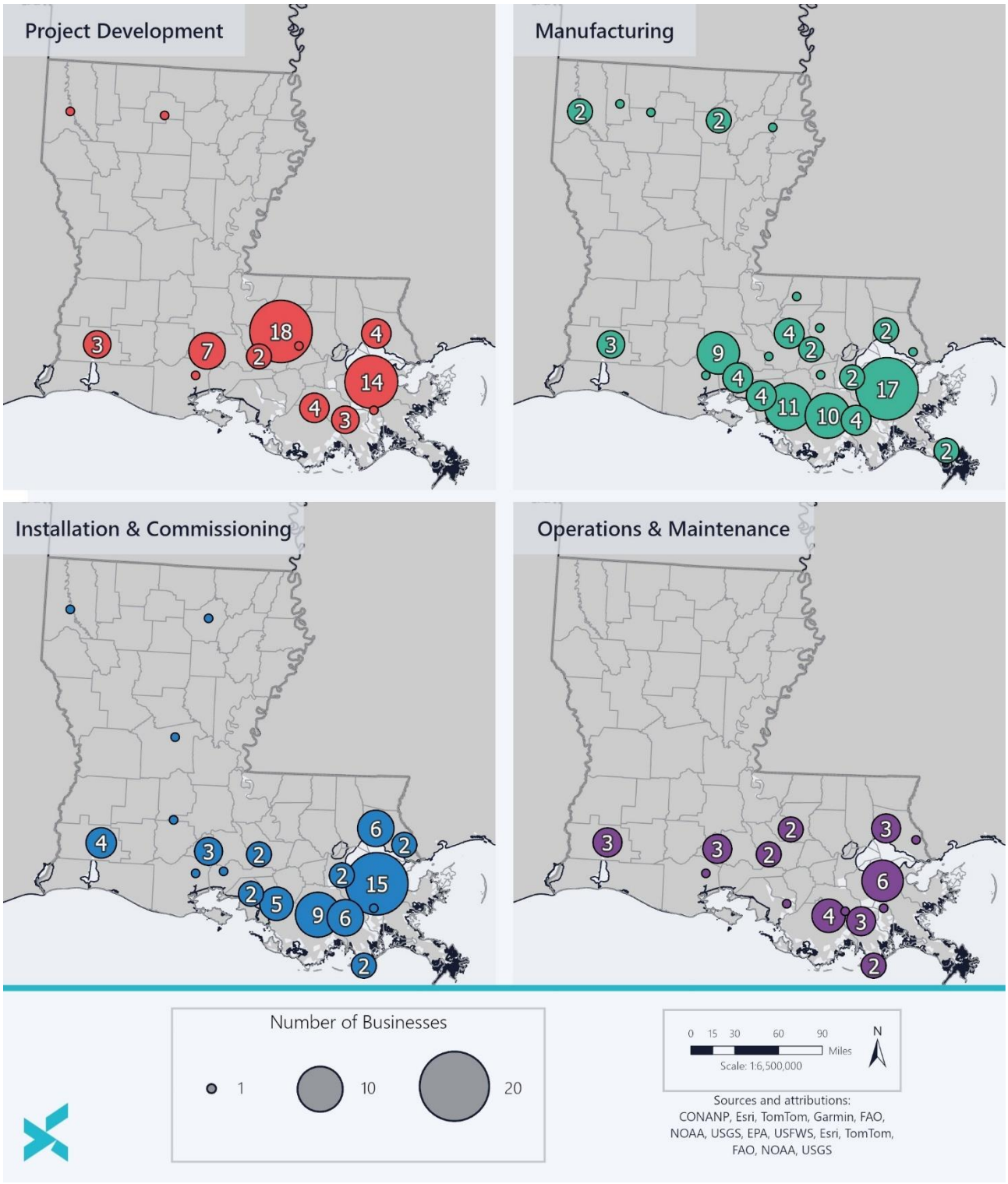


Figure 4.2 – Distribution of high applicability Louisiana offshore wind supply chain companies

Assessing the location of the Louisiana supply chain shows that the majority of high-applicability companies are clustered in southeast Louisiana near the coast. Greater New Orleans demonstrates significant clustering across supply elements while clustering extends westward around the coast through Houma, Morgan City, and Lafayette,

demonstrating the distribution of companies that have the greatest potential to become engaged in offshore wind. Beyond the coast, there is a low distribution of potential companies across Interstate 20 and in Baton Rouge.

Companies with competencies in the Project Development supply area have the greatest concentration in the Baton Rouge region, demonstrating an opportunity to bring benefits of offshore wind further inland. Likewise, Manufacturing companies located between Shreveport and Monroe, or other inland companies could supply secondary steel components, or other subcomponents that can be transported by road or rail. Although southeast Louisiana appears as an obvious choice for targeted supply chain development initiatives, consideration should also be given to ensure opportunities can be extended to suppliers beyond the region, particularly in historically disadvantaged communities, as discussed in Section 0.

4.3 Supply Chain Focus Areas

Several supply chain focus areas were identified from the outcomes of the supply chain assessment and additionally informed through insights offered by stakeholders engaged during this study.

Disadvantaged Business Enterprises

Several companies evaluated as part of this study were categorized as DBEs in the assessed databases, including minority-, women-, veteran-, disabled-owned and those designated as small businesses, such as Hudson Initiative certified. Given the diverse make-up of Louisiana, offshore wind provides a unique opportunity to build a supply chain that is representative of the broader population and allows equitable access to opportunities. The number of all high, moderate, and low applicability DBEs assessed within Louisiana are shown in Figure 4.3, demonstrating that across almost all supply chain areas there are DBEs with the opportunity to supply offshore wind projects.

A total of 66 unique DBEs were assessed as having potential applicability to supply products or services in the offshore wind industry. The highest volume of DBEs were those with the capability to provide onshore construction services and engineering and design services, with 38 and 23 DBEs assessed as having some applicability, respectively. While not assessed as part of this scope, many DBEs can provide sector support services to offshore wind (e.g., ground transportation, security, storage, insurance provision, etc.). These supply elements represent the greatest opportunity for the State to engage DBEs in the offshore wind supply chain.

The majority of identified DBEs were found to be located around larger Louisiana population centers, including New Orleans, Baton Rouge, and Alexandria. To build a diverse supply chain, several of the DBEs assessed as part of this scope may require targeted business support services or investment to partner, grow or transition into the offshore wind market.

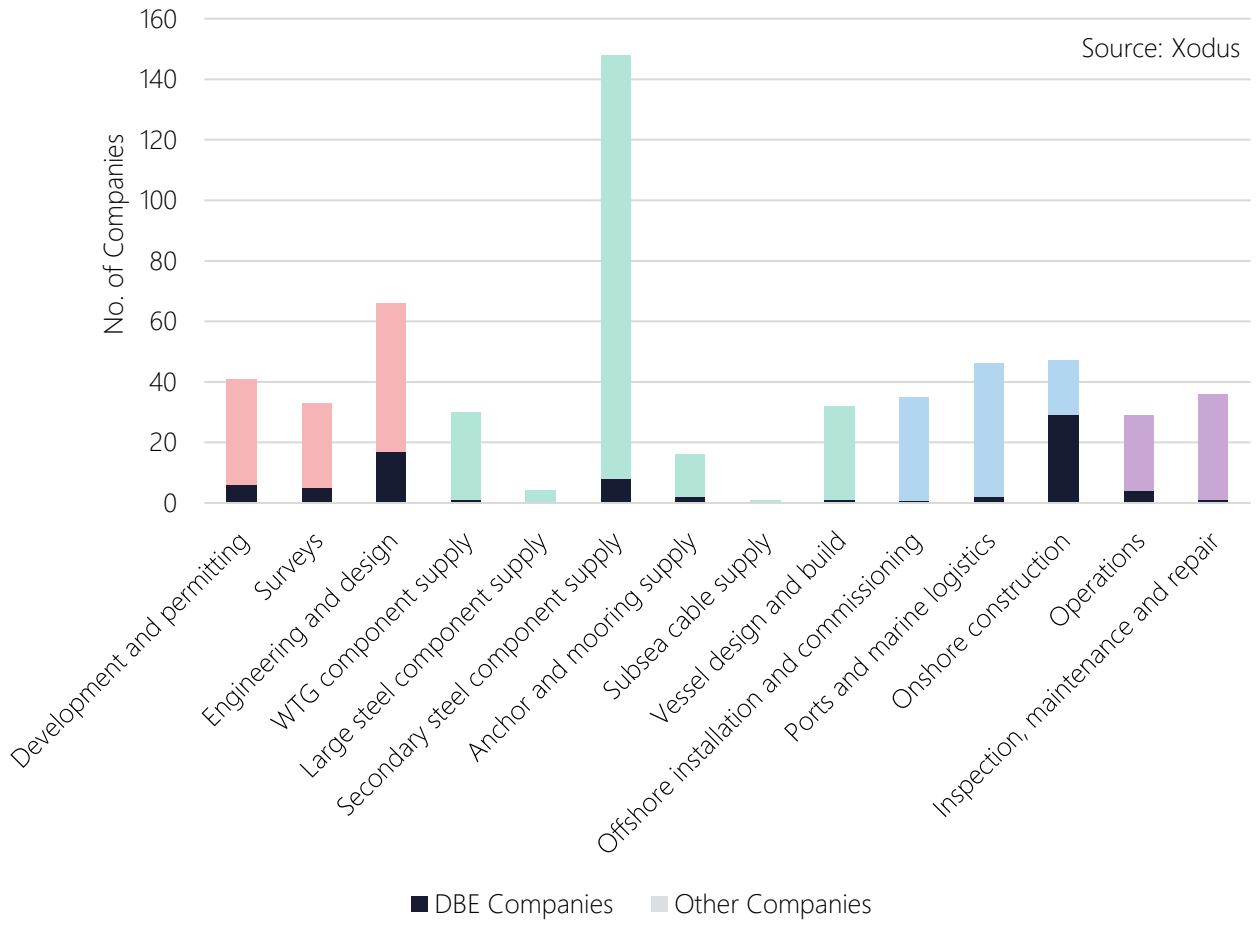


Figure 4.3 - Number of DBEs in the supply chain assessment categorized by supply element

The presence of several DBEs in the Louisiana Offshore Wind Supply Chain Database indicates that there are opportunities to diversify the offshore wind supply chain in Louisiana. Naval architecture firm A.K. Suda has experience designing WTIVs, SOVs, liftboats, and tug vessels. SSE Steel Fabrication operates a 14,000-square-foot metal fabrication facility and a two-acre blast and paint yard, which could be upgraded to supply secondary steel components. Blackstar Diversified Enterprises and G&L Contractors are well positioned to provide EPC services.

It is unlikely that all Louisiana DBEs have been captured in the assessment as databases reporting these designations typically require companies to register and/or necessitate formal certifications. There may be financial or resource challenges to DBEs attaining certifications, and lack of awareness of certification programs or databases that specifically track DBEs may also factor into under-representation. Bringing attention to these issues and providing support to make DBEs easier to identify will help to drive a more diverse supply chain in Louisiana's offshore wind industry.

Offshore Structure Manufacturing

Louisiana companies have decades of experience engineering and manufacturing offshore structures, including jackets and piles, for offshore oil and gas platforms. Louisiana companies have supplied and can continue to supply jacket foundations for offshore wind; however, some manufacturers may also be capable of producing monopiles,

transition pieces and/or gravity-base structures for fixed-bottom foundations. While still considered an early industry from a commercial scale perspective, floating foundations, anchors, mooring lines and ancillary components for floating offshore wind are all adjacent to Louisiana's experience base of manufacturing subsea structures for oil and gas and could provide substantial opportunity for manufacturing within the State.

Shipbuilding and Marine Industrial Services

There is a significant opportunity for Louisiana to increase the export of its vessel design and build services to the East Coast market. Louisiana is already actively providing vessels to the U.S. offshore wind industry and has the potential to ramp up this supply to meet further demand. Furthermore, Louisiana shipbuilders have experience designing and manufacturing specialized vessels with heavy-lift cranes, dynamic positioning, and jack-up capabilities, which enables them to supply purpose-built, highly specialized vessels, such as WTIVs, to the offshore wind industry.

Louisiana has developed a robust marine industrial sector with services ranging from marine construction to platform installation for offshore oil and gas. Such services greatly resemble those critical to the installation of all components of the offshore wind farm, particularly foundation and offshore substation installation. Louisiana is in a position to contribute dynamically-positioned feeder barges and provide rotational workforce for installation operations. These capabilities are exportable and expansion in this area could be an important feature of Louisiana's offshore wind supply chain strategy.

Immediate Export Focus

Developers of projects in the Gulf of Mexico are unlikely to place contracts for components before the end of the decade. Based on these projections, Louisiana is best positioned to capitalize on the more immediate export opportunity to leverage its robust supply chain for economic benefit in the near term.

Projects with CODs in the late 2020s, many of which are clustered along the East Coast, are likely to be in the early stages of the procurement process. Based on the current timeline of the U.S. offshore wind project pipeline, over 25 GW of total capacity will be installed between 2027 and 2030. Assuming a standard 15 MW turbine, this represents demand for over 1,600 WTG foundations and dozens of ESP foundations.

Suppliers will likely need support to scale, retool, and obtain the certifications necessary to manufacture large subsea structures at the scale, volume, and specifications required, although in many cases this level of investment would be less substantial than that required to construct new facilities to meet demand. Paired with IRA benefits for local component production, investment in new or existing facilities could position Louisiana favorably as a partner to developers and other suppliers in the near-term export market. With strategic investment Louisiana suppliers could be well-positioned to utilize the near-term demand to promote the State's offshore wind manufacturing capabilities to upcoming projects.

5 LOUISIANA OFFSHORE WIND WORKFORCE

5.1 Assessment Approach

The occupational demand from the offshore wind industry, characteristics of the State's workforce, and the potential for expanding job opportunities in offshore wind across the State were assessed to identify the offshore wind opportunity for Louisiana's workforce. The analysis compared the projected workforce requirements of the offshore wind industry against the availability and adjacency of the existing Louisiana workforce. Specific information on how workforce requirements were quantified is provided in Appendix B.

This analysis focused on three workforce case studies: a Procurement Goal Case, an Export Case, and a Combined Procurement Goal and Export Case. Each case assumes that a local Louisiana workforce can be leveraged to carry out project development services, major component manufacturing (except for WTG components and subsea cables), and installation services for an offshore wind project. The Procurement Goal case assumes a Louisiana workforce will participate in the operations phase, while the Export Case does not. Decommissioning is not covered in this analysis.

- Procurement Goal Case: This case projects the workforce requirement needed to meet Louisiana's 5 GW by 2035 offshore wind procurement goal, projecting a maximum of 1 GW being commissioned per year starting in 2031. It is assumed that workers will be required in 2030 to build one CTV and one SOV.

- Export Case: Based on Louisiana's supply of workers, products, and services to U.S. East Coast offshore wind projects to date, this analysis targets a 25% rate of participation by Louisiana workers in the U.S. East Coast pipeline until 2035. The analysis identifies the workforce requirement to meet that level of demand from component manufacturing (excluding WTG components and cables) and installation. This case does not include operations phase job roles, but it does assume two CTVs and two SOVs will be built in Louisiana in 2030 to support this buildout.

- Combined Case: This case reflects the total combined workforce demand from the Procurement Goal Case and the Export Case.

5.2 Occupational Demand

Descriptions of general offshore wind workforce requirements in each of the supply areas are given below.

The Project Development workforce includes a developer's internal employees, who span permitting, stakeholder engagement, risk management, and administration. Developers create their internal project teams several years in advance of construction, with hiring often ramping up in areas near the future construction after leases or offtake agreements are awarded. Subcontracted consultants (such as for engineering, advisory and legal counsel services) play an essential role in injecting lessons learned and best practices from the global offshore energy sector into project development work, and local mariners are often utilized for offshore survey work.

The Manufacturing workforce typically consists of mechanical engineers, electrical engineers, civil engineers, and various specialized tradespeople such as welders, electricians, and machinists working within manufacturing

facilities. In addition, health, safety, and environment professionals, operations and project managers, and various other supervisory and support roles are required. Many of these roles will also include apprenticeship positions, leveraging tax benefits under the IRA. Since manufacturing of components largely consists of assembling large steel structures and electrical equipment, teams of several journeyworkers such as welders and heavy equipment operators will work together in tandem.

Shipbuilding requires an additional manufacturing workforce adjacent to the offshore wind industry. This workforce sector is of particular importance to Louisiana, as the State is a major shipbuilding hub for the U.S. with several facilities that can support shipbuilding for offshore wind projects nationally.

Installation and Commissioning will also include engineers, journeyworkers, and apprentices, working in both onshore and offshore environments. Workers in offshore environments will require additional training including GWO or Basic Offshore Safety Induction and Emergency Training (BOSIET) certifications to ensure workers are following safe practices and are prepared in case of emergencies offshore. Vessel crew and offshore operations personnel make up much of the required workforce during this project phase. Port operations workers such as logistics managers, stevedores, riggers and crane operators are also essential during this project phase. Offshore workers may be required to work on a rotational basis, which means working for a set period offshore, and then having a set period off before repeating the cycle.

Operations and Maintenance personnel typically include smaller teams of specialized technicians, which include both the onshore teams (such as monitoring engineers, logistics coordinators, and warehouse managers) and workers deployed offshore to inspect the assets and conduct preventative maintenance, repairs, and major component replacement. Vessel crews are additionally required throughout the operational lifetime of the project to enable offshore IMR work to be carried out.

The additional workforce required in the delivery of offshore wind projects includes building maintenance staff, logistics and transportation workers for material delivery, security personnel for site protection and administrative staff for operational support. These roles are essential to the project's success but do not require specialized offshore wind certifications or training and have not been assessed as part of this analysis.

The teams working to develop, supply, and install an offshore wind project have a broad range of skills and certifications and several job roles are consistently required across supply chain areas. The job roles in highest demand to support the delivery of an offshore wind project are listed according to their relevant Standard Occupational Classification (SOC) titles in Table 5.1. SOC codes incorporate multiple job roles under one title that are generally grouped based on the kind of work performed. For instance, the SOC code for Civil Engineer encompasses workers with titles including civil engineer, design engineer, engineer, geotechnical engineer, project engineer and structural engineer. These job roles, described according to SOC code, are thus analogues for several combined job roles with similar working experiences and requirements for education, training or certification.

Table 5.1 – Projected top six SOC titles job required in the delivery of an offshore wind project

SOC TITLE	EXAMPLE JOB ROLES	RELEVANT SUPPLY CHAIN ELEMENT
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	Industrial painter, protective coating technician, sprayer operator	Large steel component supply; secondary steel supply; anchor and mooring supply; vessel design and build; onshore construction; IMR
Construction Laborers	Equipment operator, laborer, scaffolder	Large steel component supply; secondary steel supply; anchor and mooring supply; subsea cable supply; vessel design and build; ports and marine logistics; onshore construction
Civil Engineers	Design engineer, geotechnical engineer, project engineer, structural engineer	Large steel component supply; secondary steel supply; anchor and mooring supply; subsea cable supply; vessel design and build; ports and marine logistics; onshore construction
Mobile Heavy Equipment Mechanics, Except Engines	Construction equipment mechanic, heavy equipment operator	Large steel component supply; secondary steel supply; anchor and mooring supply; subsea cable supply; vessel design and build; ports and marine logistics; onshore construction
Riggers	Gantry rigger, heavy lift rigger, machinery mover, marine rigger	Large steel component supply; secondary steel supply; anchor and mooring supply; vessel design and build; offshore installation and commissioning; ports and marine logistics; onshore construction; IMR
Welders, Cutters, Solderers, and Brazers	Fabrication welder, Maintenance welder, wirer	Large steel component supply; secondary steel supply; anchor and mooring supply; subsea cable supply; vessel design and build; IMR

The occupational demand for top job roles, defined as the roles required in the greatest numbers across an offshore wind project lifecycle, under each scenario are shown in Figure 5.1.

In the Procurement Case workforce demand is projected to initiate in 2029 due to offshore wind construction in the Gulf of Mexico not being anticipated to begin for several years. Additionally, the relatively smaller regional offshore wind pipeline, compared to the larger nationwide development, limits the maximum amount of local workforce engagement, especially in the manufacturing and installation phases. There is a consistent workforce requirement in the project development phase (such as for roles found within the SOC code for Civil Engineers) in all Cases but at a smaller scale due to a relatively lighter workforce requirement than in other labor-intensive phases.

The Export Case requires immediate and consistent annual workforce participation as the offshore wind industry continues to develop on the East Coast. The additional anticipated vessel construction in the Export Case also has a significant impact on workforce demand, leading to an increase of hundreds of additional jobs. The workforce demand in the Export Case scales down because the operations phase of an offshore wind farm requires a smaller workforce of specialized technicians.

The Combined Case generated the greatest demand for workers in 2031, when the combined demand for the top six job roles is over 3,700 workers and the demand for both construction laborers and welders is over 1,000 workers in each category. Supporting both local and export markets creates a more robust workforce requirement in all top job roles.

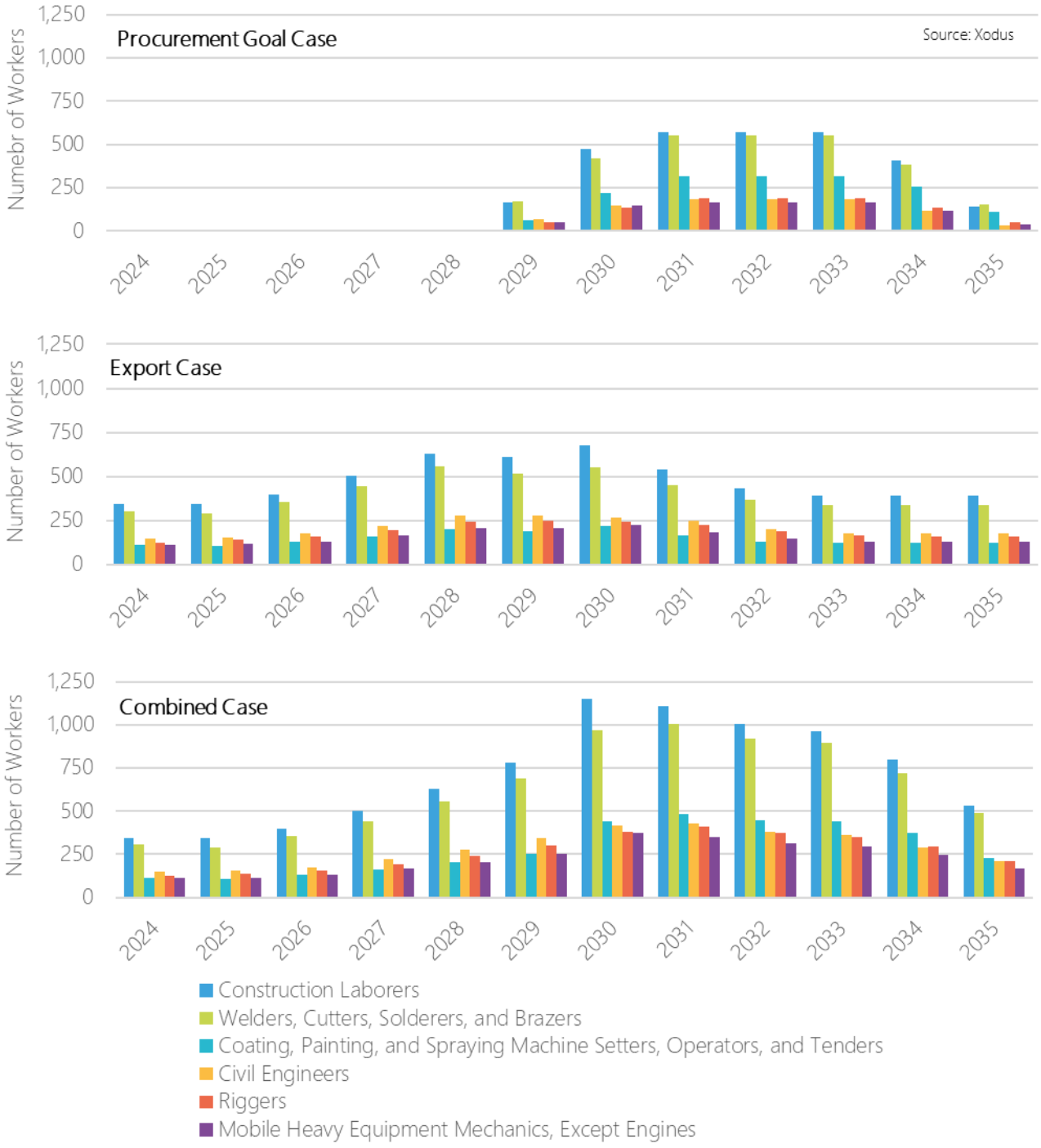


Figure 5.1 – Estimated demand for top job roles to meet Procurement Goal Case (top), Export Case (middle), and Combined Procurement Goal and Export Case (bottom)

Many of the roles required to develop of an offshore wind project can likely be sourced from within Louisiana's existing workforce. Comparing the potential demand for workers under each scenario with the current employment data for the State shows that the emerging offshore wind market would likely not cause significant burden on Louisiana's training infrastructure where most of the top roles only require a small increase in total demand. Supporting the delivery of offshore wind projects will likely not require a major influx of out-of-state workers, and could provide additional employment resilience for the current local workforce. Additional recruitment and training efforts may be required to reduce potential gaps in less common roles should the growth of the offshore wind sector increase worker demand.

Table 5.2 - Current statewide employment of top job roles and occupational demand in the Procurement, Export, and Combination Cases

SOC CODE TITLE	CURRENT STATEWIDE EMPLOYMENT [46]	WORKFORCE DEMAND % IN PROCUREMENT CASE	WORKFORCE DEMAND % IN EXPORT CASE	WORKFORCE DEMAND % IN COMBINED CASE
Civil Engineers	9,940	2%	3%	4%
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1,320	24%	16%	36%
Construction Laborers	91,540	1%	1%	1%
Mobile Heavy Equipment Mechanics, Except Engines	11,740	1%	2%	3%
Riggers	6,800	3%	4%	6%
Welders, Cutters, Solderers, and Brazers	44,220	1%	1%	2%

Occupational Distribution

While there is a relatively even geographic distribution for much of the workforce currently in the identified top job roles, Figure 5.2 shows the highest density of existing workers with skills relevant to the offshore wind sector is in southeast Louisiana. This may present an opportunity for recruiting, training, and other workforce initiatives in these areas. Any large-scale employment opportunities related to offshore wind occurring in southwestern Louisiana, such as around the Port of Lake Charles, may require efforts to be made to increase transport and accommodation options for workers originating from other parts of the State.

The lowest density of individuals currently employed in top offshore-wind relevant job roles is in the Northern Regional Labor Market Areas (RLMAs) of the State. Where much of the labor force required in offshore wind is typically employed near a quayside to enable the transport of large components by waterway, it will likely be challenging to realize economic benefits related to employment in these regions without workforce assistance programs designed to bridge this gap.

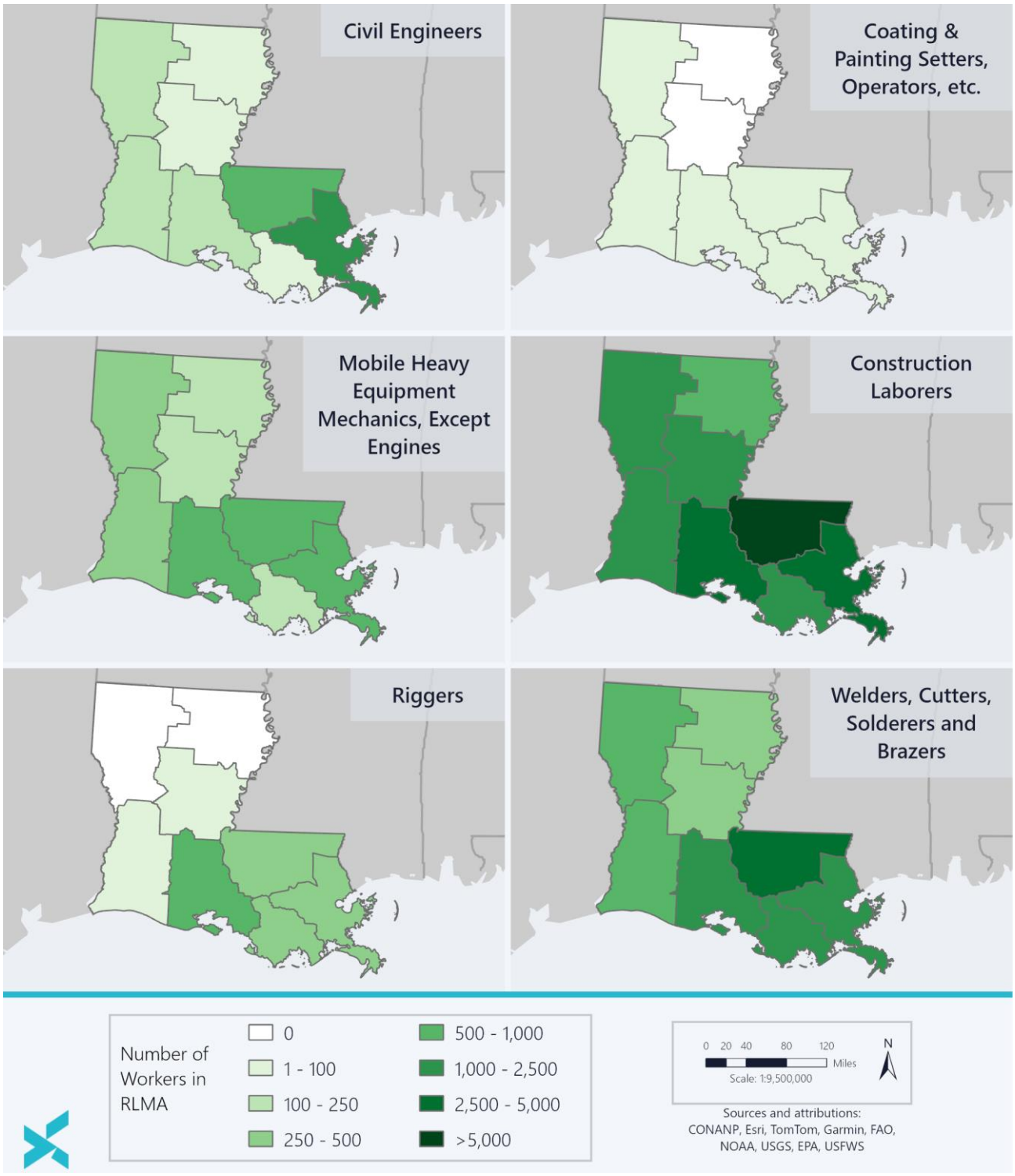


Figure 5.2 – Distribution of Louisiana workforce relevant to offshore wind industry demand [46]

5.3 Workforce Landscape

Understanding the workforce landscape in Louisiana's dominant industries is critical for identifying opportunities for the State to leverage offshore wind development, both in local and export markets, to increase total employment and add resilience to the State's economy. Industries can be considered according to the North American Industry Classification System (NAICS) which groups businesses primarily engaged in producing the same products or in rendering the same services.

Louisiana's adjacent industries (industries that possess traits similar to, or found within, the offshore wind sector) employ workers with transferrable skills to the offshore wind industry. The extent to which the existing workforce in any industry can perform the same job roles in the offshore wind industry is referred to here as "transferability". Transferability is described as a percentage of the ten most common occupations within an industry that share an SOC code with those of the workers required to design, build and operate an offshore wind project.

The transferability of the State's adjacent industry workforce was calculated for Louisiana's top ten adjacent industries by total employment. Over 60,000 workers in Louisiana are currently employed in roles that are highly adjacent to offshore wind with a weighted average transferability of 71%. The relationship between calculated transferability and average wage in each adjacent industry is shown in Figure 5.2.

Table 5.3 – Louisiana's ten largest adjacent industries by total employment and calculated transferability [46]

NAISC INDUSTRY	TOTAL WORKERS IN TOP TEN OCCUPATIONS	TRANSFERABLE WORKERS IN TOP TEN OCCUPATIONS	TRANSFERABILITY
1. Professional, Scientific, and Technical Services	30,970	15,839	51%
2. Specialty Trade Contractors	30,702	25,192	82%
3. Heavy and Civil Engineering Construction	21,036	14,981	71%
4. Fabricated Metal Product Manufacturing	8,508	5,751	68%
5. Water Transportation	5,050	4,660	92%
6. Machinery Manufacturing	4,719	3,152	67%
7. Transportation Equipment Manufacturing	3,552	2,758	78%
8. Utilities	3,158	1,592	50%
9. Oil and Gas Extraction	2,782	529	19%
10. Primary Metal Manufacturing	1,119	502	45%

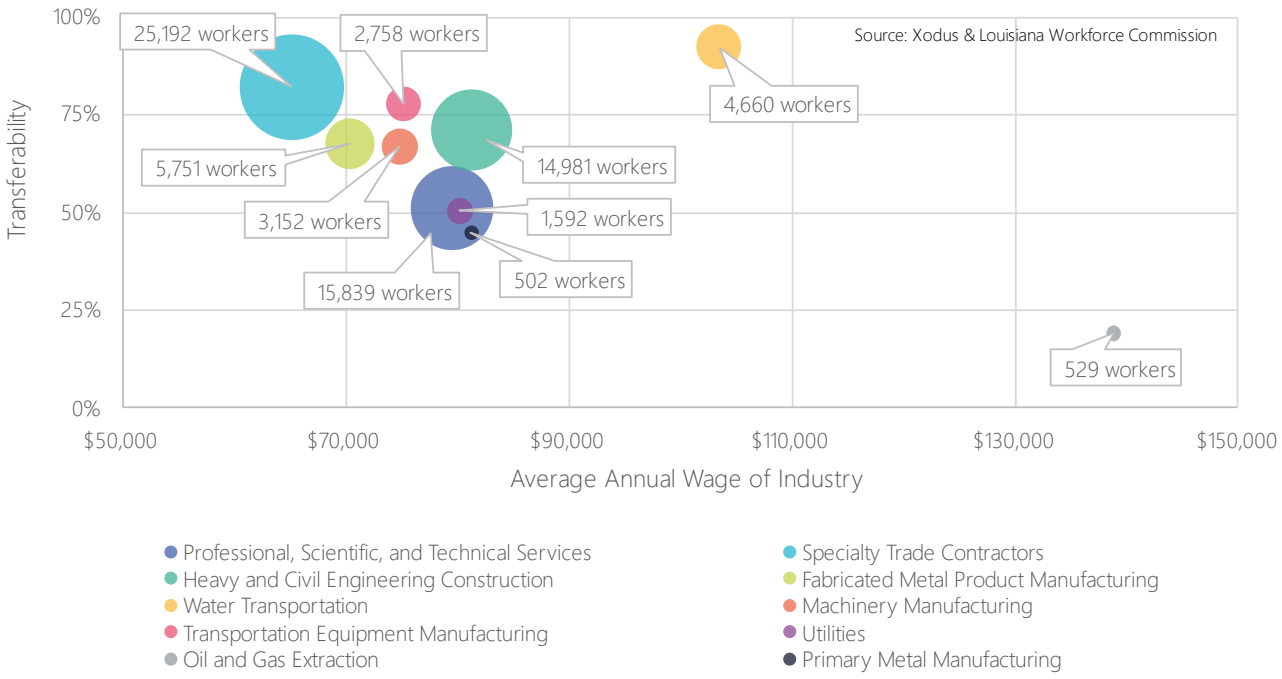


Figure 5.3 – Top adjacent industries with the average annual wage of the industry and transferability, where bubble size is relative to the number of transferable workers [46]

Many of the job roles with high transferability to offshore wind are commonly associated with Louisiana's offshore energy sector and are captured in the Transportation Equipment Manufacturing and Water Transportation industries. These include the workers categorized under the SOC codes for Captains, Mates, and Pilots of Water Vessels; Laborers and Material Movers; Welders, Cutters, Solderers, and Brazers; Structural Metal Fabricators; and Riggers. The high transferability of the Water Transportation industry indicates opportunities for mariners and ship engineers during project installation. The comparatively higher wages in the Water Transportation industry highlight the potential increased financial opportunity for workers with jobs that take place offshore.

Although there are similarities in the development, manufacturing and offshore maintenance of offshore oil and gas projects and offshore wind energy projects, the Oil and Gas Extraction industry has a relatively low transferability. Many of the job roles in this NAISC industry focus specifically on the extraction, refinement, and processing of petrochemicals whereas many of the relevant offshore roles required by the oil and gas industry are categorized as being within the Water Transportation industry. These higher-paid workers may still find employment supporting offshore wind development but may need to obtain additional training and certifications to leverage and apply their technical experience to the offshore wind industry.

Many of the workers in the Specialty Trade Contractors industry will have employment opportunities across several phases of an offshore wind project, including undertaking offshore work. For tradespeople unaccustomed to working offshore, aspects of the unfamiliar working environment such as the isolation, the working rotation schedule, and exposure to different safety risks, can become barriers to developing their interest in working in the offshore wind industry. Encouraging workers with transferrable skills to accept these conditions is a recruitment challenge that has been addressed on the East Coast by collaborating with trusted local organizations to provide education on the demands and opportunities of working in the offshore environment.

Justice40 Analysis

States soliciting proposals from offshore wind developers have taken the initiative to ensure the economic benefits of projects are broadly distributed by requiring that their bids contain plans to enhance diversity, equity, and inclusion in their supply chains. There may be opportunity in Louisiana for the emerging offshore wind sector to act as a catalyst for new employment opportunities and economic benefits to disadvantaged communities.

The Justice40 Initiative seeks to ensure that disadvantaged communities benefit from a wide range of federal spending initiatives including investments in climate preparedness, clean energy, affordable housing, and worker training. It uses the Climate and Economic Justice Screening Tool in identifying which census tracts across the U.S. meet the thresholds for at least one of eight categories of burden: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development [48]. The criteria that determine if a census tract falls under the workforce development category of burden are unemployment, educational attainment, poverty, income, and language barriers.

Under the Justice40 Initiative, communities will only be identified as disadvantaged if the census tract is above the threshold for one or more environmental or climate indicators and above the threshold for one or more socioeconomic indicators. More than half of the 1,148 census tracts in the State have been identified as disadvantaged (Figure 5.4) while 339 tracts are disadvantaged based on the criteria that define a census tract as being under burden for workforce development alone (Figure 5.5).

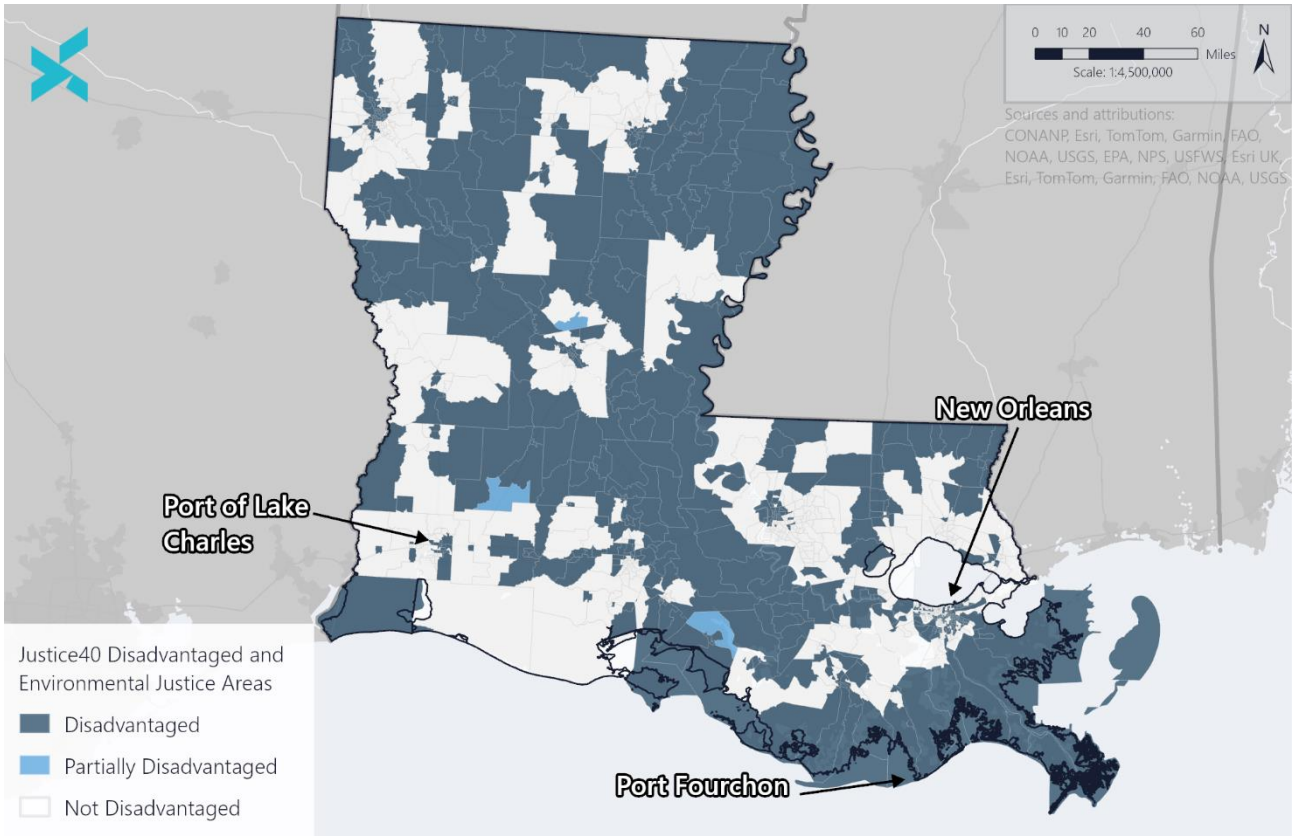


Figure 5.4 – Justice40 census tracts in Louisiana [47]

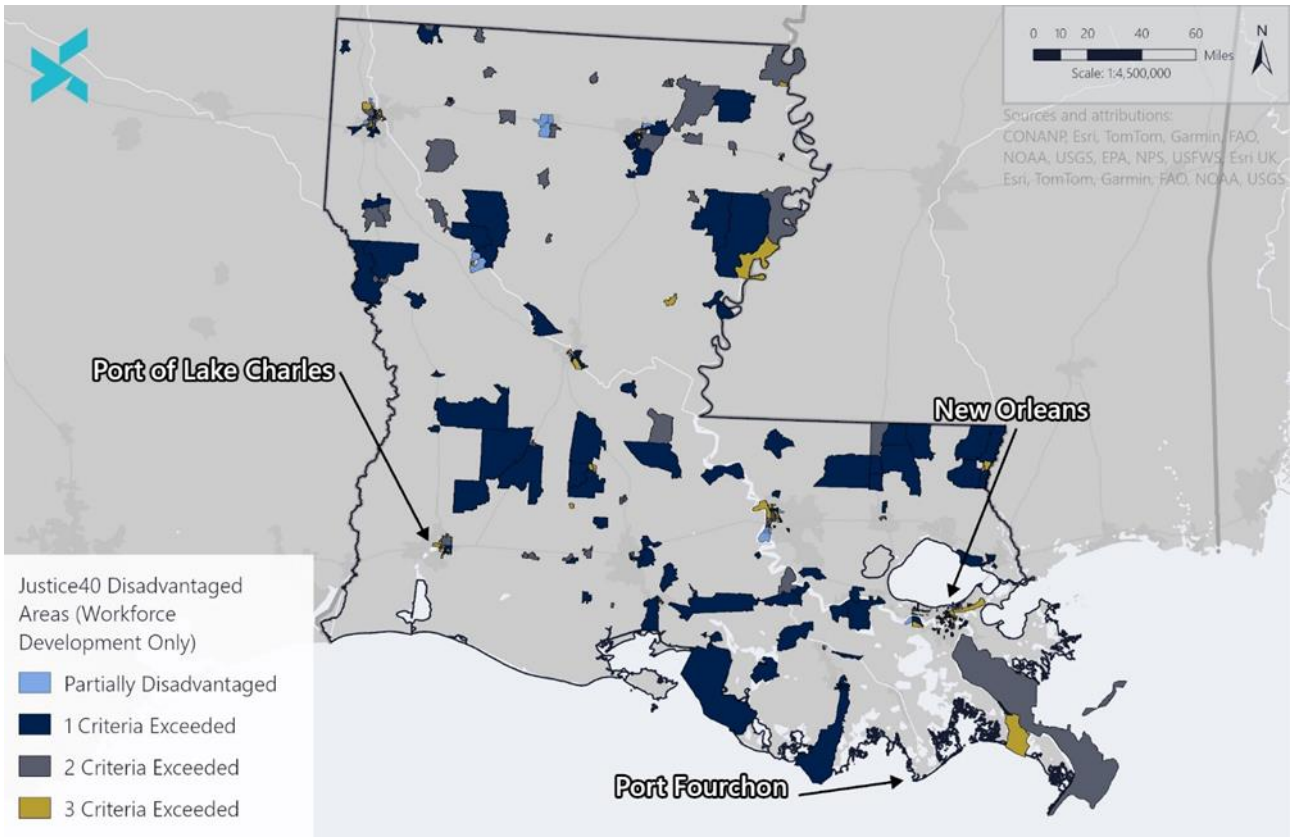


Figure 5.5 - Justice40 Initiative census tracts meeting the criteria of a disadvantaged community under the workforce development category of burden [47]

There is a clustering of disadvantaged tracts along the southeast coast of Louisiana, stretching from Morgan City to Chalmette. Many of the census tracks in this area are susceptible to impacts such as flood risk, and other dangers from natural hazards. Census tracks in Baton Rouge have higher than the 90th percentile in average energy costs divided by household income, and an increased share of individuals with asthma and exposure to wastewater discharge. Census tracks around greater New Orleans are relatively close (greater than 90th percentile) to superfund sites (such as manufacturing facilities, processing plants, landfills, or mining sites) and Risk Management Program sites (such as facilities that use extremely hazardous substances). Additionally, census tracts in New Orleans, Baton Rouge, and Lake Charles are at or above the 90th percentile for two or more of the workforce criteria.

These demonstrate that several hubs where the in-State offshore wind supply chain appears primed to coincide with communities that are under burden for workforce development and are considered disadvantaged under a variety of economic and environmental criteria. Efforts to enable workforce development should be region-specific to have the greatest impact, and consider the specific burdens faced by the individuals in each. By recognizing these needs and the potential for accessing additional federal dollars, the State can help to bring new employment opportunities and improved prospects for economic security to many of its disadvantaged communities.

6 LOUISIANA OFFSHORE WIND OPPORTUNITY ASSESSMENT

6.1 Assessment Approach

An analysis was carried out to identify the strengths and opportunities for developing Louisiana's offshore wind industry landscape, supply chain, and workforce and to assess the real-world barriers and challenges that could work against the State's success in this arena. Description on the methodology is provided in Appendix C.

A scorecard was created to assess Louisiana's performance in nine key criteria associated with the positive development of the State's offshore wind industry landscape, supply chain and workforce.

Table 6.1 - Louisiana scorecard assessment criteria

CRITERION	DESCRIPTION
Regulatory Environment	The legislative processes governing offshore wind development, specifically the offshore wind capacity target and offtake pathway.
Incentives	The availability of in-state incentive programs relevant to prospective offshore wind suppliers.
Innovation	The level of innovation taking place to benefit the offshore wind sector, such as in academic and research institutions and technology incubators.
Manufacturing	The level of capability and experience to manufacture components relevant to offshore wind projects.
Export Opportunity	The breadth of supply being provided to offshore wind projects outside of the State.
Offshore Service	The level of capability and experience to provide services in the offshore wind industry, such as engineering, installation, monitoring, maintenance of offshore infrastructure.
Ports & Quayside Assets	The readiness and availability of ports and quayside assets that could support offshore wind activities.
Transferrable Skills	The degree to which the existing workforce can perform the same job roles in the offshore wind industry.
Workforce Availability	The availability of a ready workforce able to meet the requirements of employers in offshore wind.

The criteria included in the scorecard were determined as representative areas where Louisiana must focus in order to fully capitalize on the opportunities presented by the offshore wind industry. Louisiana's existing capabilities in each criterion were scored according to the definitions shown in Table 2.1, where a score of four is the strongest and represents an achievable maximum which could be realized through strategic action and investment.

Table 6.2 – Scorecard definitions

CRITERIA	SCORE 1 - FOUNDATIONAL	SCORE 2 – GOOD	SCORE 3 – STRONG	SCORE 4 – STRONGEST
Industry Landscape				
Regulatory Environment	No legislated capacity target or pathway to offtake for state and federal projects.	Capacity target being considered by state officials. Regulatory framework for offtake under development for state and/or federal projects.	Capacity target with target timelines being developed by state officials. Regulatory framework for offtake under development for state and federal projects.	State legislated capacity target with target timeline. Regulatory framework for offtake exists for both state and federal projects.
Incentives	No applicable in-state incentive programs available for offshore wind industry development.	Up to 2 in-state incentive programs available for offshore wind industry development.	Some in-state incentive programs available for offshore wind industry development. Scale of at least one incentive program sufficient to drive significant development in at least one supply area.	Several in-state incentive programs available for offshore wind industry development. Scale of incentives sufficient to drive significant industry development across multiple supply areas.
Innovation	No current activities or interest expressed from academic or research institutions to develop offshore wind technology or processes.	Up to 2 academic or research institutions engaged/interested to develop offshore wind technology or processes. Presence of testing facilities at less than full-scale for offshore wind.	Some academic or research institutions engaged/interested in developing offshore wind technology or processes. Facility exists for cutting edge offshore wind technology development and/or physical testing.	Several academic or research institutions engaged in developing offshore wind technology or processes. Multiple facilities exist for cutting edge offshore wind technology development and/or physical testing.
Supply Chain				
Manufacturing	No local companies with experience in offshore wind. No known interest in pursuing offshore wind opportunities.	Few companies manufacturing similar components, but not for offshore wind. Companies known to be pursuing offshore wind industry.	Some companies with offshore wind manufacturing experience. At least 1 major offshore wind manufacturing operation.	Several companies with offshore wind manufacturing experience across a variety of components. Multiple major offshore wind component manufacturing operations.
Export Opportunity	No local companies supporting offshore wind in other regions.	Local companies have no experience supporting offshore wind in other regions but are known to be actively pursuing opportunities.	Some companies have provided/are providing components and services to the domestic offshore wind industry.	Several companies have provided/are providing components and services to the domestic offshore wind industry. Companies are known to be seeking global supply opportunities.

CRITERIA	SCORE 1 - FOUNDATIONAL	SCORE 2 – GOOD	SCORE 3 – STRONG	SCORE 4 – STRONGEST
Offshore Services	No local companies with experience in offshore wind. No known interest in pursuing offshore wind opportunities.	Few companies providing similar services, but not for offshore wind. Companies known to be pursuing offshore wind industry.	Several companies providing services to offshore wind industry across multiple projects/geographies and multiple supply areas.	Louisiana is known as a leader in offshore wind service delivery in the U.S. offshore wind industry. Services are regularly sought and companies are actively pursuing global opportunities.
Ports & Quayside Assets	No applicable assets earmarked for offshore wind use.	Some applicable assets earmarked/actively being developed for offshore wind use.	Assets ready and available for offshore wind use.	Assets experienced/in-use to support offshore wind.
Workforce				
Transferrable Skills	Up to 25% of top 10 existing occupations transferrable to offshore wind, on average.	25% to 50% of top 10 existing occupations transferrable to offshore wind, on average.	50% to 75% of top 10 existing occupations transferrable to offshore wind, on average.	Greater than 75% of top 10 existing occupations transferrable to offshore wind, on average.
Workforce Availability	Major gaps in workforce that will pose challenges even with additional training facilities.	Minor gaps in workforce that can be filled with additional training programs. Recruitment efforts may be required.	Workforce possesses most needed skills/ experience and retraining/upskilling required available in state.	Workforce available and largely ready to serve offshore wind industry with only minor additional certifications required (i.e. GWO).

6.2 Louisiana Offshore Wind Scorecard

Louisiana's current and future offshore wind industry opportunities are presented in Figure 6.1. The current opportunity provides an assessment of Louisiana's present capabilities, based on the inputs and findings of this study. The future opportunity score represents what can be achieved in each criterion by 2035, aligned with the current Louisiana procurement target and the timeline for delivery of at least one federally leased offshore wind project to be operational in the State. In several cases the maximum score may be reached ahead of 2035 if actions are taken to close key gaps and drive progress ahead of this date. Specific actions to support achieving the future opportunity score are described in the recommendations given in Section 7.

Louisiana is already in a strong position to support a growing local and domestic offshore wind industry and stands to benefit even further if appropriate interventions are taken. This study has identified significant strengths within the existing supply chain alongside relevant workforce experience.

The State's manufacturing sector has the capabilities required to supply the offshore wind industry. Over 100 fabrication and manufacturing assets have strong potential to support manufacturing for offshore wind when coupled with investments to reskill, retool, or expand their current operations. Shipbuilding is a significant area of strength where Louisiana companies have already supplied vessels to the US offshore wind sector.

Louisiana does not need to wait for offshore wind development in the Gulf of Mexico to take a leadership role, particularly since valuable IRA credits may expire before the State's own offshore wind industry begins contracting component supply. At least 15 Louisiana companies have supplied a variety of services to offshore wind to date and the State has an opportunity to be a national hub for shipbuilding as industry demand grows. IRA resources offer unique and strategic investment opportunities for Louisiana, which can be leveraged now to ramp up manufacturing and shipbuilding in the near-term.

Louisiana's offshore services sector includes at least 175 companies with expertise in planning, installation, operations, and decommissioning for offshore oil and gas. Many of these companies have the personnel and foundational experience to transition to a similar role for offshore wind. Existing ports are also set to undergo upgrades and retrofitting to potentially serve as staging and marshalling ports for future offshore wind projects.

State strengths include a robust workforce training ecosystem and a workforce with transferable experience, where over 60,000 Louisiana workers are currently employed in roles that are highly adjacent to offshore wind. This experience overlaps favorably with offshore wind development, resulting in high transferability of skills and an opportunity for additive employment across energy sectors. Additionally, interest in developing local innovation capability has already been shown through several landmark investments and programs, in collaboration with Louisiana academic institutions and developers.

Challenges identified focus on the current perceived risk profile associated with the industry, which may limit the potential for growth in the U.S. and, more specifically, Louisiana. The heightened risk profile is due in part to the lack of a codified state offshore wind procurement target and the absence of defined pathway for power offtake. Demonstrating leadership and funding actions that enable local offshore wind capability to develop will send positive market signals and can stimulate investment in Louisiana's offshore wind capability. Continued investment

in supply chain awareness and readiness initiatives are key for maximizing supplier competitiveness in national export markets.

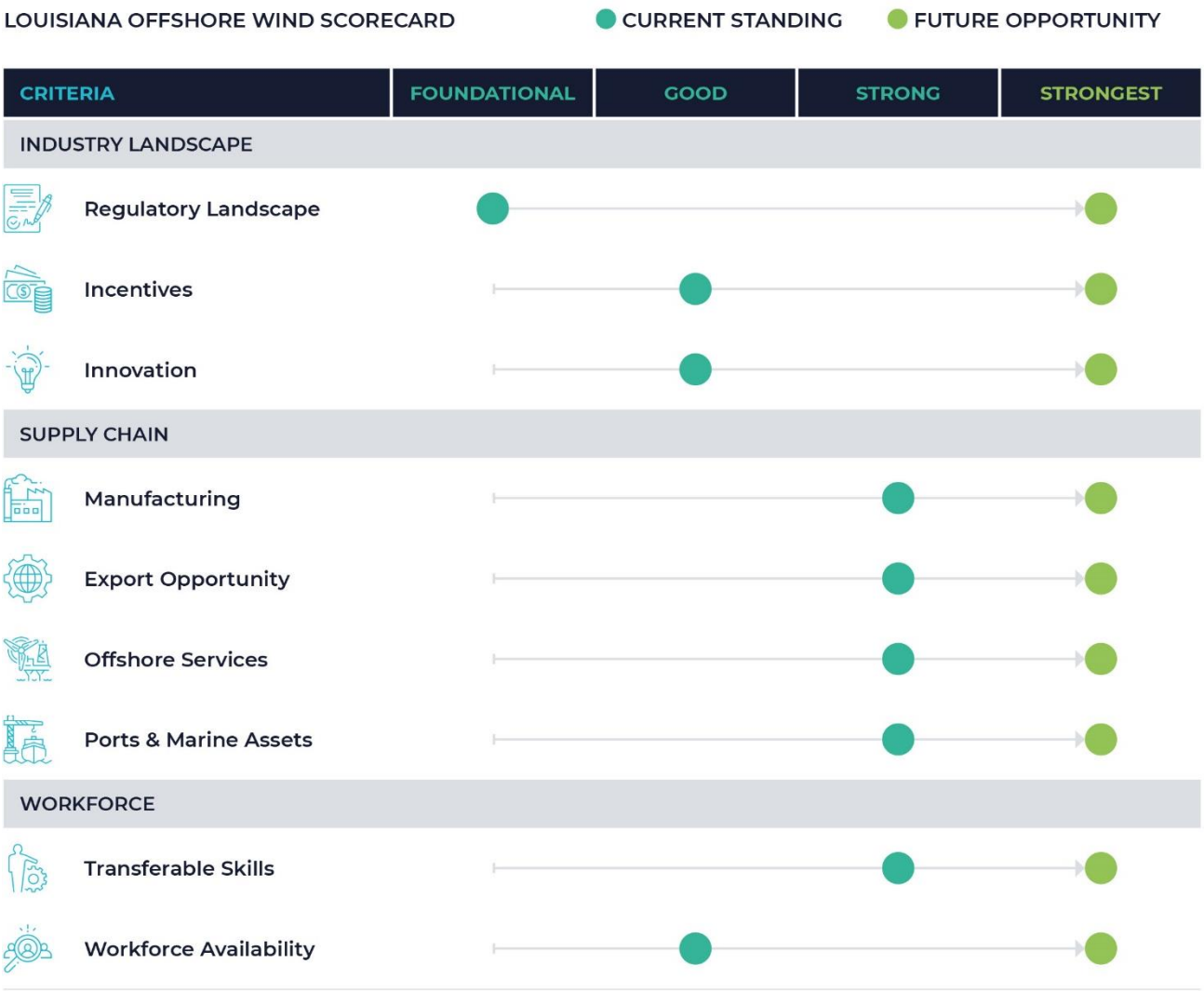


Figure 6.1 - Louisiana offshore wind scorecard

Current Opportunity

This study shows that Louisiana generally scores strongly in an assessment of its current standing in the offshore wind sector. Louisiana has a strong existing track record in supporting the emergent offshore wind industry, having assisted in the design and construction of the first U.S. offshore wind farm and with multiple Louisiana-based industries possessing high levels of transferability in their products and services. The current export opportunity given the level of desire for domestic manufacturing on U.S. projects. Louisiana ports and quayside assets are at an advanced stage of development compared to many in the Northeast, with further investment and development already underway.

Louisiana's workforce is also well-positioned to support local offshore wind development, with a significant number of workers possessing transferable skills through their careers in industries such as industrial manufacturing,

offshore construction, and offshore oil and gas development. There is room to grow in the workforce in the State in parallel with the growth of the offshore wind sector, where an increase in worker demand can create new and additional employment opportunities for Louisiana residents.

While the current industry landscape poses several challenges to offshore wind supply chain development in the State, it also presents an opportunity to encourage immediate action. A concern that surfaced during industry engagement for this study was the uncertainty in the scale and timing of the developing offshore wind market. The lack of certainty, while influenced by global macroeconomic forces and early-industry challenges in the broader U.S., is partly a result of Louisiana's 5 GW by 2035 target currently remaining unenforced, accompanied by the absence of a clear regulatory pathway for offtake. Nonetheless, Louisiana stakeholders have recognized that the State is poised to benefit substantially from the emerging industry and have already launched incentive and technology incubator programs focusing on offshore wind and green hydrogen.

Future Opportunity

The strongest score available in each of the criterion represents an achievable and impactful goal for the State that would maximize economic and social benefits from the development of the offshore wind market. In maximizing this future opportunity, Louisiana can not only prepare itself to effectively support in-state offshore wind development but also capitalize on its unique strengths to fill gaps in the broader domestic offshore wind industry supply chain, including for projects already undergoing development. Compared to other U.S. states pursuing offshore wind opportunities, Louisiana has a unique opportunity to demonstrate leadership in offshore energy and strengthen its position as a pillar of the domestic offshore wind supply chain.

Progress in the State's offshore wind regulatory environment will be key to unlocking many of the opportunities for supply chain and workforce development. The central action to pursue will be the codification of the State's capacity procurement target and commitment to an associated development budget. Such funding could then be put towards the recommendations associated with developing opportunities in the incentives and innovation space.

A keen focus for the development of the Louisiana supply chain will be to identify and lean into the types of products and services for which the State is already well-suited, while making a concerted effort to promote an export focus to the broader U.S. offshore wind industry in the near-term. These areas include vessels, jacket foundations, secondary steel, and the provision of marine industrial services. The State's experience in design and manufacturing for offshore energy projects can be further leveraged in the future as offshore wind projects are installed at increasingly greater water depths that will necessitate floating foundations, where the supply of anchors, moorings and ancillary component products are services will be in demand.

Targeted support to enable workforce development can make the greatest use of existing transferable skills and the current available workforce. Specifically, many Louisiana workers with an interest in finding a role in the industry may require additional certifications which could be obtained with the assistance of new and existing in-state resources.

7 RECOMMENDATIONS

This study proposes actionable recommendations to enable Louisiana to target key opportunities for growth in the State's existing industry landscape, supply chain, and workforce. These recommendations were developed through the study analysis and further informed through stakeholder engagement with key Louisiana policymakers, economic development experts, academia, offshore wind developers and supply chain companies. This stakeholder engagement took place through individual meetings and a workshop soliciting collaborative input from a diverse range of local experts. The results of this study show that Louisiana is positioned to capitalize on the State's legacy of maritime industrial expertise to build a strong foundation for near-term and long-term participation in the U.S. offshore wind industry, both on a national scale and regionally in the Gulf of Mexico.

Specific, actionable recommendations emerged from this analysis across the themes of supply chain, workforce and development of the broader industry landscape. The 18 recommendations across these themes are designed to:

1. Strengthen Louisiana's position as a pillar of the domestic offshore wind supply chain by leveraging the participation of local companies actively involved with current U.S. offshore wind projects and targeting strategic investment around the State's unique offerings.
2. Integrate Louisiana's broader existing workforce, industries, and businesses into the offshore wind supply chain by also focusing on companies at or below a Tier 2 level. Additionally, supporting expanded employment opportunities for Louisiana residents by continuing to identify areas of overlap with adjacent industries and prioritizing investments in training, retooling, and certification.
3. Demonstrate to a cautious offshore wind industry with multiple opportunities for expansion across the globe that Louisiana will maintain its commitment to supporting the sector. This firm commitment can be made by codifying the 5 GW by 2035 capacity target, establishing a clear offtake pathway, and securing funds that will enable a range of offshore wind-specific development efforts.

As there are opportunities to create synergy between individual recommendations, it will be important for these items to be addressed through a holistic approach championed by state leaders with a comprehensive understanding of the offshore wind industry and the State's existing assets. Securing funding for state development initiatives is especially key, as many efforts for next steps will require financial support to progress. In achieving this, the State can maximize potential development benefits and fully capitalize on any investment earmarked for sector enablement.

Louisiana's success in the offshore wind industry to date has stemmed from expertise within its existing supply chain bolstered by powerful leadership models. State government, state-led higher education networks, economic development organizations or agencies (EDOs), grant-funded innovation clusters, and suppliers have consolidated independent efforts into powerful networks to achieve collective success. Each of these groups will continue to play an impactful role as Louisiana capitalizes on its strengths and knowledge to leverage the opportunity presented by the emerging offshore wind industry.

Figure 7.1 summarizes the 18 recommendations generated through this study alongside the actioned parties to carry out each recommendation. Further description of each recommendation is subsequently provided.

● GOVERNMENT ● EDOs ● DEVELOPER AND/OR TIER 1 ● SUPPLIERS ● TRAINING & ACADEMIA

RECOMMENDED ACTION FOR LOUISIANA OFFSHORE WIND INDUSTRY DEVELOPMENT	OWNER
INDUSTRY LANDSCAPE	
Establish legislation and funding supporting offshore wind industry development	
1. Codify the Louisiana ambition for offshore wind capacity	●
2. Establish an offshore wind procurement process through State law	●
Streamline in-State offshore wind development efforts	
3. Designate an organization to oversee offshore wind development in LA	● ●
4. Support Parish-level EDOs to improve coordination of localized efforts	●
Drive in-State innovation and sector leadership	
5. Build a reputation for technical excellence and innovation in LA by localizing R&D activities	●
SUPPLY CHAIN	
Develop strong supply chain data sources to inform investments	
6. Build on the existing LA Offshore Wind Supply Chain Database	●
7. Conduct targeted surveying of industry-adjacent companies	●
8. Conduct an inventory of ports and infrastructure assets	●
9. Develop a timeline of U.S. offshore wind project supply requirements	●
Strengthen business networks to promote Louisiana offshore wind supply chain export offering	
10. Plan and execute B2B matchmaking events to connect LA companies with opportunities	● ● ● ●
11. Identify and leverage existing supplier relationships between LA companies	● ●
12. Promote advantages of doing business in LA	● ●
Position Louisiana for major component supply and shipbuilding contracts	
13. Position LA as a key manufacturing hub for large steel components	● ●
14. Identify high impact opportunities for investment in supply chain development	● ● ●
15. Leverage LA's reputation as a shipbuilding hub	● ●
WORKFORCE	
Build awareness and drive recruitment for the offshore wind workforce	
16. Increase awareness of job roles in the offshore wind sector	●
17. Secure developer/Tier 1 funding for specialized training programs	●
18. Target positive outcomes and build diversity in the offshore wind workforce	● ● ●

Figure 7.1 - Summary of recommendation to enable Louisiana offshore wind industry development

7.1 Industry Landscape

As offshore wind projects on the East Coast finalize procurement contracts and begin construction, the robust economic policies driving the development in these states are yielding returns through job creation and private investment. Louisiana has an opportunity to join the six other states that have already established procurement mechanisms for purchasing offshore wind energy from the developers.

Developers and regulators have stated that the absence of a procurement framework in Louisiana is one of the contributing factors resulting in relatively low sale prices and competition in the Gulf's first federal lease auction. The lack of a defined procurement process means that there is currently no straightforward way for developers to sell electricity generated from offshore wind in the Gulf, deterring local investment and stalling progress. When route to market is uncertain it presents additional risk to project developers as it will be more difficult to secure adequate project financing, in general limiting interest in project development and overall project feasibility. While electricity resulting from offshore wind in Louisiana has the option to be used for green hydrogen or other industrial purposes as well as being fed to the State electrical grid, having clear offtake processes are important for signalling industry commitment and creating investor confidence.

Adequate funding for impactful supply chain and workforce development initiatives is central to the ability to take advantage of the opportunity presented by the emerging offshore wind industry. While it should be anticipated that private sector investment will occur in the State once developer and supplier confidence in the market is achieved, it is likely that public sector funding will be required to enable next steps in the majority of recommended actions.

By establishing supportive legislation, developing a procurement process and designating responsibility for industry development to relevant agencies, Louisiana can ensure that all of the progress to be made in supply chain and workforce development has a dedicated pathway to return significant benefits as the offshore wind industry grows.

Establish legislation and funding supporting offshore wind industry development.

1. Codify the Louisiana ambition for offshore wind capacity including the target of 5 GW of procured offshore wind energy by 2035, with an accompanying appropriation of funds. Adopt clean energy initiatives that support the establishment of procurement and designate respective oversight for the process in the State.

   Actioned Party: State government.

   Next Step: State legislation. In passing legislation and appropriating a clear, associated funding package, the State signals committed support for development of this industry. Funding will be critical for many of the recommendations highlighted in the following sections.

2. Clearly establish an offshore wind procurement process through state law, assigning responsibility to appropriate State agencies to develop contracts and oversee a competitive process that aligns with State objectives and industry standards for offshore wind development.

   Actioned Party: State government.

Next Step: State legislation. If desired, the State could carry out assessments considering the details of other states' procurement pathways in order to understand how the differences between them may present different options for Louisiana to consider. Funding for this could come from the aforementioned funding package.

Streamline in-state offshore wind development efforts.

3. Designate organizational leadership to oversee offshore wind development in Louisiana. To date, multiple state-sponsored entities, including EDOs, have stepped up to provide thoughtful leadership and initiate important discussions on the potential benefits of offshore wind to the State. With key advantages, such as access to State funds and robust oversight, these entities will continue to be important players in the promotion of offshore wind job creation. Designating a lead agency at this point, however, will help to create efficiencies in allocating funds, coordinating program development, and more, allowing for a primary point of contact for the industry. In choosing an agency to lead this effort it may be useful for the State to explore the organizations and approaches used in other states and consider how those might be adapted to Louisiana's needs. Two examples include the Massachusetts Clean Energy Center and the New York State Energy Research and Development Authority.

   Actioned Party: Industry-focused EDOs or government entities.

   Next Step: Explore the organizations and approaches used in other states as potential models for Louisiana; identify any gaps or opportunities unique to the State and develop suitable leadership programs accordingly. This organization can also represent Louisiana in any future regional collaboration efforts.

4. Support Parish-level EDOs to improve coordination of localized efforts including education and awareness of the offshore wind industry. This will allow these groups to better direct local efforts in tracking and engaging suppliers and signposting opportunities. The State may also wish to empower these EDOs to collaborate with state-wide entities like the Louisiana Community and Technical College System (LCTCS).

   Actioned Party: Parish-level and state-level EDOs.

   Next Step: Interested Parishes should pursue the development of relationships through formalized partnerships (such as a Memoranda of Understanding), participation in state-wide consortiums, and planning recruitment and information sessions in inland Parishes; the latter can align with the opportunities presented by required activities that need not be quayside, such as works in engineering, secondary steel fabrication or sub-component supply.

Drive in-state innovation and sector leadership.

5. Build a reputation for technical excellence and innovation in Louisiana by localizing R&D activities for offshore wind-related technologies. Fostering collaboration on R&D challenges can result in increased generation of high value intellectual property in the State. Efforts are already underway in the State to design, research and test technology solutions applicable to the offshore wind market. Enabling innovators in the space can lead to Louisiana creating substantial value in the industry through technology development that optimizes processes, increases offshore safety, and reduces project costs

and risks. Floating offshore wind technology is still being developed and optimized, presenting an additional opportunity for Louisiana to innovate.

Actioned Party: Higher education institutions and technology incubators.

Next Step: The GLOW Propeller and the Gulf Wind Technology Incubator are well-suited to foster this type of innovation. With the State signaling a commitment to the industry, academia and entrepreneurs will be given an opportunity to pursue development in this field. The dedicated lead entity for offshore wind in the State should also ensure that they represent the State's interest in broader innovation funding conversations, promoting ongoing dialogue on research needs with organizations such as the U.S Department of Energy Wind Energy Technologies Office (WETO) and the National Offshore Wind Research and Development Consortium (NOWRDC).

7.2 Supply Chain

Louisiana's existing assets and experience in offshore construction, advanced manufacturing, shipbuilding, and marine logistics give the State a strong export market opportunity to supply out-of-state offshore wind projects ahead of supporting local project delivery in the Gulf of Mexico. Projects soon to be under construction in the Northeast and Mid-Atlantic can provide early contract opportunities for capable suppliers. The learning and relationship-building gained through participating in early U.S. offshore wind projects can be leveraged to build and maintain competitive advantage as the industry continues to grow and mature. Any early contracting experience gained by higher Tier suppliers will typically also generate greater opportunities for local companies in the lower Tiers where there may be existing supplier relationships from working in other industries.

Louisiana ports are a primary asset to be leveraged and have positioned the State as a globally recognized hub for international trade and offshore oil and gas extraction. Offshore wind represents an opportunity for economic diversification, with potential to support planning, manufacturing, installation, and operations. Many of Louisiana's ports have already stated support for the development of offshore wind activities in State, and have begun carrying out port upgrades, and building relationships with key developers and suppliers. Louisiana's ports will play an essential role in enabling the development of any lease areas in the Gulf. Ports that invest in upgrading and expanding quayside facilities for offshore wind can also leverage other industrial uses, such as offshore oil and gas and hydrogen production, making a stronger case for port investment and development amidst any uncertainty in the offshore wind development pipeline.

Similarly, Louisiana's capability in shipbuilding and marine operations offer significant opportunity for early involvement in the domestic offshore wind industry. Vessel availability and compliance is a notorious bottleneck for the offshore wind industry, and the State's capable shipyards and wealth of maritime experience make it a strong candidate for export support to other regions.

Actionable recommendations that will allow Louisiana to strengthen its offshore wind supply chain and capitalize on related market opportunities are described below.

Develop strong supply chain data sources to inform investments.

6. Build on the existing Louisiana Offshore Wind Supply Chain Database to include further relevant companies from high-potential adjacent industries, such as water transportation, shipbuilding, manufacturing and fabrication, oil and gas extraction, and heavy construction. Developers and top tier suppliers make use of these databases to identify local content potential, so appearing in this database is crucial for companies seeking to enter the industry.

   Actioned Party: EDOs are typically well positioned to host and maintain industry-specific supplier databases. GNO, Inc., have already begun this work for offshore wind suppliers in Louisiana.

   Next Step: Develop additional avenues to capture interested and capable suppliers, such as an onboarding form with a well-defined questionnaire allowing companies to self-identify in areas of operation from a list of offshore wind related activities. Companies should also be asked to report on diverse-ownership status and related certifications as there is likely underrepresentation in this category due to lack of awareness and barriers faced in obtaining official certification. This will allow any business support programs to identify appropriate target companies.

7. Conduct targeted surveying of industry-adjacent companies to more fully assess offshore wind readiness and determine additional information gaps. Questions on willingness to participate in this industry, as well as the degree of investment, scaling, retooling and certification required will help to build awareness of overall supply chain readiness. These efforts can further refine the results from supply chain capability assessments.

   Actioned Party: EDOs with access to a broad network of companies spanning adjacent industries.

   Next Step: Surveys should be developed and distributed to encourage participation in the Louisiana Offshore Wind Supply Chain Database. Results can be strengthened by leveraging a broad network of companies spanning adjacent industries to ensure that the proper groups are being canvassed and represented in survey results. Particular focus should be given to companies in apparent Louisiana areas of strength such as steel fabrication, advanced manufacturing, and the marine industrial sector to ensure accurate representation in areas of greatest opportunity.

8. Conduct an inventory of ports and relevant infrastructure assets to build a comprehensive understanding of capability and opportunity, alongside evidence that can support further targeted funding. Identifying available space for additional quayside development, manufacturing operations, or office space will help to identify potential offshore wind supply chain hubs as well as provide opportunities for public or private investment and partnership-building. The development of key ports in-state can be a catalyst for creating workforce opportunities in the region.

   Actioned Party: EDOs.

   Next Step: The responsible party will need to initiate a scope of work to undertake this ports and infrastructure inventory. The study should include a high-level gap analysis for quayside assets in the state, allowing for recommendations to be made for targeted, cost-effective investment opportunities.

9. Develop a comprehensive timeline of U.S. offshore wind project supply requirements making informed estimates on when various components will be required and when relevant procurement activities will take place. This timeline will, in turn, be used to develop a strategic, detailed schedule for various activities in Louisiana, including supply chain and workforce development. For example, if a company receives funding to develop further capabilities for manufacturing, this will ensure that facility will complete essential tasks and be able to meet the anticipated production window, including completing recruitment and training of any necessary, specialized workforce. This study should focus on developing a time-based model, including key milestones for inputs from the broader project pipeline which would influence or shift Louisiana's investment and development response. Results of this study should include key investment items, including those that should be made regardless and those which depend on a certain milestone being hit prior to investment. Preparing this timeline will directly support efforts for the State to engage and invest strategically to support export capabilities.

   Actioned Party: EDOs.

   Next Step: Execute a study assessing the U.S. offshore wind project pipeline specifically with a view towards Louisiana's strategic supply chain and workforce development goals. This will also help to set priorities for additional capabilities that can be built out within the State on a longer-term.

Strengthen business networks to promote Louisiana's offshore wind supply chain export offering.

10. Plan and execute Business-to-Business matchmaking events to connect Louisiana companies with developers, Tier 1 suppliers, and potential partner companies. Creating platforms for relationship building increases supplier awareness of requirements and buyer awareness of capabilities while fostering opportunities for collaboration. These events can develop strong and diverse supplier-to-supplier networks, both in-state and nationally.

    Actioned Party: These events are best organized through partnerships between industry-focused EDOs or government entities, developers, and supply chain companies.

    Next Step: The lead EDO or designated entity should organize relevant sessions. Leveraging the Louisiana Offshore Wind Supply Chain Database to identify appropriate attendees will help hosts to get the most out of the experience.

11. Identify and leverage existing supplier relationships between Louisiana companies that are currently participating or have participated in domestic offshore wind projects and/or that have a nation-wide presence to build awareness of the supply opportunity available to Louisiana. This study identified 15 companies which have already supported offshore wind development in some form, which represents a great opportunity to further assess their desire to support the industry locally and leverage and share the experience they've gained to date.

    Actioned Party: Industry-focused EDOs or government entities can drive this action by building and leading a consortium of relevant businesses.

Next Step: The consortium can drive a concerted effort to position Louisiana as a broader domestic offshore wind supply chain partner through joint development of online content and literature, collation of resources, and attendance at industry events (such as conferences and supply chain expos). Key messaging will need to be developed to support consortium members in promoting themselves to their broader networks.

12. Promote advantages of doing business with Louisiana. Tax credits, especially those set to expire under the IRA, present a near-term opportunity for export while building capacity to support offshore wind projects in the Gulf of Mexico and in the western U.S. Louisiana benefits from a longer installation weather window that is complementary to that of the Northeast, meaning that vessels may have the opportunity for multiple contracts in an annual season. Louisiana has a head-start over other states given its existing industrial capabilities. Highlighting these additional benefits, and building awareness of Louisiana's offering overall will help kick-start offshore wind industry development. This study confirmed that tax credits present significant opportunity to supercharge strategic investment but require some coordination at the state level to maximize potential benefits.

    Actioned Party: Industry-focused EDOs or government entities.

    Next Step: Leverage existing state programs like the Hudson Initiative, the LCTCS network, and the H2theFuture program to coordinate investment in SBEs and DBEs. Expand trade programs to increase visibility and funding for SBEs. The dedicated lead for offshore wind in Louisiana should represent the State's interest on the national stage, attending relevant conferences and taking part in any industry task forces and roundtables where the State could influence discussions and/or highlight its assets.

Position Louisiana for major component supply and shipbuilding contracts.

13. Position Louisiana as a key manufacturing hub for large steel components, such as subsea foundations (including jackets, monopiles, and gravity-based structures), focusing on jacket foundation supply opportunities in the near-term while building capacity for other foundation supply in the future. Localizing Tier 1 manufacturing of subsea foundations opens significant opportunities in Tier 2/3 manufacturing through the production of secondary steel components.

    Actioned Party: Industry-focused EDOs or government entities.

    Next Step: A targeted messaging campaign supported by coordination and promotion at the state level, driven through the actions stated above. Identifying and including companies that will be executing on these manufacturing scopes is necessary to ensure alignment and to avoid misrepresentation of capabilities. The Manufacturing Extension Partnership of Louisiana may be best suited to lead on this and align efforts with their ongoing work.

14. Identify high impact opportunities for investment in supply chain development, including opportunities for developing partnerships to meet scale and volume challenges. While a number of companies that were contacted as part of this scope indicated they were interested in growing their capabilities to meet the needs of the offshore wind industry, none yet possess the ability to produce large steel components like monopile foundations, towers, or transition pieces for the current generation of offshore WTGs. While

this is largely a function of scale and volume production, the actions above will help Louisiana to expand its supply offering while still leveraging in-state strengths identified through the supply chain assessment.

Actioned Party: Industry-focused EDOs or government entities; Suppliers.

Next Step: Using the results of studies such as this one, and through assessment of the Louisiana Offshore Wind Supply Chain Database, companies that have high potential for investment can work with local entities to identify funding opportunities, or express their desire for acquisition or strategic partnership formation. The next supply chain research scope to be pursued in the State could include a prioritization assessment, identifying tiers of funding opportunities determined by factors such as company interest, required funding, and projected economic benefits to the State.

15. Leverage Louisiana's reputation as a shipbuilding hub and promote tax benefits under the IRA for domestic vessel productions and Jones Act compliance. Specialized offshore wind vessels constructed domestically may result in higher costs compared to foreign production, but the tax and compliance benefits may outweigh that differential. Furthermore, demand for WTIVs globally exceeds supply which will pose supply chain bottlenecks [6]. Enhancing shipbuilding capabilities to accommodate vessel specifications for both East Coast and West Coast projects, including focusing on designs conducive to conversion to fully electric SOVs and CTVs, would be attractive to the industry. While it is currently an expensive pursuit with inherent risks to return on investment due to industry confidence, a high-profile action that would signal Louisiana's shipbuilding capability could take the form of securing a contract for a Jones Act-compliant WTIV. This would clearly establish Louisiana as a major global offshore wind supplier, however robust financial and risk-reduction strategies would need to be employed to make this feasible. Shipbuilding companies contacted through this study have signaled that they could construct such a vessel but that is it currently cost-prohibitive due to industry risks.

Actioned Party: Industry-focused EDOs or government entities; federal and state governments.

Next Step: Develop clear messaging that highlights achievable tax incentives for Louisiana shipbuilding under the IRA, coupled with an inventory of assets and companies that are capable of building the vessels required to broadly promote the State. De-risking WTIV construction through appropriation of funds, creative investment/financial structuring, guaranteed return on investment through government underwriting, etc. could lead to WTIV construction, solidifying Louisiana as a cutting-edge shipbuilding state.

7.3 Workforce

Louisiana's national leadership in offshore construction hinges on the experience and expertise of its workforce. With strategic investment in education, training, and awareness, Louisiana can leverage domestic offshore wind development as an accelerator for economic growth, employment, and social benefits, especially for communities that have not shared in the economic prosperity associated with energy development.

Offshore wind can provide a strong complement to existing employment opportunities in adjacent industries like water transportation, shipbuilding, manufacturing and fabrication, oil and gas extraction, and heavy and civil

construction. Individuals in these industries have a high level of skill transferability with offshore wind job roles, and participation in offshore wind would broaden their employment options and reduce the impact of economic fluctuations. Offshore wind workforce development also provides a strong opportunity to grow the proportion of technically skilled workers in the State, while reducing outmigration of expert workers. Actions to support workforce development described below will allow Louisiana to grow its offshore wind workforce sustainably and equitably.

Build awareness and drive recruitment for the offshore wind workforce.

16. Increase awareness of job roles required in the offshore wind sector through a coordinated educational campaign. Establishing coordination between existing training and educational institutions will lead to consistent and more impactful messaging and alignment on goals, while avoiding duplication of efforts. An example of this model is the CONNECT4Wind education partnership in Southeastern Massachusetts, which focuses on curriculum development, industry promotion, and recruitment activities.

    Actioned Party: Training and higher-education institutions.

    Next Step: Conduct the education campaign described above; state funds should be used. This effort should be promoted at all education levels, including in the K-12 system, at vocational schools, and in the post-secondary system.

17. Secure developer and/or Tier 1 funding for specialized training programs and formalize collaborations with educational institutions to ensure alignment on skill requirements. Such initiatives could follow the model of the Windward Workforce initiative by Vineyard Wind, which is a developer-funded program to recruit, mentor, and train in-state residents. Workforce development should be focused on roles related to manufacturing, fabrication, and shipbuilding to support Louisiana's role as an exporter to projects on the East and West Coast, creating jobs that stay in Louisiana. By partnering with offshore wind companies, training institutions will have greater insight into the requirements and specializations needed to meet their specifications.

    Actioned Party: Developers and Tier 1 suppliers working with training and higher-education institutions.

    Next Step: Secure funding for the initiatives above and put out a request for interest in hosting these types of initiatives. Developers and Tier 1 companies will likely be more motivated to undertake these efforts if the State has given clear indicators as to the importance of local workforce benefits and skills development. This clarity could be addressed by a detailed offtake pathway and associated solicitation process.

18. Target positive outcomes and build diversity in the offshore wind workforce by ensuring recruitment activities take place in designated Justice40 communities, areas with low socioeconomic standing, and regions known to host a disproportionate number of historically disadvantaged, unemployed and/or under-employed residents. Concerted efforts to recruit minorities, women, veterans, tribal members, those with disabilities, and other marginalized groups should also be prioritized by leveraging organizations which represent these populations. These demographics are underrepresented in the energy industry, and face greater barriers to entry such as lack of opportunity awareness, inability to apply for or attend training programs due to financial or other constraints, language isolation, etc.

Building diversity into the workforce will increase the likelihood that benefits are shared broadly and equitably, while also creating workforce resiliency and a broader support base for the industry.

Actioned Party: Training and higher-education institutions; EDOs or education-focused government entities.

Next Step: In addition to recruitment and messaging activities, programs should be established to provide wraparound services to increase accessibility to workforce training programs; such services may include the provision of childcare, transportation, lost wages, etc. These programs can be developed in conjunction with existing initiatives, ensuring that any funds dedicated towards local wraparound services target the most important barriers to entry for interested workers in that region.

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8 GLOSSARY

Glossary of Terms

Developer – An offshore wind developer is the owner and operator of an offshore wind farm. Generally, they are large multi-national energy producers and responsible for the delivery of the project in alignment with the terms agreed with local and/or national regulatory agencies and any agreed power purchase agreement.

Original Equipment Manufacturer – An OEM is the manufacturer of a product that is fully developed by the company. OEMs may still purchase parts from other manufacturers and use them to assemble their finished products.

Tier 1 – Tier 1 companies are suppliers of equipment or services to the project that generally contract directly with the Developer. Contracts are typically worth tens or hundreds of millions for the top level (Tier 1) packages such as supply or installation of WTGs or remaining balance of plant. Generally, the Tier 1 contractor will take the risk for schedule and cost overrun and be penalized accordingly should they not comply with agreed delivery dates.

Tier 2/3 – Tier 2 contractors supply products and services directly to the Tier 1 contractors. These are likely to more specialized in what they can produce and smaller than a Tier 1 company. These are likely to provide a more bespoke or specific component or service. Some Tier 1 suppliers will have a small selection of Tier 2 companies from which they exclusively source certain material, equipment, or services (to guarantee quality, price and/or schedule certainty) with other Tier 2 supply opportunities being subject to a competitive tender process to encourage competition in the supply chain. Tier 3 companies supply directly to Tier 2 suppliers and may be further specialized in what they supply.

Wind Turbine Generator – A WTG converts kinetic energy from the wind into electrical energy. The WTG consists of a rotor and nacelle. The rotor extracts kinetic energy from the wind and converts it into rotational energy through a drive train. The nacelle houses the drivetrain and other auxiliary components. The nacelle is supported by a tubular steel tower structure.

Balance of Plant – The collective term for the turbine foundations, electrical cables, ESP, and onshore substation. The turbine foundations support the WTG and provide a conduit for the electrical cables, which export the power from the WTGs to onshore transmission infrastructure via an ESP and an onshore substation.

Electrical Service Platform – An ESP is an offshore substation that reduces electrical losses during the export of power to the onshore substation by increasing the voltage. It consists of a topside and a foundation. The topside denotes everything above the substructure, including the electrical system. The foundation is a steel subsea structure.

Secondary Steel – Secondary steel includes all steel components that comprise the non-critical infrastructure of the WTG and balance of plant. Examples of secondary steelwork include boat landings, cable entry and support systems, corrosion protection systems, and personnel access systems like work platforms, ladders, and guard rails.

Installation and Commissioning – Offshore installation is the process of transporting components from quayside to the site and fixing them into place. Following installation, commissioning is the process of safely completing final mechanical and electrical assembly prior to operation.

Operations and Maintenance – The O&M phase of a project lasts from commissioning until decommissioning, typically expected to be in excess of 25 years. Electricity generation and monitoring occurs on an ongoing basis, and regular and unplanned maintenance and repair activities are carried out as required.

List of Acronyms

Acronym	Definition
BOEM	Bureau of Ocean Energy Management
COD	Commercial Operation Date
CTV	Crew Transfer Vessel
DBE	Disadvantaged Business Enterprise
ESP	Electrical Service Platform
GHG	Greenhouse Gas
GW	Gigawatt
GWO	Global Wind Organization
HLV	Heavy Lift Vessel
IIJA	Infrastructure Investment and Jobs Act
IMR	Inspection, Maintenance and Repair
IRA	Inflation Reduction Act
ITC	Investment Tax Credit
LCTCS	Louisiana Community and Technical College System
LED	Louisiana Economic Development
MW	Megawatt
NAICS	North American Industry Classification System
O&M	Operations and Maintenance
OCS	Outer Continental Shelf
OEM	Original Equipment Manufacturer
PTC	Production Tax Credit
RCPS	Renewable and Clean Portfolio Standard
SBE	Small Business Enterprise
SOC	Standard Occupational Classification
SOV	Service Operation Vessel
WTG	Wind Turbine Generator
WTIV	Wind Turbine Installation Vessel

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APPENDIX A SUPPLY CHAIN METHODOLOGY

An understanding of the Louisiana offshore wind supply chain landscape was developed through an assessment of several public data sources, including:

- Louisiana Offshore Wind Supply Chain Database from GNO, Inc. and RWE
- Wind Industry Supply Chain Database & Map from Southeastern Wind Coalition
- Current and prospective client database from the Manufacturing Extension Partnership of Louisiana
- Certified DBE Directory from the Louisiana Department of Transportation and Development
- Small Entrepreneurship, Veteran Owned Small Entrepreneurship and Service Connected Disabled Veteran Owned Small Entrepreneurship databases from the LED SmallBiz System

Datasets were thoroughly examined for potential gaps and limitations, and were discussed with local stakeholders to ensure as much inclusivity as possible. Companies that did not have a presence in Louisiana were excluded from the assessment. A three-phase process was employed to screen, prioritize, and assess the available supply chain against the supply elements identified in Table 2.1. Capability to support project decommissioning was not assessed given the early phase of industry development with services not anticipated to be required for another 30+ years. However, many of the same companies providing installation services could be utilized for decommissioning works.

Relevant NAICS codes were used to screen companies for their applicability to support offshore wind. The NAICS system is the U.S. federal standard for classifying organizations into industry categories which can then be used to assess the broader U.S. industrial landscape. NAICS codes are numerical and range from two to six digits, with six-digit NAICS codes having the greatest precision in company categorization. Six-digit NAICS codes were mapped to all activities in the offshore wind project lifecycle using Xodus in-house expertise, feedback from industry engagement, and publicly available industry data.

NAICS codes were prioritized according to both the level of project spend likely to occur in that field and level of opportunity to develop/train an offshore wind workforce. Companies participating in steel/metal manufacturing, electrical and transmission components, marine products and services (including environmental and transportation), concrete and construction, and engineering and related services were prioritized for inclusion in the analysis.

Following screening and prioritization exercises, a 'deeper dive' applicability assessment was conducted in order to better understand the ability of each company to service an offshore wind project. To assess the applicability of the remaining companies, Xodus relied on desk-based research, reviewing websites, and assessing publicly available information (press releases, news articles, etc.) with a set of guiding capability criteria as follows:

- Experience in offshore wind: The number of projects supplied to the offshore wind sector, either in the U.S. or elsewhere in the world. Participation in onshore wind work was also considered here, where there was relevant project scale, operating environment, and installation methodology.
- Experience in adjacent industries: The strength and applicability of expertise in supplying adjacent industries, such as the marine and energy sectors, as well as steel and concrete manufacturing.
- Investment case: Where a supplier is not yet ready to supply, the level of investment and market confidence needed to develop capability.

APPENDIX B WORKFORCE METHODOLOGY

Xodus' in-house offshore wind workforce tool was used to characterize and quantify the workforce requirements to enable the buildout of offshore wind projects. The tool creates a timeline of total workforce demand relative to project COD and can consider the cumulative workforce demand from the requirement of multiple concurrently developed projects. The total number of workers required in any year is calculated from the demand in workforce for constituent products and services.

Workforce demand is analyzed for the lifetime of an offshore wind project that includes five years before and 25 years after a project's COD, as this period captures the general arc of workforce demand associated with a project. This includes the ramp-up of development, manufacturing and installation work, peaking during the years of offshore installation, before reducing and plateauing of workforce demand during a long period of operations and maintenance. Each supply chain element is tagged with an *in-demand* or *no-demand* value each year relative to a project's COD reflecting when workers in that supply chain element will be required to perform work.

Xodus utilizes in-house expertise, regular industry engagement, and publicly available industry data to quantify and qualify workforce requirements. The number of workers calculated reflects the number of people required to fulfil a contract and is not equivalent to the number of full-time employees (FTEs) that would be calculated as part of an economic impact analysis. This is to account for cases where there is need for multiple workers with the same certifications to work at the same time to deliver a product or service, where the demand for training and certification will exceed the number of FTEs required.

The number of workers deployed offshore to support the installation of offshore wind farm components is guided by the number of crew members required to operate the vessel, the minimum number of people required to conduct various tasks (e.g., operation of piledriving equipment or remotely operated vehicles), or the maximum number of workers that can be accommodated on vessels.

Job roles are organized according to the Standard Occupational Classification (SOC) system, a standard set by federal agencies to classify workers for the purpose of collecting, calculating, or disseminating data and illustrate the occupational composition of the U.S. Each job role is tagged with a corresponding SOC title and SOC code, which provides a way to group similar job roles; for instance, both vessel captains and deck officers are classified with the SOC title "Captains, Mates, and Pilots of Water Vessels." This method creates a more meaningful representation of demand for job roles and mitigates small variations in responsibilities skewing demand trends.

Additionally, Xodus' workforce tool captures several pieces of data about each type job role, including: average salary, educational attainment, certification requirements, if a job operates offshore, if a job can be fulfilled by an apprentice, and if a job is typically fulfilled by a union.

APPENDIX C OPPORTUNITY ASSESSMENT METHODOLOGY

A PESTEL methodology was employed to ensure a comprehensive approach – focusing on Political, Economic, Social, Technological, Environmental and Legal factors. The analysis assessed the strengths/opportunities for and challenges/barriers facing development of the Louisiana offshore wind industry, supply chain, and workforce.

Political factors refer to the influence of government policies, regulations, and stability on industry operations. It includes aspects such as government stability, taxation policies, trade tariffs, political stability, and government intervention.

Economic factors encompass the economic conditions of the markets in which the industry operates. This includes factors such as inflation rates, exchange rates, economic growth or recession, unemployment rates, disposable income levels, and interest rates. Economic factors can significantly impact industry contracting patterns and market demand.

Social factors pertain to the cultural, demographic, and societal aspects that may affect the industry. This includes factors such as population demographics, cultural attitudes and values, lifestyle changes, workforce behavior, and education levels.

Technological factors relate to the influence of technological advancements and innovation on projects and the wider industry. This includes technology requirements and supply trends, R&D, disruptive technologies and intellectual property generation.

Environmental factors refer to the impact of environmental issues and sustainability concerns on projects and industry. This includes factors such as weather, climate change, environmental regulations, ecological conditions, and waste and hazardous material management. Projects and industry need to consider environmental factors to mitigate risks and demonstrate environmental responsibility.

Legal factors encompass the laws, regulations, and legal frameworks that govern the industry's operations. This includes factors such as state and federal legislation, employment laws, health and safety regulations, competition regulations, intellectual property laws, and international trade laws.

The PESTEL analysis methodology involved systematically examining each of these factors and assessing their potential impact on industry objectives. The PESTEL analysis that was carried out for this study is shown in Figure C.1. This analysis helped to inform the Louisiana offshore wind opportunity assessment, carried out in Section 5.1.

Figure C.1 - PESTEL assessment outcomes for Louisiana offshore wind development

The Pew Charitable Trusts provided funding for this project, but Pew is not responsible for errors in this white paper and does not necessarily endorse its findings or conclusions.