

OFFSHORE WIND ROADMAP TABLE OF CONTENTS*December 2022*

- Letter from Co-Chairs
- Executive Summary
- About the Roadmap
 - The Maine Offshore Wind Initiative
 - Building The Roadmap
 - Advisory Council & Working Group Members
- An Opportunity for Maine
 - Create Jobs & Economic Growth
 - Harness-Renewable Energy
 - Fight Climate Change
- Maine's Commitment to Responsible Offshore Wind
- The Federal Offshore Wind Leasing and Development Process

The Maine Offshore Wind Roadmap

- Objectives
 - Objective 1: Pursue Offshore Wind Supply Chain, Infrastructure, and Workforce Investments to Support Economic Growth and Resiliency 2
 - Objective 2: Harness Abundant Renewable Energy to Reduce Long-Term Costs, Reliance on Fossil Fuels, and Fight Climate Change
 - Objective 3: Advance Maine-Based Innovation to Compete in Emerging National and Global Offshore Wind Industry
 - Objective 4: Support Maine's Vital and Thriving Seafood Industries and Coastal Communities
 - Objective 5: Protect the Environment, Wildlife, & Fisheries Ecosystem in the Gulf of Maine
- Cross-Cutting Themes
 - Stakeholder Engagement and Communications
 - Equity
 - Transparency, and Data-Driven Decision Making
 - Regional Collaboration & Coordination
- Implementation
- Funding
- Milestones
- Appendices:
 - Acknowledgements
 - End Notes
 - Working Group Recommendations
 - Technical Reports

OFFSHORE WIND ROADMAP OBJECTIVES, STRATEGIES and ACTIONS WORKING DRAFT OF THE CORE ROADMAP CONTENT

December 2022

Objective 1 – Pursue Offshore Wind Supply Chain, Infrastructure, and Workforce Investments to Support Economic Growth and Resiliency

- a. Create abundant and accessible opportunities for Maine businesses
- b. Ensure opportunity and inclusivity in Maine's offshore wind workforce
- c. Develop export opportunities and industry readiness for Maine businesses and research institutions
- d. Attract investment and workforce to Maine necessary to support the industry.
- e. Strategically invest in ports and manufacturing infrastructure

Objective 2 – Harness Abundant Renewable Energy to Reduce Long-Term Costs, Reliance on Fossil Fuels, and Fight Climate Change

- a. Establish state floating offshore wind procurement coordinated regionally to achieve cost effective deployment
- b. Pursue regional transmission strategies
- c. Ensure a stable and predictable investment environment
- d. Advocate for federal leasing mechanisms that support Maine's goals

Objective 3 – Advance Maine-Based Innovation to Compete in Emerging National and Global Offshore Wind Industry

- a. Continue to develop floating demonstration projects
- b. Leverage resources to commercialize Maine's R&D capabilities in floating offshore wind
- c. Establish a floating offshore wind innovation hub in Maine
- d. Leverage and expand Maine's capabilities in Artificial Intelligence, data science, and robotics
- e. Collaboratively research co-generation technologies, clean fuels, carbon capture, and storage

Objective 4 – Support Maine's Vital and Thriving Seafood Industries and Coastal Communities

- a. Strengthen and facilitate robust engagement and integrate technical feedback from fishermen, fishing businesses and communities
- b. Promote open, transparent and comprehensive research and data gathering
- c. Seek to avoid and then minimize conflicts
- d. Ensure safe navigation
- e. Advance opportunities for fair and equitable benefits

Objective 5 – Protect the Environment, Wildlife, & Fisheries Ecosystem in the Gulf of Maine

- a. Collect high quality, relevant data that is publicly available
- b. Proactively reduce conflicts, minimize ecosystem impacts and facilitate timely permitting
- c. Strengthen Maine's state policy framework
- d. Enhance regional collaboration in the Gulf of Maine
- e. Pursue state and other funding opportunities
- f. Facilitate open and transparent engagement and integration of technical advice
- g. Promote and advance new technologies

Note: This section includes the objectives, strategies, and actions of the Roadmap. The subsequent Implementation section will include milestones and a table to include essential descriptions for each action, responsible agency and more.

OBJECTIVE 1 - Pursue Offshore Wind Supply Chain, Infrastructure, and Workforce Investments to Support Economic Growth and Resiliency

As noted in Maine's [10-year Economic Development Strategy](#), Maine's economy is rooted in its heritage and imbued with a strong entrepreneurial spirit. Over the last decade, numerous innovators and businesses have aligned with these core tenets in the burgeoning offshore wind industry. The growth of these companies and the attraction of new business to the state stands to deliver economic, workforce, and port development to Maine that builds upon our iconic maritime heritage that stretches back centuries of working with the wind, waves, and tides.

Unlocking the future potential of the offshore wind sector for Maine people will require leadership, support, and advocacy to fully advance regional, national, and global opportunities. A vibrant Maine offshore wind industry will also require workforce investments designed for the new occupations needed to support the industry's growing supply chain and infrastructure demands. To ensure long-term success, Maine must work diligently to ensure that those opportunities are available to *all* Maine people.

The Opportunity

Offshore wind is currently generating significant long-term job creation, economic development, supply chain and port infrastructure investments across the region, nation, and world. This is driven by growing global recognition of the need to reduce our reliance on fossil fuels, which is triggering significant investments in technologies that generate clean energy and decarbonize the electric grid. With the support of governments around the world for renewable energy including offshore wind, developers and private investors have the confidence to invest in infrastructure which spurs related supply chain growth. To meet the national offshore wind energy target of 30 GW by 2030 and secure the anticipated \$109 billion in private supply chain investment¹, additional catalysts will be necessary to spur domestic port, supply chain, and workforce development (Figure #).

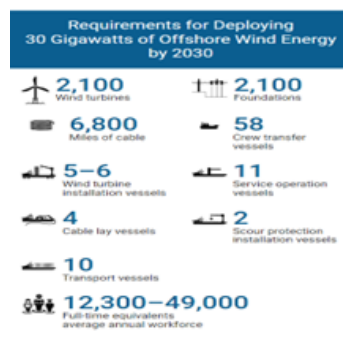


Figure #. Requirements for Deploying 30 GW of Offshore Wind Energy in the U.S. by 2030²

As a potential leader and global partner in the burgeoning offshore wind industry, Maine's strengths are significant—centered on a world-class deep-water offshore wind resource, and more than a decade of innovation, supply chain, and workforce development in both fixed and floating offshore wind.

That experience is significant and growing rapidly. Over the course of the past decade, the University of Maine's Advanced Structures and Composites Center has completed in-depth, collaborative research and development in floating offshore wind Voltorn^{US} hull technology, establishing a high level of technical readiness for commercial deployment. The University, along with private sector partners, the U.S. Department of Energy, the National Science Foundation, and the Maine Technology Institute, has successfully deployed the first floating wind turbine in U.S. waters, at 1/8 scale providing power for 18 months, and is currently planning a full-scale turbine for deployment in 2024.

The State is also planning a small-scale floating research array to advance the University's technology—and to seek opportunities to minimize offshore wind's impacts on the fishing industry and the ecosystem. Concurrent with and complementary to the University's work, Maine companies and individuals have provided permitting, surveying, engineering, maritime operations, and other critical skills to offshore wind projects around the world, bringing their knowledge back to Maine. These in-progress projects provide valuable experience to inform port, supply chain, and workforce development for future commercial offshore wind projects, and promote adaptability to emerging technologies.

As we look for future opportunities to capitalize on a growing industry³, Maine offers several additional strengths to lead the development of offshore wind in the United States, including:

- a world class offshore wind resource
- proximity to East Coast populations centers in North America with high energy demands
- deep-water ports that serve as gateways to international trade
- workforce in key occupations for offshore wind
- a strong manufacturing industry
- 80 Maine firms near-ready to engage—or already engaged—with the offshore wind industry

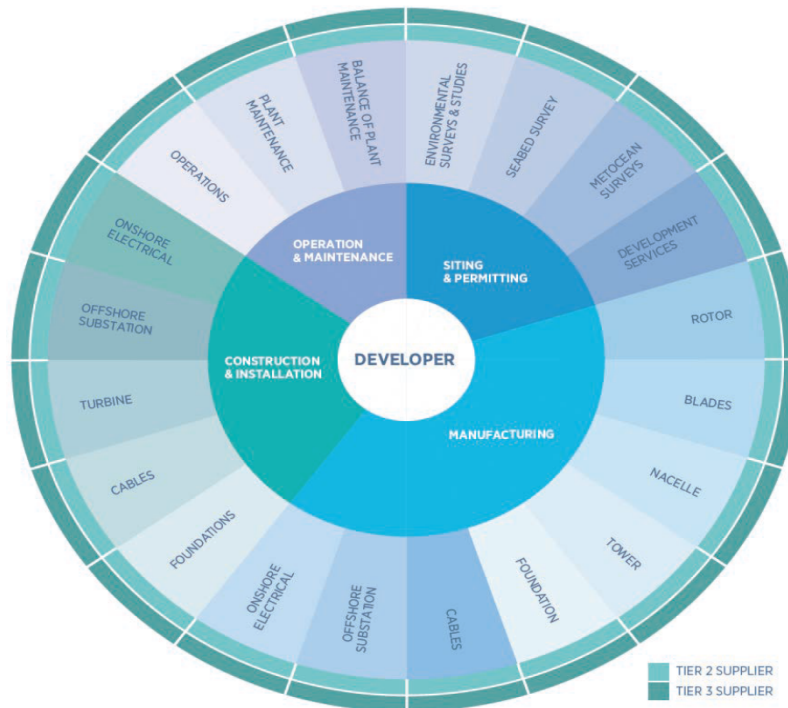
To further bolster Maine's contributions to offshore wind and leverage the opportunities in the Gulf of Maine and beyond, Maine must invest in further development of these assets now.

Supply Chain

Readiness for the offshore wind industry takes years. Significant lead time is necessary to plan and develop ports, help firms prepare to participate in the industry, and train the varied and essential workforce. With 12-13 commercial offshore wind projects projected to be under construction off the U.S. East Coast in 2025/2026—and a finite pool of supply chain, workforce, and infrastructure resources available—preparations for those projects must accelerate, and Maine can play an important role in this existing pipeline.

The offshore wind supply chain will involve a range of companies of all sizes to deliver products and services for offshore wind projects during every phase of project development. These project phases generally include siting and development, manufacturing, construction and installation, and operations and maintenance.

Offshore Wind Supply Chain Structure - graphic (credit BNOW):



Key supply chain opportunities for Maine include environmental permitting and surveying, engineering and design, project management, onshore infrastructure construction, floating offshore wind components, secondary steelwork, moorings and anchors, cable protection systems and buoyancy, synthetic lines, Crew Transfer Vessels, and other professional services.

[NOTE: Call out - An Overview of Maine's Supply Chain and Workforce; include this graphic from XODUS group]

Figure 3.1 shows the number of Maine supply chain companies relevant to OSW present across the databases categorized by the supply chain elements outlined in Table 3.1. The Maine supply chain shows apparent strength in project development services, secondary steelwork fabrication, and other professional services not directly required on an OSW project. An opportunity analysis assessing the strengths and gaps of Maine supply chain capability within these areas is provided in Section 4.

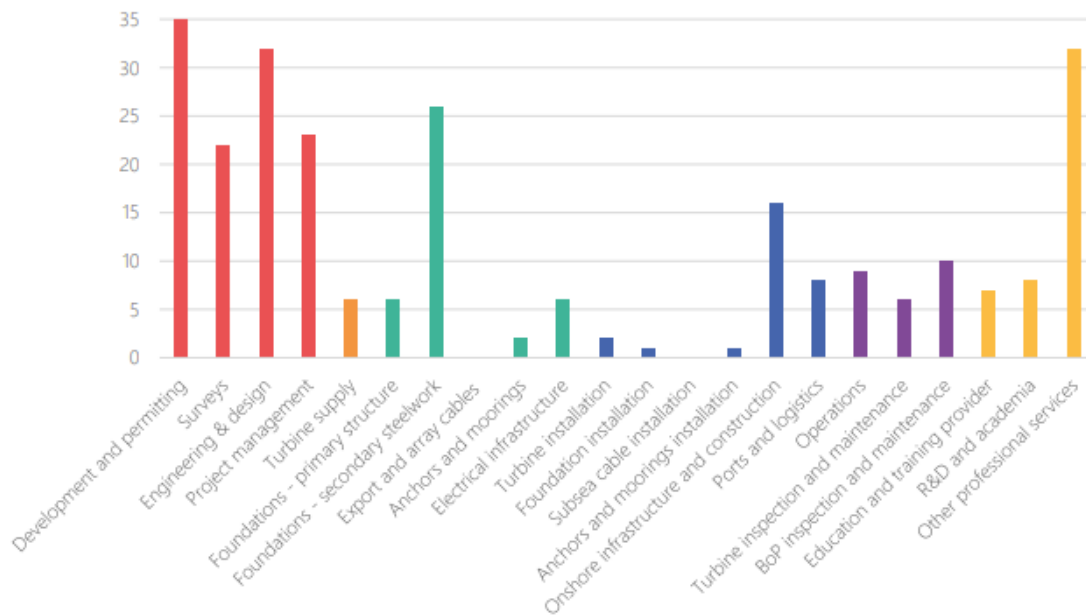


Figure 3.1 - Maine OSW Supply Chain Companies Categorized by Contracting Area

Workforce

Governor Mills has set a goal to achieve a total of 30,000 clean energy jobs in Maine by the year 2030—and the growth and development of offshore wind plays an essential role in attaining that goal. Supported by funding from the Maine Jobs & Recovery Plan for a Clean Energy Workforce Program, Maine is supporting clean energy workforce development and offshore wind can play a role in these efforts by bringing clean energy career training opportunities to workers throughout the state—including those regions where job growth historically lags state averages.

Based in part on our abundance of marine-related industries, Maine's workforce already offers deep experience in surveying, permitting, marine monitoring, naval architecture, marine architecture, and benefits from the knowledge gained with floating offshore wind pilot projects over the last decade. As offshore wind development ramps up, workforce capacity in all those areas will face the need to grow—creating new, high-paying opportunities for interested workers throughout the state.

All of these opportunities will require increased commitment to job-specific training—an area where Maine also has deep experience. Throughout the state, training and registered apprenticeship programs have helped to ensure the availability of qualified workers to accommodate growth and compensate for regular worker attrition (Reference call out on Maine training programs here). These programs may serve as models for new workforce training efforts. Relationships with regional training programs in neighboring states and Atlantic Canada can provide additional training opportunities.

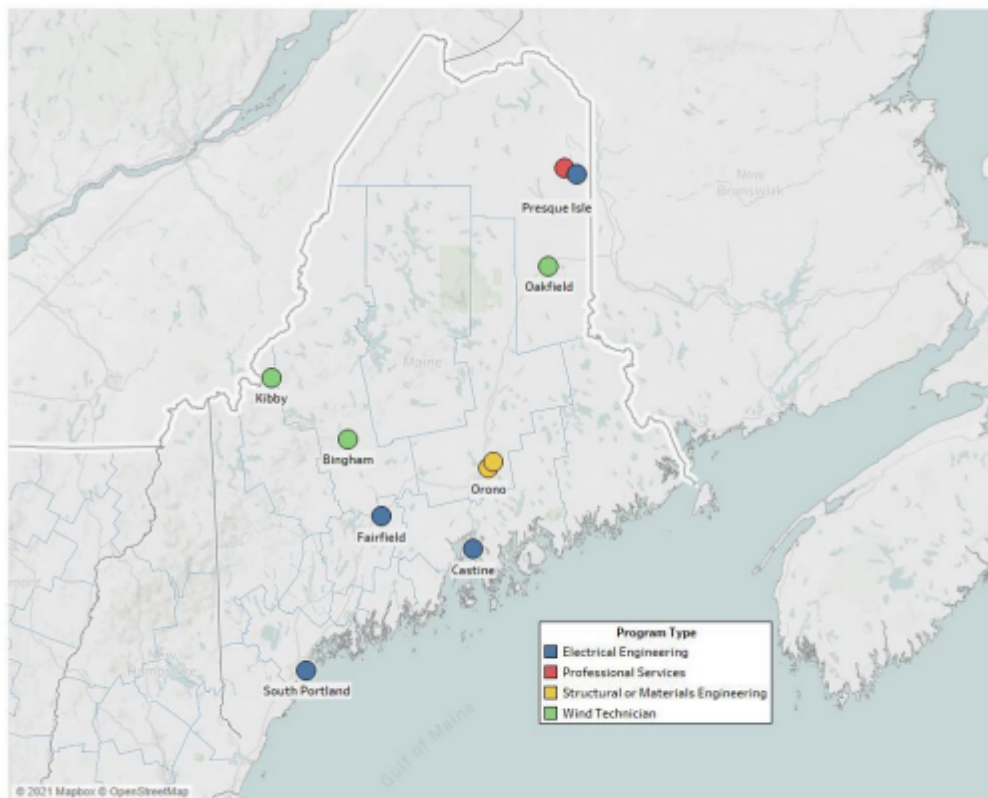
From initial planning through commercial operation, industry estimates suggest that nearly 120 unique occupations play a role in the offshore wind development process.¹ phases—and the careers they involve—include:

- *Planning and Development.* This phase of the offshore wind process typically requires two or more years, and based on U.S. averages, is estimated to represent approximately 15% of the workforce required for a project. More than 75 occupations are involved, including engineers, financial analysts, lawyers, surveyors, and many more professions.
- *Manufacturing and Assembly.* A multi-year stage of the offshore wind development process, this phase accounts for more than 40% of additional workforce demand. More than 70 careers are involved, and include engineers, equipment operators, metal workers, assemblers, and administrative staff.
- *Construction and Installation.* Spanning approximately five years and accounting for as much as of 41% of additional workforce needed, this phase requires the services of approximately 70 occupations, including mechanical engineers, welders, electricians, line workers, crane operators, and more.
- *Operations and Maintenance.* A phase that spans 20+ years, this phase accounts for an average of 17% of increased workforce demand, and calls on more than 60 occupations, including administrative staff, wind turbine techs, marine operators, and plant managers.
- *Support Services.* This phase involves approximately 20% of the additional workforce necessary for offshore wind project completion and support, calling on occupations that

¹ Some roles are specific to certain phases of the development process, while others are active throughout the process—accounting for overlap in phase-specific workforce demand estimates (BW Research Partnerships, Maine Offshore Wind Talent Analysis)

include meteorologists, vessel mechanics, lawyers, policy experts and more.

FIGURE 3. WIND-SPECIFIC TRAINING PROGRAMS IN MAINE



Infrastructure

[NOTE: Highlight – Overview of Maine ports and offshore wind, the uniqueness of floating offshore wind, and Maine’s ports studies]

The predominant opportunity in Maine to support the installation of offshore wind projects is in developing port facilities for manufacturing, marshalling, assembly, and integration of components, particularly for floating offshore wind. As of this writing, there is no floating offshore wind port in the United States, despite the fact that 66% of the U.S. offshore wind resource is in deep waters requiring floating turbines. The unique characteristics of a floating project include the need for deep draft, large and level upland and quayside areas, no air draft restrictions, heavy loading capability, heavy lift land-based cranes, and proximity to installation sites.

Recognizing Maine’s unique potential to become an offshore wind industry leader, the State has engaged in a series of studies to evaluate a carefully selected group of existing ports for their suitability to support offshore wind. The first of those studies, commissioned in 2020 with Moffat & Nichol, sought to evaluate the feasibility of using the Port of Searsport to service the offshore wind industry. The evaluation considered multiple terminal sites for either wind

turbine generator marshalling or fabrication, for both fixed and floating foundation offshore wind turbines. The study's goal was to identify the best use for this port in servicing the wind generation industry, and to arrive at an estimated cost to adapt the port to service large-scale offshore wind farms.

Moffatt & Nichol then prepared infrastructure assessments that included conceptual layouts, preliminary concept designs, construction schedules, and estimates of probable cost. In addition, they completed a thorough economic analysis for selected sites using a model that incorporated potential revenue streams, terminal activity (staging or fabrication), and the required capital expenditure to generate a return on investment.

The State of Maine has assembled an Offshore Wind Port Advisory Group (OSWPAG) to serve as an advisory to the Maine Department of Transportation, the Governor's Energy Office, and other state officials regarding the development of a wind port that will allow Maine to realize the environmental and economic benefits of the rapidly developing offshore wind market in a way that reflects community values and minimizes adverse impacts. This OSWPAG process will provide the structure for a robust stakeholder and public communication process with respect to wind port development.

In addition to the Searsport study, a companion study on broader wind port needs in Maine is currently underway to analyze how other Maine ports, including the Ports of Portland and Eastport, can play important roles supporting the offshore wind industry.

In addition to their direct impacts on the success of offshore wind development and operation, these specialized ports also act as economic engines for the communities and regions where they're located. At every level, global studies have demonstrated that local businesses benefit from offshore wind-related job growth, giving local and regional economies a boost—often in traditionally disadvantaged areas. These wind-related jobs could provide diversity and resiliency to fragile economies in rural communities that are heavily reliant on fishing or other natural resource based economies.



Supply chain, infrastructure, and workforce investment strategies

The following strategies reflect a recommended approach to accelerate pursuit of the supply chain, workforce, and infrastructure development necessary to seize the offshore wind opportunity—and to realize its full potential. Informed by detailed research reports authored by globally experienced technical consultants, the strategies and their associated actions will position Maine people to share in the estimated \$109 billion U.S. opportunity in private investment offshore wind development capital.

Strategies⁴:

- Strategy 1: Create abundant and accessible opportunities for Maine businesses
- Strategy 2: Ensure opportunity and inclusivity in Maine’s offshore wind workforce
- Strategy 3: Develop export opportunities and industry readiness for Maine businesses and research institutions
- Strategy 4: Attract investment and workforce to Maine necessary to support the industry
- Strategy 5: Strategically invest in ports and manufacturing infrastructure

O&M

CTVs transport personnel to the wind farm on a daily basis. Wind farm operators typically use aluminium catamarans up to 30m long with capacity for 12 to 16 technicians. Vessel speeds can be up to 30kn and are designed to transfer maintenance and service team members in comfort and safety



Document Number: B-400023-500-REPT-001

21

Offshore Wind Supply Chain & Workforce Opportunity Assessment
Assessment of OSW Supply Chain Opportunity



ACTIVITY	DESCRIPTION	EXAMPLE
	to the wind farm ready to start work. SOVs offer accommodation, mess and welfare facilities for wind farm technicians, as well as workshop and spares storage. SOVs will stay at the wind farm for up to four weeks at a time, at which point they will return to port to restock & change crews.	

Strategy 1. Create abundant and accessible opportunities for Maine businesses

Maine businesses and research institutions must start preparing today to engage with the offshore wind industry to access current and emerging commercial export opportunities and support current demonstration and future commercial opportunities in the Gulf of Maine and beyond.

The Bipartisan Infrastructure Law, the Inflation Reduction Act, and the CHIPS and Science Act collectively provide unprecedented opportunities to support Maine businesses and workforce, particularly through developer and manufacturing tax credits, workforce development funding, and the cascading effects of adding new family-supporting jobs throughout the industry.

Supply chain readiness is essential to continued development of the offshore wind industry in Maine and beyond—and a growing list of Maine firms and individuals have been participating in the global offshore wind industry and adjacent industries for over a decade. When combining these firms with other businesses that are near-ready to engage, there are 80 Maine firms poised for the offshore wind industry⁵. Bolstering their capacity and increasing that number will require significant support, which is achievable by leveraging existing programs, supporting growth in the broader clean energy economy sector, and developing new offshore wind initiatives. Such support for supply chain readiness can be in the form of public and private sector leadership, education and training, networking, financing, technical assistance, and promotion. This work will help to maximize the benefits of offshore wind throughout Maine, including disadvantaged communities and firms. Additionally, floating offshore wind should be prioritized as an emerging opportunity for Maine's supply chain and talent pool.

Action: Establish public and private sector leads to shepherd and coordinate economic development programs for offshore wind over the long-term. This should involve a senior level state official or body to coordinate across state agencies and implement statewide economic development programs for offshore wind. This should also be complemented by a private sector lead outside of state government that focuses on offshore wind business development, either through an existing or new initiative.

Action: Identify market opportunities in fixed and floating offshore wind through relationships, business intelligence, and market analysis building off existing work, the Maine Offshore Wind Supply Chain Opportunity Assessment and associated technical reports.

Action: Continue identifying firms with existing and potential offshore wind market-readiness to fit those opportunities identified in the action above, including aviation support, vessel building, vessel retrofitting and maritime operations. Leverage Maine firms with deep maritime and defense-related industry experience and manufacturing to provide components for fixed and floating projects. Track and communicate with those firms via the existing Maine Offshore Wind Supply Chain Registry.

Action: Prepare offshore wind industry programming and services by identifying financial resources, creating resources for Maine firms that provide companies a line of sight into their future in the offshore wind industry, developing formal engagement pathways such as networking events, tailoring targeted services based on market readiness levels, developing capability audits, and identifying industry training resources to upskill Maine firms.

Action: Leverage Maine's two floating offshore wind demonstration projects (the New England Aqua Ventus single turbine in state waters and the proposed research array in federal waters) and apply supply chain lessons learned and relationships developed. Create business opportunities to provide knowledge and services developed during the demonstration projects.

Action: Provide financial assistance and tailored services to early-stage companies through offshore supply chain education and re-assessing early-stage companies for interest in the industry. Work with Maine's existing small business support network to assess small business needs and provide business technical assistance and training.

Action: Provide assistance and tailored services to market-ready and in-market firms such as raising industry awareness, assisting with business plans and gap analyses, and facilitating inclusion of Maine businesses in supply chain registries including, but not limited to, the Maine Offshore Wind Supply Chain Registry.

Strategy 2. Ensure opportunity and inclusivity in Maine's offshore wind workforce.

To meet the target of 30 GW of U.S. installed offshore wind capacity by 2030, average annual U.S. employment levels (full-time equivalent [FTE]/year) are estimated at 15,000 (with a low level of domestic supply chain) and 58,000 (with a robust domestic supply chain). This estimate only includes the direct and indirect offshore wind jobs associated with offshore wind projects, excluding additional jobs in communities supported by offshore wind activity, also known as induced impact jobs²

The growing offshore wind industry is complex and requires talent from many different fields and backgrounds to successfully develop projects. Offshore wind provides family-supporting career opportunities in 117 different key occupations throughout the different phases of an offshore wind project.³ Occupations fall into five general categories: development, manufacturing and supply chain, ports and staging, construction and maritime, and operations and maintenance. These occupations require talent with strong and diverse educational backgrounds – ranging from technical training to post-graduate degrees. Training and educational institutions, governments, labor organizations, private industry, and others are working to understand the workforce requirements of the industry and are expanding or developing programs to meet industry needs and provide opportunities for all.

² NREL, US Offshore Wind Workforce Assessment, <https://www.nrel.gov/docs/fy23osti/81798.pdf>

³ Maine Offshore Wind Talent Analysis

Maine's existing wind-related workforce is already strong due to Maine's decade of regional leadership in installed wind capacity, accounting for more than 1,300 jobs in 2020, or about 10% of Maine's clean energy workforce. There are several key occupations and industries in Maine that are well-positioned to provide services in and outside of the state for both fixed and floating activities. Maine also has existing talent advantages in surveying, permitting, marine monitoring, floating offshore wind engineering and design, and maritime training and engineering⁴. Maine's training providers are well-equipped in many regards, although specialized training in offshore wind-specific skills (like working at height at sea) will be needed. Floating offshore wind provides an opportunity to attract new talent and families to Maine, with expanded training programs and attracting companies to the State. Maine and partners can work to ensure disadvantaged populations and communities have access to career exploration programs, training and apprenticeship programs, post-secondary education, and career opportunities in the industry. Attracting new people to the State and engaging the underemployed Maine talent in education and training can also benefit other Maine industries with workforce shortages.

Action: Strengthen and communicate offshore wind career exploration opportunities for K-12 and Career and Technical Education (CTE) students, focusing on the advantages and gaps in Maine's current workforce. Ensure disadvantaged populations and communities have access to these career exploration programs.

Action: Increase offshore wind opportunities in Maine's postsecondary education by providing scholarships, supporting Maine post-secondary R&D to benefit the offshore wind industry in and beyond Maine, supporting and leveraging existing training programs – particularly for high-demand occupations, and for disadvantaged communities and populations - and attracting students/educators/and researchers to Maine.

Action: Enhance, expand, and communicate offshore wind training and registered apprenticeship opportunities through public and private sector partnerships that involve trusted community partners, including small businesses, coordinating to ensure additive workforce development to benefit multiple industries, advocating for clear training standards, and ensuring Maine people can find and engage in workforce opportunities.

Action: Encourage family-supporting, high-quality careers for Maine workers and align with Federal workforce policy, including BOEM's recent lease stipulations, through efforts such as enhanced partnerships and ongoing trainings; prevailing wage and benefits requirements; union agreements; health and safety protections; leveraging opportunities for Maine companies in cutting edge technologies such as robotics, and/or supporting Maine's engineering and professional services clusters.

⁴ IBID

Action: Promote equity in workforce development by addressing barriers to participation and supporting training opportunities by trusted community partners. Focus on communities meeting EDA's economic distress criteria, the Climate and Economic Justice Screening Tool criteria, or criteria identified by related tools, such as the Maine Social Vulnerability Index.

Strategy 3. Develop export opportunities and industry readiness for Maine businesses and research institutions.

The International Renewable Energy Association (IRENA) projects that 1,000 GW of global offshore wind installations will come online by 2050.⁷ While the US-based offshore wind industry is poised for significant growth in the coming decades, offshore wind is a truly international industry. Efforts to identify domestic and global relationships and export opportunities for market-ready Maine businesses and research institutions should be pursued, while expanding the prominence of Maine as a global partner in the offshore wind industry.

Action: Identify export leads for market-ready or in-market firms through relationship building, training, and identification of market access opportunities.

Action: Promote partnerships between Maine firms and developers with expertise and global opportunities, such as the international companies and developers currently working in Maine and individuals working in the global industry from Maine, and with international companies with complementary products and services to expand export opportunities.

Action: Expand Maine's prominence in the international offshore wind industry, particularly with floating offshore wind, by exploring partnerships with international firms and industry associations, fostering relationships within industry innovation hubs, engaging with other state or national trade organizations, and identifying opportunities for new exports.

Strategy 4. Attract investment and workforce to Maine to contribute to the infrastructure, domestic supply chain and workforce necessary to support the industry.

Maine needs infrastructure investment and another 75,000 talented workers to realize the opportunities of emerging industries, like offshore wind.⁵ Maine can prepare for international offshore wind investments in infrastructure, supply chain, and workforce development by promoting Maine's considerable offshore wind assets as part of the larger regional context.

Action: Coordinate and collaborate with other New England states to catalyze efficient offshore wind investments, supply chain development, and train and attract skilled workers.

Action: Attract international offshore wind investments in Maine through a communications and promotion strategy and an informational marketing portal for offshore wind development. The portal should highlight the Maine Offshore Wind Supply Chain Registry.

⁵ https://www.maine.gov/decd/sites/maine.gov/decd/files/inline-files/DECD_120919_sm.pdf

Action: Promote partnerships between Maine firms and international firms with complementary products and services to encourage investments in Maine.

Action: Explore the use of Opportunity Zones and Foreign Trade Zones to attract investments. Opportunity Zones are economically distressed communities, defined by individual census tract, nominated by State Governors, and certified by the U.S. Secretary of the Treasury via his delegation of that authority to the Internal Revenue Service. Under certain conditions, new investments in Opportunity Zones may be eligible for preferential tax treatment.⁶ Foreign Trade Zones (FTZs) are designated geographical areas where foreign and domestic goods are treated, for tax and tariff purposes, as if they had never entered the United States. FTZs are normally located near U.S. ports of entry.⁷

Action: Continue to implement existing Memorandums of Understanding with other nations, such as the United Kingdom, to expand relationships and information exchange on offshore wind and other renewable energies. Consider pursuing complementary strategic MOUs with other nations.

Action: Partner with state leaders to promote Maine's assets by identifying speaking opportunities for state officials and Maine companies with national and international audiences and meetings with international developers and all supply chain companies to develop networks and attract investments.

Strategy 5. Strategically invest in ports and manufacturing infrastructure.

Maine can secure offshore wind opportunities for the state, region, and nation by strategically investing in infrastructure, such as deep-water ports, manufacturing infrastructure for floating offshore wind and for major equipment for Wind Turbine Installation Vessels (WTIV), and a floating offshore wind innovation hub. Given the long lead time of infrastructure development, newly available federal funding, and new opportunities offered by Bipartisan Infrastructure Law, the Inflation Reduction Act, and the CHIPS and Science Act, Maine's strategic infrastructure investments should begin now.

Action: Invest in a purpose-built deep-water port project in Maine to attract additional investment from the offshore wind industry sector and to drive local supply chain and workforce development. This investment will be supported by the Offshore Wind Port Advisory Group, which represents broad stakeholder interests, and studies, such as Maine Department of Transportation's Feasibility Study of the Port of Searsport and ongoing coastwide ports studies, as well as a business case in the regional commercial context.

⁶ <https://opportunityzones.hud.gov/>

⁷ <https://www.trade.gov/foreign-trade-zones-board>

Action: Continue to collaborate with other states, jurisdictions, and developers to complete a coastwide port development plan and investment strategy, including Portland, Searsport, and Eastport, to meet the needs of the offshore wind industry.

Action: Ensure a stable and predictable investment environment for offshore wind projects by starting early permitting, environmental assessments, and robust engagement with fishing business, ocean users and community stakeholders in potentially developable port sites along the Maine coast. (See Objective 2, Strategy 4).

Action: Pursue federal and private sector funding to establish a floating offshore wind fund to support additional infrastructure investment in Maine manufacturing and ports.

Action: Help secure additional resources to scale up manufacturing and supply chain infrastructure for floating offshore wind. Work with developers, OEMs, and higher tier supply chain companies to make investments in Maine.

Action: Foster partnerships with local governments and communicate directly about potential positive and negative impacts with inland and coastal communities through an ongoing engagement process to provide clarity, identify local concerns and needs, and identify solutions. (See Objective 4).

OBJECTIVE 2 - Harness Abundant Renewable Energy to Control Costs and Fight Climate Change

Maine's demand for electricity is expected to double by 2050, driven by widespread adoption of highly efficient heat pumps, heat pump water heaters, electric vehicles, and other electrified technologies. Deploying these innovative technologies – combined with a transition to renewable electricity generation – is the key strategy reducing Maine's reliance on volatile energy markets and reducing greenhouse gas emissions, 91% of which are attributed to the energy sector. Transitioning to electrified technologies will not only reduce carbon emissions, but will significantly increase the overall efficiency of energy use. Given increasing energy demands and the state of our energy infrastructure, Maine must plan for our long-term energy needs.

Offshore wind in the Gulf of Maine presents an opportunity to diversify and strengthen Maine's renewable energy generation portfolio. Many of the most competitive renewable technologies rely on capturing solar or wind energy to generate electricity, replacing costly fuels that must be extracted, refined, transported and combusted with abundant and free natural forces. A variety of resources with diverse generation profiles in different locations will be necessary to ensure renewable electricity supply can always meet demand. Offshore wind is particularly well-suited for Maine's needs because the strongest and most consistent winds offshore arrive during the winter when electricity will increasingly be needed for heating. Winds offshore are

also strongest throughout the afternoon and evening. As consumer demand generally reaches its maximum just after working hours, and solar scales down as the sun sets, this can help to meet consumer demand during peak hours. The cost-effectiveness and feasibility of high renewable-energy scenarios have been repeatedly demonstrated in a range of sophisticated analyses, but virtually no scenario has identified a viable pathway to achieving 2050 renewable energy goals without offshore wind.

New England relies heavily on natural gas throughout the year for power generation. In the winter months, natural gas is also required to heat buildings, particularly in other New England states. The limited volume of natural gas available for delivery through existing infrastructure – which must be prioritized for heating needs – forces the regional electricity grid operator to dispatch expensive and high-emissions oil- and coal-fired power plants and to rely on liquified natural gas delivered from international exporters. The electricity price increases resulting from this volatility, exacerbated by global events including the Russian invasion of Ukraine, are severe. Offshore wind can provide a robust volume of available energy in the Gulf of Maine—a resource which, in contrast to other renewable generation options—offers significantly higher production potential during winter months, meeting a key energy need for Maine and the region.

As offshore wind technology matures and is deployed at a commercial scale, its costs are projected to decline significantly—ultimately dropping well below comparable costs of fossil fuel-generated electricity. Early testing and demonstration scale projects have confirmed this trend. Hywind Scotland, a 30-megawatt floating project located in the North Sea east of Aberdeen, Scotland, offers compelling evidence of this decline in cost. Since the full-scale project has come online, costs have dropped by 70% when compared to the reduced-scale Hywind Pilot project⁹. This trend has remained consistent as new offshore wind projects have come online, with floating offshore wind showing the greatest potential for significant cost reduction. Current studies predict that global floating technology costs will decline an estimated 37-49% with continued investments in research and development from the public and private sectors and commercially scaling the technology.¹⁰

A key component of advancing offshore Wind, along with other renewable energy resources in the state, is expanding transmission capacity. Maine is already working proactively at the regional and national level to pursue transmission planning and infrastructure solutions that can leverage federal dollars, minimize impacts, and allow Maine to more effectively unlock the vast renewable energy resources available in the state. [Separate transmission overview call-out under development].

Strategies^{11,12}:

- Strategy 1: Establish state OSW procurement to achieve cost-effective, regional floating offshore wind deployment
- Strategy 2: Pursue regional transmission strategies
- Strategy 3: Ensure stable and predictable investment environment
- Strategy 4: Advocate for federal leasing mechanisms that support Maine's goals

Strategy 1. Establish state OSW procurement to achieve cost effective, regional floating offshore wind deployment.

The Governor's Energy Office will continue to work with stakeholders, and in coordination with other state entities, to determine Maine's optimal procurement target and strategy, including phased commitment that address a meaningful percentage of Maine's electricity needs by 2050 and advances Maine's renewable energy goals. This effort should include the identification of best practices from other jurisdictions and consider joint efforts with neighboring states. In addition, regional efforts to enable clean energy deployment through regional market reforms have the potential to influence the pace and scale of deployment. In at least eight other east coast states, an offshore wind electricity procurement has served as a primary driver of investment and led to cost effective results. Predictable, established, and competitive procurement processes provide the certainty needed to attract cost-effective offshore wind development. The State's procurement process for energy can also provide a mechanism to shape the development of offshore wind energy to protect our natural resources, fishing industry, economic development, research, equity, and innovation.

Action: Develop a responsible procurement target and strategy, using methods such as Offshore Renewable Energy Credits (ORECs) or long-term Power Purchase Agreements (PPAs), that pursues phased offshore wind development commitments for a meaningful percentage of Maine's electricity needs by 2050.

Action: Explore additional mechanisms to deliver affordable and cost effective floating offshore wind. This includes consideration of pursuing offshore wind through the Renewable Portfolio Standard (RPS) requirements as well as pursuing joint or coordinated procurements with other New England states or entities, including timelines and requirements to phase these coordinated procurements to drive competition and reduce costs. Additionally, to take advantage of substantial interest of business to procure clean energy, explore ways to facilitate power purchase arrangements with business, institutional, and governmental entities.

Action: Phase-in procurements for capacity incrementally to take advantage of the declining costs and lower the average cost to Maine's consumers and businesses.

Action: Include realistic local or domestic content requirements that promote supply chain development and high-quality career paths, and best practice requirements to avoid or minimize impacts on ocean users, wildlife, and the environment.

Action: Develop a plan to pursue additional studies and necessary funding to address key knowledge topics, such as additional socioeconomic studies, equity and environmental justice considerations, and energy analysis around seasonal and hourly dispatch of floating offshore wind and how it interacts with demand load profiles.

Strategy 2. Pursue regional transmission strategies

Maine will continue to collaborate with other New England states to explore coordinated approaches to offshore wind transmission, seeking opportunities to leverage shared objectives, efficiencies, and benefits. Through the Offshore Wind Roadmap process, GEO has engaged consultants to conduct an [offshore wind transmission technical review](#), which included initial injection analysis to identify potential offshore wind interconnection points using data from ISO-New England. The State is actively working with other coastal New England states (including Connecticut, Massachusetts, New Hampshire, and Rhode Island) soliciting comments from stakeholders as a part of the New England Regional Transmission Initiative to inform transmission infrastructure investment, including strategies for integrating offshore wind generation and opportunities to leverage federal funding.

A broad range of efforts should be pursued to achieve long-term, cost-effective, and responsible floating offshore wind deployment in the Gulf of Maine. The benefits of supporting offshore wind industry development are likely to be substantial; however, a proactive strategy to reduce the cost of procurements would be particularly beneficial during the initial phases. This strategy is particularly important given the region's recent high and volatile electricity prices driven by global energy markets and over-reliance on natural gas for generation.

Action: Identify approaches to plan for offshore transmission that allow for innovative, competitive, and regional action to satisfy transmission needs while meeting state policy goals. This could include approaches to allow developers to more easily secure project financing, increasing engagement in regional transmission planning with the goal of reducing costs and increasing renewable energy for Maine, and engaging with FERC's ongoing long term transmission planning initiatives and providing input to these processes on behalf of the State.

Action: Continue to engage regularly with ISO-New England, as they are responsible for conducting interconnection studies for all proposed generators in the region. This could be on a case-by-case basis for individual projects, or part of longer-term studies such as the [2050 Transmission Study](#).

Action: Pursue efforts to maximize the utility of priority points of interconnection. Considerations should be taken for coordinated offshore transmission to take advantage of all available interconnection capacity, including consideration of long-term interconnection needs.

Action: Continue efforts such as the New England Regional Transmission [Initiative](#) to engage with other New England states in a regional process to solicit detailed information regarding the potential benefits and considerations related to a coordinated transmission approach.

Strategy 3. Ensure a stable and predictable investment environment

Stable and robust permitting requirements, and the processes for establishing such requirements, are fundamental to fostering a favorable environment for investment. Like other major infrastructure projects, offshore wind development takes significant time and financial private sector investment. To attract that capital requires a permitting process that balances (i) certainty and transparency, (ii) early and adequate public and stakeholder input and (iii) confidence in the finality of duly made regulatory decisions consistent with all applicable standards. Achieving the right balance is key to achieving the predictable conditions desirable for all stakeholders to secure responsible development of an offshore wind industry that works for Maine.

Action: Continue to work with stakeholders to refine Maine's approach, including pursuing opportunities to participate in joint efforts with other New England states. Other jurisdictions that have pursued offshore wind procurements have employed a variety of structures, with varying mechanisms designed to balance risk allocation, drive competition, and reduce costs.

Action: Develop and prioritize a clear and efficient process and rules for siting, permitting, and mitigating potential adverse impacts of offshore wind development and associated transmission. Work with communities to identify best practices for successful cable landing and interconnection.

Action: Set clear requirements and achievable expectations for developers, signal stable conditions for investment, and highlight the importance of proactively building and sustaining public support and mitigating areas of potential conflict.

Strategy 4. Advocate for federal leasing mechanisms that support Maine's goals

Action: Work to achieve State goals through leasing mechanisms by supporting federal legislation, such as the RISEE act, that shares leasing revenue that would provide targeted investment throughout the state, including economic development, equity, research and monitoring, innovation, and stakeholder engagement.

Action: Engage on the development of federal lease sale stipulations or multi-factor bidding components to advance the state's interests, including but not limited to engagement and consultation with Tribes and fisheries, other stakeholder engagement, economic and workforce development, and research.

Action: Proactively support the development of community investment initiatives and work with municipalities and others to establish best practices for Community Benefit Agreements (CBAs) in advance of commercial development.

OBJECTIVE 3 - Advance Maine-Based Innovation to Compete in the Emerging National and Global Offshore Wind Industry

Innovation plays a significant role in accelerating the global energy transition to renewable energy. As this transition progresses and regional and national commitments to address climate grow, so does the need for public and private sector support to fuel the research and development efforts that drive innovation. In both the state's 10-Year Economic Development Strategy and Maine's Job and Recovery Act, Maine has recognized the essential value of innovation to the ongoing support and modernization of heritage industries—and the expansion of our economy.

Recent federal legislation—including the BIL, IRA, and the CHIPS and Science Act —also prioritizes innovation in catalyzing the shift to renewable energy. This suite of legislation expands innovation support by designating billions of federal dollars in tax credits, ongoing R&D funding, investment in regional innovation and technology hubs, and skilled workforce development to stimulate advances in renewable energy projects and technologies.

The ultimate goals of innovation for offshore wind are to:

- Accelerate efforts to minimize impacts on fishing businesses, ocean users and the ecosystem;
- Catalyze offshore wind technology development and deployment;
- Create opportunities for the U.S. supply chain; and
- Drive cost and impact-reducing advancements in engineering and design, financing, manufacturing, installation, and O&M.

Although innovation is only one of many major factors driving cleaner, more efficient energy development and subsequent declining electricity costs, the efforts will require time to produce meaningful results—primarily achieved through multiple years of deployments at increasing scale. Fortunately, those efforts are already underway.

Over the course of the past decade, the University of Maine and the State of Maine have intentionally pursued a phased approach to offshore wind to learn and benefit along the way, emulating the path of successful fixed offshore wind innovation around the world. The University of Maine's Advanced Structures and Composites Center, with developer New England Aqua Ventus (a joint venture of RWE Renewables and Diamond Offshore Wind), plans to deploy a full-scale, grid-connected single floating turbine in a state-designated test site in state waters using the Voltorn US semi-submersible foundation. The lessons from this demonstration project and associated engagement are informing the State-led floating offshore wind research array of up to 12 full scale turbines in federal waters, which in turn, is being developed with the intention to share lessons learned to improve future responsible floating offshore wind. The State is already incorporating lessons learned from the demonstration project in the development of the research array lease application and this Roadmap.

[Note: A graphic callout – New England Aqua Ventus]

New England Aqua Ventus will be the first commercial-scale floating demonstration project to go online in the US. Scheduled to enter service before the planned Maine Research Array (MeRA) becomes operational, this 11MW project off Monhegan Island will allow Maine to collect and share key engineering, environmental, fisheries, port, and workforce data to help inform MeRA research array work, BOEM’s responsible offshore wind siting work currently underway in the Gulf of Maine.

This demonstration project will be essential to maintain Maine’s technical and non-technical leadership in responsible floating offshore wind development, while helping Maine to establish the Roadmap’s proposed Innovation Hub for floating offshore wind. Over the course of the past 10 years, this project has already made significant progress—and produced abundant innovation. During that time:

- *UMaine has won a \$50 million grant for the project from the U.S. Department of Energy in a national competition*
- *70 patents have been awarded globally for the technology*
- *the State of Maine has already awarded a 20-year PPA for the project*
- *private industry has committed to invest \$100 million to realize the project.*

In addition to these technical achievements, the project has gathered more than 8 years of non-technical environmental, ecological, and fisheries data gathered at the site to reduce impacts, and will continue to collect and share data during and after construction—all of which will help to streamline future development projects and protect Gulf of Maine ecosystems, communities, and economies. The project has also provided valuable lessons learned on topics such as permitting, energy procurement, and stakeholder engagement.



During the course of its research and development efforts, the University of Maine has reached a number of milestones. In addition to the development of several types of floating foundations, the University has also innovated floating LIDAR technology, called DeepCLiDAR, to assess the wind resource at height, synthetic mooring lines to reduce the seafloor footprint and impact of floating technology on other ocean users, and the largest polymer 3D printer that can be used in the production of composite components and tooling. UMaine also has constructed W2, the first Wind/Wave basin specifically designed to advance floating offshore wind technology, a state-of-the-art wind-wave testing facility, and facilities to test wind blades and structural materials. The floating offshore wind engineering team at UMaine now has grown to include more than 40 personnel. UMaine has also developed graduate student concentrations in offshore wind engineering within the Dept. of Mechanical Engineering and is increasing these course/workshop development offerings under a grant from the State of Maine, and collaborations with European partners.

Maine companies are also innovating to advance offshore wind. For example, Deepwater Buoyancy in Biddeford, Maine produces cable protection systems and floating cable buoyancy modules, in addition to buoys that host monitoring equipment. Maine Marine Composites develops innovative engineering approaches to analyze and enhance mooring and anchoring systems. Lyman Morse Boatbuilders are augmenting traditional boatbuilding with advanced composites, modernized metal fabrication, and advanced fabrication techniques that improve safety and efficiency, while reducing waste, and can enhance vessel building for offshore wind. The Rising Tide company develops carbon sequestration approaches that can be deployed in conjunction with offshore wind turbines to further advance carbon neutrality.

To further advance innovation in floating offshore wind, the State of Maine is establishing the Maine Offshore Wind Research Consortium. In 2021, the Maine Legislature directed the Governor's Energy Office and the Department of Marine Resources to establish the Consortium with the overall goal to develop and execute a research strategy to better understand the local and regional impacts of floating offshore wind power projects in the Gulf of Maine, and inform improved, responsible offshore wind development. This initiative includes:

- Evaluation of opportunities and challenges to existing uses in the Gulf of Maine, including research on how to best support offshore wind's co-existence with the fishing industry;
- Development and refinement of methods to avoid and minimize impacts on ecosystems and existing uses; and
- Research to identify and implement cost efficiencies in commercialization

With more than a decade of offshore wind development—and rich history of marine-based innovation to its credit—Maine has already earned competitive advantages in innovation for floating offshore wind. As appetites for state, regional, and global offshore wind development grow, Maine can leverage these advantages and expand public and private sector partnerships

to move from research to improved commercial project design, development, operations, and best practices that address key challenges.

As Maine's distinction as a leader in floating offshore wind grows, new opportunities can spur economic growth throughout the state. These opportunities will allow service and manufacturing businesses to flourish statewide, including those communities with fewer opportunities.

Strategies¹⁴:

- Strategy 1: Continue developing floating demonstration projects
- Strategy 2: Leverage resources to commercialize Maine's R&D capabilities in floating offshore wind
- Strategy 3: Establish a floating offshore wind innovation hub in Maine
- Strategy 4: Leverage and expand Maine's capabilities in Artificial Intelligence, data science, and robotics
- Strategy 5: Collaboratively research co-generation technologies, clean fuels, carbon capture, and storage

Strategy 1. Continue developing floating demonstration projects.

The development of floating demonstration projects, including the single floating turbine project in state waters and the proposed floating offshore wind research array, can advance the development pipeline, where further cost and impact reductions can occur at scale. Maine has a unique, but time-sensitive, opportunity to set the global standard for responsible floating offshore wind development that mitigates impacts to ocean users and ecosystems.

Action: Continue to pursue floating offshore wind research through a phased approach to demonstration projects, including the single floating offshore wind turbine in state waters (UMaine and New England Aqua Ventus) and the State-led research array proposed in federal waters. Disseminate knowledge gained throughout the phases of the project in a timely manner to inform future projects.

Action: Implement the Maine Offshore Wind Research Consortium by leveraging Gulf of Maine expertise, regional and national partnerships, and public and private funding sources. Prioritize data and information sharing.

Strategy 2. Leverage resources to commercialize Maine's R&D capabilities in floating offshore wind.

Maine's R&D capabilities are world-class and ripe for commercialization and industrialization. Additional financial and technical resources are necessary to ensure technology transfer from research to improved commercial project design, development, operations, and best practices.

Action: Identify specific funding opportunities from the three pieces of federal legislation (BIL, IRA, CHIPS and Science Act) that address key challenges associated with commercializing UMaine's R&D capabilities for floating offshore wind.

Action: Ensure public and private sector funding and technical assistance is available to address key challenges associated with commercializing Maine's R&D capabilities. (See also, Objective 1, Strategy 1).

Strategy 3. Establish a floating offshore wind innovation hub in Maine.

An innovation hub in Maine will focus additional R&D for responsible floating offshore wind, ports, supply chain, and workforce investments for this promising global market. The hub should bring together governments, continuing and higher education institutions, businesses, labor unions, and community-based regional organizations to create partnerships to develop technology, innovation, and manufacturing sectors. This hub should also be strategically linked to the floating offshore wind research array, Maine Offshore Wind Research Consortium, other offshore wind R&D consortia and innovation centers around the world to maximize investments and expand collective knowledge.

Action: Conduct a feasibility study with broad input to scope a floating offshore wind innovation hub in Maine, including the potential for a floating offshore wind National Center of Excellence at the University of Maine.

Action: Secure funding and partnerships to support the innovation hub, including specific funding opportunities from the 3 pieces of federal legislation (BIL, IRA, CHIPS and Science Act) that address key challenges associated with floating offshore wind.

Action: Track investments in Maine floating offshore wind innovation to better measure and understand the various factors that impact progress and provide metrics of success.

Strategy 4. Leverage and expand Maine's capabilities in artificial intelligence, data science, and robotics.

Several higher education institutions in Maine have core competencies and tools to support the role of artificial intelligence (AI), data science and robotics in offshore wind (estimated to reduce the LCOE by 3.5%). However, engagement with offshore wind projects needs to be encouraged to help ensure industry applicability and advancement.

Action: Forge strategic partnerships and leverage funding to encourage more offshore wind applied research projects in AI, data science, and robotics within higher education institutions in Maine.

Action: Support and expand entrepreneurship and incubator programs on AI, data science, and robotics toward offshore wind.

Action: Promote Maine-based technology companies to engage in active offshore wind projects.

Strategy 5. Collaboratively research co-generation technologies, clean fuels, carbon capture and storage.

Collaborate with federal agencies, national laboratories, and other partners to pursue research into co-generation technologies, such as blue hydrogen, other clean fuels, and carbon capture and storage to advance decarbonization goals. Target solutions that can decarbonize hard-to-electrify sectors, such as aviation, long-haul transport, shipping, steel, and chemicals.

Action: Pursue regional partnerships focused on clean hydrogen research and development.

Action: Based on Maine's existing strengths in renewable energy and maritime industries, identify public and private partnerships and funding opportunities to advance co-generation technologies for offshore wind for clean fuels, as well as carbon capture technologies, and storage to best meet energy demands and deep decarbonization goals.

OBJECTIVE 4 - Support Maine's Vital and Thriving Seafood Industries and Coastal Communities

Maine's coastal economy is built on a thriving seafood sector and dynamic working waterfront which are critical to Maine's coastal economy. In addition to providing opportunities for generations of fishermen and their crew, the Gulf of Maine's resilient and healthy ecosystem supports aquaculturists, boat builders, bait and gear suppliers, wholesale dealers and processors, and truckers, as well as tourism-based hospitality businesses. Maine's fishing industry adds more than \$3 billion annually in direct and indirect economic benefit to the state. With more than 16,000 licensed fishermen, Maine has twice as many annual landings as any other East Coast state and is home to 30 percent of all commercial fishing trips on the entire eastern seaboard. The industry—and the families and communities that rely on the health of the Gulf—are critical to Maine's economy and heritage. These natural resources also stand as the legacy of Tribes and are inextricably linked with their cultures.

For Maine, the development and operation of offshore wind presents a unique opportunity to establish leadership in a young, fast-growing industry. Because Maine is at the transition's leading edge, Maine is ideally positioned to ensure that our efforts benefit the people and industries of coastal Maine—while preserving social and historical characteristics at the heart of the State's identity. Responsible planning—and ongoing consultation with existing businesses and stakeholders—will help to avoid, and, when necessary, to mitigate adverse impacts on marine-based industries, communities, and the people they support. To ensure the success of these efforts, the State must continue to pursue the collection of critical data needed to better inform the decision-making process through robust engagement and smart, inclusive, and

transparent planning. Maine will also seek to learn from the just transition movement around strategies to support impacted communities and sectors.

Maine has initiated a phased approach to developing offshore wind in the Gulf of Maine by advancing a demonstration project in state waters and a Research Array in federal waters, before advancing commercial scale development. This will allow the State to work with the fishing industry and offshore wind developers to determine how best to promote the co-existence of Maine's heritage economy with a promising new industry that will allow Maine to reach its climate goals. Successful co-existence of offshore wind with current ocean users should avoid high value areas and guarantee safe navigation for all mariners and ensure that systems are in place to hold developers accountable for sharing necessary information about offshore activities and maintaining a safe and healthy marine environment.

Maine's coastal communities have experienced significant challenges in recent years due to the pandemic and local governments have shown resilience and ingenuity with the support of state agencies. It is important that the State build on strong relationships and promote clear communication with local governments that may be affected by offshore wind development. The key to diversifying Maine's economy with offshore wind will be sharing information, listening to local concerns and priorities, and co-creating solutions with affected communities, small businesses, Tribes, and stakeholder groups.

Strategies:

- Strategy 1: Strengthen and facilitate robust engagement and integrate technical feedback from fishermen, fishing businesses and communities
- Strategy 2: Promote open, transparent and comprehensive research and data gathering
- Strategy 3: Seek to avoid and then minimize conflicts
- Strategy 4: Ensure safe navigation
- Strategy 5: Advance opportunities for fair and equitable benefits

Strategy 1. Strengthen and facilitate robust engagement and integrate technical feedback from fishermen, fishing businesses and communities

The development of offshore wind is a complex and lengthy process. The state of Maine has an important role in facilitating and promoting open and transparent communication between Maine's existing businesses and stakeholders, Tribes, and the many actors involved in offshore wind development, particularly the federal government and developers. Most of the authority for offshore wind development lies with the federal Bureau of Ocean Energy Management (BOEM) and it is important for the State to continue to engage in open and transparent communication with Maine's stakeholders to share information, understand concerns and priorities, and develop recommendations to advance to BOEM. Maine can support clearer communication and provide guidance to developers working with Maine's fishing industry and coastal communities. Participation takes time, energy and resources that are not equally accessible to all stakeholders.

Action: Encourage and assist BOEM in providing active and direct engagement with Maine's fishing industry in the development of wind energy areas and future federal decisions through workshops, meetings, dockside conversations, and other engagement, working closely with the Department of Marine Resources (DMR), the fishing industry and community organizations to do so in a robust and meaningful way.

Action: Work with BOEM and other New England States to strongly encourage or require offshore wind developers to follow guidelines that stipulate full engagement with the fishing industry from Maine, New Hampshire and Massachusetts during survey operations. Key elements are included in the Fisheries Working Group recommendation #1 found in the Appendix.

Action: Assess the ability and cost to participate effectively in state regulatory processes relevant to offshore wind impacts by fishing industry members and coastal communities and identify ways to expand equitable access and capacity to participate including providing support or capacity for improved participation.

Action: Foster local government partnerships and engage in direct communications with affected communities through an ongoing consultation process to provide clarity, identify local concerns and needs (including capacity considerations), and co-create solutions.

Strategy 2. Promote open, transparent and comprehensive research and data gathering.

Given the scale of fishing activity in the Gulf of Maine, specifically from Maine fishermen, the local economic impacts of that activity, and the uncertainties associated with large-scale floating offshore wind, it is critically important that Maine advocate with federal partners to better understand the impacts of both offshore and shoreside development and that data from these monitoring and research efforts are made available publicly. A key component of this strategy is working with BOEM, the fishing industry, regional partners and lease holders on monitoring requirements to adequately inform impact assessments for new floating offshore wind.

Action: Advance the Research Array and learn from the single turbine demonstration project to gather data and experience before commercial construction occurs in the Gulf of Maine so that potential impacts on fishing businesses, ocean users, marine environment and wildlife can be better understood.

Action: Continue to advance a cooperative approach to research and monitoring, as is common practice within Maine DMR, that involves direct engagement with the fishing industry in development of protocols and utilization of fishing vessels as scientific platforms when practicable.

Action: Work with BOEM, other New England states and developers to pursue monitoring for offshore wind leases that establish comprehensive baseline information for 3 years prior to

construction and encourage developers to continue comparable monitoring during and after installation. Data should be made available in a timely manner for broader use and integrated with other information. Surveys and other studies should adhere to recognized standards and be informed by the detailed recommendations of the Fisheries Working Group and the Environment and Wildlife Working Group.

Action: Advocate for public availability of geophysical and geotechnical data gathered by offshore wind developers in accessible and usable formats on a regular and timely basis as appropriate.

Action: Continue to contribute to the development of USCG's port access route study to inform understanding of formal and informal transit to fishing grounds and how such potential wind energy areas may adversely affect transit. If such impediments are identified, the State should work closely with BOEM to ensure wind energy areas are appropriately sited and designed to allow for safe transit.

Action: Request a port impact assessment by appropriate state or federal agency(ies) to determine if the vessels fishing in those proposed wind energy areas would be concentrated in certain ports, any implications for the port's local economy and shoreside businesses (including jobs gains/losses where possible and considering relative impact of those gains/losses in the area), consider cumulative impact on fishing communities of multiple projects and identify mitigation mechanisms. This assessment may require collection of new information and/or use of local ecological knowledge to supplement available data.

Strategy 3. Seek to avoid and then minimize conflicts.

BOEM has announced its intention to lease commercial scale offshore wind areas in the Gulf of Maine by mid-2024. This will require the identification of wind energy areas (WEAs) by BOEM in consultation with the Gulf of Maine Intergovernmental Task Force. Maine's representatives on the Task Force need to be prepared to fully engage in these conversations and represent the interests of Maine's citizens in the appropriate siting of wind energy lease areas. Maine has already begun this work by seeking data and input from commercial fishermen, scientists and other stakeholders with expertise in commercial fishing activity, wildlife and fisheries resources, and the offshore environment to identify areas of greatest concern for offshore wind development.

Action: Encourage BOEM to prioritize commercial development in areas outside of areas which represents the majority of effort by the Northeast lobster industry and significant effort from the groundfish, monkfish, scallop, tuna and herring fisheries outside of designated Habitat Management Areas in approved fisheries management plans.

Siting of future commercial development is a significant concern for Maine's fishermen and is critical to do thoughtfully, with the best available data and through an open dialogue among a variety of interests. The FWG recommendation is an important starting place for these

conversations. Environmental and wildlife high risk areas, transit from non-fishing mariners and cost and logistical concerns to offshore development are also part of the considerations. Maine has been undergoing a mapping project, with coordination from other states and federal agencies, to fully understand the data available and position Maine to best advocate for the most least impactful areas for commercial development (see below). As a first step, in response to the Request for Information on commercial leasing, Maine along with the other Gulf of Maine states encouraged BOEM to avoid commercial lease areas within twenty miles of the coastline. The State will utilize the mapping effort and other stakeholder dialog to continue to advocate for the protection of areas most critical to the fishing industry and other stakeholders.

Action: Continue to work with fishermen, scientists and others with relevant expertise to enhance the existing Northeast Data Portal and identify data gaps by collating Gulf of Maine data and mapping the areas of known concentration of priority species, habitats, and fishing activity to inform stakeholder engagement and future state and federal decision making.

Action: Strengthen engagement between offshore wind developers and the fishing industry in development of lease areas to minimize impact of grid orientation, layout and micro-siting on existing uses.

Strategy 4. Ensure safe navigation.

The installation of floating structures in the Gulf of Maine provides unique challenges to current users of the ocean. Maine is committed to designing strategies to foster a safe environment, reduce risks and minimize disruptions to navigation.

Action: Encourage BOEM to require offshore wind developers to work with affected fishermen and mariners to design wind array layouts to ensure fishermen and other mariners may safely operate within and around active wind turbines once projects are constructed, with appropriate standards and protections to mitigate risk and liability.

Action: Ensure BOEM requires offshore wind developers to implement mitigation strategies to reduce wind turbine generator impacts on marine vessel radar, such as the use of reference buoys and advanced radar designs, and fund upgrades of fishermen's radar to provide technology that minimizes or eliminates radar impacts.

Action: Promote the adequate marking of windfarms through multiple means, including but not limited to AIS (whether that be at corners, along perimeters, or throughout the array at appropriate distances), visual markings, sound, charts, and other means.

Action: Work with BOEM to consider in detail the unique surface and subsurface features of floating technology and design appropriate protocols to clearly mark and light subsurface platforms, cabling, anchoring and other features.

Action: Seek inclusion of a unique identifier along with a gridded numbering and lettering system, advanced seaward, such that each 1 x 1 nm square could be uniquely referenced and advocate for consistency between multiple developers.

Action: Advocate for transit lanes through wind farms that have specific marking and lighting characteristics.

Action: Encourage deployment of cellular towers within wind farm areas to facilitate emergency communication.

Strategy 5. Advance opportunities for fair and equitable benefits.

Maine seeks to first avoid and then minimize the impacts of offshore wind to the greatest extent. Key to addressing impacts on the seafood industry and coastal communities is to collect the appropriate data to better quantify and then create mechanisms to mitigate these impacts. Maine's fishing industry is currently under immense strain and uncertainty caused by the evolving right whale regulations on the lobster industry, market shifts as a result of the pandemic and current inflation pressures. Lessons can be gleaned from existing work through partners such as SEAMaine and other industry initiatives about the type of support that would be most beneficial to the seafood industry and foster dialogue with the community to advance meaningful investments.

Action: Continue to collaborate and open a dialogue with Maine's seafood industries to identify and implement pathways to help the industries thrive and explore ways development of the offshore wind industry could include investments that help support fisheries priorities.

Action: If impacts to fisheries cannot be avoided, minimized, or mitigated, advocate for a plan to assess and quantify these impacts utilizing the best available fisheries, ecological and socio-economic data, including the value of loss to the unique qualities of Maine fisheries, heritage and communities. The plan should consider broad impacts to the industry and its communities before, during and after construction and operation of OSW farms, and impacts on fishermen, associated businesses and communities.

Action: Explore federal funding and other funding mechanisms to help mitigate any impacts incurred on fishing businesses, ocean users and coastal communities and to provide additional support to complement any developer or federal funding sources.

OBJECTIVE 5 – Protect the Environment, Wildlife, & Fisheries Ecosystem in the Gulf of Maine

The Gulf of Maine is home to one of the world’s richest ecosystems, with more than 3,000 marine species and birds sharing the habitat. This count includes more than 30 species at risk, among them the roseate tern and the endangered North Atlantic right whale. Climate-driven changes to the GOM have already altered marine productivity and the abundance and distribution of marine species and wildlife. These changes are expected to continue, resulting in ecological shifts that call for ongoing monitoring and, where appropriate, human behavior modification. Maine remains committed to protecting and preserving the Gulf of Maine’s rich and varied marine species, habitats, and wildlife—and to pursuing environmentally responsible development of offshore wind technology that meets our renewable energy needs with as little adverse impact as possible.

The response of native ecosystems to fixed bottom offshore wind turbines has been well studied in Europe at both the individual foundation/turbine level and within a configured array. Research has found that some bird species may collide with turbines, while others avoid the turbines altogether.¹⁶ Avoidance has the potential to interfere with migration or cause individuals to be displaced from valuable habitat.

Still other species are attracted to turbines.¹⁷ These effects can be seen both above and below water with fish, marine mammals, birds, and bats. The new hard substrate of fixed bottom turbines has also been shown to change the habitat and cause a “reef effect”. Studies have also shown that different forms of marine life may respond to electromagnetic fields (EMF), operational noise, increased vessel traffic in the area, elevating the risk of secondary entanglement (Figure 1).¹⁸

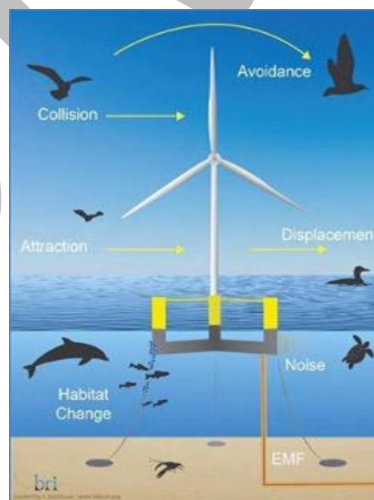


Figure x. The Potential Effects of Floating Offshore Wind on Ecosystems (Graphic credit: Biodiversity Research Institute. Used with permission.)

While much research has been conducted to date on fixed-bottom turbines (with much more research still needed), little research has been conducted on floating platform technology.^{19,20} Additionally, the cumulative impacts of multiple offshore wind projects on wildlife and the environment over time and space need to be assessed.

Maine has the opportunity to set the standard for environmentally-sensitive floating offshore wind development. This leadership opportunity will be shaped by data-driven decisions that protect the GOM's natural resources and support informed adaptation as new information becomes available. To that end, Maine acknowledges the need to do significant work upfront to avoid and, if necessary, mitigate negative impacts of offshore wind development on the environment and wildlife.

Data collection is already underway to advise environmentally sound siting and create a baseline for evaluating effects of offshore wind through time. Maine has gained valuable knowledge throughout the evolution of the single turbine demonstration project in state waters.. By advancing the Maine Offshore Wind Research Array, the state will gain critical firsthand experience with a multi-turbine array, to arrive at a greater understanding of how future floating wind farms will integrate with both the marine environment and existing ocean uses. In addition, the Research Consortium established through the legislature will develop and execute a research strategy to answer critical questions about floating offshore wind in the Gulf of Maine, and to oversee ongoing research efforts once the array is built. The Consortium will ensure that research is conducted in an open, transparent, and inclusive manner, and will include contributions of regional and national scientific entities, Maine's fishing industry, state and federal agencies, and scientific experts. This will ultimately put Maine in an ideal position to lead the nation in low-impact floating offshore wind development.

The Gulf of Maine is a shared resource. While there are several current regional initiatives focused on science and offshore wind, none are directly focused on coordination within the GOM and targeted specifically to floating offshore wind. Maine has an opportunity to partner with Massachusetts and New Hampshire to jointly identify key natural resources to avoid during offshore wind development, and to collaborate on funding initiatives that support monitoring and research on questions unique to floating technology.

Maine has a longstanding legacy of collaboration with ocean users to develop and successfully execute research and monitoring in the Gulf of Maine. These partnerships will continue - expanding to welcome participation by other regional entities and developers - while encouraging ongoing collaboration with ocean users throughout the Gulf of Maine region to ensure mutually beneficial outcomes.

Strategies:

- Strategy 1: Collect high quality, relevant data that is publicly available
- Strategy 2: Proactively reduce conflicts, minimize ecosystem impacts and facilitate timely permitting
- Strategy 3: Strengthen Maine's state policy framework
- Strategy 4: Enhance regional collaboration in the Gulf of Maine
- Strategy 5: Pursue state and other funding opportunities
- Strategy 6: Facilitate open and transparent engagement and integration of technical advice
- Strategy 7: Promote and advance new technologies

Strategy 1. Collect high quality, relevant data that is publicly available.

Although much is known about the GOM ecosystem, there remains a vast array of data needed to ensure informed siting and environmental review of areas in the GOM for potential offshore wind development. Broad-scale monitoring in the Gulf of Maine has been extremely limited to date, and collecting baseline information on wildlife species and the ocean environments has been identified as a pressing need. In addition, there is limited bathymetric data of complex habitats. Complex habitats drive above and below water species use and distribution in the Gulf of Maine, and are also important for a number of vulnerable or important commercial species such as Atlantic cod and American lobster. Current information is needed on the distribution and abundance and movement patterns of bird, bat, marine mammal, turtle, and fish species, as well as the underlying ecosystem.

Publicly available data can be used to assess broad-scale questions and potential cumulative impacts and other research questions, but the public data needs to be augmented by project-specific data to refine our understanding of impacts in the GOM. To the extent practical, data collection should be standardized, aggregated across regions and projects, and made publicly available in order to maximize learning, understand regional impacts, and create transparency.

Action: Continue to work with fishermen, scientists and others with relevant expertise to enhance the existing Northeast Data Portal and identify data gaps by collating Gulf of Maine data and mapping the areas of known concentration of priority species, habitats, and fishing activity to inform stakeholder engagement and future state and federal decision making.

Action: Coordinate with regional and federal partners to improve seafloor habitat characterization in the Gulf of Maine through the collection of bathymetry and seafloor hardness information, sediment sampling, and benthic fauna characterization. This information should be used to create detailed sediment and habitat maps of the Gulf of Maine.

Action: Initiate a coordinated below and above water ecological baseline monitoring study in identified areas of the Gulf of Maine to provide for meaningful assessment of the impacts of offshore wind development on the ecosystem, wildlife, and fishes of the Gulf of Maine.

Action: Conduct tracking studies on high-risk species, including species listed under both the Maine and Federal Endangered Species Acts in the GOM, consisting of marine and non-marine birds, bats, marine mammals, and fish species especially vulnerable to impacts from offshore wind energy development, as detailed by the Environment and Wildlife Working Group (link).

Action: Work with BOEM, Regional Wildlife Science Collaborative and other partners to ensure developers provide natural resource data as it pertains to potential impacts to wildlife, fisheries and the ecosystem in a publicly available and publicly usable format in a timely manner.

Strategy 2. Proactively reduce conflicts, minimize ecosystem impacts and facilitate timely permitting.

Maine's coast has extensive underwater cables providing power to nearshore islands and transmitting data and information across the Atlantic. Properly siting the transmission cables and nearshore infrastructure needed to advance offshore wind should be a priority for the State and will require continued engagement with ocean users, environmental and wildlife experts, coastal communities, and landowners. Proactively identifying the potential areas of conflict and environmental impacts early in the siting process can expedite the permitting process for offshore wind developers.

The State has jurisdiction within three nautical miles of shore with existing permitting processes for transmission cables, while BOEM has oversight for transmission offshore. The State can build upon lessons learned elsewhere to develop best management practices for siting and installation that are complementary to existing State permitting process and scaled to the risk. Taken as a whole, these best practices should minimize negative impacts on the most sensitive environment and wildlife while avoiding the areas of greatest potential conflict with commercial fisheries through time of year restrictions, co-location with existing development, and use of installation methods that reduce habitat disturbance. Proactive planning of transmission infrastructure can significantly reduce impacts to wildlife and the environment as well as costs, while minimizing potential user conflicts.

Action: Encourage BOEM to have developers conduct early consultations with State natural resources agencies to gather the most current spatial data that depict nearshore habitats, sensitive species distributions, and other areas of concern to facilitate informed planning for offshore wind transmission siting.

Action: Explore opportunities for development of transmission "backbones", corridors or other co-location strategies to avoid or minimize adverse impacts to benthic habitat and fishing activity, where widening of corridors would not significantly increase adverse impacts to high value marine or wildlife habitat.

Action: Prioritize transmission siting in areas outside of complex habitats, including coral habitats, and habitats protected through fisheries management plans in state waters and encourage BOEM to guide siting outside of these areas.

Action: Guide offshore wind developers to target landfall to utilize already existing high use areas so minimal habitat is disturbed, while requiring avoidance of sensitive wildlife habitat and fish species, particularly protected species

Action: Encourage offshore wind developers, to the extent practicable, to co-locate onshore transmission cables with linear development (i.e., existing roads and transmission lines) and utilize existing onshore substations to minimize disruption.

Action: Require developers to bury cables, whenever possible, at a minimum of 6 feet in state waters, and encourage BOEM to apply this standard in federal waters, thereby reducing exposure to EMF and gear conflicts with fishermen.

Action: Require offshore wind developers to avoid the greatest disruption to wildlife, marine fisheries, and habitats in state waters when laying transmission cables.

Action: Establish clear requirements for offshore wind developers to follow best management practices in state waters and encourage BOEM to apply this standard in federal waters, during installation and operation of the cable.

Action: Upon turbine decommissioning, require removal of transmission cables, unless assessment of impact indicates that removal would cause greater adverse impact to benthic habitat and marine resources in state waters and encourage BOEM to apply this standard in federal waters.

Strategy 3. Strengthen Maine's state policy framework.

Maine has opportunities through state policy to influence how offshore wind is developed through the federal consistency provisions of the Coastal Zone Management Act (CZMA) and establishment of specific criteria and contract provisions regarding coastal uses and resources as aspects of the energy procurement process.

The CZMA requires certain federal actions affecting Maine's coastal uses or resources to be consistent with standards of approval under state environmental laws which provide the "enforceable policies" of the Maine Coastal Program, which is administered by the Department of Marine Resources in cooperation with the Department of Environmental Protection and other state natural resource agencies. In accordance with P.L. 2021 c.407 (L.D. 1619), Maine is currently reviewing state laws and rules to determine whether the existing regulatory framework as applied to offshore wind energy development adequately protects Maine's coastal resources in a manner that avoids or minimizes adverse effects on coastal resources and users.

Action: Assess efficacy of existing State statutory and regulatory authorities related to the siting and development of offshore wind turbines and associated facilities, including transmission cabling, and port development, to address potential impacts to fisheries, wildlife, and other

coastal uses and resources and take action to implement corrective actions identified in the assessment as appropriate.

Action: Investigate the potential benefits of, and process by which, the State of Maine may enhance and use its federal consistency review authority under the federal Coastal Zone Management Act (CZMA) to address issues of concern regarding offshore wind energy development in federal waters, including changes to state laws and rules which provide enforceable policies and establishment of a Geographic Location Description (GLD). The state should assess its ability to review monitoring and construction plans and develop a plan to do so that includes meaningful stakeholder engagement and may require additional resources.

Strategy 4. Enhance regional collaboration in the Gulf of Maine

Maine can take several actions to ensure that there are coordinated efforts in the GOM, avoid duplication and foster regional cooperation and joint learning as offshore wind continues to be developed along the east coast. The New England states also have an opportunity to take the lead role in jointly identifying key resources that are important to avoid during the BOEM siting process and to identify and address cumulative impacts of multiple offshore wind energy development on wildlife and the environment over time and space.

Action: Maintain active membership and support toward the Regional Wildlife Science Collaborative, National Offshore Wind Research and Development Consortium, Responsible Offshore Science Alliance, and other entities as resources allow.

Action: Encourage state-to-state regional approaches to inform BOEM siting process such as the newly initiated GOM portal work through the Northeast Ocean Data Portal.

Action: Consider a role for the Research Consortium to coordinate offshore wind ecological research and monitoring in the Gulf of Maine, including monitoring on projects, federal surveys, state surveys, and research at the University of Maine and other GOM institutions.

Action: Work with regional and national agencies and organizations to identify collaborative opportunities to identify and address cumulative impacts over time and across the U.S. Atlantic Coast.

Strategy 5. Pursue state and other funding opportunities.

Maine has already recognized through a \$2 million appropriation to DMR that it is essential to invest in independent monitoring and research efforts, while collaborating and coordinating with federal and state efforts in the region as well as public and private research institutions and commercial research and monitoring. Commercial offshore wind site characterization surveys and post-construction monitoring efforts will necessarily be limited to specific project areas and will be limited in effort and duration. Additional funding will allow long-term research on questions that cannot be addressed within a standard development spatial scope or timeline, as well as provide key context for change within the ecosystem as a whole and

communities that are dependent on them. Congress is exploring avenues to create a new dedicated stream of funding from future offshore wind development for coastal protection and resiliency and these efforts should be encouraged.

Action: Support continued state funding for offshore monitoring and research. This includes funding for the Research Consortium as well as funding for fisheries and wildlife science, ecosystem monitoring, socioeconomics, community dynamics, and other fisheries and ecosystem related topics.

Action: Pursue additional funding, both independently and in partnership with states whose fishing vessels use the Gulf of Maine to increase the available pool of funding for fisheries and ecosystem monitoring and research.

Action: Pursue funding from federal agencies such as BOEM and NOAA for pre-development monitoring, research, and characterization of designated Wind Energy Areas (WEAs) prior to lease auction.

Action: Encourage joint funding with New Hampshire, Massachusetts, and other regional states and stakeholders to support research efforts into identifying and addressing cumulative impacts of multiple offshore wind projects in the Gulf of Maine over space and time.

Action: Work with Maine's Congressional delegation to support legislation to fund efforts to protect impacted communities, including Tribes.

Action: Pursue state or other funding sources for the Research Consortium.

Action: Consider establishing a Coastal Fund, modeled after the Maine Department of Environmental Protection's (DEP) In Lieu Fee Compensation Program to support regional monitoring and environmentally responsible offshore wind development and mitigate impacts to wildlife, natural resources, and ecosystems.

Strategy 6. Facilitate open and transparent engagement and integration of technical advice.

Maine will need an in-depth, coordinated, and cohesive assessment from a variety of disciplines along various stages of the development process to ensure environmentally-sound offshore wind projects. The timeline for development of offshore wind is long and complex. Neighboring states such as Massachusetts and New York have established both formal and informal advisory groups to help each state solicit input and broad technical expertise throughout the process. Specific to the BOEM siting process for offshore wind development, the inter-governmental nature of the task force has made it difficult for non-governmental entities to have a voice in other regions. Maine should proactively solicit additional input to feed into the process to allow the input of Maine stakeholders to be understood and expressed through representatives of Maine.

Action: Explore establishing an advisory body to further develop pre-and post-construction monitoring recommendations and environmentally responsible development methodology to avoid, minimize, or mitigate impacts, as outlined by the Environment and Wildlife Working Group.

Action: Develop a coordinated comment and engagement process for Maine's state agencies to effectively communicate with BOEM and other federal agencies during the NEPA Environmental Assessment and project specific Environmental Impact Statement processes.

Action: Explore ways to provide an ongoing process for Maine stakeholders to engage in the broader siting process during the GOM Interagency Task Force Meeting with BOEM around potential wind energy areas, including holding Maine stakeholder meetings prior to GOM Interagency Task Force Meetings.

Strategy 7. Promote and advance new technologies.

Technology is advancing rapidly, and new tools will be available to avoid, monitor, and minimize potential impacts over the next decade as commercial scale OSW projects are developed in the GOM. Maine should advocate for the continued use of the best available technology and encourage new research into technological advances. Because floating offshore wind is a relatively new industry in the U.S., planning and development must be dynamic and allow for the active integration of emerging research and guidelines for environmental impact reduction.

Action: Encourage BOEM to require all developers to utilize the latest, most effective technologies to avoid, minimize, and monitor impacts to wildlife and the GOM ecosystem to the extent practicable.

Action: Advocate for periodic review of the existing technology to avoid, minimize, and monitor impacts to wildlife, and encourage development of recommendations for new feasible technologies by the Regional Wildlife Science Entity (or some similar technical experts).