Leading Light Wind

Charting an American-led clean energy future

Application Narrative • August 4, 2023

New Jersey Board of Public Utilities (NJBPU) • New Jersey Offshore Wind Third Solicitation

ES
Executive summary

ES Executive summary

ES.1 Introduction

In 2018, New Jersey acknowledged the tremendous economic opportunity of offshore wind and recommitted the state to the offshore wind marketplace through executive action. The following year, the state more than doubled its wind goal from 3,500 MW to 7,500 MW by 2035, a substantial figure that was among the most ambitious in the country at the time. New Jersey understood the significant benefits that came from being a first adopter. This foresight led the state to an offshore wind approach which has spurred a nation-leading industry — one that creates local, family-sustaining jobs; revitalizes ports and manufacturing hubs; fosters environmentally responsible development; and positions the Garden State as a national leader in the clean energy transition.

Earlier this year, New Jersey set its goals even higher: the state now seeks to achieve 100% clean electricity by the year 2035 and has increased its target to a nation-leading 11,000 MW of offshore

wind that will power millions of New Jersey homes. New Jersey is already making significant progress on these goals, having selected and supported three offshore wind projects through two solicitations totaling more than 3,700 MW to date, and has sought complementary investments for ports and other facilities that will guarantee the clean energy economy generates local, well-paying jobs for years to come.

New Jersey's clean energy goals have set a national standard. They provide meaningful leadership on the moral imperative to address the climate crisis, while creating healthier economies and communities for the people of New Jersey. We thank our governmental leaders and the advocates who have set this vision and established these goals — and now we must do the hard work of effective implementation.

In response to the New Jersey Board of Public Utilities' (NJBPU) Third Offshore Wind Solicitation, Leading Light Wind is proud to submit this bold proposal — and chart an American-led clean energy future in New Jersey.

Leading Light Wind will build on our team's demonstrated track record of innovation. As tried and tested partners, we have proven our ability to effectively develop sustainable American energy and transmission infrastructure and engage with communities to advance public health, create good-paying jobs, and catalyzing a reliable, clean energy transition that empowers more people than ever before.

Leading Light Wind by the numbers

Project capacity of up to **2,400 MW** delivered to the point of interconnection (POI)

Up to **$3.1 billion** in economic development benefits for New Jersey, including over [redacted] relating to in-state manufacturing of major offshore wind components

Over [redacted] in labor expenditures associated with the project and its in-state supply chain over the contract period

Enough clean energy to power the equivalent of over **1 million New Jersey homes** every year

Up to [redacted] in utility bill relief to assist over **200,000 energy-burdened** New Jersey households via our Energy Equity Credit program

Expected minimum spending of at least [redacted] in overburdened communities (OBCs) and [redacted] with New Jersey's small, minority, women, and veteran business enterprises (SMWVBEs)

Annual average carbon emissions reductions of up to **4.2 million tons**, the equivalent of taking nearly **825,000 gas-powered vehicles** off the road annually

More than 40 miles off the coast of New Jersey

ES.2 A proven, American-led team with the ability to execute

Leading Light Wind is a partnership between two American-led clean energy companies: lead developer Invenergy and co-developer energyRe. We are a proven team that is already solving critical clean energy infrastructure challenges.

Invenergy has more than **31 GW of clean energy projects** that are in operation, construction, or contracted that span a wide-range of technologies including onshore wind, solar, high-voltage transmission, and advanced energy storage. Powered by decades of experience, Invenergy has a proven track record of delivering clean energy to customers and communities around the world. This portfolio includes transformative clean energy projects that are solving some of the world's toughest clean energy challenges.

Invenergy's project portfolio invests more than **$400 million** every year in the home communities that host our projects through taxes, landowner payments, and wages and benefits. Invenergy's portfolio has also created thousands of good-paying local jobs and has the capacity to generate enough clean energy to power the equivalent of **nine million homes** annually. In PJM, Invenergy has an extensive track record as a developer, asset owner, and operator that dates back to the completion of the 99 MW Grand Ridge Wind Energy Center in 2008. Since then, Invenergy has successfully developed over 3,400 MW of wind, solar, natural gas, and advanced energy storage projects in the PJM market, with an additional 1,200 MW under construction or contracted.

Invenergy is also the only American-led company developing a multi-project **offshore wind portfolio on both US coastlines**. Earlier this year, Invenergy was named official leaseholder of OCS-P 0565 located off the coast of Central California by the Bureau of Ocean Energy Management (BOEM), marking the company's first investment in floating offshore wind.

Leading Light Wind's co-developer energyRe is an independent New York company focused on solving complex challenges and providing clean energy solutions. **Guided by the principles of innovation and partnership and backed by expertise and experience, energyRe is committed to creating a sustainable future for all.** The executive team at energyRe has significant experience in renewable energy, infrastructure, engineering, and real estate development. Across 17 states, energyRe is currently developing **10.5 GW of renewable generation**, more than **500 miles of transmission**, and **155 MW of distributed generation** assets.

The founding partners of energyRe include the principals of New York-based Related Companies. Related is one of the largest private owners and preservationists of affordable and workforce housing in the United States, reflecting its commitment to empowering local communities. Related's developments in New York include the 28-acre Hudson Yards neighborhood on Manhattan's West Side and the transformative Willets Point community in Queens with 2,500 100% affordable housing units.

Leading Light Wind builds upon Invenergy and energyRe's robust partnership, including the development of the Clean Path NY project, which will utilize 175 miles of new HVDC transmission to deliver 7.5 million MWh of new wind and solar generation to New York City every year.

Together, we are proud to serve the communities where we live and work by successfully advancing the next generation of secure, reliable, clean energy infrastructure.

ES.3 Strong financial backing with unparalleled stakeholder representation

Our team knows that the transformative infrastructure of tomorrow requires financial backing from well-capitalized investors today. Leading Light Wind unites an investor group that brings unmatched, dependable capital deployment committed to seeing the project to fruition, as well as direct labor investment in the project. Leading Light Wind's investors include Blackstone Infrastructure Partners, CDPQ, FirstLight Power, and Ullico Infrastructure Fund.

This multi-stakeholder investor group brings organized labor and the renewable energy industry together to ensure that working families not only benefit from Leading Light Wind's job creation potential, but also vests them in its success through the direct participation of union labor pension funds. Our unique approach redefines how inclusive, collaborative, and responsible development of offshore wind in the Bight — and beyond — can be achieved.

The Leading Light Wind project team draws on a diverse set of experiences in the renewable energy and offshore sectors. Many team members have previous experience with offshore wind, including in the nascent US market. As companies that first-and-foremost develop US infrastructure projects, we are intimately familiar with American regulatory regimes and markets, their innate challenges, and how to navigate them.

Since acquiring our lease in May 2022, Leading Light Wind has completed crucial risk-mitigating development activities and surveys that allow us to offer the NJBPU project scenarios that ensure evaluations of risk and cost are data-driven instead of assumption-based. This includes a targeted geotechnical campaign inclusive of multiple locations in the lease, ongoing geophysical surveys of the lease area and cable route, and metocean data buoy measurements via lidar and other sensor arrays. Further, we have prioritized early engagement and coalition building with federal, state, and local stakeholders, prompting a virtuous feedback loop whereby our investments are directed toward the highest priority needs. Stakeholder feedback is incorporated along the way, and follow-through on our commitments is ensured.

We are not blind to the challenges that have recently surfaced in the offshore wind industry. With these in mind, throughout the development of this bid, our primary focus has been on putting together project plans that ensure that we are best positioned to deliver our project and its benefits to the state of New Jersey. In practice, this has meant being more aggressive in certain key areas, entering into strategic commercial arrangements that we believe uniquely position us to execute on our project, while in other areas, we have intentionally maintained optionality to implement alternate plans in the face of potential future headwinds. These plans are detailed further in this bid.

[redacted]

ES.4 Clean energy solutions tailored to New Jersey's third solicitation

[redacted]

In line with the opportunity offered in the Solicitation Guidance Document to submit contingent bids, all of the Leading Light Wind project alternatives presented in this bid are contingent upon the outcome of NYSERDA's 2022 offshore wind solicitation.

As shown in Figure ES-1, elements of our project are expected to touch diverse geographies across the state, bringing benefits to a wide swath of New Jerseyans.

[redacted]

Expertise and experience to execute on prebuild infrastructure

As part of our bid submission, the Leading Light Wind team has diligently and thoughtfully crafted an option to develop, construct, and own the prebuild infrastructure. Taking a data-driven approach, and with considerations for cost, feasibility, environmental factors, communities, and other factors, our team has developed terrestrial routing options that balance the needs of a wide range of stakeholders (Figure ES-2).

[redacted]

Figure ES-1. The Leading Light Wind project includes potential project components and investments across New Jersey.

[redacted]

Should the NJBPU choose to award the prebuild through this solicitation, the developers behind the Leading Light Wind project, Invenergy and energyRe, have the relevant HVDC expertise and experience to deliver on this critical scope. In addition to Invenergy and energyRe's partnership on Clean Path NY, Invenergy is a leader in developing some of America's most ambitious clean energy transmission projects across the country, including the multi-state 800+ mile Grain Belt Express, and the New Mexico North Path and Cimarron Link projects. To date, Invenergy has developed more than 4,100 miles of transmission and collection lines and managed more than 12,000 landowner relationships across Invenergy generation and transmission projects.

Given the importance of the prebuild infrastructure to delivering on the potential of the State Agreement Approach (SAA) solution, the NJBPU requires a trusted partner. Leading Light Wind can be that trusted partner.

A battery storage option that drives reliability and decarbonization

[redacted] Leading Light Wind is pleased to offer an optional energy storage project. The 253 MW/1,012 MWh [redacted] project facility will provide significant benefits to the grid, while providing **over 13% of the battery storage capacity needed to achieve New Jersey's ambitious 2 GW energy storage target.**

[redacted]

Invenergy is a leading developer, owner, and operator of advanced energy storage with over 19 projects that are operating, in construction, or contracted, totaling more than 1,800 MWh of stored clean energy. In PJM, Invenergy has been operating grid scale battery storage projects since 2012. Through a decade plus of experience, Invenergy has developed the tools and processes necessary to optimize storage bidding and operations in PJM. Invenergy will bring this know-how to the operation of [redacted].

Intentional investment to advance New Jersey's place in the American offshore wind landscape

As an American-led offshore wind project with deep connections in the region and expertise in the clean energy transition, Leading Light Wind is uniquely positioned to expand American offshore capabilities and build the next generation of supply chain facilities at the New Jersey Wind Port and across the state.

Leading Light Wind is proposing a transformative vision for a localized supply chain that will result in significant in-state job growth, alleviate supply chain constraints, drive efficiencies and costs savings, and position New Jersey as home to a leading offshore wind ecosystem. Leveraging longstanding relationships with suppliers, established leaders in offshore wind-related manufacturing, and our unparalleled expertise, our team has thoughtfully packaged manufacturing and supply chain investments to deliver on New Jersey's stated priorities and strengthen the local, long-term supply chain for the domestic offshore wind industry, making Leading Light Wind a partner of choice.

Our proposal includes the following major supply chain initiatives:

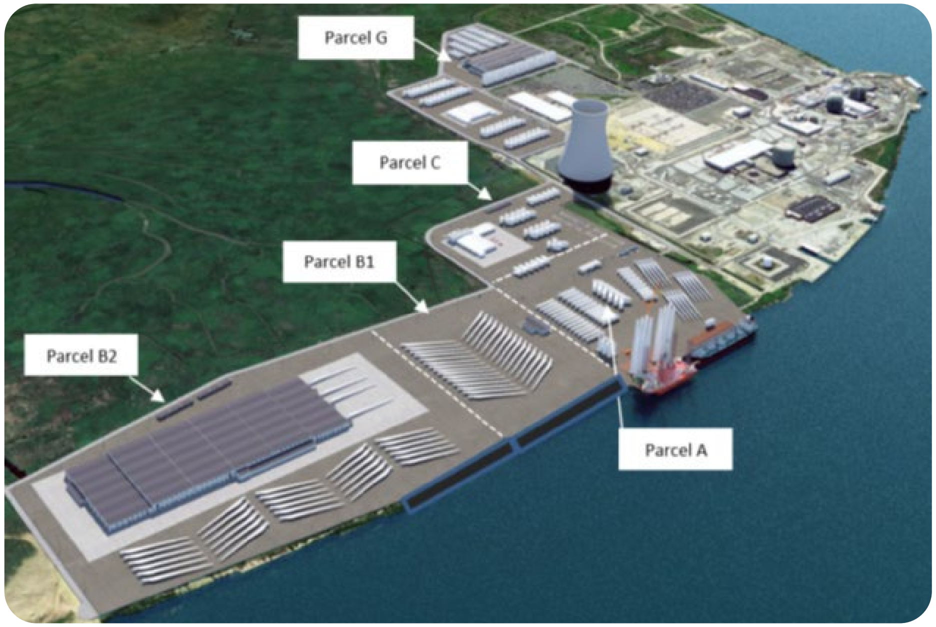

Figure ES-3. New Jersey Wind Port rendering.

Project marshaling

[redacted]

EEW AOS monopile manufacturing expansion

[redacted]

WTG tower manufacturing

[redacted]

Operations and maintenance port

[redacted]

Concrete platform fabrication

[redacted]

Together, these strategically chosen supply chain proposals represent the investments necessary to advance an offshore wind industry that benefits communities across New Jersey for generations to come.

ES.5 Key partnerships to deliver benefits beyond the Bight

Leading Light Wind will harness the transformational economic opportunities of the offshore wind industry to maximize benefits to every corner of New Jersey. We're listening and working hand in hand with community stakeholders to address New Jersey's unique needs and priorities.

Based on our conversations, we have developed the following priorities for direct investment in the state:

- **Leading environmental research:** Support environmental research that fosters innovation and collaboration within the offshore wind industry.
- **Empowering local communities:** Contribute to youth education, climate resiliency, social equity, public health, and air quality with a focus on supporting the most at-risk, overburdened members of our local communities.
- **Building an inclusive next-generation offshore wind workforce:** Support workforce development and education programs focused on pathways for priority populations to access green, family-sustaining jobs.
- **Accelerating the offshore wind supply chain:** Foster the equitable growth of the offshore wind industry in New Jersey through various investments, including supporting capacity and access for Tier 3 and Tier 4 suppliers.

Using these priorities, our project has intentionally and thoughtfully cultivated opportunities to deliver material benefits and opportunities to all New Jerseyans, supporting existing offshore wind initiatives, expanding state capabilities, and directing investments and resources to communities historically excluded from decision-making in infrastructure development.

If provided with an OREC award by the NJBPU, Leading Light Wind is committing to a **community benefits program** with up to **$150 million** in funding, which includes the following:

- An innovative **Energy Equity Credit** program that would provide direct assistance to over **200,000 energy-burdened households in New Jersey**, reducing their projected monthly electricity bill impacts from our project by 50%.
- The required funding of **$10,000/MW** for New Jersey's Research and Monitoring Initiative (RMI).
- **25 initial partnership and program opportunities**, totaling up to [redacted] in funding support (see Figure ES-4). Based on extensive stakeholder engagement, each of these partnerships is intended to address a specific need in New Jersey, raise awareness of the benefits of offshore wind, and build a coalition of supporters and champions across the state.

[redacted]

In particular, we would like to highlight the following innovative partnerships:

- **Waves to Wind Program:** [redacted]
- **Offshore Wind Innovation Campus (in partnership with Newlab):** [redacted]
- **New Jersey academic institution partnerships:** [redacted]

[redacted]

- **Environmental justice and OBC partnerships:** [redacted]

Leading Light Wind partnerships impact ([redacted])

Local impact

Leading environmental research

- Rutgers University

Empowering local communities

- Leading Light Wind Fisheries Accelerator Fund
- Zeem Solutions Charging Hub
- Boys & Girls Clubs of Monmouth County
- Neighborhoods for a Sustainable Future
- Liberty Science Center
- Gotham Whale

Building an inclusive next-generation offshore wind workforce

- Newark School of Data Science and Information Technology
- Mid-Atlantic States Career & Education Center
- Hudson County Community College
- New Jersey Institute of Technology
- Rowan University
- Rowan College of South Jersey
- New Jersey Community College Consortium

Accelerating the offshore wind supply chain

- New Jersey Manufacturing Extension Partnership
- Paulsboro Economic Development Program
- Offshore Wind Innovation Campus (in partnership with Newlab)

Statewide impact (not on map)

- Leading Light Wind Strategic Environmental Initiatives Fund
- Leading Light Wind Tribal Support Fund
- Leading Light Wind Offshore Wind Scholars Program
- Children's Environmental Literacy Foundation
- Waterfront Alliance
- Waves to Wind Program
- Leading Light Wind Applied Science Grant Program
- New Jersey Wind Institute

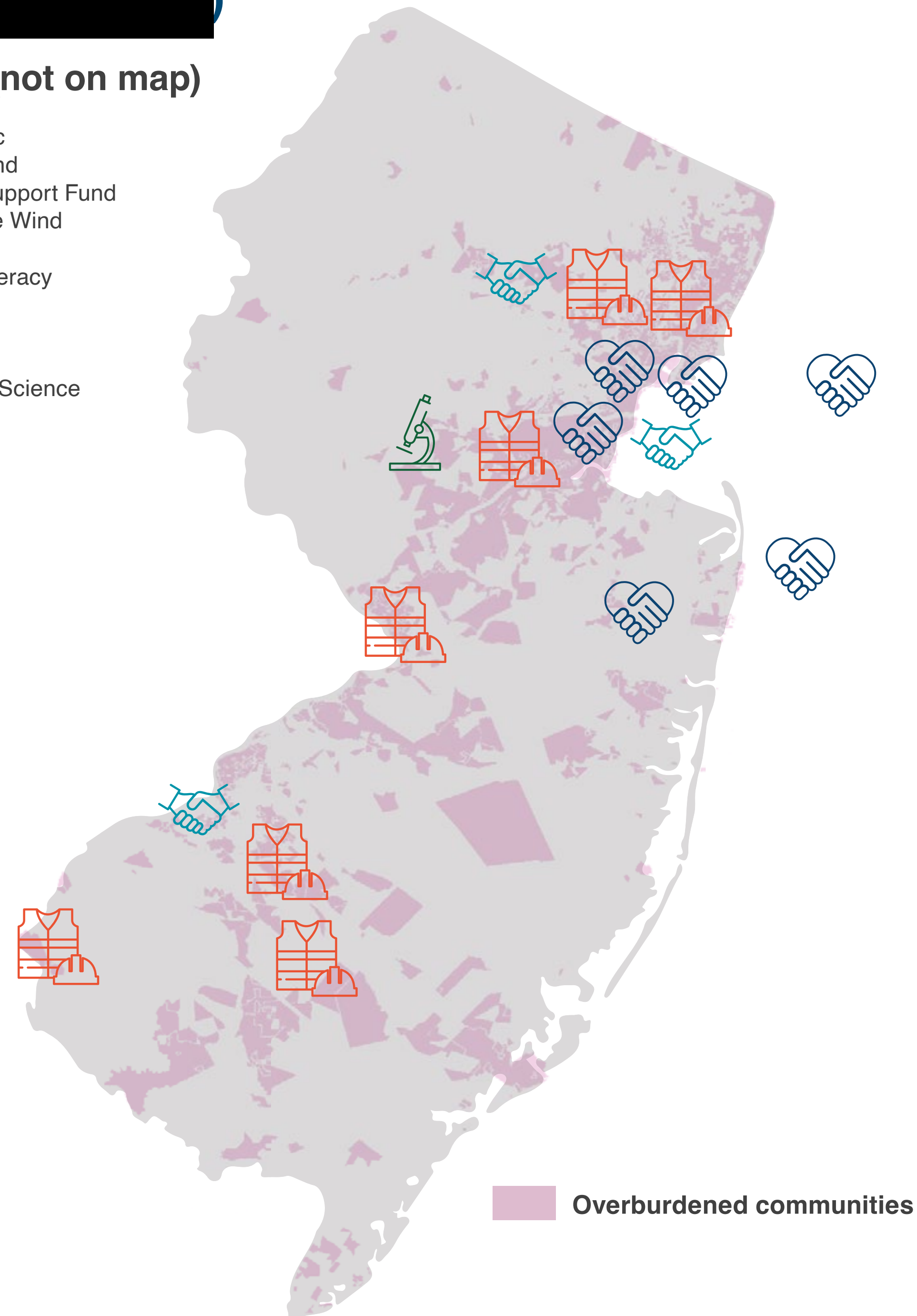

Figure ES-4. Leading Light Wind has cultivated partnerships across the state.

ES.6 New Jersey's skilled workforce is poised to lead the nation's clean energy future

Leading Light Wind is dedicated to creating a clean energy economy that is designed, engineered, and built by American labor.

We firmly believe that domestic know-how is ready to be cultivated. Our project will establish an American leadership position in the offshore wind industry while ensuring that New Jersey workers will underpin this historic workforce growth. Leading Light Wind is committed to deliver on its values-informed strategy that will develop a diverse, inclusive, and highly skilled workforce and result in well-paying career opportunities for New Jerseyans across the state. And with union-backed funds invested directly into Leading Light Wind via the Ullico Infrastructure Fund, the project is further compelled to work with union labor in line with New Jersey's priorities.

Leading Light Wind has executed a Memorandum of Understanding (MOU) with five New Jersey unions that memorializes our commitment to prioritize union construction on our project and create new career pathways to the offshore wind sector. This MOU, along with carefully cultivated partnerships and expansive training programs, will support the creation of critical workforce infrastructure, and establish a world-class New Jersey workforce to construct the project.

[redacted]

Figure ES-5. Leading Light Wind is dedicated to creating a clean energy economy that is designed, engineered, and built by diverse American labor.

ES.7 Our commitment to responsibly deliver New Jersey's clean energy future

Leading Light Wind believes that the natural environment and offshore wind can mutually coexist and thrive.

Our approach and philosophy to development is based on the premise that coexistence is achievable by carefully evaluating existing uses in and around our lease area, avoiding impacts where feasible, and reducing impacts through mitigation where needed.

Together, Invenergy and energyRe have worked with regulators, stakeholders, and Tribal Nations to permit complex American infrastructure projects. Through our shared and independent experience advancing the development and construction of a diverse portfolio of clean energy solutions, we have deep expertise in utilizing sound environmental and permitting practices.

We are committed to transparency and accountability as core values. We are, and will continue to, actively coordinate, collaborate, and consult with agencies, communities, and other stakeholders at every stage of development.

We recognize that early engagement, industry collaboration, prioritizing partnerships that advance monitoring and research, and data collection and sharing are all critical pieces of developing strong and lasting relationships that promote effective project permitting and development while advancing industry innovation. As part of our proposal, we are committed to establishing the "Leading Light Wind Strategic Environmental Initiatives Fund," a fund of [redacted] for investment in innovative environmental initiatives and scientific research.

Leading Light Wind is an active member of the Regional Wildlife Science Collaborative and the Responsible Offshore Science Alliance. We will continue engaging with these research collaboratives, as well as the New Jersey RMI, to strategically advance regional science priorities through this fund.

Figure ES-6. The Leading Light Wind external affairs team is actively engaged in conversations with key stakeholders.

A project built on local stakeholder engagement

To effectively develop an infrastructure project of Leading Light Wind's scale, you have to be present.

Since acquiring our lease area, Leading Light Wind has steadily increased its presence across New Jersey, actively engaging in conversations with a wide range of stakeholders, providing project information and building a coalition of support across the state. To date, the Leading Light team has had more than [redacted] with New Jersey stakeholders, not including agency meetings. This includes elected officials, environmental groups, fisheries, labor unions, and those in New Jersey's higher education and business communities, among others.

Our regionally based external affairs team is comprised of experts in economic development, equity-driven community planning, communications, marine, labor, and tribal affairs — in addition to technical subject matter experts — who have worked on some of the largest energy infrastructure projects in the region.

We are committed to a robust local supplier outreach program, providing opportunities for small to medium businesses, including SMWVBEs, that will provide important goods and services to our project.

ES.8 Substantial benefits for the state of New Jersey

[redacted] the Leading Light Wind project will provide substantial benefits to the state of New Jersey.

These include:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

ES.9 Conclusion

Leading Light Wind's American-led team is ready to be New Jersey's partner of choice to deliver on its ambitious offshore wind goals.

With a long track record of responsibly executing critical infrastructure projects, our team is poised to deliver our expertise and experience to New Jersey and enable the state — and New Jersey residents — to share in the success of the project and a flourishing offshore wind industry.

We're ready to play a key role in advancing public health, creating good-paying jobs, and supporting local supply chain growth across the Garden State. We'll drive investments into the New Jersey Wind Port and support the build out of a globally leading offshore wind workforce, which will further position New Jersey as a leader of the domestic offshore wind industry of responsible development. Over time, the project will serve as an economic development engine and deliver on community needs and priorities.

Our holistic, stakeholder-led approach to engagement will ensure that the benefits to Jersey residents and businesses are tangible and specifically tailored to deliver the best outcome to the state. We can be counted on to build a coalition of support and will ensure our engagement is broad reaching, incorporates feedback, and provides a new chapter for offshore wind in New Jersey.

Leading Light Wind will leverage our partnerships with unions and focus on workforce development will create pathways to opportunity for diverse New Jersey communities. Fueling job creation and catalyzing a new domestic industry, the project will drive new economic opportunity across the state, making New Jersey a more attractive place to live, work, and do business for generations to come.

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- **2.3** Geotechnical Interpretation Report
- **2.4** Preliminary Ground Model
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- **2.7a** Strategic Partnerships
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- **3.1** DNV Statement of Qualifications

Acronyms and abbreviations

Acronym/ abbreviation	Meaning
AC	Alternating current
AECI	Associated Electric Cooperative Inc.
AIS	Automatic identification system
BNOW	Business Network for Offshore Wind
BOEM	Bureau of Ocean Energy Management
bopd	Barrels of oil per day
BSEE	Bureau of Safety and Environmental Enforcement
CAFRA	Coastal Area Facility Review Act
CAISO	California Independent System Operator
CFR	Code of Federal Regulations
CLV	Cable-lay vessel
CO_2	Carbon dioxide
COD	Commercial operation date
ConEd	Con Edison
COP	Construction and Operation Plan
CPP	Coordinated Project Plan
CTV	Crew transfer vessel
CVA	Certification Verification Agency

Acronym/ abbreviation	Meaning
DC	Direct current
DEI	Diversity, Equity, and Inclusion
DoD	Department of Defense
DVOB	Disabled Veteran-Owned Business
EBITDA	Earnings before interest, taxes, depreciation, and amortization
EDP	Energía del Pacífico, Ltda. de C.V.
EIS	Environmental Impact Statement
ELCC	Effective Load Carrying Capability
EPA	Environmental Protection Agency
EPC	Engineering, procurement, and construction
EPP	Environmental Protection Plan
ERCOT	Electric Reliability Council of Texas
FAA	Federal Aviation Administration
FEED	Front-end engineering design
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FID	Final Investment Decision

Acronym/ abbreviation	Meaning
FIR	Fishing industry representative
FLO	Fisheries Liaison Officer
FLS	Floating lidar system
FPP	Fisheries Protection Plan
FPSO	Floating production, storage, and offloading
FTE	Full-time equivalent
GDP	Gross domestic product
[redacted]	
GIS	Geographic information system
[redacted]	
GW	Gigawatts
GWh	Gigawatt-hour
HDD	Horizontal directional drilling
HLV	Heavy lift vessel
HSE	Health, safety, and environment
HTV	Heavy transport vessel
HVAC	High-voltage alternating current
HVDC	High-voltage direct current
ICPC	International Cable Protection Committee
IMO:MSC	International Maritime Organization: Maritime Safety Committee
[redacted]	
Invenergy	Invenergy LLC
ISO	International Organization for Standardization
ITC	Investment tax credit
JCP&L	Jersey Central Power & Light
kA	Kiloampere
kHz	Kilohertz
km	Kilometer

Acronym/ abbreviation	Meaning
K m/W	Kelvin meter per watt
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
LCC	Line-commutate converter
LCS	Larrabee Collector Station
LEED	Leadership in Energy and Environmental Design
Lidar	Light detection and ranging
LNG	Liquefied natural gas
m	Meters
MISO	Midcontinent Independent System Operator
mm	Millimeters
MMIS	Marine Minerals Information System
MOU	Memorandum of Understanding
MTA	Metropolitan Transportation Authority
MW	Megawatts
MWBE	Minority/Women-owned Business Enterprise
MWh	Megawatt-hour
NAICS	North American Industrial Classification System
NATCP	Native American Tribal Consultation Plan
NEPA	National Environmental Policy Act
NGTC	National Guard Training Center
N.J.A.C.	New Jersey Administrative Code
NJBPU	New Jersey Board of Public Utilities
NJDEP	New Jersey Department of Environmental Protection
NJDMAVA	New Jersey Department of Military and Veteran Affairs
NJDOT	New Jersey Department of Transportation
NJEDA	New Jersey Economic Development Authority
NJHPO	New Jersey Historic Preservation Office

Acronym/ abbreviation	Meaning
NJTA	New Jersey Turnpike Authority
nm	Nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrous oxide
NYISO	New York Independent System Operator
NYSERDA	New York State Energy Research and Development Authority
O&M	Operations and maintenance
OCS	Outer Continental Shelf
OFCS	Offshore converter station
OEM	Original equipment manufacturer
OIV	Offshore installation vehicle
ONCS	Onshore converter station
OREC	Offshore Wind Renewable Energy Certificate
OTN	Offshore transmission network
OWEDA	Offshore Wind Economic Development Act
PEIS	Programmatic Environmental Impact Statement
PLA	Project Labor Agreement
PM	Particulate matter
POI	Point of interconnection
PPA	Power Purchase Agreement
PSP	Public Sector Pension
REC	Renewable Energy Credit
RFP	Request for proposal
RMI	Research and Monitoring Initiative
ROSA	Responsible Offshore Science Alliance
ROV	Remotely operated vehicle
ROW	Right-of-way

Acronym/ abbreviation	Meaning
RPS	Renewable Portfolio Standard
SAA	State Agreement Approach
SBE	Small Business Enterprise
SCADA	Supervisory control and data acquisition
SCOQ	Surfclam/ocean quahog
SDVOB	Service-Disabled Veteran Owned Business
SERC	State Electricity Regulatory Commission
SF_6	Sulfur hexafluoride
[redacted]	
SMWVBE	Small, minority, women, and veteran business enterprise
SO_2	Sulfur dioxide
SOV	Service operation vessel
SPMT	Self-propelled modular transporter
SPP	Southwest Power Pool
SRIV	Subsea rock installation vessel
STEM	Science, Technology, Engineering, and Mathematics
SWECO	Suzlon Wind Energy Corporation
TI	Turbulence intensity
TLP	Tension-leg platform
TP	Transition piece
TSS	Traffic separation scheme
UCAP	Unforced capacity
UPS	Uninterruptible power supply
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Acronym/ abbreviation	Meaning
UXO	Unexploded ordnance
VMS	Vessel monitoring system
VOB	Veteran-Owned Business
VSC	Voltage-source converter
WECC	Western Electricity Coordinating Council
WTG	Wind turbine generator
WTIV	Wind turbine installation vessel
XLPE	Cross-linked polyethylene

01
Applicant information

Solicitation requirements

Checklist item	Section reference
A demonstration of the Applicant's applicable experience in projects of similar size and scope to the proposed Project(s) (N.J.A.C. 14:8-6.5(a)(2), N.J.A.C. 14:8-6.5(a)(2)(i)(1))	Section 1.4
List of all key employees, including resumes for each that detail their individual track record in construction and operation of power plants of similar size and scope (N.J.A.C. 14:8-6.5(a)(1)(i))	Section 1.3
Description of any work done to date by the key employees in developing projects of similar scope, especially any ocean-based energy project or New Jersey large-scale energy project siting work (N.J.A.C. 14:8-6.5(a)(1)(ii))	Section 1.3
If the work described was not performed by the entire team of key employees, the Applicant must delineate the experience or work performed by key employees (N.J.A.C. 14:8-6.5(a)(1)(iii))	Section 1.3
The Applicant shall disclose, in detail, any prior business bankruptcies, defaults, disbarments, investigations, indictments, or other actions against either the Applicant, its parent company, affiliates, subsidiaries, or any key employees identified above (N.J.A.C. 14:8-6.5(a)(1)(iv))	Section 1.6
Two years of audited financial statements, including accompanying financial notes to these statements, of the Applicant and/or parent company in US GAAP. If not in US GAAP, the Applicant shall provide an opinion from an accounting firm that attests to the financial statements and accompanying financial notes and the strength of the Applicant and/or parent company and has provided professional qualifications that demonstrate that expertise (N.J.A.C. 14:8-6.5(a)(3)(vi))	Section 1.7

01 Applicant information

1.1 General business information

Invenergy Wind Offshore LLC (Proposer) is the American-led bidding entity for the Leading Light Wind project. As seen in Figure 1-1 on the following page, the Proposer is a limited liability company that is ultimately backed by six well-capitalized firms, including four financial investors (FirstLight PSP, Ullico Infrastructure Fund, Caisse de dépôt et placement du Québec [CDPQ], and Blackstone) and a project developer (Forward Power, a joint venture between Invenergy Renewables and energyRe). Leveraging a 20+ year track record with global development of renewable energy and other large infrastructure projects, Forward Power's two member organizations have the experience and management capabilities necessary to develop, operate, and decommission a holistic project that meets or exceeds the New Jersey Board of Public Utilities' (NJBPU's) requirements.

In support of the Offshore Wind Economic Development Act (OWEDA) and Governor Murphy's Executive Order No. 307, we expect that the project alternatives included in this bid will both directly and indirectly support the State of New Jersey's 11,000 megawatt (MW) by 2040 offshore wind targets.

Since obtaining our approximately 84,000-acre lease area 48 miles east of Atlantic City in 2022, Leading Light Wind is already on its way to developing an environmentally and economically sustainable project that will center stakeholders and empower New Jersey communities.

We are committed to developing and building project alternatives that support New Jersey's long-term transition to renewable energy, while providing significant and wide-spread benefits to the state. We are proud to be participating in New Jersey's third offshore wind solicitation.

This section provides additional detail on the ownership of Leading Light Wind, the Proposer's prior experience, and the development team that will bring this monumental project to fruition.

1.2 Organizational chart and project officers

As shown in Figure 1-1 on the next page, the Proposer is wholly owned and managed by New York Bight Offshore Holdings LLC, which includes an investor consortium of six well-capitalized firms, four financial investors, and a project developer. Section 5.2 includes additional information on the financial strength and financing experience by entity.

Figure 1-1. Leading Light Wind organizational chart.

[redacted]

- **Forward Power Offshore LLC** is a wholly owned subsidiary of Forward Power Offshore Holdings LLC, which is ultimately a 50/50 joint venture between energyRe and Invenergy. As discussed in greater detail in Section 1.4, Invenergy is the world's largest privately held developer and operator of renewable power, and energyRe (an affiliate of Related Companies) is a New York-based company focused on solving complex infrastructure and energy challenges.
- **Atlas Renewables Holdings L.P.** is indirectly controlled by Blackstone Inc., a Delaware corporation listed on the New York Stock Exchange, and part of Blackstone's infrastructure strategy. Blackstone targets a diversified mix of core+, core, and public-private partnership investments across all infrastructure sectors, including energy infrastructure, transportation, digital infrastructure, and water and waste, with a primary focus in the US.
- **CDPQ Investments (US) Inc.** is a long-term institutional investor that manages funds primarily for public and parapublic pensions and insurance plans in the province of Quebec. As of December 31, 2022, CDPQ held CAD $401.9 billion in net assets. As one of Canada's leading institutional fund managers, CDPQ invests globally in major financial markets, private equity, infrastructure, debt and real estate.
- **FirstLight PSP Offshore Wind LLC** is majority owned by PSP Investments. It owns and operates approximately 1.6 GW of clean energy assets in North America, including the largest portfolio of clean generation assets in ISO New England. FirstLight's portfolio covers 26 facilities, predominately hydroelectric, in the US Mid-Atlantic, US Northwest, and Ontario, and includes significant energy storage projects, including the 1,168 MW Northfield Mountain pumped-storage facility and approximately 200 MW of conventional hydroelectric facilities. FirstLight is also developing a pipeline of nearly 200 MW of new solar and battery storage projects at sites it owns in Massachusetts and Connecticut.
- **Ullico Infrastructure New York Bight Holdco LLC** is a wholly owned subsidiary of the Ullico Infrastructure Fund, which provides institutional investors with access to infrastructure investments that deliver long-dated, low-volatility, and inflation-linked cash flows. Ullico is the only labor/union-owned North American insurance and investment company. For more than 95 years, Ullico has provided financial and insurance products and services to meet the needs of union employers and employees. Its portfolio of investments spans the spectrum of infrastructure including power, utilities, energy, transportation, and digital infrastructure.

Collectively, the investor consortium backing Leading Light Wind provides unmatched financial resources to develop and execute the project.

Development of the Leading Light Wind project is being led by Invenergy and energyRe (the project sponsors). Bios for the project's contributing officers from Invenergy and energyRe are provided on the following pages. Leading Light Wind is committed to becoming a more diverse, equitable, and inclusive team as we are building out a more sustainable world. A diversity, equity, and inclusion (DEI) plan for selecting new project officers has been developed by energyRe's Tanya Diaz-Goldsmith, who has been appointed as the overall DEI Officer for Leading Light Wind.

Invenergy officers

Michael Polsky, Founder and Chief Executive Officer

With more than 30 years of experience in the energy industry, Michael is widely recognized as a pioneer and industry leader in the cogeneration and independent power industry in North America. Michael founded Invenergy, a leading clean energy company in 2001. Previously, in 1991, Michael founded SkyGen Energy — a developer, owner, and operator of natural gas-fueled generating plants — which was purchased by Calpine Corporation in 2001. Before forming SkyGen, Michael cofounded and was president of Indeck Energy Services Inc.

Jim Murphy, President and Corporate Business Leader

As Invenergy's cofounder, president, and corporate business leader, Jim is responsible for the general management of the company, leading and overseeing the legal, finance, government affairs, communications, and administration functions. Jim has negotiated more than $40 billion in private equity and debt investments, power plant acquisitions and sales, and project financing over his 40 years in the energy industry. He has managed organizations across the continuum from startup through growth and eventually liquidity events.

Bryan Schueler, Senior EVP and Construction Business Leader

Bryan leads Invenergy's construction business segment including procurement, construction, and project management for all Invenergy projects, as well as key domestic and international functions including environmental strategy and compliance, offshore wind, and Invenergy's Japan presence. Bryan has experience in plant operations and engineering, as well as the development, permitting, and construction of wind, solar, natural gas, biomass and landfill gas projects. Previously, he was a project director at Calpine Corporation and SkyGen Energy.

Meghan Schultz, EVP and Chief Financial Officer

Meghan leads Invenergy's finance and capital markets team and has overseen the execution of more than $28 billion in private equity investments, power plant acquisitions and sales, and project debt and tax equity financing. She has been involved in the execution of over 18,000 MW of renewable energy projects and 3,000 MW of new natural gas projects. Prior to joining Invenergy in 2008, Meghan was a Vice President at Bank of America and at ABN AMRO. Her industry leadership has been recognized by Women of Renewable Industries and Sustainable Energy (WRISE), *Power Finance and Risk*, and *A Word About Wind*.

Bill Bradley, EVP and Counsel

Bill leads Invenergy's legal and compliance departments. Previously, Bill was General Counsel for GE Energy Financial Services, GE's global energy investment division, where he was part of the senior leadership team and was responsible for legal, compliance, and regulatory affairs. Bill has extensive experience in global law firms and as in-house counsel for companies, where he has developed and managed sophisticated legal teams. His work in the energy and financial services industry has focused principally on power and infrastructure development, finance, mergers and acquisitions, and capital market transactions.

Jesse Campbell, SVP, Financial Operations and Administration

Jesse oversees Invenergy's accounting, tax, treasury, financial planning, financial systems, business transformation, and real estate functions. Prior to Invenergy, Jesse was the Chief Financial Officer at Suzlon Wind Energy Corporation (SWECO) from 2015 to 2020, where he led all the company's North American finance, human resources, and IT functions.

Will Borders, EVP, Legal and Chief Compliance Officer

Will oversees Invenergy's multidisciplinary global compliance function, ensuring that business activities across the company meet and exceed global regulatory and contractual requirements. Previously Will served as Invenergy's Deputy General Counsel, with oversight of all legal matters for the company, including financing transactions, mergers and acquisitions, general commercial transactions, compliance and corporate governance best practices, government and regulatory affairs, corporate formation, and maintenance and employment-related issues. Prior to Invenergy, Will was in the energy practice of DLA Piper.

Kelly Speakes-Backman, EVP, Public Affairs

A nationally recognized thought leader in the clean energy industry, Kelly leads Invenergy's communications, government affairs, and marketing activities. Immediately prior, she served as the Acting Assistant Secretary for the Office of Energy Efficiency and Renewable Energy of the Department of Energy in the Biden administration, leading the office's $3.2 billion portfolio of renewable power, energy efficiency, and sustainable transportation. Kelly has spent more than 25 years working on energy and environmental issues in the public, private, and nongovernmental organization sectors.

energyRe officers

Jeff Blau, Chairman and Founding Partner

Jeff has served as Chairman and Founding Partner of energyRe since its formation in November 2021, and is CEO and a partner of Related Companies. In his position at energyRe, Jeff led the recruitment of the company's executive team, and continues to oversee the company's foundational, nation-leading renewable energy projects. As CEO of Related, he is responsible for directing and overseeing new developments worth over $60 billion in virtually every sector of the real estate industry, with a strong emphasis on sustainability and environmentally responsible development. Jeff serves on the Board of Directors of Equinox Holdings, Inc., the Central Park Conservancy, the New York City Partnership Fund, Robin Hood Foundation, Real Estate Roundtable, the Wharton Graduate School, the University of Michigan, Trinity School, Lincoln Center, and the Mount Sinai Medical Center.

Miguel Prado, Chief Executive Officer

Miguel oversees the management and expansion of generation and transmission assets to meet the growing demand for reliable, resilient, and responsive renewable energy solutions with domestic sources that create economic and community benefits in American cities. Prior to his current position, Miguel served as CEO of North America at EDP Renewables, a global leader in the renewable energy sector. Under his leadership, EDP Renewables North America tripled its growth and the value of the company's publicly traded shares. Miguel was a key driver of the company's growth to the fourth-largest wind generation company in the world. Miguel managed EDP Renewables' 1,000 US-based employees and oversaw the company's 8.8 GW of renewable projects under management, more than $11 billion of assets and a development pipeline of more than 15 GW.

Kenneth P. Wong, Founding Partner, Chief Operating Officer, and Director of International Development

Kenneth is responsible for overseeing the day-to-day operational, corporate, and business functions of energyRe, and oversees development activities in international markets. Kenneth has over 40 years of business experience overseeing the development of a broad range of real estate assets from retail shopping centers to theme parks and planned communities in the US and internationally, representing well over $30 billion worth of assets. His executive experience includes developing and operating businesses in public and private companies, bridging the worlds of real estate, entertainment, design, and technology. Kenneth rejoined Related in March 2008 from Westfield America, where he served as President and was responsible for all operations, development, leasing, marketing, and management of the $15 billion Westfield portfolio.

Pedro Pereira, Chief Financial Officer and Chief Business Development Officer

Pedro directs energyRe's corporate development activities, managing investments and financing to meet the growing demand for renewable energy solutions, overseeing the company's strategy and planning functions, and advancing the management and expansion of corporate areas across the different business platforms. Prior to joining energyRe, Pedro was the Global Head of Business Development and a member of the Investment Committee at EDP Renewables. In these roles, Pedro led the vision and strategy definition for new markets with the implementation of the company's international growth platform, all international merger and acquisition activities, and global or regional partnerships. Pedro also served as the Director of Finance at EDP Renewables North America — having originated and executed $4 billion of tax equity investments and project financings in the US, Canada, and Mexico.

Ryan Brown, Chief Operating Officer

Prior to joining energyRe, Ryan was EVP of EDP Renewables North America for the Eastern Region, Mexico, and Canada. In this role, Ryan led the company's business in regions covered by the Midcontinent Independent System Operator (MISO), PJM Interconnection, New York Independent System Operator (NYISO), and ISO New England (ISO-NE), and in the Southeast, Mexico, and Canada. He also oversaw government and regulatory affairs for the platform. Ryan was responsible for a region that successfully developed 33 wind and solar projects totaling nearly 4,300 MW in operation or under construction and built a robust project pipeline to deliver additional growth. He was also a member of EDP Renewables North America's seven-person executive team and a board member of Mayflower Wind, a Shell and Ocean Winds offshore wind farm joint venture.

Charles John O'Byrne, EVP Policy

Charles is EVP of Policy at energyRe and EVP for Policy at Related Companies. He serves in a leadership role on a wide range of assignments involving government affairs on the federal, state, and local levels; labor issues; litigation matters; and questions of strategy on projects within the Related portfolio, including environmentally conscious real estate developments and pioneering urban energy solutions that address increasing demands on cities. Charles was trained as an attorney, and his career prior to joining Related involved government, religion, academia, and business. A former Jesuit, he worked at Columbia and Harvard Universities as a chaplain and teaching fellow. He also served as Associate General Counsel for the Archdiocese of New York. Charles spent more than five years in state service acting as Chief of Staff to the Senate Minority Leader, Chief of Staff to the Lieutenant Governor, and Secretary to former Governor David A. Paterson.

Glenn Goldstein, President of Clean Path New York

Glenn is President of Clean Path New York for energyRe. He leads energyRe's New York portfolio, which includes overseeing large-scale infrastructure and generation projects. With over 25 years of experience in development and complex legal matters, Glenn brings expertise to every element of the development process, including site acquisition and planning approvals, financing, construction, design, leasing, and property management. As President of Related Retail, Glenn, in conjunction with other Related principals, was instrumental in the development of the 650,000-leasable-square-foot Shops & Restaurants at Hudson Yards. One of New York City's premier locations for fashion and dining, Hudson Yards has set a new benchmark for shopping in a dynamic, mixed-use setting. Prior to his work at Hudson Yards, Glenn led the development of several large-scale retail destinations including Gateway Center phases I and II, the Bronx Terminal Market, College Point Retail Center, Clifton Commons, and The Hub Office and Retail Complex.

1.3 Key employees

The Leading Light Wind project team draws on a diverse set of experiences in the renewable energy and offshore sectors. Since being declared a provisional winner in the New York Bight auction in February 2022, we have focused on compiling a skilled team focused on a shared mission to support New Jersey in achieving its offshore wind goals and targets, including those laid out in the OWEDA and Executive Order No. 307. Leading Light Wind acknowledges and agrees to the terms related to contingent projects set forth by NJBPU in Section 1.3 of the Solicitation Guidance Document.

Leading Light Wind's hiring strategy has been centered on securing team members with experience in developing large infrastructure projects of a similar scope, including complex ocean-based projects in the United States and across the globe.

The key employees identified herein are members of the team who have unique knowledge and experience across the full spectrum of large-scale power generation project development, including engineering, development, procurement, permitting, external affairs, and energy markets. Many team members have previous experience with offshore wind, including in the nascent US market. Together, the team has the range of skill sets necessary to develop, operate, and manage this project and bring its associated benefits to the state of New Jersey.

Table 1-1 provides selected relevant project experience by key employee.

Wesley Jacobs, Senior Project Director, Offshore Development, Invenergy

Alberto Osorio-Liebana, Senior Director, Offshore Development, Invenergy

Louis Feldman, Director Renewable Project Management, Offshore Development, Invenergy

Michael Porto, External Engagement Director, Offshore Development, Invenergy

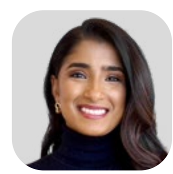
Deniz Ozkan, PhD, Senior Commercial Director, Offshore Development, Invenergy

Aaron Geschiere, Manager, Offshore Wind Origination, Invenergy

Daniel Birmingham, Senior Procurement Manager, Offshore Development, Invenergy

Nash Tahmaz, Senior Vice President, Offshore Wind, energyRe

Laura Morse, Director, Environmental Compliance and Strategy, Invenergy



Amy Varghese, Vice President, External Affairs, energyRe

Key employee	Project	Type	Responsibilities
Wesley Jacobs	Atlantic Shores Offshore Wind Project 1 (Atlantic Shores)	Offshore wind, 1,510 MW	Business Development Manager (Local Content Lead)
	Atlantic Shores Offshore Wind portfolio (Atlantic Shores)	Offshore wind, 3,000 MW	Strategic Procurement and Local Content Lead
	Sakhalin-1, Russia Far East LNG (ExxonMobil)	Planned LNG liquefaction plant	Development Manager
	Alaska North Slope Gas (ExxonMobil)	Planned gas development project	Opportunity Assessment Manager
	Angola Block 15 Gas Gathering Project (ExxonMobil)	Subsea pipeline facility	Business Services Manager (cost, schedule, project controls lead)
	Oil and gas exploration projects globally (ExxonMobil)	Various exploration pursuits and programs, with focus on Sub-Saharan Africa, Russia, and South America	Business Development Manager, Negotiation Lead, Planning and Analysis Global Manager
Louis Feldman	Koshkonong Solar (Invenergy)	Solar, 300 MW	Project Director
	Badger Hollow Solar (Invenergy)	Solar, 300 MW	Project Director
	Paris (Invenergy)	Solar, 200 MW	Project Director
	Darien (Invenergy)	Solar, 250 MW	Project Director
	Plymouth and Atchison County Wind Center (Invenergy)	Onshore wind, 300 MW	Senior Project Manager
	Appomattox (Shell)	Oil, 200,000 bopd	Transportation and Installation Project Engineer and Package Manager
	Stones (Shell)	Oil, 50,000 bopd	Transportation and Installation Project Engineer and Package Manager
	Mars B (Olympus) (Shell)	Oil, 150,000 bopd	Transportation and Installation Project Engineer and Package Manager
Nash Tahmaz	Sheringham Shoal (Equinor)	Offshore wind, 317 MW	Construction and Prepare for Operations Manager
	Dudgeon (Equinor)	Offshore wind, 402 MW	Development Manager
	Hywind Scotland (Equinor)	Offshore Wind, 30 MW (UK)	Manager, Head of Bankability
	Dogger Bank (Equinor)	Offshore wind, 3,600 MW (UK)	Manager
	Surf (Equinor)	Offshore wind, 250 MW (Spain)	Business and Commercial Lead
	Empire Wind (Equinor)	Offshore wind, 2,100 MW	East Coast Business Development Lead
	Beacon Wind (Equinor)	Offshore wind, 2,400 MW	East Coast Business Development Lead

Table 1-1. Key employee experience.

Key employee	Project	Type	Responsibilities
Deniz Ozkan, PhD	South Coast Mayflower (Shell)	Offshore wind, 2,400 MW+	Senior Valuation Lead
	Atlantic Shores (Shell)	Offshore wind, 3,000 MW+	Senior Valuation Lead
	Mid-Atlantic Offshore Development (Shell)	Transmission, 3,500 MW+	Senior Valuation Lead
	European Projects (Shell)	Offshore wind, 3,000 MW+	Senior Valuation Lead
	Atlantic Wind Connection Project (Atlantic Grid Development)	Offshore transmission, 6,000 MW	Director of Analysis, Research and Systems Engineering
Daniel Birmingham	Las Fenicias (invenergy)	Onshore wind, 168 MW	Project Manager
	El Indio (Invenergy)	Onshore wind, 65 MW	Project Development
	Zacatecas (Invenergy)	Solar, 104 MW	Project Development
	Chihuahua (Invenergy)	Solar, 13.7 MW	Project Development
	Alle-Catt (Invenergy)	Onshore wind, 340 MW	Project Engineer
	Short Mountain (Invenergy)	Onshore wind, 80 MW	Project Engineer
	Potter (Invenergy)	Onshore wind, 90 MW	Project Engineer
	North and South Deuel (Invenergy)	Onshore wind, 301 MW	Project Engineer
	Freeborn (Invenergy)	Onshore wind, 200 MW	Project Engineer
	Palo Alto (Invenergy)	Onshore wind, 340 MW	Project Engineer
	Orient (Invenergy)	Onshore wind, 500.8 MW	Project Engineer
	Chickasaw (Invenergy)	Onshore wind, 200 MW	Project Engineer
	Hardin (Invenergy)	Onshore wind, 250 MW	Project Engineer
	Ida Grove II (Invenergy)	Onshore wind, 250 MW	Project Engineer
	Kossuth (Invenergy)	Onshore wind, 152.2 MW	Project Engineer

Table 1-1 (continued). Key employee experience.

Key employee	Project	Type	Responsibilities
Laura Morse	Bay State Wind (Ørsted)	Offshore wind, TBD	Permitting and environmental compliance
	South Fork Wind (Ørsted)	Offshore wind, 132 MW	Permitting and environmental compliance
	Revolution Wind (Ørsted)	Offshore wind, 704 MW	Permitting and environmental compliance
	Sunrise Wind (Ørsted)	Offshore wind, 924 MW	Permitting and environmental compliance
	Ocean Wind I (Ørsted)	Offshore wind, 1,100 MW	Permitting and environmental compliance
	Ocean Wind II (Ørsted)	Offshore wind, 1,148 MW	Permitting and environmental compliance
	Skipjack Wind (Ørsted)	Offshore wind, 966 MW	Permitting and environmental compliance
	Block Island Wind Farm (Ørsted)	Offshore wind, 30 MW	Permitting and environmental compliance
	Coastal Virginia Offshore Wind (Dominion/Ørsted EPC)	Offshore wind, 30 MW	Permitting and environmental compliance
	Shell Alaska (Shell)	Oil and gas exploration drilling, Chukchi and Beaufort Seas	Permitting and environmental compliance
Alberto Osorio-Liebana	Energía del Pacífico LNG-to-power (Invenergy)	Natural gas, 380 MW	Project Director, Offshore Engineering
	CCGT Tula Paquetes (Initec Energia Mexico)	Natural gas, 2 x 275 MW	Director of Engineering
	CCGT Centro Morelos I (Initec Energia Mexico)	Natural gas, 640 MW	Director of Engineering
	ENG Baja California Sur IV (Abengoa)	Natural gas, 43 MW	Managing Director
	CCGT A3T Nuevo Pemex (Abengoa)	Natural gas, 230 MW	Managing Director
	Solana (Abengoa)	Solar, 280 MW	Director of Civil, Structural and Architectural Department
	Shams 1 (Abengoa)	Solar, 100 MW	Director of Civil, Structural and Architectural Department
	Solarcor (Abengoa)	Solar, 2 x 50 MW	Director of Civil, Structural and Architectural Department
	Helios (Abengoa)	Solar, 2 x 50 MW	Director of Civil, Structural and Architectural Department
	Solaben (Abengoa)	Solar, 4 x 50 MW	Director of Civil, Structural and Architectural Department
	Agua Prieta II (Abengoa)	Solar, 16 MW	Director of Civil, Structural and Architectural Department

Table 1-1 (continued). Key employee experience.

Key employee	Project	Type	Responsibilities
Alberto Osorio-Liebana (continued)	PS50 (Abengoa)	Solar, 50 MW	Director of Civil, Structural and Architectural Department
	ABBK, 2nd Generation Biomass (Abengoa)	Biomass, 25 million gallons	Civil Engineering Manager
	ABF, 1st Generation Bioethanol (Abengoa)	Biomass, 250 million liters	Civil Engineering Manager
Michael Porto	Clean Energy Commitment (Con Edison)	Energy and utilities	Manager, City Government Affairs
	Second Avenue Subway (MTA)	Transit, $4 billion	Project Manager, External Affairs
Amy Varghese	Moynihan Train Hall (Empire State Development)	Transit, $1.6 billion	Communications and Public Affairs
	Jacob K. Javits Center Expansion (Empire State Development)	Public infrastructure, $1.5 billion expansion	Communications and Public Affairs
	Belmont Park Redevelopment Project (Empire State Development)	Public infrastructure, $1.3 billion redevelopment	Communications and Public Affairs

Table 1-1 (continued). Key employee experience.

In addition to the key employees, Leading Light Wind has aggressively built out a larger, robust team of professionals with a wide range of experience and skillsets across project development, finance, permitting, design, construction, diversity, equity, and inclusion (DEI), and external affairs. As of May 2023, Leading Light Wind is staffed with approximately [redacted] at Invenergy alone, and there are over 100 people from Invenergy and energyRe that spend at least some of their time on Leading Light Wind, providing the necessary scale for project execution. Bios for key employees, as well as other select employees, are provided on the following pages.

[redacted]

Development and finance

Wes Jacobs

Wes is a Senior Director, Offshore Wind at Invenergy and the Project Director for Leading Light Wind, directing development activities for the project. He has over 20 years of experience in energy, with roles spanning capital project development, supply chain management, economic analysis, and new business development. Before joining Invenergy, Wes was a Business Development Manager for Atlantic Shores Offshore Wind, where he led strategic supply chain localization initiatives, including design and implementation of the $848 million local spend commitment for Atlantic Shores 1, a central element of the company's winning bid into New Jersey's second offshore wind solicitation.

Louis Feldman

Louis is the Deputy Project Director and Director of Project Execution for Leading Light Wind. Louis has been with Invenergy since 2019 and has held project development and project management roles for wind, solar, and battery storage. His experience includes working as the developer, manager, and director for the 300 MW Outlaw Wind project in Atchison County, MO, which came online in 2021 and managing execution of over 1 GW of solar generation in Wisconsin. Prior to joining Invenergy, Louis supported various project management and project engineering roles with Shell, with a focus in deepwater offshore transportation and installation.

Nash Tahmaz

Nash is Senior Vice President, Offshore Wind for energyRe. Nash has more than 20 years of experience in the energy industry and more than a decade of experience in offshore wind. Prior to joining energyRe, he was Leader, Offshore Wind Execution at Equinor ASA/UK, where he led the US East Coast offshore wind business development working group on behalf of the partners BP and Equinor. Nash was also involved among others in the development and bankability of Hywind Scotland, the world's first floating offshore wind farm, and Dogger Bank, the world's largest offshore wind farm, where he was head of operations and safety.

Deniz Ozkan, PhD

Deniz is Senior Commercial Director, Offshore Development at Invenergy and leads commercial strategy for contracting, economic modeling, and valuation of offshore projects. She has over 17 years of offshore wind and transmission experience, with a focus on system design, cost, and financial optimization of development and interconnection projects. Prior to joining Invenergy, Deniz led economic and financial analysis and development of offshore wind projects at Shell, focusing on South Coast and Atlantic Shores projects in the US and investment opportunities in Europe. She also served as Director of Analysis, Research and Systems Engineering at Atlantic Grid Development, an HVDC multi-terminal offshore transmission backbone project. Deniz holds a doctoral degree in engineering management and continues to teach as guest lecturer at the University of Delaware's Offshore Wind Skills Academy.

Aaron Geschiere

Aaron is a Manager, Offshore Wind Origination at Invenergy, primarily focused on bid development and offtake strategy for Invenergy's offshore wind portfolio. In addition, Aaron supports lease auction preparation and M&A activity for Invenergy in the offshore wind space. Prior to joining Invenergy, Aaron primarily worked in energy markets consulting, working with a wide range of public, private, and nonprofit sector clients on renewable policy development, policy analysis, markets forecasting, new market entry, renewable bid development, and competitive analysis of procurement outcomes.

Jorge Ayala

Jorge is a Senior Manager, Offshore Wind at Invenergy, working primarily on interconnection strategy and execution. Prior to joining Invenergy, Jorge worked on business development with Equinor, where he focused on the interconnection solution for Empire Wind 2, which was awarded an Offshore Wind Renewable Energy Credit (OREC) contract by NYSERDA in January 2021. Prior to Equinor, Jorge worked at National Grid on large-scale energy project development, including work related to the Revolution Wind offshore wind project and work as an electric trader.

Katya Samoteskul

Katya is a Senior Manager, Offshore Wind at Invenergy, working primarily on transmission line development. Katya has ten years of experience in the energy industry, including seven years with Invenergy, with her experience spanning solar, wind, energy storage, and natural gas projects. Until June 2021, she led Invenergy's development team in Indiana, growing the portfolio from 450 MW to about 3,000 GW in three years. Her team's responsibilities included real estate, stakeholder engagement, permitting, property tax abatements, and engaging with various internal and external multidisciplinary teams to find solutions to numerous challenges.

Jonathan Furman

Jonathan is an Associate at energyRe, where he focuses on capital markets and financing solutions across a variety of renewable energy technologies. Before joining energyRe, Jonathan served as Advisor to the United States Secretary of Transportation, focusing on infrastructure development and finance, emerging transportation technologies, and transportation safety. Jonathan collaborated directly with senior Department of Transportation leadership and served as the Secretary's primary liaison with members of Congress, executive branch officials, and private sector stakeholders.

Nick Wagner

Nick is a Development Analyst on the Offshore Wind team at energyRe, where he provides support on development activities, surveying, due diligence, stakeholder engagement, and real estate work. Prior to joining energyRe, Nick was a Technical Advisory Services Analyst with Arup's Transaction Advice group, advising owners, sponsors, and lenders on the structuring, financing, and delivery of projects in the energy and infrastructure sectors. Among his recent experience, Nick has conducted technical due diligence for the potential acquisition of a stake in a portfolio of offshore wind farms along the US Atlantic coast and advised on the successful acquisition of a large portfolio of district energy systems.

Megan Schneir

Megan is the Vice President of Finance and Capital Markets for Leading Light Wind. Megan has been with Invenergy since 2016 and has supported and lead closings, fundings and conversions of debt, and tax equity financings for onshore wind, solar, and thermal projects in the US. Prior to joining Invenergy, Megan worked in investment banking at KeyBanc Capital Markets, supporting various sell-side transactions.

Permitting, design, and construction

Alberto Osorio Liebana

Alberto is Senior Director, Offshore Engineering and leads the offshore engineering team at Invenergy. Alberto has over 19 years of experience leading and managing multidisciplinary engineering and construction teams on major, complex infrastructure projects. Alberto's experience spans a wide range of project types and technologies through development and EPC phases, including offshore projects, thermal power plants, biofuel facilities, transmission lines, and other infrastructure projects. Most recently, Alberto served as Project Director for the Energía del Pacífico (EDP) LNG to power facility in El Salvador.

Guillaume Hardouin

Guillaume is a Senior Manager, Offshore Engineering at Invenergy. Guillaume has almost 20 years of engineering experience, with a focus on the offshore space in oil and gas as well as offshore wind. Prior to joining Invenergy, Guillaume was a Senior Field Development Engineer and Study Manager at TechnipFMC on its New Energy Ventures team, where he worked on a wide variety of efforts for the Magnora Offshore Wind partnership. These included management of desktop studies for seabed investigation, and environmental impact assessment and technology screening and recommendations for turbines, foundations, cables, and mooring.

Tom Egan

Tom is a Senior Manager, Renewable Electrical Engineering at Invenergy. Tom has been involved as an electrical engineer in over 2 GW of wind, solar, battery storage, and thermal power generation projects. On the offshore wind side, Tom manages and leads the evaluation of potential interconnection technology solutions and directs desktop studies. Prior to joining Invenergy, Tom was an electrical engineer with the Kiewit Engineering Group.

Laura Morse

Laura is a Director of Environmental Compliance and Strategy at Invenergy, where she leads federal, state and local permitting for offshore wind and provides strategic input to the offshore wind business unit. Laura has over 25 years of science, conservation, management, and regulatory experience focused on the marine environment. Laura has held senior-level advisory positions for several energy developers and has pioneered innovative research, mitigation, and monitoring programs for the energy industry. She is a recognized leader in the energy and environmental field.

Daniel Birmingham

Daniel is a Senior Manager on Invenergy's offshore wind procurement team. He leads Invenergy's interactions with Tier 1 contractors for the Leading Light Wind project, including strategic partnering and procurement efforts. Prior to joining Invenergy's offshore wind team, Daniel spent five years supporting the development and construction of Invenergy's renewable energy pipeline in Mexico and Latin America. He started his career in oil and gas operations.

Brian Kerkhoven

Brian is a Director of Labor Relations at Invenergy and the Labor Liaison Officer for the Leading Light Wind project. Brian's relationships with labor leaders throughout New York City, Long Island, and New York State uniquely position him to be an effective interface between Leading Light Wind and organized labor. Brian joined Invenergy with nearly a decade of labor experience after serving as the Energy Policy Advisor for North America's Building Trades Unions (NABTU). He played an integral role in developing the relationships between labor and the nascent offshore wind industry in the US, leading to the first of its kind Memorandum of Understanding between organized labor and the eventual Project Labor Agreement signed between NABTU and Ørsted.

Jeff Lee Romero

Jeff is a Director Economic Development for Invenergy and Leading Light Wind. A development finance attorney and urban planner by training with over 20 years of experience in community and economic development, Jeff thrives in helping private and public sector stakeholders to innovate and grow. Jeff has experience overseeing high-profile industrial and manufacturing initiatives and programs, including the New York City Industrial Development Agency program. He also oversaw NYCEDC's efforts in applying for and winning a $50 million award under the federal new markets tax credit program. As a Principal at Karp Strategies, Jeff oversaw a number of projects in the Northeast to grow local offshore wind supply chains. Prior to joining Karp Strategies, Jeff spearheaded the economic development practice at Capalino.

Ross Diamond

Ross is a Manager with Invenergy's Environmental Compliance & Strategy team where he splits his time supporting permitting and agency engagement on Leading Light Wind and another Invenergy and energyRe project, Clean Path New York. Prior to moving to Mercer County, New Jersey and joining Invenergy, Ross worked with the New York City Department of Parks and Recreation where he led interagency conservation initiatives and projects and implemented wetlands restoration projects.

Diversity, Equity, and Inclusion

Tanya Diaz-Goldsmith

Tanya is the Director of Talent Development & Diversity for Related Companies and the Director of Diversity, Equity, and Inclusion for energyRe. She leads organizational diversity efforts, working to embed best-in-class diversity and inclusion practices into all facets of the business to support the company's commitment to advancing equity. Tanya has developed robust strategies to promote diversity that prioritize a holistic, people-centric approach and makes use of her decades of experience in real estate and nonprofit. Prior to joining Related, Tanya was the Senior Director of Learning & Organizational Development at the YMCA of Greater New York, where she led learning and development programs and organizational culture initiatives for over 4,400 staff. Tanya is a proud member of the board of directors of Rehabilitation Through the Arts, and sits on its DE&I committee. RTA is committed to breaking the cycle of incarceration by helping people in prison develop critical life skills through the arts.

External affairs

Michael Porto

Michael is the External Engagement Director for Leading Light Wind. He leads Leading Light Wind's overall communications and engagement strategy for elected and government officials, NGOs, local communities, labor, fisheries, and tribal communities. He has over 15 years of experience working at the intersection of sustainable infrastructure and public policy. Before joining Leading Light Wind, he served as Manager of City Government Affairs with Con Edison for nearly seven years. While there, he led the company's New York City government relations efforts, including the revamp of the company's Clean Energy Commitment. Previously, he was Director of Outreach and Planning at the Waterfront Alliance, and created the first version of WEDG, or Waterfront Edge Design Guidelines, a tool to promote resiliency, ecology, and public access for waterfront sites.

Amy Varghese

Amy is the Vice President of External Affairs for energyRe. She leads energyRe's external communications, such as media engagement and content management, that support the company's clean energy project portfolio — including the 1,300 MW HVDC Clean Path New York transmission project. Prior to joining energyRe, Ms. Varghese held several positions in New York City and State public service, including as Director of Communications for the Office of the New York City Comptroller and Press Secretary for Empire State Development, where she led communications for many of New York's largest infrastructure initiatives — including the redevelopment of the Moynihan Train Hall, the expansion of the Jacob K. Javits Center, Atlantic Yards, and the UBS Arena.

Jennifer Palestrant

Jennifer is the Senior Vice President of Public Affairs for Invenergy's Offshore Wind team. She previously worked at Fugro, a leading global geo-data specialist, where she led business development efforts for offshore wind in North and South America. Before joining Fugro, she worked closely with the Business Network for Offshore Wind (BNOW) to organize the 2022 International Partnering Forum in Atlantic City. In 2019, Virginia Governor Ralph Northam appointed Jennifer as Chief Deputy for the Virginia Department of Energy, Virginia's first Director of Offshore Wind and the Commonwealth's first female head of mining. Jennifer has served in roles across the maritime spectrum in Virginia and North Carolina, leading the US Coast Guard Maritime training program for Tidewater Community College and promoting maritime and offshore wind education nationwide.

1.4 Proposer experience

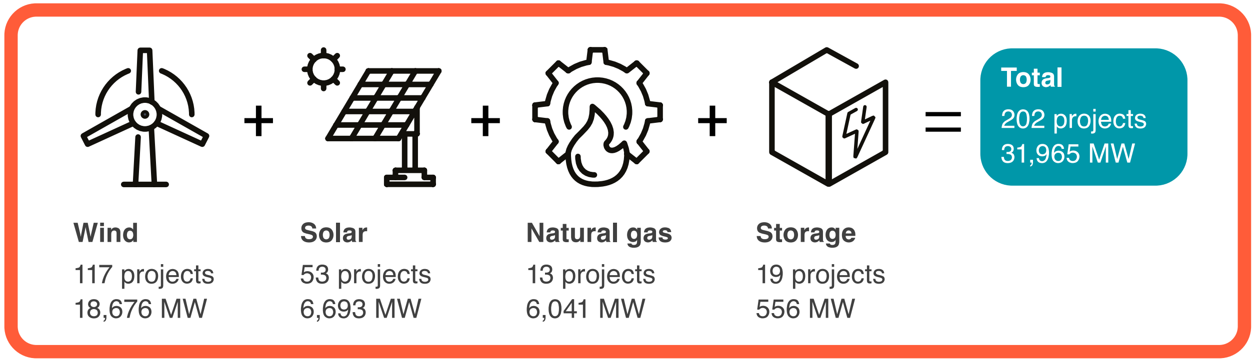


Figure 1-2. Invenergy's portfolio consists of four core technologies.

Invenergy

Invenergy's name is synonymous with American-led innovation in an industry undergoing transformation. As the world's largest privately held developer and operator of renewable power, Invenergy works with leading utilities, global brands, and public sector partners to take energy infrastructure projects from the drawing board to reality. Invenergy has over 2,100 employees who are united by a vision to be innovators building a sustainable world.

Headquartered in Chicago, and with one office in New York, the company has successfully developed over 30 GW of power projects across the Americas, Europe, and Asia. Invenergy projects enable a more sustainable, flexible, and resilient grid. Invenergy is committed to advancing the coexistence of its projects with their environments through development, construction, and operations. Figure 1-2 shows operating, under construction, or contracted project capacity that Invenergy has developed across four core technologies since its founding in 2001.

In addition to Invenergy's four core technologies, Invenergy recently announced its first green hydrogen project. Located in Illinois, the Sauk Valley Hydrogen Project will use solar energy and electrolyzing technology to produce up to 52 tons of green hydrogen a year. The project is anticipated to be commissioned by September 2023 and selling hydrogen by December.

Transmission experience

Because the core of Invenergy's business model is project development and long-term ownership and operations, the company takes great care to ensure the longevity, reliability, and cost-effectiveness of its assets, especially the transmission and interconnection infrastructure for its projects.

Since 2001, Invenergy has built all required transmission and distribution lines, generator step-up transformers and substations for its facilities in the California Independent System Operator (CAISO), Electric Reliability Council of Texas (ERCOT), MISO, NYISO, PJM, State Electricity Regulatory Commission (SERC) Reliability Corporation, Southwest Power Pool (SPP), and Western Electricity Coordinating Council (WECC) territories, and internationally.

Invenergy has developed, constructed, maintained, or operated ten transmission facilities inside and outside the PJM region. These are part of a larger list of transmission facilities that Invenergy has placed in service.

- Stony Creek 230 kV substation
- Prairie Breeze 230 kV substation
- Hardin 345 kV substation
- Shoreham 69 kV substation
- Number Three Wind 115 kV substation
- Prairie Breeze 230 kV transmission line
- Miami 345 kV transmission line
- Santa Rita 345 kV transmission line
- Wake 345 kV transmission line
- Traverse 345 kV transmission line

Invenergy has developed, permitted, and constructed this infrastructure across various terrains, state, and local jurisdictions, and in vastly differing environmental and regulatory conditions. As seen in Figure 1-3, this experience adds up to over 702 miles of high-voltage transmission lines, over 4,199 miles of distribution lines, 88 substations, 96 generator step-up transformers, and 5,323 pad-mounted transformers, of which several have been built for utilities.

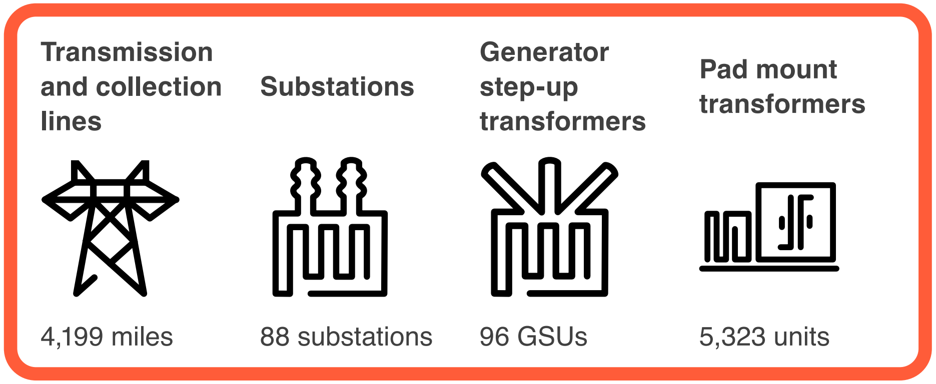


Figure 1-3. Invenergy's transmission development experience.

Invenergy's reputation with construction vendors as well as local project stakeholders including landowners has been built on trust, fairness, and proactive communication. While some developers cycle through construction vendors, more than half of Invenergy builds have been with construction partners it has worked with previously.

Invenergy is a leader in the development of high-voltage transmission projects, including the Clean Path New York, Grain Belt Express, New Mexico North Path, and Cardal Transmission projects. Details of these projects are as follows:

- **Clean Path New York** is a 175-mile, 1,300 MW high-voltage direct current (HVDC) project being developed with partners energyRe and the New York Power Authority. The $11 billion infrastructure project will enable the delivery of more than 7.5 million MWh of upstate clean energy into New York City.
- **Grain Belt Express** is an 800-mile, 5,000 MW HVDC project that will connect the SPP, MISO, Associated Electric Cooperative Inc. (AECI), and PJM grids to deliver renewable energy from Kansas to other markets. By improving regional transferability, the project is also expected to improve reliability across a wide region.
- **New Mexico North Path** is an HVDC transmission project that will deliver up to 4,000 MW of renewable energy from northeastern New Mexico to the Four Corners region, powering approximately two million homes.
- **The Cardal Transmission** project is located in Uruguay and consists of 55 kilometers of new 500 kV high-voltage transmission line, 20 kilometers of new 150 kV transmission line, a new 500 kV substation, and accompanying infrastructure. The project began construction in 2021 and is expected to achieve commercial operation in 2023. The new transmission line will connect to the Punta del Tigre substation and a 150 kV high-voltage line in Salto, Uruguay.

Invenergy solutions

Invenergy's unique combination of full-service solutions, end-to-end execution ability, and relationship-driven approach has won it a reputation for meeting customer's needs with high-value projects delivered on time and on budget. Traditionally, Invenergy's approach has been to develop, build, own, and operate projects, but the company provides a full range of services and flexible structures to serve utilities, corporate buyers, asset owners, and financial institutions.

Full range of services and flexible structures

- Development-transfers
- Build-transfers
- Engineering, procurement and construction (EPC)
- Joint Development Agreements
- Power Purchase Agreements (PPAs)
- Short- and long-term operations and maintenance and asset management

Invenergy has deep technical expertise at every step of the project lifecycle. This is rooted in an engineering culture that recognizes the critical importance of projects aspects like system design, transmission, and interconnection, which other companies are often comfortable outsourcing.

End-to-end, fully integrated capabilities allow Invenergy to serve as the single entity responsible for project development, construction, financing, and operations, with seamless execution from one phase to the next.

End-to-end, fully integrated capabilities

- Project development
- Permitting
- Engineering
- Transmission
- Interconnection
- Finance
- Project construction
- Asset management
- Operations and maintenance

Invenergy's involvement in projects, from early development through operations, ultimately benefits customers through higher project efficiency and quality. Invenergy's operations group constantly reports on how the latest equipment and system configurations perform under real-life conditions in the field. This immediately shapes procurement and design considerations by Invenergy's development, engineering, and construction groups working on pipeline projects, keeping Invenergy at the forefront of project design and constructions practices and methods. Invenergy boasts an impressive portfolio of 190 projects totaling 30,100 MW of power.

In addition to the services and capabilities it offers, Invenergy embraces a relationship-driven approach to business, based on the belief that a project can only be considered successful if all parties are engaged and satisfied. EPC contractors, customers, and financial institutions that have choices about the power sector companies they work with consider Invenergy a preferred partner. That is why Invenergy has successfully completed over $35 billion in transactions over the past two decades and over 50% of its projects represent repeat business.

Invenergy stands by a mission that brings clean energy to as many people as possible for as little cost as possible. By providing competitive prices in competitive markets, Invenergy has been able to provide flexible, reliable, and fair and equitable prices to all markets, especially in PJM.

More information on Invenergy can be found at invenergy.com.

energyRe

energyRe is an independent New York-based company focused on solving complex challenges and providing clean energy solutions. Guided by the values of community engagement, government partnership, and a demonstrated commitment to sustainability, energyRe is working towards a clean energy future for all.

Currently, energyRe is under development across 17 states: 10.5 GW of renewable generation across wind, solar, storage, and offshore wind projects, more than 500 miles of transmission, and 155 MW of distributed generation assets. energyRe is active in the development of HVDC transmission projects, including the 175-mile, 1,300 MW Clean Path New York project (along with Invenergy). This development pipeline represents a capital investment of $11 billion.

The executive team at energyRe has significant experience in renewable energy, infrastructure, engineering, and real estate development. energyRe's founding partners are principals of Related Companies, the most prominent private real estate firm in the US, with over $60 billion in assets owned or under development. Related started exclusively as an affordable housing developer in 1972 and today is one of the largest developers of affordable and workforce housing in the United States.

Named to *Fast Company* magazine's list of the 50 Most Innovative Companies in the World, Related is a champion of environmentally conscious real estate that continuously advances the design, construction, and operation of its properties to reduce their environmental footprint. In 2008, Related committed that every building developed in the United States, regardless of asset class, shall be certified Leadership in Energy and Environmental Design (LEED) Silver or better.

The principals of energyRe have developed the following marquee projects involving interconnection to Con Edison (ConEd) transmission infrastructure.

Hudson Yards cogeneration microgrid. Nearly every Eastern Rail Yard building at Hudson Yards was planned with the intention of installing cogen to help meet high-level LEED requirements. But the plants would have been small, because each building's individual demand for hot and chilled water varies greatly over the course of the day or week. Commercial buildings peak in the afternoon, residential buildings peak in the morning and evening, and retail and cultural facilities are busiest over the weekend when the commercial buildings are nearly empty.

In response, we consolidated the power and thermal demands of the buildings, establishing a microgrid and connecting the buildings to a thermal loop. Related established one larger plant instead of four smaller ones, making more than four times as much cogen capacity economically rational. This single-plant solution capitalizes on the mixed-used program of Hudson Yards.

Just as crucially, Related did not have to build out a costly electrical distribution network to implement the microgrid. Instead, the cogen plant delivers power directly to the ConEd grid, and ConEd offsets this power from the Eastern Rail Yard buildings' electricity bills. In the event that ConEd's grid fails, breakers open to isolate Hudson Yards from the rest of the grid, and cogen power will be delivered directly to the buildings.

All told, Related's 13.3 MW cogen plant, thermal loop, and ConEd interconnection cost nearly $200 million. To recoup some of this cost, Hudson Yard sells various forms of power to the Eastern Rail Yard buildings and tenants through a subsidiary set up for its business. This setup allows Hudson Yards to cover ongoing operating costs and the facilities' mortgage payments. It comes with a binding commitment that rates will be no higher than they would be if the microgrid did not exist.

Time Warner Center load management energy conservation. Time Warner Center (now known as Deutsche Bank Center) is a two-million-square-foot mixed-use skyscraper developed by Related Companies in 2003 and managed by Related Management thereafter. The facility has foot traffic of approximately 5,700 people per day for entertainment, luxury condominiums, retail shops, and hotel and commercial office space.

Time Warner Center, in partnership with NYSERDA and utiliVisor, undertook a load management energy conservation project that optimized chilled-water production for the past two years. Since the project has been implemented, approximately 1,407,014 kilowatt-hours (kWh) have been saved.

Figure 1-4. Related's Gateway Center battery storage system contributes to a cleaner, more efficient electric grid in its community.

Gateway Center battery storage project. Gateway Center, a mall for big-box stores in Brooklyn's East New York that is owned by Related, is the site of a 5 MW lithium-ion battery energy storage project, the largest battery storage project in New York City. The battery connects in front of the meter for dispatch based on ConEd's signal.

Enel X, the developer of the battery system that leases the space from Related, said in a statement, "The system's design enables a direct relationship between Enel X's energy storage resource and ConEd, while simplifying the lease transaction from a real estate perspective by removing the complexities of energy management and tenant participation from the structure."

The battery generates revenue by delivering capacity to the utility as part of its Brooklyn-Queens Neighborhood Project, which uses flexible resources to defer expensive grid upgrades.

More information on energyRe can be found at energyre.com.

Invenergy and energyRe select project experience is included in Table 1-4 at the end of the section.

1.5 PJM experience

Invenergy has an extensive track record as a developer, asset owner, and operator in PJM that dates back to the completion of the 99 MW Grand Ridge I wind project in 2008. Covering all four core technologies, Invenergy has developed 19 projects in the PJM footprint, totaling 3,442 MW of generating capacity (see Table 1-2). As of July 2023, Invenergy is also the operator of the vast majority of these projects in the PJM wholesale markets (17 projects; 3,348 MW).

Name	Technology	Capacity (MW)	Earliest COD year
Beech Ridge	Wind	101	2010
Beech Ridge II	Wind	56	2020
Beech Ridge Storage	Storage	32	2015
Blooming Grove	Wind	261	2020
Grand Ridge I	Wind	99	2008
Grand Ridge II	Wind	51	2009
Grand Ridge III	Wind	50	2009
Grand Ridge IV	Wind	11	2010
Grand Ridge IV Expansion Storage	Storage	3	2016
Grand Ridge IV Storage	Storage	2	2012
Grand Ridge Solar	Solar	20	2012
Grand Ridge Storage	Storage	32	2014
Hardin I	Solar	150	2021
Lackawanna	Natural gas	1,483	2019
Morgans Corner	Solar	20	2015
Nelson	Natural gas	600	2015
Nelson Expansion	Natural gas	380	2023
Todd	Solar	20	2021
Wilkinson	Solar	74	2019

Table 1-2. Invenergy completed projects in PJM.

At the time of their completion, many of Invenergy's projects are among the largest renewable infrastructure projects in their state. For example, at 150 MW, the Hardin I Solar Energy Center, located in Hardin County, OH, is the second-largest solar farm in the state. In addition, the Blooming Grove Wind Energy Center in Bloomington, IL supported approximately 500 jobs during construction and currently generates enough electricity to power about 69,000 American homes each year. As a leading partner to both commercial and industrial and utility renewable energy customers, Invenergy continues to develop projects across the PJM footprint to support these entities in reaching their sustainability goals.

In line with our track record in PJM, Invenergy is on the Board of Directors for the Mid-Atlantic Renewable Energy Coalition (MAREC) organization. Formed by a coalition of utility-scale solar, wind, and battery storage developers, MAREC is dedicated to the growth and development of renewable energy in the Mid-Atlantic region.

Upon achieving commercial operations, Invenergy Wind Offshore LLC would assume PJM market participant duties for the Leading Light Wind project. Invenergy Services LLC will operate the control center and act as the agent for the projects in the PJM markets. Invenergy Services is discussed further in Section 7 and Section 15.

Energy storage in PJM

As one of the earliest pioneers in advanced energy storage, Invenergy is also an experienced developer, owner, and operator of energy storage, including 68 MW in the PJM markets (see Table 1-3). Invenergy completed its first energy storage project in 2012 and since then has amassed over 150,000 hours of storage system runtime experience. Additional detail on Invenergy's experience with energy storage is provided in Section 2.

Name (state)	Technology	Capacity (MW)	COD year
Beech Ridge Storage (WV)	Storage	32	2015
Grand Ridge IV Expansion Storage (IL)	Storage	3	2016
Grand Ridge IV Storage (IL)	Storage	2	2012
Grand Ridge Storage (IL)	Storage	32	2014

Table 1-3. Invenergy's energy storage experience in PJM.

1.6 Disclosures

Leading Light Wind and its affiliates each have expansive enterprises of affiliate businesses that are engaged in typical volumes of commercial litigation commensurate with the size and scope of their businesses. However, none of this litigation is material to the proposal herein and Leading Light Wind's ability to develop and finance this project. Similarly, Leading Light Wind and its affiliates do not have any defaults, disbarments, investigations, indictments, or other actions to report.

Neither Leading Light Wind, its directors, employees, and agents, nor any affiliate of Leading Light Wind is currently under investigation by any governmental agency. In addition, neither Leading Light Wind nor its affiliates have been convicted, found liable, or been the subject of any debarment action for any act involving conspiracy, collusion, or other impropriety with respect to any contract offering.

1.7 Financial statements

Audited financial statements available for the project cosponsors are as follows:

Invenergy: Invenergy Renewables LLC's 2021 and 2022 audited financial statements are provided in Attachment 1.1.

energyRe: Consolidated 2022 audited financial statements for energyRe Clean Path Holdings LLC and Consolidated energyRe LLC are also provided in Attachment 1.2. Due to the stage of the company, energyRe does not have audited financial statements for 2021. However, additional details regarding energyRe's financial resources, its parent companies, and capabilities can be made available upon request.

1.8 Proposer experience: Additional detail

Project	Location	Project type, size, and technology	COD	Construction financing year	Permanent financing year	Form of debt financing	Form of equity financing	Capacity factor (est.)			Capacity factor (act.)			Availability factor			Reference
								2022	2021	2020	2022	2021	2020	2022	2021	2020	
Grand Ridge Energy Center (Invenergy) Three clean energy technologies are co-located at Grand Ridge Energy Center, including a 210 MW wind farm, 36 MW of battery storage, and a 20 MW solar farm, all developed and operated by Invenergy. The first project phase began operating in 2008 and the latest came online in 2016. A battery system helps maintain power quality and reliability for the PJM electric grid. The project provides enough power for 54,000 homes.	LaSalle, IL	• Generation • 210 MW Wind • 20 MW Solar • 36 MW Battery Storage	2008-2016	2008 and 2009 (Wind)	2008 and 2010 (Wind)	Construction Loan (Wind, 2008), Construction and Term Loan (Wind, 2009)	Tax Equity (Wind, 2008), Tax Equity Loan (Wind, 2009), 100% Sponsor Equity (Solar, Storage)	22.94%	21.66%	22.94%	21.57%	21.70%	22.63%	89.03%	94.96%	97.11%	Beth Conley 1 S. Wacker Drive Suite 1800 Chicago, IL 60606 312.429.2529
Samson Solar Energy Center (Invenergy) Samson Solar is a 1,310 MW project that spans across three Texas counties and is being constructed over five phases. Once fully complete in late 2023, Samson Solar will be the single largest solar project in the US. To-date, the project has secured offtake from a wide variety of C&I and utility offtakers.	Franklin, Lamar, and Red River Counties, TX	• Generation • Solar • 1,310 MW	2022-2023	2021	2022	Bridge and Construction Loans	Tax Equity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Beth Conley 1 S. Wacker Drive Suite 1800 Chicago, IL 60606 312.429.2529
Traverse Wind (Invenergy) Traverse Wind Energy Center is a 998 MW wind power generation facility in Custer and Blaine Counties that began operations in March 2022. The Project is sited on more than 100,000 acres and consists of 356 2.5- and 2.8-MW wind turbines, and an 84-mile transmission route. Invenergy developed, designed, and managed construction for the project and also serves as the initial project operator.	Custer and Blaine Counties, OK	• Generation • Wind • 998 MW	Mar. 2022	2019/2020	2021	Bridge and Construction Loans	Project sold to AEP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Beth Conley 1 S. Wacker Drive Suite 1800 Chicago, IL 60606 312.429.2529

Table 1-4. Project experience.

Project	Location	Project type, size, and technology	COD	Construction financing year	Permanent financing year	Form of debt financing	Form of equity financing	Capacity factor (est.) 2022	Capacity factor (est.) 2021	Capacity factor (est.) 2020	Capacity factor (act.) 2022	Capacity factor (act.) 2021	Capacity factor (act.) 2020	Availability factor 2022	Availability factor 2021	Availability factor 2020	Reference
Lackawanna (Invenergy) Lackawanna Energy Center is a 1,500 MW power plant equipped with GE's latest technology and has already generated fewer emissions and features the highest efficiency combustion turbines in its class. As a combined cycle facility, it maximizes usage of the heat from natural gas as fuel, increasing efficiency. Over the entire lifespan of the project, LEC will bring significant economic impact and benefits to the community.	Jessup, PA	• Natural Gas	Jan. 2019	2016	2019	Construction Loan, Term Loan, Working Capital Facility, Fixed Rate Note, Subordinated Loan	Preferred Equity	69.30%	82.58%	88.08%	72.25%	83.43%	72.76%	81.91%	86.44%	92.59%	Beth Conley 1 S. Wacker Drive Suite 1800 Chicago, IL 60606 312.429.2529
Beech Ridge Wind and Energy Center (Invenergy) Beech Ridge Wind Farm (I/II) is a 156.7 MW wind farm with 87 GE wind turbines. Beech Ridge Energy Center is a 31.5 MW/31.5 MWh storage facility co-located with the wind farm. Invenergy repowered the batteries at Beech Ridge in 2019, increasing energy output from an initial 12.5 MWh to 36MWh. Beech Ridge Wind and Energy Center provides fast-response regulation service to the PJM market.	Rupert, WV	• Generation • 156.7 MW Wind • 31.5 MW Battery Storage	Sep. 2010 (Wind)	2010 (BR I 100.5 MW) 2019 (BR II 56.2 MW) N/A (Storage)	2010 (BR I 100.5 MW), 2020 (BR II 56.2 MW), N/A (Storage)	Construction Loan, Term Loan (BR I), Construction Loan/90% Equity Sale (BR II), N/A (Storage)	N/A (BR I 100.5 MW), 90% Equity Sold to Southern (BR II), N/A (Storage)	29.93%	28.09%	29.91%	29.08%	26.72%	29.16%	90.80%	96.25%	96.95%	Beth Conley 1 S. Wacker Drive Suite 1800 Chicago, IL 60606 312.429.2529

Table 1-4 (continued). Project experience.

Grand Ridge Energy Center is the world's largest co-located wind, solar, and energy storage facility, totaling 266. It was the first Invenergy project for PJM. It maintains power quality and reliability for the PJM electric grid and serves as an innovation and research center for Invenergy.

Grand Ridge Energy Center			
Partner	Invenergy		
Location	LaSalle County, IL		
Project type	Generation		
Project size	210 MW wind, 20 MW solar, 36 MW battery storage		
Project technology	Wind, solar, storage		
COD	2008-2016		
Estimated and actual capacity factor (past three years)	**Year**	**Estimated**	**Actual**
	2022	22.94%	21.57%
	2021	21.66%	21.70%
	2020	22.94%	22.63%
Availability factor (past three years)	**Year**	**Availability factor**	
	2022	89.03%	
	2021	94.96%	
	2020	97.11%	
Reference	Beth Conley 1 S. Wacker Drive, Suite 1800, Chicago, IL 60606 312.429.2529		

Project description

Grand Ridge Energy Center is in LaSalle County, Illinois, 80 miles southwest of Chicago. Three clean energy technologies are co-located, including a 210 MW wind farm, 36 MW of battery storage, and a 20 MW solar farm, all developed and operated by Invenergy.

The first phase of the project began operating in 2008 and the latest came online in 2016. Renewable energy from Grand Ridge helps consumers meet sustainability goals, while its battery system helps maintain power quality and reliability for the PJM electric grid. The project serves the PJM power market, which stretches from northeastern Illinois to the Eastern Seaboard.

A center of innovation

Grand Ridge is the site of Invenergy's first solar project and its first storage project. The Brookfield solar test bed facility is located on site. Here, engineers and operators are able to evaluate and compare the performance of various system configurations and equipment types as well as test new operations strategies and techniques.

Grand Ridge Energy Center (continued)

The experience of developing, owning, and operating these projects has given Invenergy confidence in development, battery chemistry, deployment, and operations, paving the way for its large solar and storage portfolio today.

Invenergy is also funding the collection of data from five telemetry units that are attached to Bald Eagles to better understand their behavior and interaction with the landscape and operational wind facilities. This research is being conducted in partnership with the US Fish and Wildlife Service (USFWS) in Illinois.

Honors

The site has won both *Power Engineering* and *Renewable Energy World* magazines' Project of the Year Award as well as Energy Storage North America's Innovation Award.

Benefits

The project produces enough renewable energy to power 54,000 US homes. It provides fast-response regulation service to the PJM market. Emissions reductions from the project are equivalent to removing 68,000 cars annually from the road.

The project generates $4.88 million annually in wages, benefits, local taxes, and landowner payments. Three hundred thirty jobs were created during construction, and the project employs six full-time operations and maintenance staff.

Beech Ridge Wind I and II is co-located with Beech Ridge Energy Storage, totaling wind, solar, and energy storage facility, totaling 156.7 MW. It provides power to 27,000 homes, meeting electricity needs in the PJM market.

Beech Ridge Wind I/II and Energy Storage			
Partner	Invenergy		
Location	Wind I/II: Greenbrier County, West Virginia Energy Storage: Rupert, West Virginia		
Project type	Generation		
Project size	156.7 MW Wind, 31.5 MW battery storage		
Project technology	Wind, storage		
COD	2010-2020		
Estimated and actual capacity factor (past three years)	**Year**	**Estimated**	**Actual**
	2022	29.93%	29.08%
	2021	28.09%	26.72%
	2020	29.91%	29.16%
Availability factor (past three years)	**Year**	**Availability factor**	
	2022	90.80%	
	2021	96.25%	
	2020	96.95%	
Reference	Beth Conley 1 S. Wacker Drive, Suite 1800, Chicago, IL 60606 312.429.2529		

Project description

The Beech Ridge project is located in Greenbrier County, West Virginia and consists of 156.5 MW of wind capacity and 31.5 MW of battery storage capacity. The project was completed across three phases, inclusive of an initial 100.5 MW of wind capacity in 2010, 31.5 MW of battery storage in 2015, and an additional 56 MW of wind capacity in 2020.

Beech Ridge I and II, which is majority owned by Southern Power, consists of 87 GE wind turbine generators. Invenergy retains a minority stake in the project and provides operations and maintenance services for the facility via Invenergy Services. The battery storage project consists of 18 lithium-ion battery energy storage containers and a 138 kV transmission line gen-tie.

Benefits

The wind component of the project generates enough power for at least 27,000 West Virginia homes, providing clean energy and resource diversification to the coal-heavy West Virginia grid. The battery storage system complements the site's wind energy production, providing fast-response regulation and other services to the PJM grid.

Across all three project phases, Beech Ridge created hundreds of construction jobs as well as ongoing operations and maintenance jobs. The project provides millions of dollars in annual wages, benefits, local taxes, and landowner payments to local communities in Greenbrier County.

Beech Ridge Wind I/II and Energy Storage (continued)

Challenges

Development and operations of the Beech Ridge project required navigation of several challenges, including those related to siting and permitting. Chief among these were permitting challenges regarding potential project impacts to Indiana and Virginia big-eared bats. Ahead of completing construction, the project agreed to apply for an Incidental Take Permit (ITP) for the Indiana bat and to modify project operations to avoid potential impacts until the ITP was received. Protective measures included turbine adjustments during nighttime low wind speed events, when *Myotis* bat species are most likely to have a turbine encounter.

Energía del Pacífico, Ltda. de C.V. (EDP) is an LNG to power project at the Port of Acajutla, El Salvador. This $1 billion project, the largest private investment to date in El Salvador, achieved commercial operations in May 2022. The project meets about one third of El Salvador's total electricity needs while significantly reducing the amount of carbon and sulfur pollution in the air.

Energía del Pacífico, Ltda. De C.V. (EDP)			
Partner	Invenergy		
Location	Port of Acajutla, El Salvador		
Project type	Generation		
Project size	380 MW		
Project technology	LNG to power project		
COD	May 1, 2022		
Estimated and actual capacity factor (past three years)	**Year**	**Estimated**	**Actual**
	2022	N/A	N/A
	2021	N/A	N/A
	2020	N/A	N/A
Availability factor (past three years)	**Year**	**Availability factor**	
	2022	N/A	
	2021	N/A	
	2020	N/A	
Reference	Beth Conley 1 S. Wacker Drive, Suite 1800, Chicago, IL 60606 312.429.2529		

Project description

IIn 2013, the Government of El Salvador issued a call for electricity supply aimed at securing a 20-year supply of new electric power generation from sources other than heavy fuel. EDP secured the winning bid.

The EDP project consists of the following:

- 380 MW power plant that runs on natural gas, with one 28 MW common steam turbine generator
- Offshore LNG import terminal, including a dedicated, permanently moored, floating storage and regasification unit
- Natural gas pipeline approximately 1.1 miles (1.8 km) long, installed under the seabed and delivering gas to the power plant
- 27-mile (44 km) 230 kV double-circuit transmission line from Acajutla to Ahuachapán and its associated substations
- EDP's development, construction, and operations are led by Invenergy and supported by El Salvador-based partners Grupo Calleja, VC Energy de Centroamérica, and Quantum Energy. EDP includes El Salvador's first LNG-fueled power plant and the region's first floating storage and regasification unit.

Energía del Pacífico, Ltda. De C.V. (continued)

Challenges

Laying the groundwork for this project had its challenges, including regulatory approvals for offshore gas storage and transmission, the complex scope of the transmission network, designing novel physical components, and minimizing environmental and visual impacts. As project lead, Invenergy is leveraging decades of development, engineering, finance, construction and operating experience to execute this complex project alongside its partners. Most of the construction was executed during the worst spike of the COVID-19 pandemic. Commercial operation date (COD) was declared in May 2022, two months before the deadline according to the PPAs.

Investing in El Salvador

EDP completed project financing for the LNG-to-power project in December 2019. The project brings approximately $1 billion in foreign direct investment, making it the largest-ever private investment in El Salvador. Leading global financial institutions — Overseas Private Investment Corporation (succeeded by the United States International Development Finance Corporation), International Finance Corporation (IFC), IDB Invest, Finnish Export Credit Ltd., and KfW IPEX-Bank — are lenders to the project.

EDP's groundbreaking development and project financing has been recognized by multiple awards, including *Latin Finance*'s Infrastructure Financing of the Year Award and *Latin Lawyer*'s Project Finance (Energy) Award. EDP's successful financing demonstrates Invenergy's ability to proficiently structure project financing and to maintain and develop successful relationships with a wide range of partners.

EDP has also been recognized by the financing institutions as an exemplary project in the management and prevention of impacts originated by the COVID-19 pandemic to keep workers safe while the project continued progressing on schedule. This project was selected as an IFC case study due to the excellent gender-based violence prevention and response provided by the project team during execution. EDP was also honored at the 2022 Americas Energy Summit & Exhibition with the Americas LNG & Gas Project of the Year Award.

Complex transmission infrastructure

For the project, Invenergy is building a 27.3-mile (44-km) transmission line and three substations. The line will run from the coastal port town of Acajutla through mountainous terrain to Ahuachapán. It will connect to and strengthen the Central American Interconnection System (SIEPAC), supplying electricity to six Central American nations. The transmission is a showcase of Invenergy's execution abilities as the right-of-way negotiations had to be finalized before power plant construction could begin.

Benefits

EDP provides cleaner, more reliable energy for El Salvador, diversifying the energy mix and meeting more than 30% of the country's energy demand. Reliable power generation will drive economic growth and contribute to the stability of the region. The project created over 2,000 jobs during construction and more than 60 permanent jobs in its operational phase.

Invenergy is heavily invested in the social and economic advancement of the municipality of Acajutla. Invenergy is providing more than $500,000 of projects and initiatives each year that will improve the quality of life for local communities through improvements in basic infrastructure and social services. These include improvements in public streets and roads, a wastewater treatment plant in Acajutla, new power lines for remote boroughs without access to power supply, and donations of miscellaneous supplies to the communities of Acajutla, Ahuachapán, Sonsonate, San Pedro, and Santo Domingo de Guzmán.

Related worked closely with the City of New York and the Metropolitan Transportation Authority (MTA) on the development of Deutsche Bank Center (formerly Time Warner Center). Sitting atop the third-busiest subway station in the New York City transit system, Deutsche Bank Center proves that thoughtful urban design with a complementary mixture of uses and transportation improvements creates a whole project that is greater than the sum of its parts. The Deutsche Bank Center addressed the City's concerns to develop a positive neighborhood catalyst, while simultaneously meeting MTA's need to maximize the value of its site.

<table>
<tr><th colspan="4">Deutsche Bank Center</th></tr>
<tr><td>Partner</td><td colspan="3">energyRe</td></tr>
<tr><td>Location</td><td colspan="3">New York, NY</td></tr>
<tr><td>Project type</td><td colspan="3">Mixed use development</td></tr>
<tr><td>Project size</td><td colspan="3">2.8 million square feet</td></tr>
<tr><td>Project technology</td><td colspan="3">N/A</td></tr>
<tr><td>COD</td><td colspan="3">2004</td></tr>
<tr><td rowspan="4">Estimated and actual capacity factor (past three years)</td><td>Year</td><td>Estimated</td><td>Actual</td></tr>
<tr><td>2022</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2021</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2020</td><td>N/A</td><td>N/A</td></tr>
<tr><td rowspan="4">Availability factor (past three years)</td><td>Year</td><td colspan="2">Availability factor</td></tr>
<tr><td>2022</td><td colspan="2">N/A</td></tr>
<tr><td>2021</td><td colspan="2">N/A</td></tr>
<tr><td>2020</td><td colspan="2">N/A</td></tr>
<tr><td>Reference</td><td colspan="3">Jon Weinstein
30 Hudson Yards, New York, NY 10001
212.801.3902</td></tr>
</table>

Project description

The Deutsche Bank Center added drama to the city's skyline and serves as an urban catalyst that redefines the Columbus Circle neighborhood.

Related worked closely with the City of New York and the MTA on the development of the soaring 2.8-million-square-foot vertical mixed-use property.

Deutsche Bank Center (continued)

Active nearly 24 hours a day, the 80-story building reflects the pace and cadence of the city around it. It includes the following features:

- Bustling commercial office center, home to Deutsche Bank
- 338,000-square-foot retail and dining complex featuring world-renowned chefs Thomas Keller, Masa Takayama, and Michael Lomonaco
- 5-star Mandarin Oriental Hotel with 198 rooms and 46 suites
- 40,000-square-foot Equinox® Fitness Club
- 122-seat Jazz at Lincoln Center
- 199 luxury residences

Benefits

Completed in 2004, Deutsche Bank Center quickly became a mixed-use destination like New York City had never seen before. Today, its shops attract more than 16 million visitors annually and have helped establish the neighboring entrance to Central Park as the most popular entry to Manhattan's most beloved green space.

Acting as a bridge between the mature neighborhoods of Midtown Manhattan and the Upper West Side, Deutsche Bank Center created a new center of gravity for the Columbus Circle neighborhood due to its scale, diversity of offerings, and sensitive architectural and urban design.

Hudson Yards, Manhattan's first-ever LEED GOLD Neighborhood Development, was constructed over the Eastern Rail Yard of the Long Island Railroad, at the center of New York City's rapidly changing West Side. At the nexus of Chelsea and Hell's Kitchen, Hudson Yards is the largest private real estate development in New York since Rockefeller Center. It was co-developed by Related Companies and Oxford Properties Group.

Hudson Yards			
Partner	energyRe		
Location	New York, NY		
Project type	Mixed-use development		
Project size	18.1 million square feet		
Project technology	N/A		
COD	March 2019		
Estimated and actual capacity factor (past three years)	**Year**	**Estimated**	**Actual**
	2022	N/A	N/A
	2021	N/A	N/A
	2020	N/A	N/A
Availability factor (past three years)	**Year**	**Availability factor**	
	2022	N/A	
	2021	N/A	
	2020	N/A	
Reference	Jon Weinstein 30 Hudson Yards, New York, NY 10001 212.801.3902		

Project description

Hudson Yards is far more than a collection of towers and open spaces. It is a model for the 21st-century urban experience: an unprecedented integration of buildings, streets, parks, utilities, and public spaces that forms a connected, responsive, clean, reliable, and efficient neighborhood. The development is part of New York City's goal to transform the broader 42-block Hudson Yards District from a largely vacant, underdeveloped area into a vibrant mixed-use neighborhood of workers, residents, and visitors. The development is being achieved ahead of projections, with over 30 million square feet of new development completed or in construction since the rezoning in 2005.

Building an entire new neighborhood in the heart of Manhattan from the ground up afforded us the opportunity to recalibrate every aspect of a 21st-century, urban mixed-use neighborhood.

Since opening in March 2019, Hudson Yards has become a thriving destination for foodies, fashionistas, art lovers, park goers and tourists — not to mention home of the world's most innovative businesses and trendiest urban dwellers. Hudson Yards is home to dozens of restaurants and one-of-a-kind shopping experiences: The Shed, a unique cultural center; the first Equinox Hotel®; world-class medical facilities and lush gardens; and Edge,

Hudson Yards (continued)

the Western Hemisphere's highest outdoor observation deck. All of this is in addition to state-of-the-art office space, and the finest in luxury residences and affordable rental apartments.

To build the first half of Hudson Yards, a "platform" was constructed over the Eastern Rail Yard of the Long Island Railroad. Completed in 2016, the 10-acre platform bridges 30 working tracks, three subsurface tunnels used by Amtrak and New Jersey Transit, and the Gateway Tunnel, which is not yet in service.

The platform, which weighs more than 35,000 tons, is supported by 300 caissons ranging from four to five feet in diameter and 20 to 80 feet in depth. The caissons were drilled into the bedrock between existing tracks. In total, 25,000 tons of steel and 14,000 cubic yards of concrete were used in the platform's construction. Throughout construction, all train lines remained operational.

Supported by an advanced technology platform, operations managers monitor and react to power demands and temperature change to enhance the employee, resident, and visitor experience. Communications are supported by a fiber loop designed to optimize data speed and service continuity for rooftop communications, as well as mobile, cellular, and two-way radio communications.

Resilience

Whatever the potential disruption — superstorm, brownout — Hudson Yards has the onsite power-generation capacity to keep basic building services, residences, and restaurant refrigerators running. Because it is built above a rail yard, the first level of Hudson Yards is well above the flood plain.

A unique electrical interconnection will allow the cogeneration plant to disconnect from the utility during grid outages and restore power to tenants.

The 895-foot-tall tower at 10 Hudson Yards features a 1.2 MW cogeneration plant that generates power, hot water, and chilled water with twice the efficiency of standard systems. It remains operational in the event of a power outage. A stormwater retention tank replenishes cooling towers and irrigates terrace landscaping, and an Operation and Energy Control Center coordinates security, building performance, and visitor experience throughout Hudson Yards.

Hudson Yards (continued)

Economic benefits

Hudson Yards is a new economic engine for New York City. The project contributed more than $10 billion to the City's GDP during construction and serves as a significant source of revenue to the MTA. Hudson Yards is well known as the largest private sector project in US history and an enormous source of jobs through construction and associated industries. The first wave of construction at Hudson Yards, comprising nearly 7.5 million square feet, was built predominantly with union labor.

Related created the "Hudson Yards Hiring Network" in 2018 to help assure that many of the operational jobs being created by our new Hudson Yards development would be made available to city residents who might face barriers to employment. The Hiring Network coordinates the efforts of multiple city agencies and at least ten community nonprofits that service the needs of those who are justice-involved, have physical and mental health disabilities, live in public housing, or are veterans or homeless.

Environmental benefits

Hudson Yards is Manhattan's first-ever project to receive the LEED GOLD Neighborhood Development designation.

A 13.3 MW cogeneration facility will provide over 50% of the electrical and thermal demand of the Eastern Yards, avoiding 25,000 million tons of greenhouse gas emissions each year (equal to the annual emissions of 5,000 cars).

Nearly 10 million gallons of stormwater will be collected each year from building roofs and public plazas, then filtered and reused in mechanical and irrigation systems to conserve potable water for drinking and reducing stress on New York's sewer system. Captured rainwater is used to irrigate the over 200 mature trees and 28,000 plants in the public park

The Grand LA is a visionary project to revitalize downtown Los Angeles' cultural and civic core with a mix of commercial, retail, cultural, and residential units stitched together with great public spaces and world-class architecture.

The Grand LA			
Partner	energyRe		
Location	Los Angeles, CA		
Project type	Mixed use development		
Project size	1.56 million square feet		
Project technology	N/A		
COD	2022		
Estimated and actual capacity factor (past three years)	**Year**	**Estimated**	**Actual**
	2022	N/A	N/A
	2021	N/A	N/A
	2020	N/A	N/A
Availability factor (past three years)	**Year**	**Availability factor**	
	2022	N/A	
	2021	N/A	
	2020	N/A	
Reference	Jon Weinstein 30 Hudson Yards, New York, NY 10001 212.801.3902		

Project description

The Grand LA is a multiphase master-planned development to reenvision and redevelop underutilized government-owned parcels directly adjacent to the Civic Center and key cultural institutions such as the Music Center, Walt Disney Concert Hall, the Colburn School of Music, and the Museum of Contemporary Art. The Grand is a 24-7 destination for shopping, dining, entertainment, and hospitality, as well as a paradigm-shifting place to live. The result is a dynamic mixed-use district fitting for the cultural center of Los Angeles.

Part of the Grand Avenue Project is a visionary public-private partnership with the Los Angeles Grand Avenue Authority to revitalize downtown Los Angeles' cultural and civic core with a mix of commercial, retail, cultural, and residential uses connected with great public spaces and world-class architecture.

The Grand LA (continued)

The Grand includes 176,000 square feet of retail space anchored by chef-driven restaurants and a collection of shops, more than 400 residences including 20% affordable housing units, a luxury hotel, and more. The development also includes a large, vibrant public plaza with a series of landscaped, open terraces. Key project components funded by Related include these:

- Grand Park (12-acre public park, 3 million visitors yearly, completed 2012)
- The Emerson residential tower (271 residences, 5,000 square feet of retail/restaurant, completed 2014)
- The Broad contemporary art museum (completed 2015)
- The Grand (3.2 acres, 436 residences, 309 hotel rooms, 1,036-space parking garage, 175,000 square feet retail/restaurant/entertainment, 1.56 million total square feet, completed 2022)

Designed by Frank Gehry, The Grand includes a dynamic mix of hotel, dining, nightlife, and residential anchored by a central public plaza above subterranean parking. Destination restaurants and shopping are spread among a series of landscaped open terraces along with a 39-story residential tower, 20% of which are affordable-rate units.

As part of Related’s longtime commitment to the larger Grand Avenue Project, Related also developed Grand Park.

The Grand LA (continued)

Benefits

The Grand LA generates broad community benefits including an estimated 10,000+ new jobs: 8,310 construction jobs and 3,280 permanent jobs during operations. The Grand is working with local labor advocates and human service agencies to create construction and permanent employment opportunities for formerly incarcerated individuals, nonnative English speakers, those without a high school diploma, and other populations who face employment barriers.

The project provides much-needed affordable housing, $1.3 billion in one-time total economic output for Los Angeles County, $397 million in revenue to the City of Los Angeles, and $68 million in revenue to the County of Los Angeles over the next 25 years.

The destination attracts thousands of visitors from across the nation and around the world, along with downtown residents and visitors from other communities throughout the region.

The Grand exceeds energy efficiency requirements through high-efficiency heating, cooling, and hot water systems, LED lighting, Energy Star equipment and appliances, and smart controls. Use of the city's potable water supply is reduced through significant rainwater collection and reuse for irrigation systems and water efficient fixtures.

The Grand offers residents and visitors access to sustainable and unique amenities including EV charging stations, on-demand electric vehicle car sharing, and over 150 bicycle parking spaces. The Grand's site design enhances the neighborhood fabric with mixed uses and a pedestrian-friendly streetscape.

02 Project descriptions

Solicitation requirements

Checklist item	Section reference
A detailed description of each Project (N.J.A.C. 14:8-6.5(a)(2))	Section 2.3
Maps, Surveys, and other visual aids that support the detailed description of the Project (N.J.A.C. 14:8-6.5(a)(2))	Section 2.3
The configuration of turbine array, location of the cable and balance of the system equipment (N.J.A.C. 14:8-6.5(a)(2))	Section 2.3
Indicate the areas used for all aspects of the Project including the location(s), the construction staging area(s) and port usage (N.J.A.C. 14:8-6.5(a)(2)(i)(3))	Sections 2.3, 2.5, and 2.6
Include a map with the location of the site(s) clearly marked by longitude and latitude and the Federal Bureau of Ocean Energy Management, Regulation and Enforcement block numbers (N.J.A.C. 14:8-6.5(a)(2)(i)(4))	Section 2.2
Specification of whether the Project is located at one contiguous site within their lease area, or divided among several non-contiguous sites (N.J.A.C. 14:8-6.5(a)(2)(i)(6))	Section 2.2
Describe any current uses, conflicts or characteristics of the ocean and land areas that will be used for each Project (N.J.A.C. 14:8-6.5(a)(2)(i)(5))	Section 2.2
Define the attributes which make the site(s) attractive, and list any potential problems, constraints or limitations with siting an energy facility at that location or locations (N.J.A.C. 14:8-6.5(a)(2)(i)(7))	Section 2.2
To the fullest extent possible, indicate the major types of equipment that have been selected to be installed, and the characteristics specified (N.J.A.C. 14:8-6.5(a)(2)(i)(8))	Section 2.4
Indicate whether the Applicant plans to own or lease equipment (N.J.A.C. 14:8-6.5(a)(2)(i)(9))	Section 2.4
Describe the selected equipment, the specifications, warranties, how long it has been commercially available, approximately how many are currently in service and where they are installed (N.J.A.C. 14:8-6.5(a)(2)(i)(10))	Section 2.4
The type, size and number of individual units for the selected turbines and foundations (N.J.A.C. 14:8-6.5(a)(2), N.J.A.C. 14:8-6.5(a)(2)(v))	Section 2.3
The history, to date, of the same type, size and manufacturer of installed turbines and foundations globally (N.J.A.C. 14:8-6.5(a)(2))	Section 2.4
Demonstrate that the wind technology is viable, cost competitive and suitable for use in New Jersey's offshore environment under varying and expected meteorological and climate conditions (N.J.A.C. 14:8-6.5(a)(2)(i)(2))	Section 2.2
Include a description of the ability of the equipment to work in New Jersey's offshore and near shore climates and the basis for that conclusion (N.J.A.C. 14:8-6.5(a)(2)(i)(11))	Section 2.2

Checklist item	Section reference
Describe construction plans in detail, identifying proposed subcontractors, with evidence of capability of performing necessary tasks, as well as proposed time frames for completion of all necessary tasks (N.J.A.C. 14:8-6.5(a)(2)(iii))	Section 2.5
A summarized comparison of each of the Projects being submitted by the Applicant and their differentiating characteristics	Section 2.1
If the selected equipment is not currently commercially available, describe the development status and expected timeframe for the equipment becoming commercially available	Section 2.4
The plan to procure the selected equipment, including key milestones, and status of the procurement process	Section 2.4
Expected manufacturer warranty terms for major types of equipment	Section 2.4
The rationale for the selection of HVDC cable voltage, including tested capabilities in similar applications and advantages/ disadvantages associated with different kV ratings	Section 2.4
A description of the method used to install the marine portion of the export cable and the target depth of cable burial	Section 2.5
Identification of the port(s) that will be used to support construction of the Project and the activities that will be conducted at each port	Section 2.6
Whether the Applicant plans to include storage capability	Section 2.7
Type of storage system, including manufacturer and model, if applicable	Section 2.7
The location of the storage system and how it is integrated with the Project and with the electric transmission and with the distribution system in New Jersey	Section 2.7
Description of the anticipated storage charge/discharge operating regime, including any technology limitations affecting dispatch	Section 2.7
Description of how storage will be deployed, e.g., maximize energy revenues, reduce peak demand for electricity, or improve reliable operation of the system	Section 2.7
Description of how storage will contribute to maximizing revenues to be returned to customers	Section 2.7
The benefits of the storage system	Section 2.7
An indication of the net benefits that the proposed storage provides to New Jersey, and/or ratepayers, that is, how total expected benefits are equal to or greater than the cost of the storage system	Section 2.7
Any new and innovative technologies that will be utilized to reduce the demand for peak electric generation, improve the reliable operation of the electric system, reduce the emissions from electric generation, and/or avoid, minimize or mitigate environmental and/or fisheries impact	Section 2.3
A detailed description of the vessels that will be used for the construction of the Project, and how Jones Act compliance will be addressed for each vessel and/or vessel class	Section 2.5
A letter of intent or memorandum of understanding from the turbine manufacturer/supplier to supply the selected turbines (N.J.A.C. 14:8-6.5(a)(2))	Section 2.4
A demonstration of the financial strength of the selected turbine manufacturer/supplier (N.J.A.C. 14:8-6.5(a)(2))	Section 2.4

Checklist item	Section reference
A declaration from the foundation manufacturer/supplier that states their ability to manufacture and deliver all foundation within the targeted schedule (N.J.A.C. 14:8-6.5(a)(2))	Section 2.4
A declaration from the undersea cable manufacturer/supplier that states its ability to manufacture and deliver all undersea cable components within the targeted schedule (N.J.A.C. 14:8-6.5(a)(2))	Section 2.4
A letter of intent or memorandum of understanding from the proposed engineering, procurement, and construction ("EPC") contractor, balance of plant ("BOP") contractor, and/or key construction contractors or vendors (N.J.A.C. 14:8-6.5(a)(2))	Section 2.5
Provide evidence that the Applicant has selected certified wind turbine generators or a detailed certification plan that is underwritten by a certifying body (N.J.A.C. 14:8-6.5(a)(2))	Section 2.4
Audited financial statements for two years, in US GAAP, including accompanying financial notes to these statements, for key Project suppliers including, but not limited to, the turbine manufacturer and EPC contractor. If not in US GAAP, the Applicant shall provide opinions from an accounting firm that attests to the financial statements, including accompanying financial notes to these statements, and the strength of the key suppliers, and has provided professional qualifications that demonstrate that expertise (N.J.A.C. 14:8-6.5(a)(3)(vii))	Section 2.5
The maps, surveys and other visual aids must also show plans for the location, general configuration, turbine spacing vis-à-vis one another, and orientation of the wind turbine array, and the locations of the export cable (generator lead line) route, offshore and onshore substation(s), converter stations, cable landfall location at the NGCT at Sea Girt, onshore transmission right-of-way, and point of interconnection at the Larrabee Collector Station	Section 2.3
A distance in statute miles between the nearest turbine and the closest point on shore	Section 2.3
A demonstration of the financial strength of the selected foundation manufacturer/supplier	Section 2.4
A demonstration of the financial strength of the selected cable manufacturer/supplier	Section 2.4
A demonstration of the financial strength of the proposed EPC contractor	Section 2.5
A demonstration of the proposed BOP contractor	Section 2.5
A demonstration of the financial strength of the other key construction contractors or vendors	Section 2.5
Disclosure of known existing or pending litigation among the wind turbine generator manufacturer, foundation manufacturer, and/or cable manufacturer that may impact Applicant's ability to achieve the COD set forth in Applicant's Application	Section 2.4
If the Applicant plans to include storage capability, a diagram showing configuration of storage system with respect to Project facilities and POI	Section 2.2

Table of contents

02 Project descriptions

2.1 Summary

The project alternatives presented herein are the result of a thoughtful, thorough, and robust assessment of various project design and development options across the full scope of the project, including turbine layout and orientation, cable routing, and interconnection.

Leading Light Wind has considered a wide variety of factors, including other ocean users, the shared boundary with lease area OCS-A 0541 (Atlantic Shores Offshore Wind), efficient use of cable routing space, and avoidance of sensitive areas. Taken together, these considerations will ensure the development of a responsible and ultimately successful offshore wind project.

This section provides an overview of the project, including its location, project site plans, environmental setting, cable routing considerations and potential submarine cable route options [redacted] associated with the optional prebuild infrastructure. The section also covers major equipment discussions, description of port facilities and construction plans, and energy storage.

The project alternatives offered by Leading Light Wind to the New Jersey Board of Public Utilities (NJBPU) are summarized in Table 2-1. As introduced in the Executive Summary, these alternatives represent [redacted]

2.2 Site description

Overview and BOEM lease

Leading Light Wind will be built within Bureau of Ocean Energy Management (BOEM) lease area OCS-A 0542, approximately 48 miles east of Atlantic City, NJ [redacted]. The lease area contains 83,976 acres.

Invenergy Wind Offshore LLC holds a 100% interest in the lease area. The lease has an effective date of May 1, 2022, and an initial term of 39 years, further divided into a preliminary term (one year), a site assessment term (five years), and an operations term (33 years). Per the lease, these terms may be modified or extended. A copy of the full BOEM lease for the Leading Light Wind project is provided in Attachment 2.1. The lease area is shown in Figure 2-1.

Lease area OCS-A 0542 is shown in Figure 2-2. [redacted] The coordinates for the lease area boundaries are listed in Table 2-2.

[redacted]

Table 2-1. Leading Light Wind project alternatives.

[redacted]

Figure 2-1. Site overview map.

[redacted]

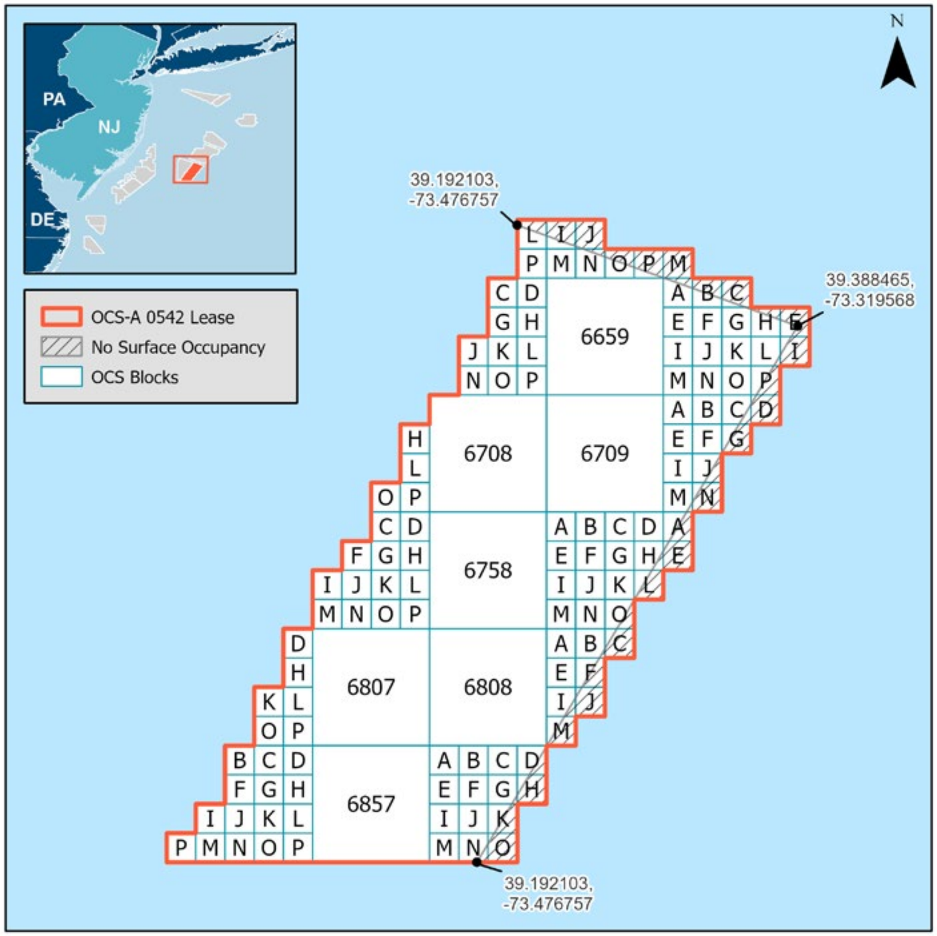


Figure 2-2. BOEM lease area OCS-A 0542.

Point no.	Direction	Longitude (DD)	Latitude (DD)
1	Start (NW to SE)	-73.452425	39.427638
2	Corner	-73.319568	39.388465
3	End (NE to SW)	-73.476757	39.192103

Coordinate system/datum: Geographic NAD83 (Decimal Degrees).

Table 2-2. Coordinates for the lease area boundaries.

The No Surface Occupancy area totals 7,082 acres. Depicted on the lease map, it is subject to No Surface Occupancy Stipulation No. 8.2 and includes the portion of the lease area lying northeast and southeast of a line extending from point number 1 to point number 3.

The lease area was created as the result of a nearly four-year process, beginning with the issuance of BOEM's Call for Information and Nominations on April 11, 2018. In the years following, BOEM engaged extensively with a wide range of stakeholders, including multiple Intergovernmental Renewable Energy Task Force meetings, ultimately leading to a determination that the lease area was suitable for commercial offshore wind development.

The lease area has a wide variety of characteristics that make it attractive for offshore wind development. These include:

- Significant distance from shore means that the project is expected to be imperceptible from even the closest onshore vantage points
- Excellent wind resource (average wind speeds of over 10 meters/second)
- Generally upwind of neighboring wind farms (decreasing wakes)
- Limited vessel traffic through the lease area
- Initial data shows that the lease area soil predominantly consists of dense to very dense sand, which should minimize foundation installation issues
- The submarine cables that cross the lease area are all out-of-service, thus minimizing potential cable crossing issues

The following sections discuss the lease area and our project alternatives offered to the state of New Jersey in greater detail.

2.3 Project description

As discussed in the Executive Summary, project capacity scenarios are as follows (Table 2-3). [redacted]

[redacted]

Table 2-3. Project capacity scenarios.

Site plan

Depending on the project alternative selected by the NJBPU, the Leading Light Wind project will consist of between [redacted] wind turbines. Regardless of the project alternative selected by NJBPU, the project will include offshore and onshore high-voltage direct current (HVDC) converter stations, inter-array cabling, submarine HVDC export cabling [redacted], and HVDC underground cable [redacted] Additional details on the site plan for the Leading Light Wind project are provided in this section.

[redacted]

[1] USCG-2020-0172 Port Access Route Study.

[redacted]

[redacted]

The proposed project layout described in this section is subject to federal permitting requirements and further stakeholder consultation outcomes.

Inter-array cabling

The proposed inter-array cabling for the project is designed to minimize the number of feeders and maximize the number of turbines per feeder to reduce the number of required connections to the offshore converter station (OFCS). Through engagement with potential cable suppliers, we determined several common inter-array cable sizes. Suppliers suggested using a maximum of three cable sizes per project. The optimal cable size depends on the size of the turbine and voltage of the inter-array cabling system. [redacted] Table 2-4 shows the three distinct cable sizes that are considered for different turbine size and output voltage scenarios.

[redacted]

Table 2-4. Cable sizing for different turbine options.

OFCS size and location

The OFCS has been centrally located to minimize overall inter-array cable length and placed in a localized shallow water depth to minimize substructure costs. The OFCS is located on the uniform grid, within the broader layout, to ensure consistent corridor widths and continuous passage for any search and rescue vessel traffic. [redacted]

Offshore transmission network (OTN) design

Leading Light Wind has considered the spacing needed for an OTN 230 kV cable corridor and applied the same methodology to determining the OTN cable routing as to the submarine export cable routing for the project. One corridor heading north has been provided as an example. The corridor has been designed to minimize crossings, maximize spacing from turbines and inter-array cables, and reduce overall cable length. To minimize crossings with inter-array cabling, [redacted]

The OTN corridor will be optimized to meet future requirements from NJBPU.

Project grid interconnection

Expected transmission technology

[redacted] The transmission technology for the primary project alternative includes an OFCS, submarine HVDC transmission cable, terrestrial HVDC transmission cable, and an onshore converter station (ONCS).

Onshore and offshore converter stations

Both the OFCS and ONCS will use voltage source converter (VSC) technology. [redacted]

[redacted]

Delivery point

Leading Light Wind will utilize the [redacted]

[redacted]

[redacted]

Submarine export cable setting

Leading Light Wind is approximately 48 miles east from Atlantic City, NJ and approximately [redacted]. Depending on the project alternative selected by NJBPU and the resultant number of HVDC transmission cables needed, Leading Light Wind proposes to install the cables in [redacted]. The total offshore easement width will depend on the number of submarine cables installed. The project will endeavor to keep a [redacted] distance between the trenches, but variations will occur along the transmission cable route to accommodate various routing constraints. For more information, please see Section 2.4 below.

Project design considers [redacted]

For the submarine portion of the route, depending on the alternative selected, the transmission cable route length is approximately [redacted]. Submarine HVDC transmission cables will be installed from the OFCS to the

[redacted]

Submarine export cable development process and options

The southern Bight area is a highly utilized and complex marine space, with numerous constraints and characteristics that affect route choice and risk. Leading Light Wind has identified initial routing opportunities and risks [redacted]

The project team identified key areas for submarine cable route avoidance or areas that are unavoidable yet may need to be traversed and will need to be investigated further. [redacted]

[redacted]

Additional coordination with agencies and other stakeholders is planned as the submarine cable route options are developed further.

Key routing constraints that affected route choice include [redacted]

Some of these constraints could be fundamentally avoided with route choices. However, some are pervasive in nature and cannot be avoided. [redacted]

[redacted]

Key criteria for route development

As discussed above, the submarine HVDC cable routes were designed to navigate among the preexisting uses and constraints within the southern Bight Area between the lease area and [redacted].

The key criteria used to build these routes are shown in Figure 2-7.

Based upon the combined assessment of these data and this criteria, professional judgment was used to design the submarine cable routes presented here. The route selection also demonstrates Leading Light Wind's commitment to a healthy marine environment.

Marine uses and the environmental setting

BOEM approved the lease area after considering existing marine uses and benthic habitat, reducing the potential impacts to other marine uses and critical marine habitat. [redacted]

[redacted]

[redacted]

[redacted]

Figure 2-7. Key criteria used to build the submarine cable routes.

[redacted] The Communications Team, as described in the Fisheries Protection Plan, will consult with these agencies and with commercial fishing stakeholders to better understand spatial and temporal fisheries usage. Leading Light Wind will consider those inputs during project planning and development.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Coastal marine space

Anchorages and shipping lanes

The Southern Bight and New Jersey coastline experiences a high density of vessel traffic navigating its waters. Cargo vessels and tankers primarily transit within the designated traffic lanes or TSSs.

TSSs are commonly used to identify and constrain inbound and outbound shipping traffic lanes, typically with a separation zone between the traffic lanes to minimize the likelihood of vessel collisions. There are three TSSs in the Bight approach to the Port of New York and New Jersey, with Separation Zones between each one-way vessel traffic lane. Two of these TSSs continue into the southern Bight off the greater New Jersey coast: the Barnegat-Ambrose TSS and the Hudson Canyon-Ambrose TSS, respectively (see Figure 2-13).

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

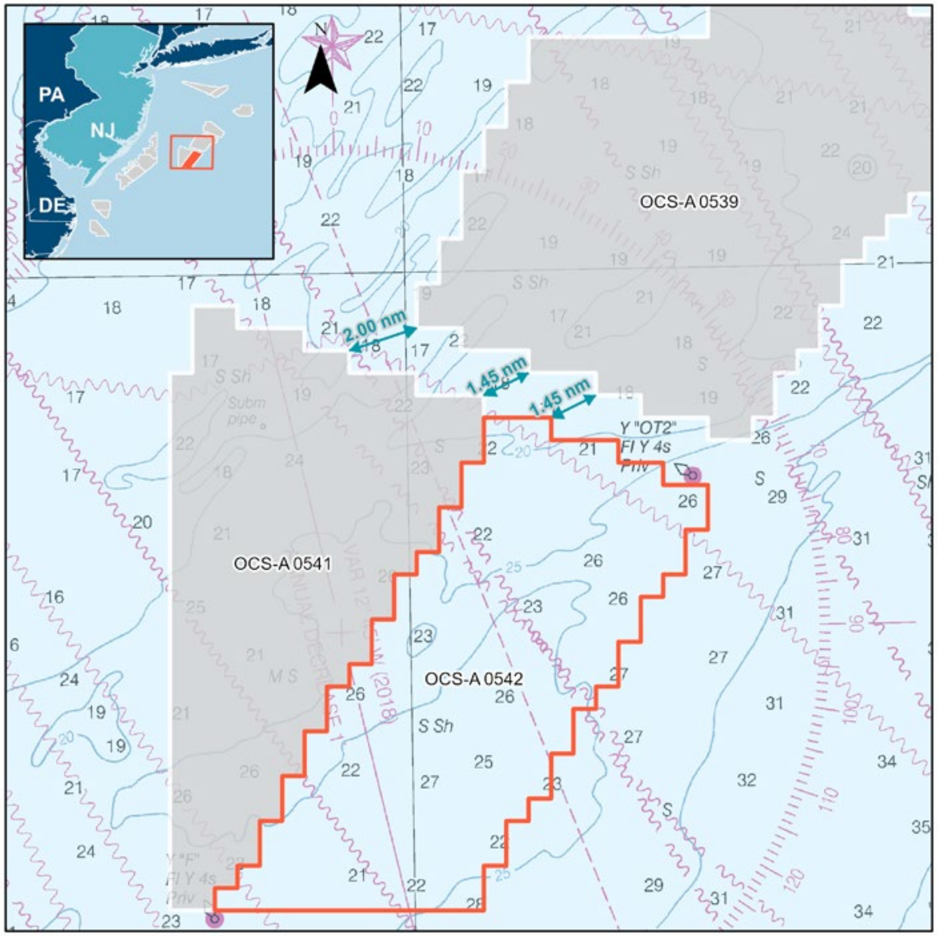


Figure 2-12. Offshore corridor width among BOEM lease areas.

[redacted]

It is important to note that AIS-simulated anchoring activity is only capturing activity from vessels that are either required to have their AIS transmitters enabled or those vessels that volunteer to do so. Smaller craft vessels (e.g., recreational fishing or boating) are typically not required to have AIS transmitters and therefore AIS-simulated anchoring may not capture all

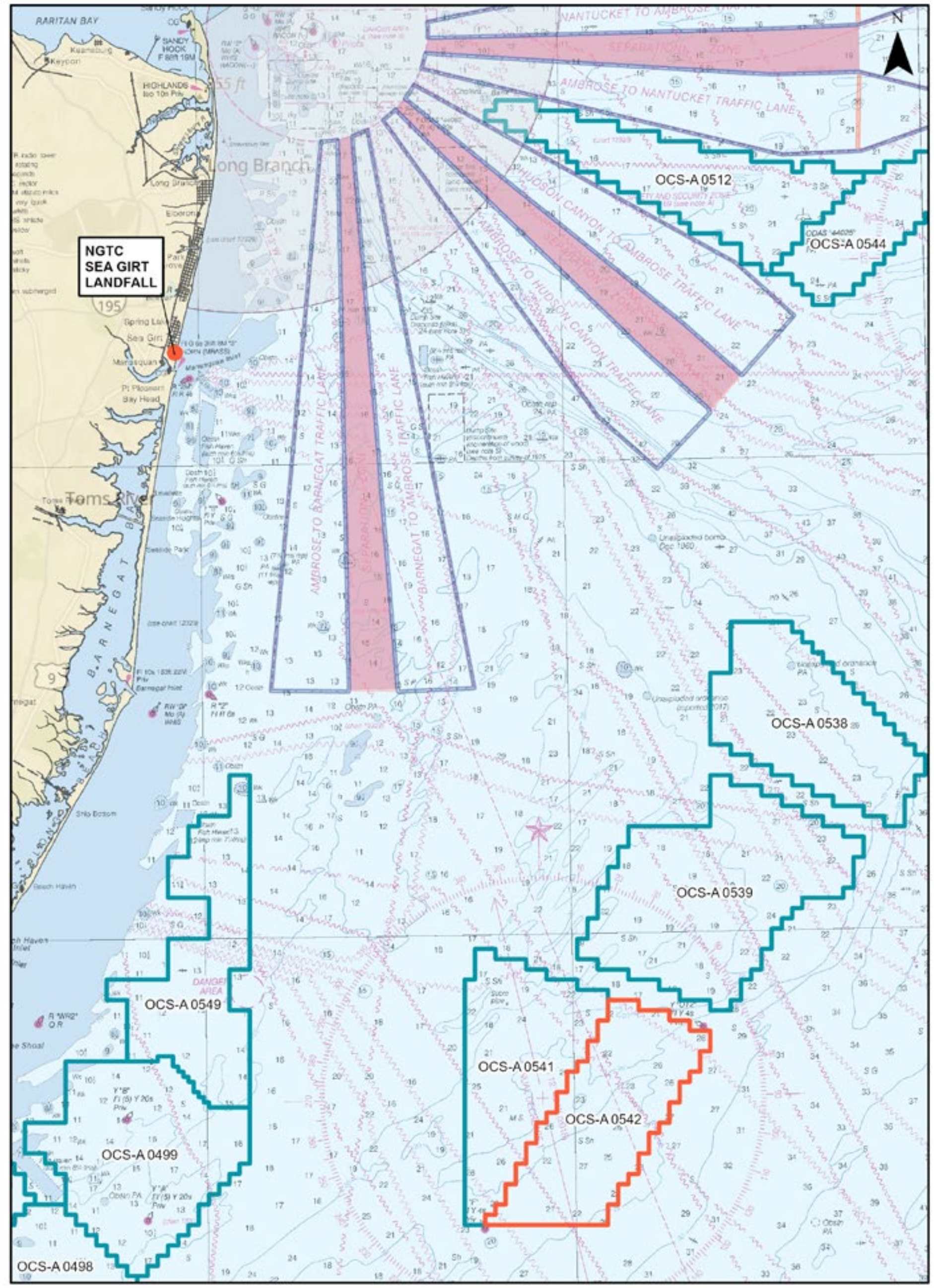


Figure 2-13. TSSs off NGTC Sea Girt.

activity. However, it will capture the larger vessels (e.g., cargo, tanker vessels) that are required to have AIS enabled.

Military areas and UXO

Several military-related uses present in the Southern Bight must be considered to minimize risk for submarine cable routing. [redacted]

[redacted]

Artificial reefs and disposal sites

[redacted]

[redacted]

[redacted]

Figure 2-14. Artificial reefs and disposal sites.

[redacted]

[redacted]

Subsea cables

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Figure 2-15. Operating and out-of-service cables landing at NGTC Sea Girt.

New Jersey USACE sand resource areas

Sand resource areas are marine seabed spaces that have been identified as having the potential sand composition suitable to be converted into a sand borrow area, used for dredging operations to support coastal resiliency projects, beach nourishment, or other related coastal marine works. [redacted]

The BOEM Marine Minerals Information System (MMIS) provides a database of identified sand resource Areas along the Eastern Seaboard. [redacted]

[redacted]

[redacted]

[redacted]

Figure 2-16. USACE sand resource areas and sand borrow areas, Sea Girt, NJ.

[redacted]

[redacted] Figure 2-16 provides a map documenting these constraints in the approach to Sea Girt.

New Jersey USACE sand borrow areas

[redacted]

[redacted]

[redacted]

[redacted]

Shipwrecks and obstructions

Shipwrecks and other obstructions are navigational hazards in the coastal waters of the United States. Knowing the locations of shipwrecks and obstructions is important for safe navigation as well as support for coastal and marine spatial planning. The presence of dense boulder fields, rock outcrops, wrecks, and areas of harder seabed sediment can potentially impact cable route options and choices, causing minor adjustments to routes.

[redacted]

Marine mammals

Several whale species are known to use the marine waters off the New Jersey coastline. According to NJDEP Fish and Wildlife, threatened and endangered whale species that use the southern Bight marine space include the North Atlantic Right Whale, Blue Whale, Fin Whale, Humpback Whale, Sei Whale, and Sperm Whale.[13] The typical baleen whale migratory pattern consists of movement between northern summer feeding grounds and southern winter calving grounds, yet some of these species have been seen year-round in New York coastal waters.[14]

[redacted]

---

[13] New Jersey Department of Environmental Protection Fish and Wildlife. *New Jersey Marine Mammal and Sea Turtle Conservation Workshop Proceedings*, New Jersey Department of Environmental Protection, 2006, pp. 55-56, www.dep.nj.gov.

[14] Whitt, A. D., Powell, J. A., Richardson, A. G., and Bosyk, J. R. (2015). *Abundance and distribution of marine mammals in nearshore waters off New Jersey, USA*. J. Cetacean Res. Manage., 15(1), 45-59.

For additional information on marine mammals and potential impacts please refer to the Environmental Protection Plan (Attachment 10.1).

Threatened and endangered species

Several other threatened or endangered species use the coastline of New Jersey. Further research is needed to determine fundamental route constraints and/or time of year restrictions for certain types of marine activities to support cable operations.

[redacted]

Marine Protected Areas

Marine Protected Areas (MPAs) have conservation purposes, defined boundaries, management goals, and some legal authority to protect resources within their boundaries. Within MPAs, human activities are typically managed to protect important natural or cultural resources. MPAs vary widely in purpose, management approaches, level of protection, legal authorities, managing agencies, and restrictions on uses. Several MPAs throughout New Jersey's coastal marine space offer varying degrees of protection. However, most of these areas are within bays and estuaries, shielded from the greater

---

[redacted]

Atlantic Ocean by barrier islands. Therefore, none of these areas would affect submarine cable route decisions into the NGTC Sea Girt landing.

For additional information on threatened and endangered species and potential impacts please refer to the Fisheries Protection Plan (Section 11) and the Environmental Protection Plan (Attachment 10.1).

Submarine HVDC export cable options

Based upon the identified constraints and risks for submarine cable route options from the lease area to the NGTC Sea Girt Landing, Leading Light Wind developed [redacted] (Table 2-5 and Figure 2-18). Leading Light Wind has approached routing development with the intention to preserve a healthy marine environment. [redacted]

The preliminary routes are described in more detail below.

[redacted]

Table 2-5. Potential export cable routes.

[redacted]

[redacted]

[redacted]

[redacted]

Figure 2-18. Potential submarine HVDC cable routes to NGTC Sea Girt.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Cable landfall site: NGTC Sea Girt

The cable landfall will be located on federal property at the NGTC within Sea Girt Borough, abutting Manasquan Borough. The detailed description of NGTC Sea Girt was provided in the documents shared by the New Jersey Department of Military and Veterans Affairs (NJDMAVA) that operates the base. The Leading Light Wind team also made a site visit to the base in April 2023. The facility dates back to 1888. [redacted]

[redacted]

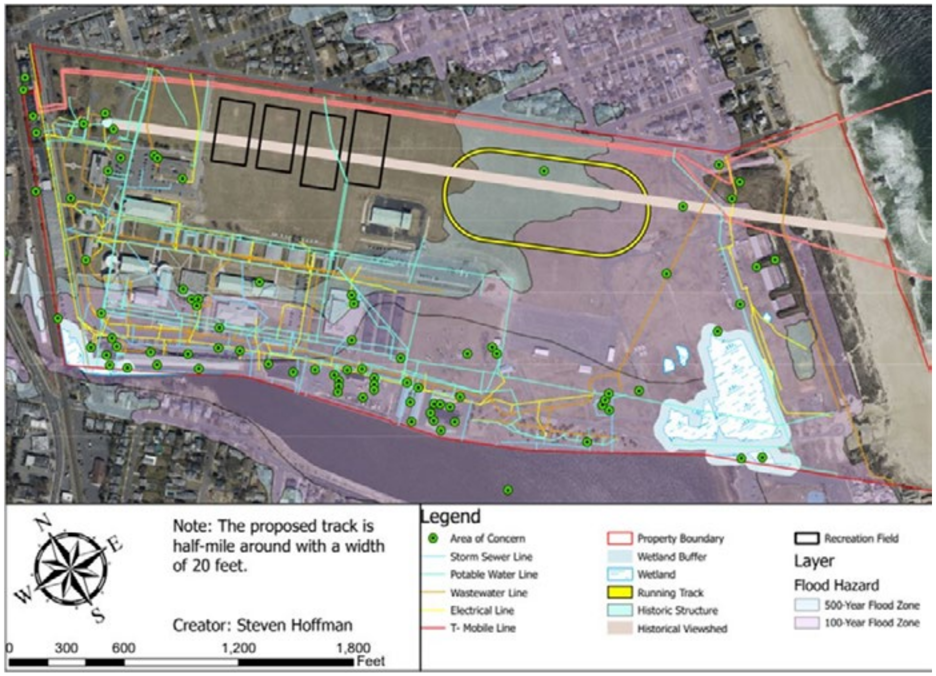


Figure 2-22. NGTC environmental constraints and developable area, from NJDMAVA data package.

[redacted]

[redacted]

Figure 2-23. Current range layout on the NGTC (NJDMAVA).

Figure 2-24. Historical range areas and adjacent areas on the NGTC (NJDMAVA).

[redacted]

Onshore HVDC transmission cable route development methodology and existing conditions

Leading Light Wind developed terrestrial routes for prebuild infrastructure that would be specific to our project being selected to install the prebuild infrastructure. If another developer is selected to deliver this scope, Leading Light Wind will use their routes and infrastructure.

[redacted]

Figure 2-25. Rare species protection areas and endangered and threatened species locations at NGTC (NJDMAVA).

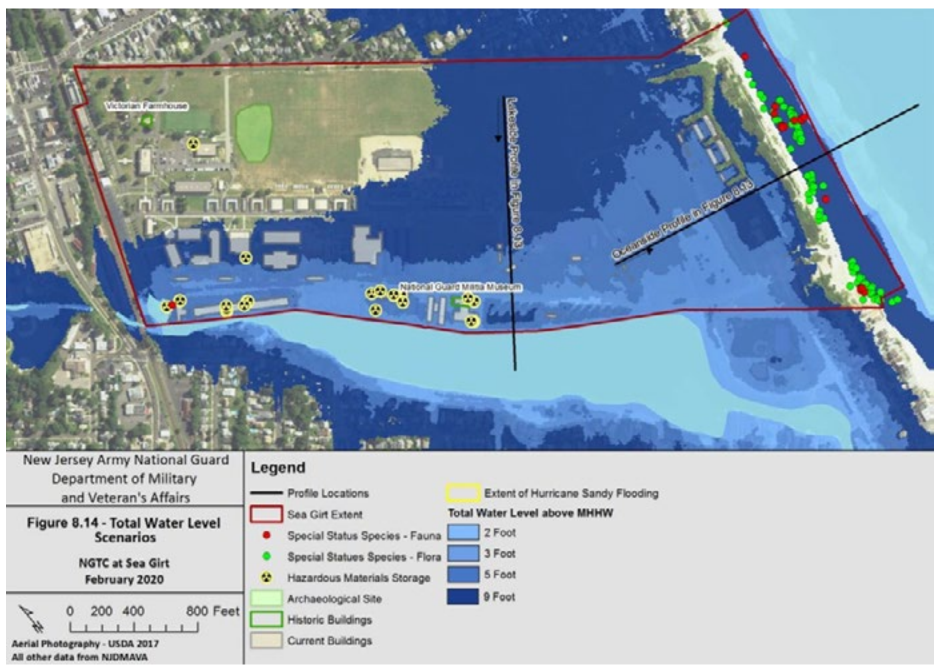


Figure 2-26. Total water scenarios at NGTC (NJDMAVA).

[redacted]

[redacted]

Figure 2-27. Proposed locations of transition vaults for four HVDC circuits.

[redacted]

Figure 2-28. High-level terrestrial routing guidelines.

Based upon the combined assessment of these data, professional judgment was used to develop the terrestrial cable routes presented here.

Study area for terrestrial HVDC cable routes

[redacted]

Technical considerations

[redacted]

[redacted]

Figure 2-29. Terrestrial HVDC cable route study area.

[redacted]

[redacted]

Social conditions in the study area

[redacted]

[redacted]

Figure 2-30. Land use map.

[redacted]

[redacted]

[redacted]

[redacted]

Figure 2-31. Social conditions map.

[redacted]

Environmental conditions in the study area

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Onshore route overview

[redacted]

[redacted]

[redacted]

Figure 2-32. Environmental conditions map.

[redacted]

[redacted]

[redacted]

[redacted]

Terrestrial routes (Sea Girt to LCS)

The following provides a summary of the terrestrial route identification process and of the alternative routes that were identified during the process.

Review of route alternatives

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Figure 2-33. Reviewed alternative HVDC transmission cable routes.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Table 2-6. Alternative route quantitative metrics.

[redacted]

Battery storage project

Leading Light Wind is proposing to site our battery storage project using the [redacted] More details about the proposed energy storage project can be found in Section 2.7.

2.4 Major equipment

Each proposed project alternative consists of the same major equipment: WTGs, foundations, HVDC transmission system (OFCS and ONCS), inter-array cables, and HVDC export cables. This section will describe the equipment, the technical considerations for equipment selection, and the work done to-date to define and de-risk the technical elements of the project. A summary of the major equipment features for each project alternative is described in Table 2-7. Further discussion of planned and potential suppliers and approach to supplier selection can be found in Section 2.5.

Wind turbine generators

Leading Light Wind will use the next generation of WTG technology in the project, allowing for the most efficient use of the lease area and lowest cost of energy. [redacted]

[redacted]

Figure 2-34. Proposed prebuild infrastructure terrestrial cable routes for four HVDC cables.

[redacted]

[redacted]

Table 2-7. Major equipment features for each project alternative.

The WTG is the central element of the wind farm design, touching all elements of the project. It is typically the largest single contract and capital expenditure. The WTG selection also heavily influences the wind farm power generation, foundation design, electrical design, and installation strategy. It is also the principal component that needs to be maintained during the operations phase of the project. Due to the scale of the WTG contract, it is a key opportunity to use local suppliers and deliver local content.

The project's WTGs will feature the industry standard, three-bladed, horizontal-axis rotor nacelle assembly mounted on a steel tower. [redacted]

The WTG will sense the direction of the wind using integrated sensors and will automatically turn into the wind by activating the yaw system. The WTG will continuously adjust the blade pitch angle during operation to maximize power production and maintain safe operating limits. The drivetrain, electric generator, yaw system, control system, and power electronics are enclosed in a nacelle, which provides protection from inclement weather, including lightning.

The WTG power system, which includes the power converter, transformers, and switchgear, converts the voltage and frequency of the power produced by the WTG's generator to the inter-array cables' voltage and electrical grid's frequency. It reduces harmonics and provides reactive power. The power converter and transformer may be located in the nacelle or inside the WTG tower. The switchgear and inter-array cable terminations may be located inside the WTG tower or inside the transition piece. All power system components will be protected according to best practices and industry standards.

The WTG control and protection system monitors environmental and operational parameters to keep equipment within design limits. Heating and cooling systems regulate the temperature of each component and lubrication systems keep components corrosion-free and rotating smoothly. The control and protection system monitors the WTG and protects equipment and personnel by providing automatic shutdown and alarms in response to constant monitoring of turbine operation and condition of turbine components as well as in reaction to environmental conditions, including extreme winds

[redacted]

and storm events. In addition, the system includes fire detection, ice detection, overheating, overpower, and overspeed protection.

For remote monitoring and control, WTGs will be connected to the central supervisory control and data acquisition (SCADA) system, which allows remote operators to track the operation and performance of all project assets from a single system, store long-term data, and access short-term high-resolution data for fault troubleshooting. It also allows functions such as remote testing, software updates, parameter updates, WTG shutdown for maintenance, and curtailment or electrical parameter manipulation at the request of grid operators, regulators, or search and rescue teams. Individual WTGs can be controlled manually from within the nacelle or tower base for commissioning and maintenance activities. Section 15 provides more detail on Leading Light Wind's capabilities for WTG monitoring.

An uninterruptible power supply (UPS) will power the control and protection system in case of a grid outage to enable safe shutdown of the WTG and saving operational data. Additional backup power systems (e.g., WTG self-power feature, portable generators, and/or battery systems) may be utilized to provide power for commissioning or for storm protection in the event of a longer-term grid outage.

[redacted]

The WTG can be accessed for commissioning and maintenance from the platform on the WTG foundation via a locked door in the tower base. WTGs are equipped with an elevator, ladders, and other access routes that enable the movement of maintenance personnel, small equipment, and small spare parts inside the tower and rotor nacelle assembly. [redacted]

All WTG components will be designed to comply with relevant health, safety, security, and environmental protection (HSSE) standards and regulations.

During construction and operation, the WTGs (and their foundations) will be lit and marked in accordance with Federal Aviation Administration (FAA), USCG, and BOEM guidelines to aid safe navigation within the wind turbine area.

WTG foundations

Leading Light Wind has completed a comprehensive conceptual foundation design and review process for the lease area. Different types of foundations were considered as part of this initial step to evaluate their feasibility, [redacted]

Monopiles are the most commonly used offshore wind turbine foundation type, with over 4,000 steel monopiles installed globally since 2010. The largest monopiles currently installed at 10 to 12 meters in diameter with an approximate length of 110 meters and 2,500 tons of weight were installed in the German Baltic Sea in 2022, but suppliers are well aware of the future need to supply monopiles up to and beyond 15-meter diameter and are making preparations to supply monopiles this large by the end of the decade. [redacted]

For all types of structures, soil conditions are always a key driver of stability, long-term project lifetime and functionality for foundations. In this regard, the project team has taken many precautions to ensure certainty on the design conditions and assumptions.

To aid in selecting the most economical and technologically suitable foundation type for the lease area, [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

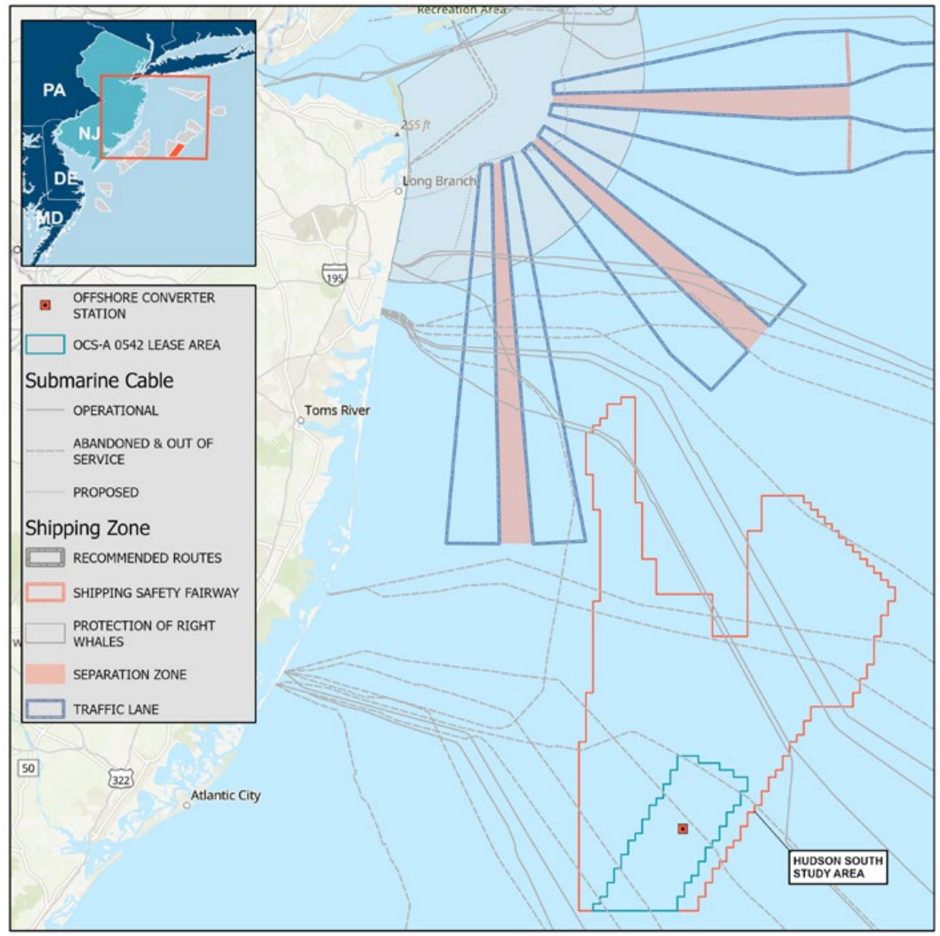


Figure 2-35. Project study area.

[redacted]

Figure 2-36. Geotechnical investigation locations in the lease area.

[redacted]

[redacted]

[redacted]

Foundation design considerations for seismic activity

The foundations will be designed according to site-specific conditions, including WTG loads, metocean data, and geological and geotechnical data information, based on industry standards [redacted]

[redacted]

[redacted]

[redacted] Monopiles and transition pieces

Monopiles

Monopile foundations are the most common foundation type in offshore wind due to their relatively basic design structure and lower fabrication costs. Monopiles are large cylindrical steel tubes with straight and conical sections and a ranging wall thickness.

The monopile has a uniform diameter for the majority of the monopile, with a conical section towards the top, where the diameter will be reduced to enable the connection of the TP. The diameter at the top of the monopile depends upon the connection design. The TP connects the WTG to the foundation and is discussed below.

Transition pieces

The TP provides an interface for the monopile to attach the WTG. The TP transfers all WTG loads to the foundation and provides safe access for vessels and personnel. The TP hosts various auxiliary components such as a work platform, vessel landing, ladder(s) for technician access, cranes for equipment/small component loads, and winches for cable pull-ins.

The TP is attached to the monopile via grouting and/or bolting (our design incorporates bolting via ring flanges) to ensure leveling and tolerances are acceptable for WTG assembly. The platform can be designed only with structural steel or a combination of concrete deck and structural support steel. [redacted]

[redacted]

Each WTG monopile foundation will be surrounded by scour protection composed of quarry-supplied sand, gravel, and rock, which will prevent sediment scour around the monopile. Multiple design options exist for scour protection. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Scour protection is assumed for all project cases. The respective minimum and maximum volumes are outlined in Table 2-10. The maximum width of the scour protection has been accounted for when designing the locations of the turbine center points to ensure that all of the permanent substructure falls within the lease boundary.

[redacted]

[redacted]

Artificial reefs as part of scour protection

[redacted]

HVDC transmission system

The HVDC transmission system will comprise of a radial connection of an OFCS installed on a platform foundation and an ONCS. The OFCS will collect the alternating current (AC) power generated by the WTGs through an inter-array cable system and convert it to direct current (DC) for transmission through the subsea export cable to the ONCS.

A VSC of choice will invert the incoming DC generation to the proper frequency and transmission voltage of the AC grid. Both the offshore rectifier (AC to DC) converter station and onshore inverter (DC to AC) converter station use VSC technology. The first commercial VSC HVDC project was commissioned in 1999. VSC is a common selection over line-commutated converter because VSC does not suffer commutation failures and power reversal for commissioning is possible using cross-linked polyethylene (XLPE) cables. VSCs are also better during grid instabilities, providing controlled fault current for AC faults, being quickly restored after failures, and even capable of a black start.

Modular multilevel converters are the widely applied VSC solution for long-distance HVDC transmission, with the capability of full voltage and active/reactive power control. This feature allows for consistent grid compatibility for the various operational statuses of the wind generation.

[redacted] As project partners, Invenergy and energyRe bring additional experience and expertise to the development and execution of HVDC projects via the point-to-point symmetrical monopole Clean Path New York project we are co-developing and will install and commission prior to the commissioning of Leading Light Wind.

[redacted]

[redacted]

Inter-array cables

The inter-array cabling system connects the WTGs to the OFCS. Inter-array cables are arranged in strings and connect multiple WTGs to the OFCS. [redacted]

[redacted]

Potential inter-array cable layouts

The project is still in the preliminary design stage and has developed [redacted] different inter-array cable layouts. The inter-array cable layouts for each of the [redacted] primary project alternatives are provided in Section 2.3.

[redacted]

Figure 2-38. Example array cable design.

[redacted]

Inter-array cable protection

Cables will primarily be buried to ensure that they are suitably protected from external risks. The burial technique is to be determined based on the following key factors:

[redacted]

[redacted]

Any required crossings of other project cables by the inter-array cables will utilize typical industry practices. Minimum separation distances will be determined so that both cables can operate safely without risk of damage to either cable.

HVDC export cables

The OFCS will be connected to the onshore infrastructure via HVDC cabling system including submarine and underground routes. The majority of the route is submarine with a portion of the route using underground HVDC cable through the prebuild infrastructure (see Section 2.3). Regardless of the project alternative chosen by NJBPU, the project will utilize HVDC submarine export cables. The export cables will be installed within the export cable corridor with landfall at the NGTC in Sea Girt. [redacted] and will connect to the ONCS by the LCS.

The export cables considered are single-core armored submarine cables. The conductor will be copper stranded, with XLPE insulation, a lead sheath, and a polyethylene over-sheath. The cable will be covered with galvanized steel wire armor, and an outer serving of polypropylene yarns soaked in bitumen. The final design will be crafted during the detail engineering phase. [redacted]

The introduction of VSC HVDC converter technology in the late 1990s boosted the market for HVDC cables with extruded insulation, like XLPE cables. Cables with extruded insulation could not be used with line-commutate converter (LCC) HVDC converter technology because of the way LCC converters reverse power flow — by inverting the DC voltage polarity.

For this reason, HVDC submarine cables were primarily oil-filled pipe or mass impregnated cables. Both cable technologies have downsides, especially the environmental impact of incidental damage to an oil-filled pipe cable. In the past 20 years, there have been significant advances in the voltage rating, current capacity, and production volume of HVDC extruded insulation cables. The cables selected for Leading Light Wind are state-of-the-art, and non-oil-filled to lower risk to the environment.

[redacted]

Figure 2-39. HVDC submarine cable cross section.

To transmit power to shore, these export cable designs have been considered:

[redacted]

Figure 2-40. HVDC underground cable cross section.

[redacted]

HVDC underground cable

HVDC underground cable will be installed in the prebuild infrastructure from the transition vault to the point of demarcation. [redacted]

The installation details of the underground export cable are discussed in the prebuild infrastructure sections of Section 13.

Cable protection

HVDC export cables will primarily be buried to ensure that they are suitably protected from external risks. The burial technique is to be determined based on the following key factors:

[redacted]

[redacted]

Stand-alone fiber optic cable

In addition to the integrated fiber optic cables described above, a stand-alone fiber optic cable is considered to satisfy overall data transfer, communications, protection and control, and monitoring purposes. This standalone cable will be installed in parallel with HVDC cables inside the HVDC cable trench and shall have the same design life as the HVDC cabling system.

2.5 Construction plan

Through months of project planning and close coordination with dozens of suppliers and contractors, Leading Light Wind has developed a robust construction and logistics plan for the execution of the project.

Central to this plan are our priorities of creating family-sustaining jobs in New Jersey, advancing the state's position as an offshore wind leader, minimizing the cost borne by the ratepayers, equitably distributing the project benefits to all New Jerseyans, delivering a timely and reliable project, and prioritizing the environment and safety of all workers involved in the project.

[redacted]

Strategic partnerships

We actively seek to enter into strategic relationships that align with our project priorities and have forged such relationships with several parties who are considered leaders in their respective industries. Leading Light Wind has entered into several strategic commercial arrangements that we believe uniquely position us to execute the work as laid out in this chapter while ensuring that as many benefits as possible flow to the state of New Jersey and its residents. These can be viewed in Attachment 2.7a. We have also provided a number of letters of support from suppliers to demonstrate our close and continuous coordination with suppliers across the supply chain that can be viewed in Attachment 2.7b.

Our partnerships are structured to give confidence that we have a viable project and access to critical resources on the timeline required for our project, while providing ample flexibility to further optimize the construction plan as the project matures. They pertain to offshore installation assets and the production facilities required for project execution.

[redacted]

[redacted]

WTG foundations

As discussed in Section 2.4, Leading Light Wind has completed a substantial amount of work since acquiring our lease to demonstrate the viability of monopiles in our lease area. [redacted]

[redacted]

Supply

[redacted]

Transportation

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Installation

Monopile installation equipment and methodology

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Completion

Completion of foundation installation involves overall checks, verification of installation tolerances, and installation of smaller items. Temporary installation equipment is removed, navigation aids are installed, and protective covers are placed over critical elements of the foundation. [redacted]

Wind turbine generators

[redacted]

This section goes on to describe in further detail the key activities and equipment required for transportation and installation of the WTG components.

Supply

[redacted]

Figure 2-43. WTG blades being transported to marshaling harbor.

[redacted]

Transportation

Transportation refers to the process of moving the WTG components from the location where they are manufactured to the marshaling harbor (Figure 2-43).

[redacted]

[redacted]

Marshaling

Upon arrival at the New Jersey Wind Port, [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Commissioning

Commissioning and energization of the turbine and related activities involve mechanical and electrical completions followed by final testing and hot commissioning. [redacted]

Offshore converter station

There are multiple possible configurations for the OFCS, depending on the project alternative ultimately selected by the NJBPU. Regardless of the project configuration, the OFCS will consist of a topside, which contains all of the electrical and auxiliary equipment, and a jacket type foundation. [redacted]

[redacted]

Supply

[redacted]

Transport

[redacted]

Installation

[redacted]

Jacket installation

[redacted]

[redacted]

[redacted]

Commissioning

After the installation is complete, completion and commissioning teams will begin putting the topside in service. [redacted]

Offshore cables

The submarine electrical cables to be installed for Leading Light Wind come in two general categories: HVDC export cables and medium-voltage AC inter-array cables. The HVDC export cables are used to connect the OFCS to the land-based ONCS, while the AC inter-array cables are used to connect the turbines to the OFCS. As discussed in more detail in Table 2-7, [redacted]

[redacted]

[redacted]

[redacted]

Supply

[redacted]

[redacted]

Installation

Preparation

[redacted]

[redacted]

Export cable

[redacted]

Inter-array cables

[redacted]

Commissioning

[redacted]

Integrated vessel summary

The anticipated vessels required to execute the proposed project are detailed in Table 2-11. This table is intended to serve as a consolidation of the vessel requirements for the various installation campaigns as outlined in the preceding Sections.

[redacted]

Table 2-11. Integrated vessel summary.

[redacted]

[redacted]

Table 2-11 (continued). Integrated vessel summary.

[redacted]

[redacted]

Table 2-11 (continued). Integrated vessel summary.

[redacted]

Table 2-11 (continued). Integrated vessel summary.

[redacted]

Table 2-11 (continued). Integrated vessel summary.

[redacted]

Table 2-11 (continued). Integrated vessel summary.

2.6 Port facilities

Overview

Leading Light Wind plans to execute the project from numerous port facilities across New Jersey. Leading Light Wind will utilize these port facilities for various aspects and activities associated with the project, including the following:

- Marshaling, staging, installation, and preassembly
- Manufacturing
- Operations and maintenance (O&M)

The port facilities used will facilitate economic development across the state and provide efficient and effective operations for offshore wind construction, manufacturing, and O&M.

Marshaling and WTG component manufacturing: New Jersey Wind Port

Marshaling ports are required for cost-effective construction and maintenance of offshore wind farms. [redacted] Leading Light Wind plans to utilize the New Jersey Wind Port as our project's marshaling and as our primary choice for a WTG tower manufacturing facility. More information about our tower localization plans can be found in Section 8.2.

The New Jersey Wind Port is the nation's first greenfield wind port, designed, built, and operated exclusively for offshore wind marshaling and Tier 1 WTG component manufacturing. The NJEDA, an independent authority of the State of New Jersey, is developing the New Jersey Wind Port on behalf of state and will conduct a lease RFP in Q3 of 2023 for both marshaling and Tier 1 WTG component manufacturing parcels.[26]

The New Jersey Wind Port is located on the eastern shore of the Delaware River in Lower Alloways Creek, Salem County, New Jersey. The port is free of vertical restrictions and will comprise over 220 acres. The port is one of few planned East Coast facilities with the capacity to co-locate both marshaling activities and Tier 1 WTG component manufacturing. The facility is being developed in a two-phase approach, commencing in 2021 and scheduled to be fully complete by 2028 (see Figure 2-51).

Once completed, the New Jersey Wind Port will be able to support the marshaling of two offshore wind projects simultaneously and multiple (approximately three) Tier 1 WTG manufacturers.

The NJEDA has indicated that commencement of the next round of tenant selection for both marshaling and a manufacturing parcel for New Jersey Wind Port will commence after completion of NJBPU's third offshore wind solicitation. Leading Light Wind plans to participate in this process for a marshaling parcel to execute our project from. As a project, we will encourage our supply chain partners to participate in the tenant selection process and localize their manufacturing facilities at the New Jersey Wind Port.

Monopile manufacturing: Paulsboro Marine Terminal

In March 2021, the EEW Group announced the ground-breaking for the first US offshore wind manufacturing facility. EEW American Offshore Structures (EEW AOS) is located at the Paulsboro Marine Terminal in Gloucester County, New Jersey (see Figure 2-52), which is part of the terminal network of the South Jersey Port Corporation along the Delaware River.[27] The monopile production facility is the largest offshore wind manufacturing facility in the US to date. With direct access to the Atlantic Ocean, the facility is strategically located to serve the emerging US offshore wind industry with high-quality monopiles.

[redacted]

[26] New Jersey Offshore Wind Third Solicitation – Solicitation Guidance Document – Application Submission for Proposed Offshore Wind Facilities – New Jersey Board of Public Utilities – Attachment 12 – New Jersey Wind Port Parcel Information.

[27] EEW Group, www.eew-group.com/locations/eew-aos/.

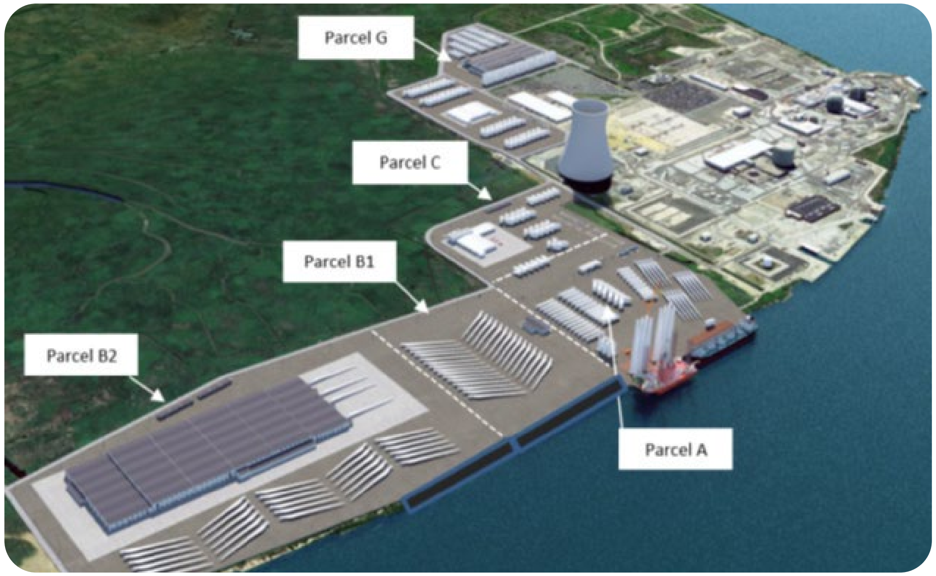


Figure 2-51. New Jersey Wind Port.

[redacted]

[redacted]

Operations and maintenance port

[redacted] The O&M port will be an integral part of the Leading Light Wind project. It will provide needed business functions, including but not limited to the following:

- Home port for vessel operations, surveying, and emergency operation
- Control center for planning and coordination of O&M activities at the project
- 24/7 monitoring center of site conditions and other maritime activities
- Machine shop for miscellaneous maintenance and repair projects
- Warehousing for sparts parts, consumables, and equipment
- On-site administrative functions in support of the day-to-day O&M activities for the project

The location will [redacted] serve as the departure point for the various technicians, support personnel and equipment needed to operate and maintain Leading Light Wind. The site will also have warehouse space for spare parts and equipment, a machine shop for minor repairs, and office space for administrative functions, as well as space for an on-site control center for remote monitoring and the operation of Leading Light Wind.

For additional information regarding Leading Light Wind's O&M port facility, see Section 15.2.

[redacted]

[redacted]

[redacted]

[redacted]

2.7 Energy storage

Summary

In contribution toward New Jersey's energy storage target of 2 GW by 2030, Leading Light Wind is pleased to offer an optional battery storage project as part of its bid submission. [redacted] Leading Light Wind expects to serve as the developer, owner, and operator of the project.

Leading Light Wind will be able to draw on the experience of Invenergy, one of the earliest pioneers in advanced energy storage. Invenergy is today the world's leading privately held owner and operator of grid-scale storage. Invenergy completed its first energy storage project in 2012 and since then has amassed over 150,000 hours of storage system runtime experience.

In 2019, Invenergy received the **Energy Storage Association's Brad Roberts Award**, recognizing extraordinary accomplishments in the storage market and comprehensive industry commitment and participation.

Invenergy currently has 19 battery storage projects either operating or contracted (see Figure 2-54 and Table 2-12), representing over 550 MW of capacity and over 1,800 MWh.

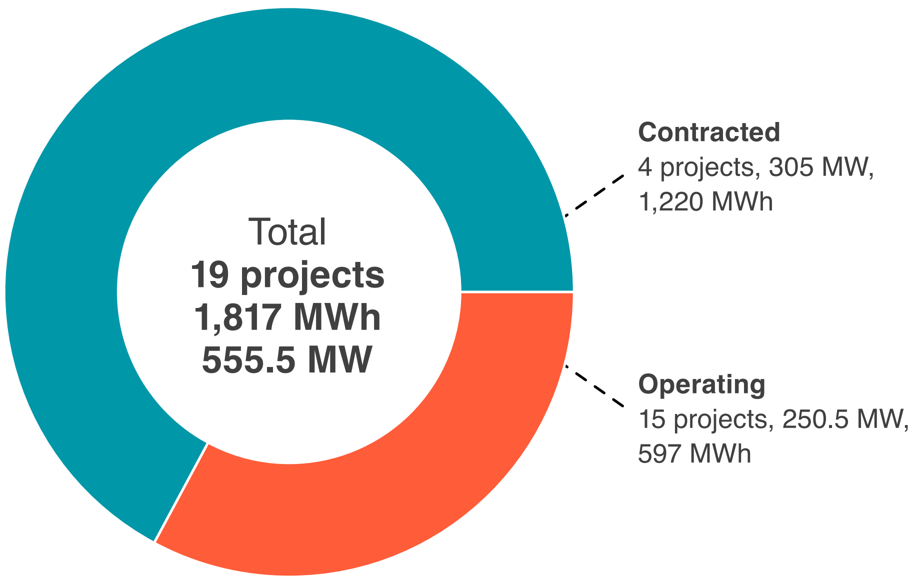


Figure 2-54. Invenergy's operating and contracted storage portfolio.

Project name	Status	Location	COD	Power (MW)	Energy (MWh AC)
Grand Ridge IV Storage	Operating	Illinois	2012	1.5	1
Grand Ridge Storage	Operating	Illinois	2014	31.5	31.5
Beech Ridge Storage	Operating	West Virginia	2015	31.5	31.5
Grand Ridge IV Expansion	Operating	Illinois	2016	3	1.3
MidAm Knoxville	Operating	Iowa	2018	1	4
Orangeville Storage	Operating	New York	2022	20	20
La Toba Storage	Operating	Mexico	2022	20	80
Westar	Operating	Kansas	2022	1	4.7
Desert Star	Operating	Arizona	2023	10	30
Cotton Center	Operating	Arizona	2023	17	51
Foothills	Operating	Arizona	2023	35	105
Gila Bend	Operating	Arizona	2023	32	96
Hyder I	Operating	Arizona	2023	16	48
Hyder II	Operating	Arizona	2023	14	42
Paloma	Operating	Arizona	2023	17	51
Paris	Contracted	Wisconsin	2023	110	440
El Sol	Contracted	Arizona	2024	50	200
Darien Storage	Contracted	Wisconsin	2025	75	300
Yuma Storage	Contracted	Arizona	2024	70	280
			Total	**555.5**	**1,817**

Table 2-12. Invenergy's operating and contracted battery storage projects.

Type of storage system

Technology and equipment

Leading Light Wind is agnostic to battery suppliers and will select a top-tier battery supplier to provide a cost-effective and reliable energy storage system. We have experience working with a variety of battery manufacturers and will select battery technologies and vendors that provide the best storage system based upon system reliability, performance, flexibility, and cost. To date, our advanced energy storage experience has focused on lithium-ion battery technology, which is tested and proven and has been deployed worldwide. We have expertise across the major lithium-ion chemistries, including nickel cobalt manganese, nickel cobalt aluminum, and lithium iron phosphate.

The project is expected to use [redacted] or a similar manufacturer's lithium-ion batteries. The project may also utilize a system integrator such as [redacted] or similar. Additional technical details can be provided in further discussions. Example lithium cell parameters are as shown in Table 2-13.

[redacted]

Table 2-13. Example lithium battery specifications and parameters.

[redacted] The batteries will be housed in non-occupiable, secured, climate-controlled enclosures. The exact sizing and design of the enclosures is dependent on the most appropriate and developed technology and will be submitted upon final selection in accordance with the authorities having jurisdiction.

In addition to the battery enclosures, the power conversion system will control the power flow to and from the battery strings by adjusting the voltage on the DC bus, as well as providing reactive power support. The power conversion system operates as both an inverter and rectifier with four-quadrant active and reactive power control.

Under normal operation the inverter coupling the battery to the grid will 1) produce real power by discharging the battery or 2) consume real power by charging the battery. Working in conjunction with a variety of top-tier suppliers, Leading Light Wind will supply the power conversion system and the integration of the control and monitoring system. Table 2-14 highlights some system specifications and basic characteristics of the inverter.

[redacted] The exact sizing and design of the enclosure depends on local code requirements and will be submitted upon final selection in accordance with authorities having jurisdiction. The inverters and pad-mount transformers will be located outside and adjacent to the enclosure(s).

The pad-mounted transformers will set up the low-voltage AC from the power conversion system to medium-voltage, [redacted]. The medium-voltage cabling will be connected in parallel, combined in sectionalizing cabinets, and fed into a feeder breaker prior to the medium-voltage side of the generating step-up transformer, where the voltage is stepped up from medium-voltage.

Storage safety design features

Safe operation of advanced energy storage systems begins with safe equipment and compliance with safety codes and regulations (see Table 2-15). Our equipment suppliers manufacture to stringent quality standards,

[redacted]

Table 2-14. Example power conversion system specifications and parameters.

and equipment at our projects must be tested and certified by third-party professionals. We develop projects following the principles of inherently safer design, including the selection of safer cell chemistry and the decision to use outdoor-rated non-occupiable enclosures to reduce life safety risk.

Our project hazard mitigation analysis demonstrates multiple barriers to failures and hazards according to guidance from leading battery safety standards. We work with first responders to educate departments on hazards highlighted in our analyses and to construct proper, site-specific emergency response plans.

Leading Light Wind complies with several major standards in its battery systems designs, [redacted]

[redacted]

[redacted]

Table 2-15. Invenergy complies with several major standards in its battery systems designs.

As a member of American Clean Power's Storage Safety, Codes, and Standards Committee, Invenergy is an industry leader in advancing responsible best practices. Table 2-16 on the following page summarizes Invenergy's standard safety design features.

Project development plan

[redacted]

This section provides an overview of the permitting plan, financing plan, current high-level development schedule and how it is integrated with the project.

Permitting plan

As discussed in Section 1, Invenergy is an experienced developer, owner, and operator in the PJM market, with over 900 MW of renewable and battery storage capacity in operation or contracted and an extensive pipeline of development-stage projects. Our involvement in PJM has shown that early, clear, and regular communication is an essential component to successfully develop any new energy infrastructure. Table 2-17 outlines key milestone dates to plan and develop the [redacted] to achieve a similar COD [redacted] we are likely to develop the project on a slightly longer timeframe in line with the offshore wind project COD.

The following is a high-level project timeline with key milestones noted.

[redacted]

Table 2-17. Key milestone project schedule.

[redacted]

Table 2-16. Invenergy's standard safety design features.

Our development team has direct experience preparing spill prevention, control, and countermeasure plans, agricultural data statements, visual and noise simulations, and stormwater pollution prevention plans, among others, to fully investigate, understand, and account for the potential impacts of an energy storage system. The schedule listed in Figure 2-55 provides generalized guidelines for when we would seek necessary permits.

Financing plan

Leading Light Wind expects to utilize a project finance approach for the [redacted] project. [redacted]

As further discussed in Section 5, our highly experienced capital markets team is unparalleled in the US renewable energy sector. We maintain strong relationships with a wide range of financial partners, including international and domestic banks, multilateral development banks, export credit agencies, tax equity investors, and financial investors. As a result, we have direct access to a variety of capital sources, allowing us to optimally finance each project on an individual basis.

At Final Investment Decision (FID), we expect to have financing arrangements in place that are appropriate for the project. This is likely to include committed construction loan lenders and tax equity investors, and final project financing arrangements that include a combination of project debt, tax equity, and sponsor cash equity.

[redacted]

Interconnection plan

[redacted]

Storage operating regime

Storage operations

[redacted] The operating characteristics of the site are summarized in Table 2-18.

Invenergy monitors over 4,000 data points per MWh from its storage facilities. It has personnel staffed 24/7 with remote access for battery and inverter control. Invenergy's battery storage control software optimizes state of charge and maximizes system performance, efficiency, and life. Invenergy can accept dispatch instructions from the customer and direct the storage system to respond, or have it run autonomously in a variety of modes to maintain voltage or frequency, shave peaks, and optimize economic dispatch.

Invenergy has built upon the preventative maintenance schedule required by battery and inverter manufacturers to fit internal best practices. Invenergy prioritizes acquiring and archiving all data that manufacturers have available,

[redacted]

Table 2-18. [redacted] operating characteristics.

which allows much of the preventative maintenance and troubleshooting to be done by Invenergy technicians and operators. Invenergy has augmented manufacturer maintenance to include capacity tests, voltage balancing, and alarm testing.

Capacity tests
Capacity tests, typically biannual, to track system health and diagnose premature degradation

Voltage balancing
Cell and system-level voltage balancing to improve capacity

Alarm testing
Regular alarm testing to ensure remote visibility

[redacted]

[redacted]

Storage deployment and revenue optimization for New Jersey ratepayers

The Solicitation Guidance Document states that in return for the sale of ORECs, the offshore wind projects are required to return to ratepayers the value of energy, capacity, and ancillary services revenue through ongoing active participation in PJM's wholesale markets. Leading Light Wind believes that we can leverage our skill, experience, and expertise in the deployment of battery energy storage systems to maximize revenues for the project and thereby minimize the net costs of the project to New Jersey ratepayers. See Section 7 for additional discussion of Leading Light Wind's operational track record (via Invenergy).

[redacted]

[redacted] The proposed dispatch will support New Jersey's decarbonization goals by enabling higher renewable penetration and displacing fossil fuel generation in these ways:

1 Charging during periods of excess renewable energy, especially during periods the energy would have been otherwise curtailed

2 Discharging during periods of low renewable availability, high demand

[redacted]

Energy storage can capture revenue in the PJM market through energy arbitrage, capacity, and ancillary services. Wholesale market price signals are expected to incentivize dispatch primarily for energy arbitrage, which consists of purchasing cheap (off-peak) energy to charge the system and selling it later at a higher price (typically in on-peak periods), making charged energy available when its needed most. As a result, energy arbitrage helps suppress price increase by supplying energy at points of high demand, when the marginal cost of energy tends to be higher.

[redacted]

Cost of the storage system included in the OREC price

[redacted]

[redacted]

Net benefits of storage system to New Jersey and the ratepayers

As mentioned above, Leading Light Wind has provided an option to include the [redacted] facility as a value-added enhancement to the proposed offshore wind energy projects for the New Jersey ratepayers.

In addition to the added revenue for the ratepayers to be earned by the storage project in the PJM wholesale markets for energy, capacity, and ancillary services, the proposed [redacted] facility will provide other valuable benefits, including net positive economic impacts resulting from new in-state spending and job creation associated with the construction and operation of the plant, as well as net pollutant emission reductions from the PJM fossil fleet that will have important positive health and climate effects for New Jersey.

The proposed [redacted] facility has been included in the preparation of the project cost-benefit analysis in Section 17 for those proposals including energy storage by adding the cost of the storage project to the overall project costs (i.e., the net present value of the total OREC price) and including the positive net economic impacts, the estimated market revenues, and the monetized value of the net emission reductions of the storage project with the overall project benefits. In addition to the net positive economic impacts, increased market revenues, and net emission reductions, the proposed [redacted] facility will provide a wide variety of additional grid and load benefits to the New Jersey and PJM power systems that also directly and indirectly benefit New Jersey ratepayers, including increased grid reliability and system resiliency. This section describes and quantifies those storage-specific benefits.

In-state spending and job creation

A detailed analysis of the expected total economic impacts of the proposed offshore wind projects, including the [redacted] facility, on in-state spending, employment, wages, and taxes is provided in the Leading Light Wind Economic Development Plan in Section 8. The economic impacts of the [redacted] facility itself including total direct in-state expenditures (in nominal dollars) and job creation and the total direct, indirect, and induced economic impacts are summarized in Table 2-20 and Table 2-21, respectively. The present value of the stream of value-added economic benefits discounted to December 31, 2022, at a 7% nominal discount rate are presented in Table 2-22.[31]

The [redacted] facility is expected to create new employment of over [redacted] FTE-years for the development and construction of the plant and 20-year operations period providing an expected total

[redacted]

increase of in-state labor expenditures of [redacted] resulting from total overall expected in-state expenditures of [redacted].

The ongoing operations and maintenance of the plant over its expected 20-year life (corresponding to the full 20-year OREC period) is expected to create [redacted] FTE-years of employment (assuming 1,820 hours per year per FTE) providing an expected increase of in-state labor expenditures of [redacted] resulting from total expected in-state expenditures of [redacted] for routine storage plant operations and maintenance work.

Section 17.3 describes the methodology employed in the project cost-benefit analysis for estimation of the direct, indirect, and induced economic effects of the project. The results of this analysis on the economic impacts of the [redacted] facility are provided in Table 2-22, including the construction phase total and operations phase average annual value-added impacts in real 2023 dollars (Columns 2-3) and the present value of the total annual impacts discounted to December 31, 2022, at a 7% nominal discount rate (Column 4). A summation of the total present value-added effects, using 100% of the direct value-added and 50% and 40% of the indirect and inducted value-added effects, respectively, is provided in Column 5.

[31] There is a small difference in the present value of the value-added totals related to the different COD dates associated with the small and large capacity bid alternatives.

Net emissions reductions

The proposed energy storage system will provide long-term health and climate benefits by shifting grid energy from off-peak to peak hours, displacing fossil-fired peaker generators and associated pollutants, including nitrous oxide (NOx), sulfur dioxide (SO_2) and carbon dioxide (CO_2). NOx and SO_2 pollutants tend to dominate estimates of impact of fossil fuel combustion emissions due to their direct and measurable impact on human health. The main health impacts of NOx and SO_2 emissions are related to their contribution to the formation of secondary particulate matter with diameters of 2.5 microns or less ($PM_{2.5}$). Long-term exposure to these has significant public health consequences, including increased mortality risk, particularly from cardiovascular causes. A reduction of these pollutants, particularly in densely populated urban areas, decreases mortality, emergency room visits, and hospital stays, as well as the prevalence of acute and chronic respiratory diseases. The beneficial environmental impacts include the total reduced pollutant emissions of the project from fossil-fired generation of the PJM fleet of the pollutants described above. These total avoided emission volumes are netted against the estimated project emissions and monetized for use in the project cost-benefit analysis as described in Section 17.

[redacted]

Table 2-23. Indicative average annual avoided emissions (short tons).

[redacted]

Table 2-24. Monetized net emission reductions at the [redacted] facility.

To evaluate the system-wide impact of [redacted] on regional offsets in fossil fired generation, [redacted], was used to model the PJM and entire eastern interconnect electricity system in 2033. The [redacted] receives as an input the 2033-forecasted resource mix, transmission topology, import and export limits, and demand, and then calculates the security constrained and economic dispatch (SCED) of all the resources on the system.

The analysis showed that fossil fuel generation in New Jersey was reduced compared to the scenario without Leading Light Wind and [redacted], in turn reducing emissions (including NOx, SO_2, and CO_2) from fossil fuel plants.

Please see Section 10 and Section 17 regarding the details of the emission risk analyses, estimation and quantification of the direct project and avoided emissions, and monetization methodology of the net benefits for the project. (A detailed description of the expected environmental benefits of the proposed offshore wind project and proposals including the [redacted] project is provided in Section 10).

A summary of the estimated total project emissions from construction of the plant and indicative average annual avoided emissions of the [redacted] facility over its projected 20-year life is provided in Table 2-23. The monetized present-value of the total benefits of the net emission reductions discounted to December 31, 2022, at a 7% nominal discount rate using the methodology described in Section 17 are provided in Table 2-24.

---

[32] Present value discounted to December 31, 2022, at a 7% nominal discount rate.

Grid benefits

The [redacted] facility will provide a wide variety of benefits to the PJM grid including increased reliability and resiliency, as well as congestion and curtailment relief.

Maintaining system reliability means ensuring sufficient generation resources are available to meet load, while holding sufficient operating reserves to meet flexibility needs and respond to contingencies. As New Jersey transitions to a more renewable grid, balancing loads with intermittent generation will require energy storage to supplement the declining use of fossil peaker units. Fast response four-hour battery energy storage such as that proposed for the [redacted] facility increases reliability for the entire system by strategically locating resources capable of providing sufficient power for when its needed most.

As indicated above, system reliability primarily relates to equipment availability and potential interruptions to customer power service when generating equipment cannot produce sufficient power, or when transmission and distribution networks cannot move sufficient power to consumers. Energy storage on the system increases reliability for the entire system by strategically locating resources capable of providing sufficient power when it is needed most, in response to new system reliability needs arising from the increasing penetration of bulk flows of variable renewable energy.

[redacted] also increases the resiliency of the system by providing enhanced flexibility to firm up the increasing flows of variable renewable energy. “System flexibility” refers to the ability of grid operators to closely align supply and demand in the system using energy resources that can start, stop, and ramp quickly and economically, and operate across a wide output range, providing spinning reserves and other ancillary services.

By the time of project COD after 2032, new challenges relating to the stability of the PJM power system and its ability to withstand grid frequency disturbances, are expected to emerge as variable renewable generation penetration levels achieve 20% to 30% of the energy supply in PJM.[33] At these levels it is possible that variable renewable generation output covers most or even all of power demand in certain situations and time periods.

In systems where inverter-based resources (including wind, solar, and battery energy storage) are replacing mechanical-based synchronous machines that traditionally provide system inertia and primary frequency response, certain counter-balancing effects both decrease the need for inertia overall to maintain grid frequency and the increasing need for fast-ramping secondary frequency response to maintain stability. Fewer synchronous power plants on the system will mean variable renewable generation and energy storage will have to move towards being able to provide all essential reliability services for the grid. Only this will allow these resources to cover close to 100% of power demand on occasions in an entire synchronous grid area and allow New Jersey to achieve its goal of 100% renewable power by 2035.

While combustion turbines are currently one of the primary suppliers of flexibility to the system, lithium-ion battery storage provides sub-second, virtually unconstrained ramp rates, compared to ramp rates of several to tens of minutes required for combustion turbines to reach full power. Further, battery storage can perform these services without the opportunity and maintenance costs that result from use of combustion turbines.

By operating as described above, [redacted] is projected to alleviate regional transmission constraints, local congestion, and renewable curtailment that is estimated due to the operation of future proposed generations. The [redacted] results provide power flows across the PJM system, which allows for isolating the flowgate contribution to locational marginal price congestion. From this analysis, [redacted] reduces overall congestion along the [redacted] flowgates, increasing renewable energy deliveries from Leading Light Wind and across the greater New Jersey system. These benefits are due to storage charging during periods of excess offshore wind generation, particularly during periods the energy would have been otherwise curtailed and discharging that energy when offshore wind generation is low. As a result, storage reduces the number of hours Leading Light Wind is curtailed from [redacted].

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[33] By 2021, the national rate of variable renewable energy penetration had grown to 12.9 percent (driven primarily by sustained growth in ERCOT, MISO, SWPP and CAISO), with PJM obtaining penetration rates of 7.7 percent. Current baseline expectations for variable renewable energy growth by 2025 is 20.8 percent nationally and 10.6 percent for PJM. However, state-based policy goals and targets for renewable resource deployments including offshore wind in the North Atlantic region indicate that the variable renewable energy penetration levels may in fact be above 20 percent in PJM by 2025 and exceed 30 percent by 2030.

Load benefits

Energy storage provides significant costs savings to load-serving entities and their customers. Battery energy storage systems are extremely effective at balancing supply and demand. As a result, they lower the market-wide price of energy. Combined with the volume of energy (MWh) that the load server must procure each hour, a small energy price ($/MWh) reduction translates into significant savings.

However, within the current market system, energy storage cannot capture a meaningful portion of the value it creates. The [redacted] results show that [redacted] reduces cost to load by [redacted] in 2033, compared to the case without it. The savings this system creates for the PJM load are approximately [redacted] greater than the revenue realized by the energy storage system itself.

The economic benefits that flow to the PJM system due to the proposed [redacted] project are the result of an overall operational improvement to the system brought by the reliability and resiliency contributions of the [redacted] facility. These productivity increases and value creation stem from the unique ability of storage resources to time-shift energy (energy arbitrage) and provide capacity services and operational reserves. Dispatching [redacted] during high priced hours will suppress energy prices by supplying energy during periods of high demand by offsetting dispatch of higher marginal cost fossil fuel peaker units.

Energy-time shift leads to additional and significant indirect economic benefits through the resulting optimization of the system including reduced fuel-use and other operation and maintenance costs. This includes the ability to time-shift energy from efficient and clean baseload generation to offset use of less efficient, dirtier on-peak generation.

Other optimizations leading to system economic benefits include the reduction of energy losses if energy is transmitted during off-peak times, and dynamic operating benefits for the system fossil generation as equipment is used less frequently (i.e., has fewer startups), operates at a more constant output when it is used (avoided part load operation), and operates at its rated output level most of the time when in use.

As indicated, these economic benefits may be precisely measured as net energy market revenue (the “arbitrage”) received by the [redacted] facility for performing this system optimization. Additional revenues, indicative of additional economic benefits resulting from increased production and value creation provided by the [redacted] project may be measured in the revenues received in the capacity and ancillary services markets.

The PJM Reliability Pricing Model uses the effective load carrying capability (ELCC) construct specifically to calculate the system capacity value of intermittent renewables and battery storage sensitive to load shapes and the resource mix in the capacity region.

The [redacted] plant will also use a significant share of its capacity providing operating reserves to stabilize system frequency as the penetration of variable renewable power increases and battery energy storage plays a more critical role in grid stabilization and the duty cycles of the synchronous machines of the PJM system fossil-fleet are reduced.

Net benefits analysis

Using the results provided in the preceding sections for the cost of the storage system included in the OREC price and the benefits of the storage system to New Jersey and the ratepayers presented above, a net benefit analysis is provided in Table 2-25 through Table 2-27 for the [redacted] project alternatives demonstrating that the benefits of the proposed [redacted] project exceeds the costs in all cases.

[redacted]

[redacted]

03
Energy production estimate

Solicitation requirements

Checklist item	Section reference
Assumptions that are the basis for the estimate of net energy output for the Project, as reported in the Application Form (N.J.A.C. 14:8-6.5(a)(2)(v))	Sections 3.1, 3.2, 3.3, and 3.4
Account for, to the fullest extent possible, the coincidence between time of generation for the Project and peak electricity demand (N.J.A.C. 14:8-6.5(a)(2)(vi))	Section 3.6
Provide an estimate, with support, of the amount of energy that will be generated over the term of the life of the turbines (N.J.A.C. 14:8-6.5(a)(2)(vi))	Section 3.5
Estimate, with support, the level of generation that the Project will be able to provide over the life of the equipment, assuming the Project runs for the equipment's full life (N.J.A.C. 14:8-6.5(a)(2)(vi))	Section 3.5
Provide the total amount of clean energy being generated over the term of the OREC program and the life of the turbines (N.J.A.C. 14:8-6.5(a)(2)(v))	Section 3.5
For each proposed Project, an explanation of how the Annual OREC Allowance, as submitted in the Application Form, is derived from the wind resource and energy assessment	Section 3.5
A wind resource and energy assessment from a wind energy consultant for the exact manufacturer, model and specifications of turbines selected for the Project (N.J.A.C. 14:8-6.5(a)(2)(v))	Section 3.7
Professional qualifications for the wind energy consultant to demonstrate sufficient expertise (N.J.A.C. 14:8-6.5(a)(2)(v))	Sections 3.1 and 3.7
For each proposed Project, a planned maintenance outage schedule for the turbines and other equipment	Section 3.6

03 Energy production estimate

3.1 Summary

This section summarizes Leading Light Wind's wind resource assessment and energy yield analysis. The analysis has been prepared by our project engineering group and meteorology consultants using data collected from on-site floating light detection and ranging (lidar) buoys (see Figure 3-2).

DNV, a trusted offshore wind industry technical consultant, was contracted to perform a wind resource and energy assessment for Leading Light Wind (see Section 3.7). See Attachment 3.1 for DNV's statement of qualifications.

These estimates are based on available data and will be updated periodically as more data is collected and the project design is refined. This section composed by Leading Light Wind is meant to supplement and elaborate upon the formal third-party wind resource and energy estimates created by DNV, and all information in this section is consistent with those reports. We use a measure-correlate-predict approach that includes the steps shown in Figure 3-1.

Measure

1. On-site floating lidar buoys collect data on wind speed, wind speed standard deviation, wind direction, and temperature.
2. Collected data is validated to remove potentially erroneous samples using quality flags and flag by scatter-plot techniques.
3. Average measured wind speeds are calculated for every measurement location and height.

Correlate

4. Wind shear coefficients are determined after studying data collected at various elevations.
5. Long-term reference datasets are studied to identify those most closely correlated to data collected at the site.
6. Hub-height average wind speeds are calculated using wind shear coefficients to vertically extrapolate between measurement heights.

Predict

7. Predictions are made of the long-term hub-height wind speeds at every measurement location.

Figure 3-1. Leading Light Wind uses a measure-correlate-predict approach.

[redacted]

Figure 3-2. Floating lidar buoy locations.

Leading Light Wind has processed the existing floating lidar buoy data and correlated long-term time series data for each buoy location. This data was then utilized to establish a site-specific wind resource grid, which was used in the energy modeling program [redacted] to generate optimized wind turbine layouts and maximized energy production.

The process described above reflects a thoughtful, deliberate, and data-driven approach to achieve accuracy in the energy yield analysis and is consistent with state-of-the-art methods to model offshore wind farm production. Further detail is provided in the following subsections.

As discussed in previous sections, this analysis is premised on a base case expectation of utilizing the [redacted] turbine model. However, based on extensive internal analysis, we are confident that should the project utilize the [redacted], Leading Light Wind will be able to deliver a similar or higher net capacity factor (NCF) and P50 value.

3.2 Summary of data

The wind resource campaign consists of [redacted] floating lidar systems (FLSs) near the lease area (Figure 3-3 and Table 3-1).

Before deployment, each buoy underwent a pre-deployment verification and port site acceptance test to ensure the quality and accuracy of the data collection instruments. The standard of documentation was reasonable and sufficient to verify traceability of the instrumentation throughout the monitoring campaign.

[redacted]

Table 3-1. Summary of measurements.

[redacted]

All verifications concluded that the FLSs exceeded the key performance indicators and acceptance criteria for wind data accuracy, as defined by the Carbon Trust Offshore Wind Accelerator Roadmap. [redacted] Both the [redacted] technologies were recently independently verified as having reached Stage 3, the highest commercial maturity rating.

This is the final stage of certification, after Stage 1 (Baseline) and Stage 2 (Pre-commercial). At Stage 3 (Commercial), a significant body of operational evidence and verification has been accumulated across a range of environmental conditions, leading to a good understanding of any environmental performance sensitivities and thus increasing certainty in the performance of the FLS. Furthermore, the FLS has consistently demonstrated significantly more demanding reliability performance and data availability.

There is low spatial variability of the metocean conditions (wind, waves, current, temperature) at more than 50 km from the nearest shore, where the lease is located. [redacted]

[1] DNV, NYSERDA Floating LiDAR Buoy Data, www.oswbuoysny.resourcepanorama.dnv.com.

3.3 Description of data

[redacted]

The FLSs were set up to record data during the timelines shown in Figure 3-5 and at the heights listed in Table 3-2. The FLSs were programmed to record mean wind speed and direction, maximum wind speed, and dispersion components during ten-minute intervals.

3.4 Wind resource assessment

Proper characterization of the wind conditions at the project location is critically important to creating accurate energy production estimates. The analysis and classification of wind speed and direction, shear, turbulence, temperature, spatial and temporal variation, cross-site correlation, and long-term correlation all have significant impacts on the input files used in the Openwind energy assessment model.

[redacted]

Table 3-2. Measurement deployment summary.

[redacted]

Figure 3-5. Timeline of FLS measurements.

Measured wind speeds

The data supplied was processed and compensated for motion using the manufacturer's algorithm. Leading Light Wind applied a further quality checking procedure to the processed remote sensing wind data to identify records that were affected by equipment malfunction and other anomalies. From this data, wind speeds and data coverage were established at a height of 160 meters (Table 3-3).

[redacted]

Table 3-3. Wind speed measurements at 160 meters.

Cross-site correlation

To bring all the measurement periods to a consistent period of record, missing and historic wind speed and direction data at the primary measurement levels of each measurement location were synthesized from neighboring lidar on a ten-minute directional basis, as shown in Table 3-4.

[redacted]

[redacted]

[redacted]

Table 3-4. Cross-site correlated FLS data at [redacted].

Long-term correlation

Hourly measured on-site data was correlated to long-term reference data from [redacted] to predict long-term wind speeds at measurement height. Both [redacted] global reanalysis wind datasets were evaluated for their correlation to onsite data.

[redacted] is the fifth generation of the European Centre for Medium-Range Weather Forecasts' atmospheric reanalysis of the global climate. It incorporates vast amounts of historical measurement data, including satellite-based, commercial aircraft-based, and ground-based data.

[redacted]

Table 3-5. Long-term wind speed at 155 meters.

[redacted] is produced by the National Aeronautics and Space Administration (NASA) by assimilating satellite observations with conventional land-based meteorology measurement sources using the Goddard Earth Observing System, Version 5.12.4 atmospheric data assimilation system.

Both [redacted] long-term data references are well recognized as industry standard global reanalysis wind datasets. [redacted] was chosen due to its higher correlation coefficient. Further, the [redacted] data has potential consistency issues in this area, in the later part of its period of record, so it was not utilized in the measure-correlate-predict process (Table 3-5). The resulting long-term wind rose and wind frequency distribution is shown in Figure 3-6.

[redacted]

Shear

Shear coefficients for changes in wind speeds with respect to height are provided in Table 3-6. Shear coefficients for each measurement location were determined by analyzing measured shear at each lidar averaged by month and hour of day (12x24 diurnal). These shear values were used to extrapolate wind speed at the specific hub heights for the wind turbine types considered in the energy production estimate and are further described in Section 3.5.

[redacted]

Table 3-6. Average shear coefficients at FLS measurement locations.

Turbulence

Post-processed turbulence intensity measurements were available at the floating lidar buoy locations. However, it is widely accepted that turbulence intensity measurements from lidar devices (volume measurements) are not directly comparable to measurements from meteorological masts using cup anemometers (point measurements), which is currently the wind industry standard. [redacted]

3.5 Wind conditions and electrical output

Method

Leading Light Wind used [redacted] software to model wind flows across the site and calculate the gross energy production from the planned wind farm. The [redacted] mesoscale wind flow model for Leading Light Wind was produced by adjusting a wind resource grid to multi-height meteorological data from the [redacted] long-term correlated FLS buoys (Figure 3-2).

[redacted]

Figure 3-7. Mean wind speed map at [redacted].

[redacted] uses the long-term wind speed data, turbine power curves, and turbine locations to calculate the turbine power generation performance at each location. Site-specific air density is included in each measurement location. The [redacted] wake model, with offshore specific settings, was used to calculate wake losses and energy output of the wind farm. Turbine dimensions, power curves, thrust curves, and operational parameters (temperature derate, high wind hysteresis cut-out) for this analysis were provided by the turbine vendor.

Project configuration

Base case project alternatives are shown in Table 3-7.

Turbine performance characteristics

The production estimates provided herein assumes the project will be built with a [redacted]. Additional turbine details are outlined in Table 3-8.

Full power curve specifications, including details on air density-adjusted power curves, cut-in and cut-out wind speeds, and other operational characteristics are provided in Attachment 3.2. Extended cut-out functionality is provided in Attachment 3.3.

Neighboring wind farms

A number of wind farms are close to the Leading Light Wind project area (Figure 3-8 and Table 3-9). Information on the turbine models, sizes, and locations was identified from public Construction and Operation Plan (COP) documentation (ASOW 1, 2, and 3, Ocean Wind 1) or assumed by Invenergy

[redacted]

Figure 3-8. Neighboring wind farm layouts.

[redacted]

Table 3-7. Base case project alternatives.

[redacted]

Table 3-8. Turbine details.

Table 3-9. Neighboring wind farm details.

[redacted]

based on a 2030 COD (ASOW-NY, Community Offshore Wind, and Hudson South B). Wake impacts from these six wind farms were included in the energy model.

The turbine types for Leases OCS-A 0541, 0539, and 0538 are assumed at this point, and will be updated as more information becomes available.

Energy output

Expected long-term P50 net energy (inclusive of all losses and wake effects) is shown in Table 3-10.

As provided in our Application Forms, [redacted]

Losses

Project energy losses have been either assumed based on regional estimates and historical operational data, or directly calculated in [redacted]. See Table 3-11 for a summary of losses.

Waking losses

- **Internal waking.** The [redacted] wake model, with offshore settings, is used to calculate the losses due to wake effects for the Leading Light Wind project and all neighboring wind projects. A wake adjustment factor has been used to align the [redacted] wakes effects with DNV's wake effects.

[redacted]

Table 3-10. Energy estimates.

[redacted]

Table 3-11. Summary of losses.

- **External waking.** [redacted] nearby wind farms were considered (see Table 3-9).
- **Blockage.** The blockage loss is derived from an empirical relationship that accounts for inter-turbine spacing, turbine dimensions, and atmospheric stability. [redacted]

Availability losses

- **Wind turbine availability.** Leading Light Wind has made a starting assumption for the turbine availability that could be expected from the projects based on the wave climate, anticipated O&M access strategy, and some assumptions regarding the reliability and track record of the turbine technology to be installed in the future. Note that this loss accounts for site access as well. [redacted]
- **Balance of plant and grid availability.** Leading Light Wind has commissioned multiple availability assessment studies. The balance of plant availability value is based on input from design consultants, O&M consultants, converter station OEMs, and data made publicly available through CIGRE standards. [redacted]
- **Electrical efficiency.** Array and export cable designs were generated and an associated net annualized electrical loss for the electrical systems was computed by the Leading Light Wind electrical engineering team. The electrical efficiency calculation includes losses from the turbine transformer, inter-array cables, converter stations, export cable, and onshore AC cabling. Electrical losses breakdowns are as follows in Table 3-12.

[redacted]

Table 3-12. Net annualized electrical losses used in energy yield estimates.

Turbine performance

[redacted]

Environmental

[redacted]

Curtailment/operational strategies

[redacted]

3.6 Energy delivery

For the planned maintenance outage schedule covering WTGs and other equipment refer to Section 15.3.

Diurnal

The expected long-term average seasonal and diurnal variation in energy production has been assessed from the available data at the project site (Tables 3-14, 3-15, and 3-16). The long-term average seasonal and diurnal variations in air density were developed from temperature and pressure records at [redacted] and scaled to the predicted long-term annual site air densities.

[redacted]

Table 3-13. Coincidence between time of generation for project alternatives and peak electricity demand.

Simulated time series of production data were produced using the time series of density, wind direction, and wind speed and the [redacted] energy model. The coincidence between time of generation for the project alternatives and peak electricity demand is shown in Table 3-13. Per PJM's definitions of peak/offpeak hours and seasons, winter runs from December through February and summer from June to August. Peak hours run from 7 am through 11 pm, with offpeak making up the remainder of hours.

The resulting expected seasonal and diurnal variations in energy production for each alternative are presented in the following tables in the form of 12-month by 24-hour (12 x 24) matrices. We note that the uncertainty associated with the prediction of any given month or hour of day is significantly greater than that associated with the prediction of the annual energy production.

Uncertainty

The main sources of deviation from the central estimate (P50) have been quantified and combined using a probabilistic model, assuming full independence between the sources.

Interannual variability

Even if the central estimate was perfectly defined, wind farm energy production varies from year to year due to a number of factors, including natural variation in the wind regime, variations in system availability, and variations in environmental losses. Table 3-17 presents the interannual variability estimated for the site.

Long-term measurement-height wind regime

Table 3-18 presents uncertainties in determining the long-term measurement-height wind speed for the measurement locations on the site.

Project uncertainties

Uncertainties on the P50 energy estimate were calculated based on annual wind speed variance, duration of meteorological data campaign, correlation with the long-term reference station, correlation among on-site FLS buoys, vertical extrapolation, and topography.

Wind speed uncertainties are converted to energy uncertainties using the sensitivity ratio, which shows how sensitive the net energy production is to changes in wind speed and is dependent mainly on the wind speed distribution and power curve of the turbine. [redacted] A summary of the uncertainty values for the Leading Light Wind P50 energy is shown in Table 3-19.

The results of the probabilistic simulation of net energy production are summarized in Table 3-20.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

3.7 Technology viability, cost competitiveness, and suitability

A third-party wind resource and energy assessment was procured from DNV for the three alternatives and is provided in Attachment 3.4.

The P50 net energy described in the above section and in the DNV report in Attachment 3.4 can be considered representative of the annual OREC allowance, and these quantities of MWhs should be considered eligible to receive payment of ORECs. This amount was calculated based on the total installed capacity of the project, projected capacity factor, total number of hours of operation per year, and all losses outlined.

[redacted]

[redacted]

[redacted]

04
Financial analysis

Solicitation requirements

Checklist item	Section reference
A complete financial analysis of the Project (N.J.A.C. 14:8-6.5(a)(3)	Section 4.2
A comprehensive business plan with fully documented estimates of all associated and relied upon revenue and expense projects (N.J.A.C. 14:8-6.5(a)(3)(iv))	Section 4.2
Tax credits, subsides or grants the Project will qualify for (N.J.A.C. 14:8-6.5(a)(12)(viii)(2))	Section 4.2
Debt service costs and return on equity assumptions (N.J.A.C. 14:8-6.5(a)(12)(viii)(3))	Section 4.2.
Taxes and depreciation assumptions (N.J.A.C. 14:8-6.5(a)(12)(viii)(4))	Section 4.2
The operation and maintenance ("O&M") plan for the Project must be integrated into the financial analysis of the Project (N.J.A.C. 14:8-6.5(a)(7)(viii)	Section 4.2
Coverage ratios for recourse and non-recourse debt tranches	Section 4.2
A nominal levelized cost of energy ("LCOE") over the 20-year contract term using a 7% nominal discount rate and the Project's expected output, as reported in the Application Form	Attachment 4.1
An Excel file containing financial statements for the Project over the development, construction, operation and decommissioning periods	Attachment 4.1
Pro forma income statements (N.J.A.C. 14:8-6.5(a)(3)(i))	Section 4.2
Balance sheets (N.J.A.C. 14:8-6.5(a)(3)(ii))	Section 4.2
Cash flow projections for the proposed OREC period, including the internal rate of return, and a description and estimate of any State and/or Federal tax benefits that may be associated with the Project (N.J.A.C. 14:8-6.5(a)(3)(iii))	Section 4.2
All tax credits or other subsidies upon which the Applicant is relying, as described in Section 3.6 (N.J.A.C. 14:8-6.5(a)(5)(ii))	Section 4.2
A full cost accounting of the project, including total equipment, construction, O&M, and decommissioning costs (N.J.A.C. 14:8-6.5(a)(5)(ii))	Section 4.3
A feasibility study used to determine the construction costs included in the cost accounting (N.J.A.C. 14:8-6.5(a)(3)(v))	Section 4.3
The Project financial statements must include the annual earnings before interest, taxes, depreciation, and amortization ("EBITDA") over the 20-year contract term	Section 4.2
The pro forma income statements should provide reasonable insight into the financing assumptions used to support Applicant's required return on investment ("ROI")	Section 4.2
The full cost accounting of the Project must specifically identify the material and installation costs for the generator lead line between the offshore substation(s) and the Larrabee Collector Station, and for the Prebuild Infrastructure	Section 4.3

04 Financial analysis

4.1 Summary

As outlined in greater detail below, Leading Light Wind has conducted a thorough financial analysis for each of our bid alternatives, relying upon the sponsors' deep experience in development, construction, operating, and financing large-scale projects to develop a robust and achievable business plan.

4.2 Business plan and assumptions

The following business plan for Leading Light Wind outlines underlying assumptions and forecasted financial statements associated with each of our project components (offshore wind project, prebuild infrastructure, and battery storage) and bid alternatives, which are provided in Attachment 4.1.

Pro forma income statements

Projected pro forma income statements (labeled as "profit & loss") for the bid alternatives, including annual earnings before interest, taxes, depreciation, and amortization (EBITDA) over the proposed OREC period, can be found in Attachment 4.1.

Revenue projections

Securing a contracted source of revenue is crucial for the financial viability and business plan of the project. For lenders and investors, the contracting of project ORECs will be a key source of revenue stability that will provide comfort and security as they invest into the project, since the 20-year OREC period provides a predictable revenue stream.

Project finance debt and tax investors are essential for optimizing the cost of capital and minimizing the cost to ratepayers. The market revenues — which are shown within the profit & loss statements to be refunded back to ratepayers during the 20-year OREC term as well as during the post-OREC merchant period — were projected by using the energy production estimate discussed in detail in Section 3 and the [redacted] The revenue assumptions and strategies are discussed in further detail in Section 7. Leading Light Wind's assumed forecasted average annual market pricing, including merchant energy pricing, REC pricing and capacity pricing, can also be found in the "summary assumptions" section of Attachment 4.1 for each of our components/bid alternatives. We note that there is no assumed incremental market revenue associated with the addition of the prebuild infrastructure option for each of our project alternatives.

Expense projections/O&M plan

Leveraging Invenergy Services' extensive asset management, operations and maintenance (O&M), and remote operations experience, Leading Light Wind has developed an O&M plan, inclusive of forecasted operating expenses, to maximize performance and ensure safe and reliable delivery of power to its customers, as further detailed in Section 15. The projected annual operating expenses for each project component/bid alternative are included within the profit & loss statements included within Attachment 4.1. The projections include site O&M expenses, corporate overhead, security requirements, and project-specific operating expenses, which consist of Bureau of Ocean Energy Management (BOEM) operating fees, property taxes, and fisheries mitigation.

Leading Light Wind has developed an O&M plan to maximize performance and ensure safe and reliable delivery of power to its customers.

Return on investment

Information pertaining to the required return on investment is included within the Attachment 4.1, including EBITDA and total project costs for each project component/bid alternative.

Balance sheet

Attachment 4.1 presents the annual projected balance sheets for each project component/bid alternative throughout the construction, operations, and decommissioning phases of the Leading Light Wind project.

Debt financing assumptions

[redacted]

[redacted]

[redacted]

A summary of debt service costs and coverage ratios are included in the following tables, and rolling debt service coverage ratio calculations for the back-leverage loan are included for each bid alternative within Attachment 4.1.

[redacted]

[redacted]

Equity assumptions

[redacted]

[redacted]

[redacted]

Figure 4-1. Potential state incentives for Leading Light Wind include the NJEDA Offshore Wind Tax Credit program and/or the Emerge Program.

Cash flow projections

Attachment 4.1 includes projected cash flow statements for the proposed OREC periods associated with each project component/bid alternative.

Internal rate of return

A running calculation of the project level, after-tax cash flow internal rate of return, is included within Attachment 4.1 for each project component/bid alternative.

Tax benefits

Leading Light Wind [redacted] Lastly, we expect to work closely with our contractors and suppliers to pursue state incentives, including the NJEDA Offshore Wind Tax Credit program and/or the Emerge Program where applicable. These benefits and qualifications are discussed in more detail in Section 6.

Taxes and depreciation assumptions

The Leading Light Wind project is using the tax and depreciation assumptions shown in Table 4-5, and as also outlined in Attachment 4.1.

Nominal levelized cost of energy

The nominal levelized cost of energy over the 20-year period at a 7% discount rate is included within Attachment 4.1 for each bid alternative.

[redacted]

Table 4-5. Taxes and depreciation assumptions.

4.3 Cost accounting

Attachment 4.1 outlines assumed project costs (labeled as “spending schedule”), including development, construction equipment costs, as well as financing and other costs. Attachment 4.1 also summarizes the expected operating and decommissioning costs within the “profit & loss” section. Cost assumptions were developed using the sponsors’ industry knowledge as well as working with top-tier contractors and suppliers. This section outlines the cost accounting of the Leading Light Wind project, including total equipment, construction, operating and decommissioning costs, and also includes a feasibility study used to outline the determination of construction costs.

Construction costs and feasibility study

Construction costs consist of expected development, engineering, construction services, and equipment costs, which have been developed with the sponsors’ knowledge of the industry as well as working closely with leading contractors and suppliers. These costs can be viewed and are supported by the feasibility study included as Attachment 4.2.

Operating costs

As previewed above and further discussed in Section 15, expected operating costs have been developed from the sponsors' breadth of operational experience in addition to quotes from contractors and suppliers as the project built out the O&M plan. These costs can be viewed in Attachment 4.1 for each bid alternative and are summarized in Table 4-6.

Decommissioning costs

As previewed above and further discussed in Section 16, expected decommissioning costs were developed from the sponsors' industry expertise as well as engaging with leading engineering consultant COWI A/S to prepare a decommissioning plan. [redacted]

[redacted]

Table 4-6. Operating costs by category.

[redacted]

Table 4-7. Decommissioning costs by category.

05
Project financing plan

Solicitation requirements

Checklist item	Section reference
The proposed method of financing the Project (N.J.A.C 14:8-6.5(a)(4))	Section 5.2
A detailed financial plan (N.J.A.C 14:8-6.5(a)(4)(iv))	Section 5.3
Identification of equity investors, fixed income investors, long and short-term debt, and any other sources of capital (N.J.A.C. 14:8-6.5(a)(4)(i), N.J.A.C. 14:8-6.5(a)(4)(iv))	Sections 5.2 and 5.3
A demonstrated ability to finance construction through market sources, which may include tax-exempt bond financing through the New Jersey Economic Development Authority (N.J.A.C. 14:8-6.5(a)(4)(iii))	Section 5.3
Names, functions, and fees of all financial and legal advisors (N.J.A.C. 14:8-6.5(a)(4)(iv))	Section 5.3
Specify if and under what conditions equity or other ownership interests in the Project can be transferred to other parties and considerations involved (N.J.A.C. 14:8-6.5(a)(4)(iv))	Section 5.3
Potential debt lenders	Section 5.3
Expected amount of tax equity financing	Sections 5.2 and 5.3
Evidence of the ability to finance the Project, such as: a letter of intent to offer credit from credible financiers, a letter of commitment from equity investors, and/or a guarantee from an investment-grade party (N.J.A.C. 14:8-6.5(a)(4)(ii))	Section 5.4

05 Project financing plan

5.1 Summary

Leading Light Wind is owned and funded by its co-developers, Invenergy and energyRe, along with a consortium of investors including Blackstone, CDPQ, FirstLight PSP, and Ullico Infrastructure Fund. Leading Light Wind has developed a strong and viable Financing Plan for the project, applying the extensive experience and knowledge across different aspects of financing among the sponsors and the investor consortium. Currently, the project is financed 100% by sponsor equity. [redacted]

5.2 Proposed financing method and sources of capital

Collectively, the sponsors and investor consortium have the financial resources and financing expertise necessary to successfully execute on the Leading Light Wind project. We have outlined the financial strength and financing experience of each entity as follows.

Invenergy: Over nearly two decades, Invenergy has completed more than $50 billion in financial transactions. Its highly experienced capital markets team is unparalleled in the renewable energy sector in the United States.

Invenergy maintains strong relationships with a wide range of financial partners including international and domestic banks, multilateral development banks, export credit agencies, tax investors, and financial investors. As a result, Invenergy has direct access to a variety of capital sources, allowing it to optimally finance each project on an individual basis.

In 2021 alone, Invenergy closed more than $4 billion in project financings, including construction financing for Invenergy's 998 MW Traverse Wind Energy Center in Oklahoma, America's largest single-site wind facility. Invenergy has been recognized with Power Finance and Risk Borrower of the Year or Deal of the Year awards in 2012, 2013, 2016, and 2017.

energyRe: The principals of energyRe have substantial resources and a successful track record investing and raising capital for large-scale development and infrastructure projects. A core strength of energyRe is its ability to creatively and efficiently finance projects to maximize value for all stakeholders. Its financing approaches have historically included a variety of different sources: general and limited partner equity, conventional construction and permanent debt, taxable and tax-exempt bonds, tax credits, preferred equity, and multiple other sources.

energyRe has an extensive network of debt and equity relationships that includes many of the world's largest banks, insurance companies, pension funds, sovereign wealth funds, and other financial institutions. The team has historically sourced $5 billion to $10 billion of debt and equity capital per year and has done so at scale across economic cycles. energyRe's founding investors include principals of Related Companies, one of the nation's most prominent privately-owned real estate firms, with over $60 billion in assets owned or under development.

Blackstone: Founded in 1985, Blackstone is the largest alternative asset manager globally, with $991 billion in assets under management. Blackstone Infrastructure Partners, Blackstone's infrastructure platform with $36 billion in assets under management, seeks to apply a long-term buy-and-hold strategy to large-scale infrastructure assets, with a focus on delivering stable, long-term capital appreciation together with a predictable annual cash flow yield. This approach to infrastructure investing focuses on responsible stewardship and stakeholder engagement to create value for investors and the communities Blackstone serves.

CDPQ: CDPQ is a long-term institutional investor that manages funds primarily for public and parapublic pensions and insurance plans in the province of Quebec. As of December 31, 2022, CDPQ held CAD $401.9 billion in net assets.

As one of Canada's leading institutional fund managers, CDPQ invests globally in major financial markets, private equity, infrastructure, debt and real estate. CDPQ is AAA stable rated by S&P, Moody's, Fitch, and DBRS. CDPQ has been a major infrastructure investor for more than 20 years and its infrastructure portfolio totaled CAD $54.6 billion as of December 31, 2022.

FirstLight PSP: FirstLight Power, majority owned by PSP Investments, owns and operates approximately 1.6 GW of clean energy assets in North America, including the largest portfolio of clean generation assets in ISO New England. FirstLight's portfolio covers 26 facilities, predominately hydroelectric, in the US Mid-Atlantic, US Northwest, and Ontario, and includes significant energy storage projects, including the 1,168 MW Northfield Mountain pumped-storage facility and approximately 200 MW of conventional hydroelectric facilities.

FirstLight is also developing a pipeline of nearly 200 MW of new solar and battery storage projects at sites it owns in Massachusetts and Connecticut. Based in Burlington, MA, with operating offices in Northfield, MA and New Milford, CT, FirstLight provides stewardship and recreational access to 14,000 acres of land and waters along the Connecticut, Housatonic, Shetucket, Still, and Quinebaug Rivers. FirstLight has a fully dedicated 24/7 real-time trading desk that manages the commercial operations of the business, including moving power to and from the US Northeast.

Ullico: For more than 95 years, Ullico has provided financial and insurance products and services to meet the needs of union employers and employees. In 2010, Ullico launched an investment fund to assist in the construction, maintenance, and refurbishment of America's infrastructure. The fund currently has over $5 billion in investor commitments on behalf of over 200 investors, with 23 portfolio investments across water, wastewater, telecommunications, electricity transmission, power generation, transportation, and gas transmission subsectors, two of which are headquartered in New Jersey. Ullico is exploring opportunities in all infrastructure-related subsectors. Additionally, Ullico Infrastructure Fund has over $100 million of capital from New Jersey labor pension plans.

[redacted] Expected sources and uses are outlined in the Santander Financing Plan memo included in Section 5.3. [redacted] A sample of successfully financed projects are included in Table 5-1.

[redacted]

Table 5-1. A sample of Invenergy's successfully financed projects.

5.3 Detailed financial plan

[redacted] The sponsors and investor group have deep capital markets expertise, and the Leading Light Wind project is supported by experienced advisors who have reviewed and advised on financing options and assumptions specific to this project and offtake arrangement.

Details of the proposed financing plan are outlined within a Financing Plan memo provided to Leading Light Wind by Santander Bank (see Attachment 5.1). [redacted] Santander is a leading provider of services in the global offshore wind market, with the execution of over 35 mandates.

The sponsors engaged Santander to help develop and review the financial plan due to their strong ongoing relationship with Santander, as well as Santander's insight and experience in providing advisory and financing services within the offshore wind market in the US and abroad.

Figure 5-1. [redacted]

5.4 Santander Bank Letter of Intent

Santander

In addition to the Financing Plan memo, Santander Bank has provided Leading Light Wind with a Letter of Intent, which is provided as Attachment 5.2.

06

Documentation of financial incentives

Solicitation requirements

Checklist item	Section reference
Documentation to demonstrate that the Applicant has applied for all current eligible State and Federal grants, rebates, tax credits, and programs available to offset the cost of the Project or provide tax advantages (N.J.A.C. 14:8-6.5(a)(5))	Section 6.2
Documentation of all Federal and State tax incentives for which the Applicant is applying or has applied or otherwise are applicable, even if such incentives have not been sought or approved (N.J.A.C. 14:8-6.5(a)(5)(i))	Section 6.2
The assumed Federal Investment Tax Credit and/or Production Tax Credit, Federal and State subsidies, grants, or other incentives that the Applicant expects to be eligible for, including but not limited to those available under the federal Inflation Reduction Act and Infrastructure Investment and Jobs Act, and a proposed plan to secure such tax credits, subsidies, grants, or other incentives	Section 6.2
Identification of additional Project costs associated with qualifying for tax credits	Section 6.2

06 Documentation of financial incentives

6.1 Summary

[redacted]

6.2 Documentation of financial incentives

Federal tax incentives

[redacted]

Investment tax credit

[redacted]

[redacted]

[redacted]

Credit monetization

[redacted]

[redacted]

[redacted]

Bonus credits

Domestic content

[redacted]

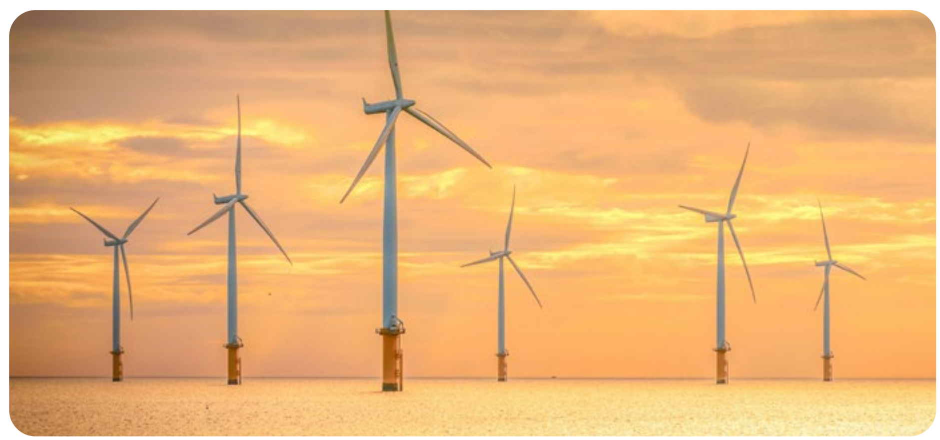


Figure 6-1. [redacted]

[redacted]

Energy communities

[redacted]

State tax incentives

Sales and use tax

[redacted]

Property tax abatements

[redacted]

Other programs

[redacted]

Additional project costs

As noted previously in this section, potential additional project cost spend [redacted]

[redacted]

07
Project revenue plan and strategy

Solicitation requirements

Checklist item	Section reference
A Project revenue plan which forecasts revenues as well as identifies the strategy for offering the electricity provided in the electric market and for generating all expected revenues (N.J.A.C. 14:8-6.5(a)(6)(i))	Section 7.2 and 7.3
Provide an estimate, with documented support, of the amount of electrical capacity the Project will make available that is calculated consistent with PJM rules and procedures (N.J.A.C. 14:8-6.5(a)(2)(vi))	Section 7.3
The project revenue plan must link the anticipated revenues to the Project time schedule and costs for the entire Project's lifecycle term extending to the expected life of the turbines and eventual decommissioning (N.J.A.C. 14:8-6.5(a)(6)(ii))	Section 7.3
Specify financial expectations and marketing strategies for securing revenue from expected capacity-based payments in PJM markets, energy-based payments in PJM markets, Renewable Energy Credit ("REC") revenue from Renewable Portfolio Standard ("RPS") or voluntary markets, and emission credits from various air emission reduction cap and trade programs (N.J.A.C. 14:8-6.5(a)(6)(iii))	Section 7.2 and 7.3
The quantity of Unforced Capacity ("UCAP") that the Applicant expects the Project to offer into the PJM Base Residual Auction ("BRA"), and the basis for this quantity of UCAP	Section 7.3
Describe the approach to calculating a capacity price forecast, and, if different than the proxy use by Board Staff for evaluation, provide an explanation of why the Applicant's approach is preferred	Section 7.3
Any adjustments contemplated to the operating revenues related to UCAP sales under PJM's anticipated accreditation principles	Section 7.2 and 7.3
How capacity market risk, including any capacity performance penalty or incentive payments, will be addressed	Section 7.2
Strategies for maximizing Project revenues that do not depend on routine settlement in PJM's day-ahead and/or real-time markets, and how, if at all, the Applicant intends to address any risk associated with such strategies	Section 7.2
A description of how the applicant intends to manage hedging mechanisms and revenue settlement operations, and how the Applicant intends to allocate risk associated with such mechanisms	Section 7.2
A description of the Applicant's contingency plan to address how capacity revenue may be realized over all or a portion of the OREC term if the Project is not eligible to participate in PJM's annual BRA	Section 7.2

07 Project revenue plan and strategy

7.1 Summary

Navigating the PJM wholesale markets takes expertise, a dedicated team, and a keen understanding of opportunities and risks. Leading Light Wind is uniquely positioned to maximize ratepayer value from its project for the benefit of New Jersey ratepayers. Its lead developer, Invenergy, has been operating in PJM since 2008, with a current operational portfolio of about 3.3 GW. As part of its energy management function, Invenergy Services' power scheduling and trading desks continually seek opportunities to optimize the revenue generation of each asset under their care.

PJM's capacity markets are currently in a state of flux. Leading Light Wind is an active market participant with PJM and is deeply involved in current market reform processes, including advocating for fair treatment of renewable energy resources. In determining if and how we participate in PJM's capacity market, we will carefully weigh all risks and opportunities, with the goal of seeking and preserving maximum value for New Jersey ratepayers.

Leading Light Wind's current market view is informed primarily by [redacted] This section provides resulting pricing expectations as well as expected annual revenues by operating year for each of our offshore wind project capacity size alternatives.

7.2 Project revenue plan and marketing strategies

Operational track record and operating principles

Leading Light Wind recognizes that minimizing New Jersey ratepayer costs associated with the state's OREC program means maximizing non-OREC project revenues. We take seriously our obligation to operate our project(s) in a way that maximizes these project revenues while managing numerous market risks.

Operation of the project will benefit greatly from the robust energy management expertise and operational track record of Invenergy Services. Invenergy's operating history in PJM dates back nearly 15 years to the completion of the Grand Ridge I wind project (discussed in greater detail in Section 1.5). As of early 2023, Invenergy Services (a wholly owned subsidiary of Invenergy LLC) provided energy management services for 159 projects totaling over 20 GW of generating capacity across a wide range of US electric markets and balancing authorities. Notably, this includes over 3.3 GW of generating capacity located directly in the PJM footprint.

As part of its energy management function, Invenergy Services' power scheduling and trading desks continually seek opportunities to optimize the revenue generation of each asset under their care. This includes the sale of applicable products including energy, capacity, ancillary services, and RECs, as well as the deployment of revenue maximizing and risk management strategies such as day-ahead and real-time energy trading, congestion hedging, and consideration of forward sale opportunities (as appropriate).

In addition to its Services team, Invenergy has an active and knowledgeable Regulatory Affairs team that engages with PJM on critical issues that are likely to impact project revenues, such as capacity accreditation and market formation. During the operational life of the project, the Leading Light Wind team will remain engaged with the Regulatory Affairs team to ensure that PJM's markets are just and reasonable and will properly value the products that the Leading Light Wind project is able to offer into the market.

Energy

The project anticipates its primary source of revenue to be energy sales into the PJM wholesale market, which will be realized on a $/MWh basis.

[redacted] The project will benefit from the attention and experience of Invenergy's robust Commercial Execution team in striking an ongoing balance between potential pricing premium and the credit and shortfall risks of selling material quantities in the day-ahead market. This team evaluates and participates in real-time and day-ahead scheduling, capacity marketing, REC trading, gas trading, and congestion hedging on a daily basis.

A dedicated PJM trading unit, in close collaboration with operational and regulatory teams, will be tasked with continual assessment and improvement of the project's day-ahead bidding strategy, taking into consideration weather events, system outages, historical pricing, rule changes, and forecasts for weather, gas, and load.

[redacted]

Capacity

With careful consideration of potential risks, Leading Light Wind hopes to offer any qualifying project capacity into the PJM capacity market (known as the Reliability Pricing Model). The following sections discuss potential avenues for Leading Light Wind's participation in capacity markets as well as potential risks and issues associated with capacity market participation.

Capacity market participation

Leading Light Wind's base case expectation for capacity market participation is via PJM's annual Base Residual Auction (BRA). If the project is unable to participate in the BRA associated with a given time period, Leading Light Wind will consider partaking in an associated Incremental Auction.

In addition, we are aware that New Jersey has been exploring alternative approaches to resource adequacy, including procuring capacity through the Fixed Resource Requirement (FRR). While the state has elected to stay with the PJM capacity market at this time, Leading Light Wind will cooperate with the NJBPU, while seeking to maximize ratepayer value within whatever resource adequacy construct the Board chooses to pursue.

Capacity market risks and issues

In July 2021, the Federal Energy Regulatory Commission (FERC) accepted a proposal by PJM to implement an average Effective Load Carrying Capability (ELCC) accreditation methodology in the region's capacity market, beginning with the 2023/2024 capacity deliverability year.[1]

Under an ELCC accreditation methodology, the class rating/accredited Unforced Capacity (UCAP) value for a variable renewable resource, such as offshore wind, is determined using a wide variety of assumptions and parameters, including load scenarios, weather, variable renewable resource output shapes, and expected resource deployment. Notably, the class rating/accredited UCAP value for offshore wind is expected to decline over time as its market penetration in PJM increases.

[1] See "Order Accepting Tariff Revisions and Terminating Section 206 Proceeding" in Docket ER21-2043, Docket ER20-584, and Docket EL19-100.

In addition to shifting to an ELCC accreditation methodology, recent changes to PJM's capacity market rules have significantly impacted the ability of renewable generators to mitigate the risks of participating in the capacity market. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

As discussed further in Section 7.3, our view on the PJM capacity market is aligned with, and informed by, current and potential market constructs. As the PJM capacity market continues to change and evolve, our experienced team will carefully evaluate the revenue opportunities available in the market, seeking at all times to maximize risk-adjusted capacity revenue for the project for the benefit of New Jersey ratepayers.

Renewable energy credits

Given that the project's OREC allowance will be carved out of New Jersey's annual Renewable Portfolio Standard (RPS) targets and that all ORECs transferred to New Jersey suppliers are expected to be retired, we do not anticipate being able to secure any additional REC revenue during the OREC term.

[redacted]

[redacted]

Based on the project's generating technology (wind), its anticipated commercial operations date (COD), and the current state of RPS regulations, Leading Light Wind expects the project to qualify as a Class/Tier I resource across a wide variety of states/territories in the PJM footprint. [redacted]

Ancillary services

Through Invenergy, Leading Light Wind will monitor and engage with PJM's current effort to revise its approach to reactive power compensation to enable the project to secure an additional revenue stream for the benefit of the ratepayers.

[redacted]

New products

With planned CODs after 2030 for all project alternatives and a 20-year OREC term extending well into the future, additional revenue opportunities for the project may become available. Leading Light Wind is committed to making commercially reasonable efforts to explore the feasibility, risks, and potential upside of any potential new revenue streams for the project and to refund any net revenues to New Jersey ratepayers during the project's OREC term.

Excess OREC generation

If, in a given year, an awarded project generates in excess of the project's annual OREC allowance, [redacted]

7.3 Financial expectations

Leading Light Wind's financial expectations for our project alternatives are based primarily on [redacted]

[redacted]

The following sections discuss the financial expectations for the project, as well as the potential marketing strategies, for each project revenue stream.

Energy revenue

Figure 7-1 provides two energy pricing streams [redacted], which is inclusive of the full 30-year project life for each of our project alternatives. [redacted]

Figure 7-1. All-hours and project realized energy prices by year.

Figure 7-2. Capacity price forecast and captured capacity price for offshore wind by year.

[redacted]

Table 7-1. Forecasted project energy revenues by operating year.

[redacted]

Settlement operations will be coordinated by Invenergy's settlements team, in conjunction with PJM and the transmission owner.

Capacity revenue

[redacted]

[redacted]

Table 7-2. Forecasted project capacity revenues by operating year.

[redacted]

REC revenue

[redacted]

[redacted]

Figure 7-3. PJM Class/Tier I REC price forecast by year.

[redacted]

Table 7-3. Forecasted project PJM Class/Tier I revenues by operating year.

08
Economic development plan

Solicitation requirements

Checklist item	Section reference
Detailed job creation information, including location, type of activity or occupation, and wages or salaries for employment activities to be created by the Project and assumed employment impacts within New Jersey, with job totals expressed as full-time equivalent positions assuming 1,820 hours per year (N.J.A.C. 14:8-6.5(a)(11)(vi), N.J.A.C. 14:8-6.5(a)(11)(xiii))	Section 8.6
Method for confirming employment impacts (N.J.A.C. 14:8-6.5(a)(11)(vi))	Section 8.6
Other benefits, such as increased in-State activity from construction, O&M, and equipment purchases N.J.A.C. 14:8- 6.5(a)(11)(iv))	Section 8.6
Proposed consequences if the claimed in-State employment and spending benefits do not materialize (N.J.A.C. 14:8- 6.5(a)(11)(vii))	Section 8.7
A detailed input-output analysis of the impact of the Project on income, employment, wages, indirect business taxes and output in the State with particular emphasis on in-State manufacturing employment (N.J.A.C. 14:8-6.5(a)(11)(i), N.J.A.C. 14:8- 6.5(a)(11)(v))	Section 8.6
Planned in-State spending to support development, construction, O&M, and equipment purchases	Section 8.2
Method for confirming in-State spending	Section 8.6
Identification of the supply chain components and installation labor that are expected to be provided by in-State businesses and/or workers	Section 8.2
A description of the Applicant’s plan for incremental investments in infrastructure, supply chain, workforce development and other offshore wind cluster-building programs, and the associated economic benefits for the State, with a focus on workforce development; investments in innovation; investments in existing infrastructure; use of the marshalling and/or manufacturing facilities at the New Jersey Wind Port and development of alternative ports for marshalling, manufacturing, and O&M activities	Section 8.2
A description of how the economic development plans, including supply chain and other arrangements, will promote effective competition and reduce risk in the offshore wind marketplace	Section 8.2
For each proposed manufacturing or port facility, provide the status of any arrangement or commitment to utilize the port and describe plans, or provide plans if they have already been prepared, to develop the port, including construction or rehabilitation of shoreline protection structures, wharf structures and other infrastructure improvements	Section 8.2
For each proposed manufacturing or port facility, explain the status of any arrangement or commitment to utilize the site that reflects reasonable expectations on the part of the Applicant to receive financial support from the State of New Jersey and/or the Federal government, including under the Inflation Reduction Act	Section 8.2
A detailed Local Supplier Engagement Plan	Section 8.4

Checklist item	Section reference
A description of the Applicant's plan to engage with and provide opportunities to local suppliers and manufactures, with an emphasis on Small, Minority, Woman, or Veteran-owned Business Enterprises ("SMWVBEs"), including strategies to prepare New Jersey firms for contracting opportunities, specific targets for contracts awarded to New Jersey firms as a percentage of contract value and whether the Applicant will commit to making those targets public	Section 8.4
A description of the Applicant's plan to advertise business opportunities to New Jersey firms including, at a minimum, notices for all bids for supplier contracts over $1,000,000 by the Applicant and by the Applicant's direct suppliers to New Jersey companies (at minimum those listed on the New Jersey Offshore Wind Supply Chain Registry)	Section 8.4
A description of the Applicant's plan to advertise business opportunities to New Jersey SMWVBE's including, at a minimum, notices for all bids for supplier contracts for goods over $250,000 and services over $100,000 by the Applicant and by the Applicant's direct suppliers to New Jersey companies (at minimum those listed on the New Jersey Selective Assistance Vendor Information, or "NJ SAVI")	Section 8.4
An acknowledgment that the Applicant and the Applicant's direct suppliers will make best efforts to consult both the New Jersey Offshore Wind Supply Chain Registry and NJ SAVI for all contracts, regardless of the value of these contracts	Section 8.4
Specific targets for contracts awarded to New Jersey firms as a percentage of total development, construction, and operations spending, either on an overall basis or differentiated by Project phase, and whether the Applicant will commit to making those targets public	Section 8.2
Specific targets for contracted awarded to New Jersey SMWVBEs as a percentage of total development, construction, and operations spending, either on an overall basis or differentiated by Project phase, and whether the Applicant will commit to making those targets public	Sections 8.1, 8.5, and 8.6
A description of proposed plans to collaborate with State agencies and other public, non-profit, and private partners to support engagement with New Jersey businesses, including, but not limited to, organizing meet-the-buyer events, providing technical assistance, etc.	Section 8.4
A description of the Applicant's plan to use domestically sourced materials, including, but not limited to, iron and steel, in the construction of the Project	Section 8.2
A detailed Workforce Development Plan	Section 8.5
A description of the Applicant's approach to workforce development and plan to provide workforce training programs and employment opportunities for New Jersey residents through engagement with the Wind Institute and its associated programs and any other relevant State programs	Section 8.5
Identification of potential job opportunities for residents of OBCs and any associated diversity and inclusion initiatives	Section 8.4
Specific targets for hiring New Jersey residents and residents of OBCs, either on an overall basis or differentiated by Project phase, and whether the Applicant will commit to making those targets public	Section 8.6
Applicant's are encouraged, but not required, to also set specific targets for hiring members of other specialized populations, such as incumbent workers from the non-renewable energy sector, veterans, or justice-involved individuals, either on an overall basis or differentiated by Project phase	Section 8.5

Checklist item	Section reference
A description of the Applicant's plan to use unionized labor, including identification of specific unions if available, for construction and for O&M, including considerations related to prevailing wages, union neutrality agreements, provisions for workplace disputes, jurisdictional disputes and other best practices to prevent Project disruption, and participation in community benefit agreements that include commitments to local hiring and skills training for local residents, including those in OBCs	Section 8.5
Identification of occupations with the highest, moderate, and limited opportunity to hire New Jersey residents, including rationale for determination and core skills required, and strategies to increase opportunities for occupations identified as having limited opportunity for New Jersey residents	Section 8.5
A description of the Applicant's overall approach to engage with stakeholders in a timely manner to prepare a well-trained and available local workforce through the development of new and/or utilization of existing training, education, and/or outreach programs and ensure that stakeholders are aware of industry-specific certifications and expectations in order to enable their effective participation in such programs	Section 8.5
A description of the Applicant's approach to fostering innovation in the offshore wind industry, particularly where there are open market opportunities for existing and start-up companies in New Jersey, opportunities to attract additional investment to build an offshore wind innovation hub in the state, any Applicant plans to enhance the use of offshore wind electricity through energy storage, green hydrogen technologies, carbon capture and others, and plans to coordinate and engage with the Wind Institute as part of these efforts and opportunities	Section 8.3
Documentation including, but not limited to, contracts or other binding commitments to substantiate any claims that manufacturing services related to the Project will be sourced from a New Jersey location (N.J.A.C. 14:8-6.5(a)(1)(vii))	Section 8 Attachments

08 Economic development plan

8.1 Summary

As the only American-led offshore wind developer in the Bight, Leading Light Wind and its affiliates are excited to participate in the development of a domestic offshore wind supply chain that will catalyze the growth of the state's economy and create new career opportunities throughout New Jersey's communities, including historically marginalized populations. We embrace this opportunity and look forward to building the transformational partnerships needed to usher in generational clean energy socioeconomic benefits to New Jerseyans.

Leading Light Wind is uniquely positioned to support New Jersey's target of 11,000 MW of offshore wind capacity by 2040 and 100% clean energy by 2035, as set forth in Executive Order 307 and Executive Order 315. We are grateful to be part of this historic movement and believe that with New Jersey's leadership in both environmental justice and renewable energy, we can be part of righting the wrongs imposed on generations of marginalized Americans which have been excluded from economic opportunity and have suffered from the negative impacts of the fossil fuel economy. Through intentional efforts to fully engage with and create long-term opportunities for New Jerseyans, the Leading Light Wind project can be a key factor in the transition to an equitable and clean economy.

To advance the state's goal to be a regional offshore wind hub and industry leader across the entire offshore wind value chain, our proposal includes

significant investments in New Jersey's offshore wind infrastructure, supply chain, and local workforce development programs, while ensuring a just energy transition that benefits overburdened communities (OBCs) and lifts up small, minority, women, and veteran business enterprises (SMWVBEs). We believe that this approach is key to building lasting benefits from offshore wind throughout the state.

Through early and sustained engagement, we have sought out numerous top-tier organizations and stakeholders in New Jersey, with the goal of making them aware of our project and its opportunities as well as developing beneficial partnerships. As our project further develops, we are eager to create the support mechanisms and partnerships to best position Leading Light Wind and New Jersey to be leaders in offshore wind construction, operations, project development, research and development, and innovation.

To capitalize on the economic opportunities expected to be created by the planned direct investments by Leading Light Wind, we have identified specific scopes of work in order to achieve significant utilization of members of environmental justice and OBCs and other priority populations, including SMWVBE, veteran owned, and disabled veteran owned (VOB/DVOB) firms. [redacted]

We understand that to ensure the long-term success of New Jersey's offshore wind industry, the in-state supply chain must grow to meet demand created by New Jersey's offshore wind industry needs and broader regional needs as well. Failure will result in leakage of production and employment out of state, and the loss of some of this critical growth opportunity. We are committed to minimizing this wherever possible, through building an integrated supply chain network encompassing the broader offshore wind ecosystem.

By working to build a prepared workforce and strengthening linkages between our Tier 1 and Tier 2 contractors and their Tier 3 and Tier 4 in-state suppliers and service providers, we will promote strong interfirm linkages that will help keep the industry rooted in New Jersey, promote innovation, and sustain the market readiness and competitive advantage of these firms.

8.2 Our local content in New Jersey

The Leading Light Wind project presents the opportunity to catalyze and shape New Jersey's economy, helping to ignite economic growth through anchor investments in new, state-of-the-art manufacturing and port facilities, not only creating growth for large companies but also helping scale up small and medium sized businesses throughout the state looking to participate in the growth of the nascent offshore wind sector.

This section describes our approach to working with supply chain partners who share Leading Light Wind's values. Through an extensive vetting process, we seek to partner with world-class vendors, manufacturers, and contractors who not only have a successful track record of executing complex infrastructure projects, but also demonstrate a commitment to strengthening and growing the local economy, through local hiring, local purchases, and other means of localized investments. From manufacturers to installers, from scour protection to operations and maintenance (O&M) siting, our project team will partner with a strong, capable set of contractors which will help bring the Leading Light Wind project into reality.

Leading Light Wind is committed to the development of a competitive, sustainable domestic supply chain, and intends to incorporate as much domestic content into our project as possible. As described at length in this proposal, we will achieve this goal through close collaboration with our supply chain partners to find viable solutions to their localization challenges. This proposal is based on informed projections about what components will be domestically available on our project timeline. In some cases, we have already entered into agreements or made commitments to incorporate these domestic elements into our project. In other cases, we will continue to monitor the market and engage with various suppliers to develop their capabilities and identify pathways to incorporate their products into our project. [redacted]

[redacted] The supply chain partnerships which we have developed will allow us to successfully meet this commitment and to leverage our project to build local business capacity and know-how, helping accelerate the growth of New Jersey's offshore wind economy.

A high-level summary of our proposed supply chain partners (and their associated facilities) is provided below.

Manufacturers

The Leading Light Wind team has developed strong relationships with established leaders in offshore wind-related manufacturing. These firms — which include original equipment manufacturers (OEMs) and Tier 1 manufacturers or installers — will provide or facilitate the primary component manufacturing, assembly, and installation activities, with small to medium enterprises providing support services and supply of materials, equipment, and labor.

[redacted]

[redacted]

A description of the specific manufacturers which we have engaged with and what we propose to localize in New Jersey is included below.

Wind turbine tower manufacturing

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

EEW AOS monopile manufacturing at Paulsboro

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Project marshaling

After their manufacture, offshore wind components must be transported on cargo vessels or barges to a staging port near an offshore wind project site for assembly, pre-commissioning, and transport offshore for installation. As such, marshaling ports are required for cost-effective construction of offshore wind farms, and are a critical component of the overall project infrastructure.

[redacted]

For additional information regarding the New Jersey Wind Port and the project's marshaling activities, please see Section 2.6, "Marshaling and WTG component manufacturing: New Jersey Wind Port."

O&M port facilities

The O&M facility is a critical component of the overall project. This site will serve as a homeport for vessel operations, surveying, and emergency operations, as well as a control center for planning and coordination of O&M labor and vessel activities. It will also serve as an around-the-clock monitoring center and will provide on-site administrative functions. A machine shop and warehouse will be required to support these functions. [redacted]

[redacted]

These roles are expected to be staffed starting at full scale at or before Leading Light Wind's commercial operations date. Leading Light Wind will prioritize hiring and training directly from local host communities and surrounding OBCs.

[redacted]

[redacted]

Scour material

[redacted]

[redacted]

New Jersey financing and incentive programs

[redacted]

8.3 Innovation and research

From the invention of the incandescent light bulb by the "Wizard of Menlo Park" to Nobel Prize winner Guglielmo Marconi's innovation of radio technology to the establishment of Bell Labs, New Jersey has long been a worldwide leader in technological innovation and research. That tradition continues today with the state making major investments in innovation and research and creating a welcoming environment for early-stage companies in the innovation economy.

We seek to build upon this powerful innovation ecosystem by making impactful investments in research that will develop the next generation of offshore wind and renewable energy technologies. These investments will not only cover research in lab environments but will also include testing and refinement in large-scale facilities, as well as commercialization efforts in incubator-type environments. These programmatic investments are summarized in Table 8-2 and described in more detail below.

Program	Financial commitment
New Jersey Wind Institute (Wind Innovation Center)	[redacted]
Offshore Wind Innovation Campus (in partnership with Newlab)	
Leading Light Wind Applied Science Grant program	[redacted]
Rowan University Composites and Biomaterials Research Partnership	

Table 8-2. Leading Light Wind investments in innovative research.

New Jersey Wind Institute: Support for Wind Innovation Center

[redacted]

[redacted]

Offshore Wind Innovation Campus (in partnership with Newlab)

[redacted]

Leading Light Wind Applied Science Grant Program

[redacted]

[redacted]

Rowan University Composites and Biomaterials Research Partnership

[redacted]

[redacted]

8.4 Local supplier engagement plan

Leading Light Wind appreciates the supply chain levers that we control as a clean energy developer at the top of the offshore wind value chain, and we have a robust plan for investing in programs and partnerships that will optimize local suppliers' participation in the Leading Light Wind project.

In accordance with the philosophy and principles described in our Stakeholder Engagement Plan (Section 9), we are committed to a robust local supplier outreach program, providing opportunities for small to medium businesses, including SMWVBEs, that will provide important goods and services to our project. [redacted]

We recognize that by engaging local New Jersey businesses in offshore wind project opportunities, we can help create a more resilient, dynamic, and thriving offshore wind supply chain, benefiting not only our own project but the sector as a whole.

The growth opportunities created by the project — onshore and offshore — enable companies at all levels of the value chain to reap the economic benefits of this growing sector.

Our SMWVBE commitment

Small businesses play a central role in New Jersey's economy. The state ranks 11th in the number of small businesses in the US, with over 816,000 enterprises. Small business employers in New Jersey account for around 87% of all private-sector employers in the state, employing approximately 665,000 people and generating around $28 billion in payroll income per year. These small to medium enterprises make up a crucial part of the in-state value chain by providing increased opportunities for just distribution of clean energy transition benefits to OBCs and priority populations.

In historically underserved and under-resourced communities, this is especially true. Minority-owned, woman-owned, and disadvantaged businesses are critical to the economic health of communities across the state, especially in communities suffering from high rates of disinvestment or unemployment.

Leading Light Wind is not only committed to the goal of developing a regional industrial sector of offshore wind in New Jersey, but to driving a just energy transition whereby those populations most impacted by the negative impacts of the fossil fuel economy reap the benefits of the transition to clean energy.

Accordingly, we are committed to ensuring that a portion of the economic benefits go to specialized populations such as SMWVBEs and those in OBCs.

[redacted]

Procurement strategies

As a fully committed partner in growing the New Jersey-based supply chain, Leading Light Wind is committed to maximizing local content and offering New Jersey companies the opportunity to provide goods and services to our contractors and other suppliers of the project wherever possible. Through contracting strategies, supply chain partnerships, small business outreach, and other procurement approaches, we will take a holistic approach to finding ways to integrate small and medium sized New Jersey businesses into our supply chain. [redacted]

[redacted]

Local supplier engagement

The work of successful engagement with the New Jersey business community is significant, and will require ongoing meetings, communications, relationship building, and event production — all designed to share information about our project and to build a communications framework with small business stakeholders to make them aware of the opportunities that our project can provide. Through our engagement with the local supplier and business community, we are committed to supporting the following objectives:

- Creating new contract opportunities in wind farm construction and development as well as long-term operations and maintenance.
- Developing strategies for involving SMWVBEs in offshore wind supply chain opportunities, including capacity building and industry training programs for small business owners.
- Supporting a just transition to a clean energy workforce by providing opportunities for members of OBCs
- Supporting New Jersey's objective to create and preserve quality jobs, anchor New Jersey's modern industrial sector and its businesses, and connect the local community with the resources and economic opportunities.
- Creating local jobs and training programs that ensure minority and disadvantaged contractors have meaningful roles in the supply chain.

Outreach partnerships

Leading Light Wind understands the importance of working with existing organizations, whether they be nonprofit organizations or industry associations, that have invested years of time and effort into building relationships with local stakeholders and business owners.

[redacted]

[redacted]

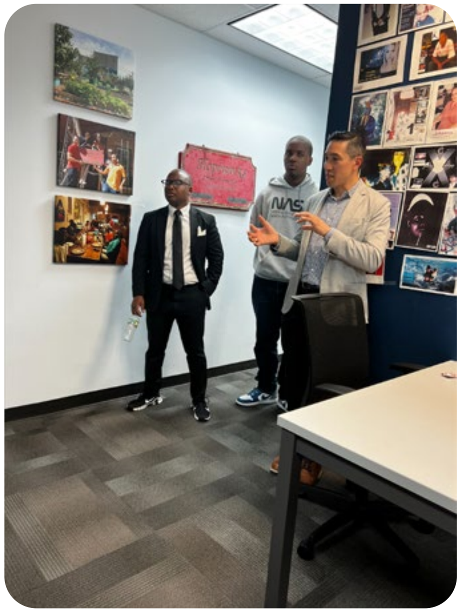
Curated supplier events

[redacted]

Established engagement activities

[redacted]

[redacted]



[redacted]

[redacted]

Table 8-3. Leading Light Wind participation in various industry-related events.

Leveraging existing supplier databases

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Programmatic investments and interventions

In addition to a robust strategy for engaging SMWVBE businesses, we will implement several programmatic strategies and partnerships for engaging local suppliers and businesses and reducing barriers to local business participation in our supply chain. These programs and partnerships are outlined below.

Program	Financial commitment
Waves to Wind Program	[redacted]
New Jersey Manufacturing Extension Partnership	[redacted]
Fisheries Accelerator Fund	[redacted]
Paulsboro Community Economic Development Program	[redacted]

Table 8-5. Local supplier and small business partnerships.

[redacted] **Waves to Wind Program**

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

New Jersey Manufacturing Extension Partnership

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Fisheries Accelerator Fund

[redacted]

[redacted]

[redacted]

[redacted]

Paulsboro Community Economic Development Program

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

8.5 Workforce development

We recognize that our project, and its accompanying investments, have the potential to make a significant impact on New Jersey's workforce landscape. By developing a comprehensive workforce development plan, we aim to effectively engage New Jersey's highly skilled and highly trained workforce in a way that maximizes opportunities for members of OBCs, underserved communities, and workers transitioning out of careers in oil and gas industries.

Figure 8-6. Leading Light Wind is committed to engaging New Jersey's highly skilled and highly trained union workforce and maximizing opportunities for members of OBCs.

[redacted]

[redacted]

Job creation commitments

Workers are at the front lines of climate change, and a well-trained, organized, and diverse workforce is the cornerstone to building a new clean energy economy in New Jersey. The Leading Light Wind project — and the nascent offshore wind sector in general — presents an opportunity to provide meaningful employment and career opportunities which create pathways to the middle class for members of underserved and OBCs in New Jersey.

The offshore wind sector is projected to create a surge in clean energy employment opportunities. New Jersey's 11 GW offshore wind target, and accompanying infrastructure investments, will result in job growth across numerous sectors of the state's economy, including construction, manufacturing, and professional services. In 2030, New Jersey is projected to see approximately 20,000 new jobs related to offshore wind, both from in-state and regional demand.[1]

[redacted]

[redacted]

[1] NJEDA and the Governor's Office of Climate Action and the Green Economy, *New Jersey's Offshore Wind Workforce Assessment Through 2035*. September 2022.

[redacted]

Labor unions

Background

Organized labor is the backbone of the American middle class, and as the only American-led project bidding into New Jersey's third offshore wind solicitation, we intend to use our partnerships with workforce training service providers to strengthen and augment existing career pathways. As outlined in our memorandum of understanding (described in detail below), we understand the value of partnering with the unions. Their apprenticeship readiness programs and their registered apprenticeship programs set the industry standard. Our team understands that an effective partnership with organized labor is central to achieving successful workforce development outcomes, and we will operate with this central tenet in mind as we create new pathways into the middle class by engaging with labor throughout every aspect of Leading Light Wind's project lifecycle.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Project Labor Agreement

[redacted]

[redacted]

[redacted]

Workforce training

We understand that workforce development is pivotal to the success of New Jersey's ambitious economic development goals in serving as a regional hub for offshore wind manufacturing. Continued development of the offshore wind industry in New Jersey and along the East Coast requires the associated development of a robust ecosystem of skills training. We have the opportunity to channel our workforce investments to jobseekers from underserved communities, including OBCs. It is imperative that we develop programmatic solutions for optimizing the amount of offshore wind sector jobs that will be accessible to jobseekers who do not have college degrees but who demonstrate the skill and interest to obtain jobs in the offshore economy and develop family-sustaining careers.

Our efforts to support workforce development activity in New Jersey are guided by a set of key principles, which ensure that statewide investments in training and upskilling are aligned with the policy priorities of New Jersey stakeholders, community members, and workforce experts. These key principles are outlined below.

[redacted]

Program	Financial commitment
Newark School of Data Science and Information Technology	[redacted]
Mid-Atlantic States Career & Education Center	[redacted]
Rowan University Offshore Wind Management Certificate Program	[redacted]
Rowan College Wind Turbine Technician Program Expansion	[redacted]
New Jersey Institute of Technology	[redacted]
Hudson County Community College	[redacted]
New Jersey Community College Consortium	[redacted]
New Jersey Manufacturing Extension Partnership (NJMEP) – Veterans Training for Offshore Wind Careers	[redacted]
Leading Light Wind Offshore Wind Scholars Program	[redacted]

*The NJMEP partnership is also described in Section 8.4 above.

Table 8-6. Workforce partnerships and associated financial commitments.

Newark School of Data Science and Information Technology

[redacted]

Mid-Atlantic States Career & Education Center

[redacted]

Figure 8-7. Leading Light Wind is working with various institutions to provide offshore wind career education and training.

[redacted]

Rowan University Offshore Wind Management Certificate Program

[redacted]

Rowan College Wind Turbine Technician Program Expansion

[redacted]

New Jersey Institute of Technology

[redacted]

Hudson County Community College

[redacted]

New Jersey Community College Consortium

[redacted]

[redacted]

New Jersey Manufacturing Extension Partnership – Veterans Training for Offshore Wind Careers

[redacted]

Leading Light Wind Offshore Wind Scholars Program

[redacted]

[redacted]

[redacted]

[redacted]

Pre-apprenticeship and apprenticeship programs

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Other

[redacted]

Environmental justice and overburdened communities

While using Leading Light Wind project investments to create and prioritize new economic opportunities for historically disadvantaged populations, we are also committed to avoiding the repeat of prior environmental impacts which have harmed these same communities during large-scale, pollutive energy development projects in the past.

[redacted]

[redacted]

Program	Financial commitment
Zeem Solutions Charging Hub	[redacted]
Waterfront Alliance	[redacted]
Children's Environmental Literacy Foundation	[redacted]
Gotham Whale	[redacted]
Boys & Girls Clubs of Monmouth County	[redacted]
Liberty Science Center	[redacted]
Neighborhoods for a Sustainable Future	[redacted]
Leading Light Wind Energy Equity Credit program	[redacted]

Table 8-7. Partnerships supporting environmental justice and OBCs.

Zeem Solutions Charging Hub

[redacted]

[redacted]

Waterfront Alliance

[redacted]

Children's Environmental Literacy Foundation

[redacted]

Gotham Whale

[redacted]

Figure 8-8. Leading Light Wind pursues partnerships with local institutions, businesses, and community organizations to advance New Jersey's offshore wind initiatives.

Boys & Girls Clubs of Monmouth County

[redacted]

Liberty Science Center

[redacted]

Neighborhoods for a Sustainable Future

[redacted]

Leading Light Wind Energy Equity Credit program

[redacted]

The goal of the Leading Light Wind project is not only to bring economic benefits, but to also reduce existing environmental burdens, as described above, by promoting the transition to electric vehicles, providing educational resources, and facilitating the cleanup and redevelopment of brownfield sites. This dual focus of increased benefits and decreased burdens informs all our activities, as we understand that in order to be successful, the transition to a green energy economy must have equity as a core tenet.

8.6 Economic benefit commitments

Methodology

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Local spending commitments

Total direct in-state expenditures (nominal) and job creation

[redacted]

[redacted]

Guaranteed minimum total direct in-state expenditures (nominal) and job creation

[redacted]

[redacted]

[redacted]

[redacted]

Tier 1 capital investments

[redacted]

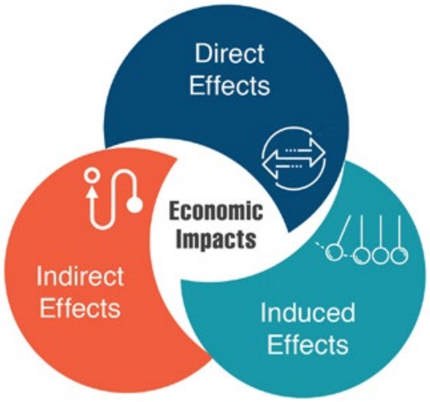
Other in-state purchases

[redacted]

[redacted]

Total direct, indirect, and induced economic impacts

[redacted]



As indicated, the **"direct effects"** refer to in-state spending that may justifiably be credited to direct capital infused into the economy by the project through supply chain purchases, capital investments in manufacturing and port facilities, and direct transfers to governments and nonprofits for supply chain or workforce development and other community benefits.

[redacted]

[redacted]

The **"indirect effects"** refer to those intermediate goods and services that require additional production within the in-state supply chain to meet the increases in final demand — i.e., the new demand for materials, equipment, supplies, and skilled labor, etc., necessary to supply the offshore wind project.

The **"induced effects"** represent new in-state economic activity that is supported by the estimated increase in New Jersey household spending of labor income after removal of taxes and savings. The induced effects are the downstream economic impacts resulting from increases in earnings experienced by New Jersey worker households who in turn spend a portion of those dollars in their communities on local business, education, entertainment, household improvements, etc.

[redacted]

Impacted industries and occupations

The Leading Light Wind offshore wind projects will provide important new revenue streams for both existing and well-established industries in New Jersey, including onshore construction and professional services, as well as new opportunities for significant growth of key industries including offshore construction and wind turbine component manufacturing that will serve the offshore wind industry and contribute to the broader growth of the New Jersey economy.

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

Prebuild economic impacts

[redacted]

[redacted]

Storage impacts

[redacted]

[redacted]

Economic benefits related to OBCs and SMWVBEs

[redacted]

Verification

In general, acceptable documentation for verification of in-state expenditures and job creation for project expenditures incurred by Leading Light Wind and/or its affiliates shall include the following:

[redacted]

[redacted]

[redacted]

8.7 Economic benefit shortfall compensation mechanism

Leading Light Wind will work diligently to ensure that the commitments made in local spending and hiring are met. [redacted]

[redacted]

[redacted]

[redacted]

Figure 8-9. Leading Light Wind is committed to hiring and spending locally.

[redacted]

[redacted]

[redacted]

[redacted]

09
Stakeholder engagement

Solicitation requirements

Checklist item	Section reference
A description of the Applicant's values and philosophy related to stakeholder engagement	Section 9.1
Identification of key stakeholders by category and specific organizations or entities, and goals for engagement with these stakeholders, including, but not limited to, tribal nations, community-based organizations, local and county elected officials, recreational and commercial fisheries, labor unions, higher education, coastal residents and business owners, economic and workforce development organizations, environmental and environmental justice groups, OBCs, and New Jersey SMWVBEs	Section 9.2 and Attachments 9.1 and 9.2
Specific stakeholder engagement activities the Developer has already conducted, what concerns have been raised; what has been done to date to address those concerns, and what activities the Applicant will take to address any concerns that have not been addressed	Section 9.2
Specific stakeholder engagement activities that the Applicant plans to conduct through COD	Section 9.2
A description of the Applicant's strategies for engaging with New Jersey government entities	Section 9.2

09 Stakeholder engagement

9.1 Approach

Overall philosophy and principles

Leading Light Wind believes robust stakeholder engagement is the foundation for empowering the communities where we live and work, as well as the success of any development project. We will build on our track record of innovation in sustainable American infrastructure and impactful community engagement to advance public health, create well-paying jobs, and support our local supply chain.

Leading Light Wind is committed to proactive community involvement throughout project development and decision-making. We work with potentially affected stakeholders and seek broad representation while elevating the voices of those historically left out of development decisions.

By making opportunities available to the communities that have experienced the greatest environmental and health impacts from traditional energy development, we are championing a just transition.

Our approach to stakeholder outreach is established on the following core principles (Figure 9-1). We seek to understand, incorporate, and respond to the diverse perspectives, needs, and concerns of stakeholders at every stage of project development.

Humility

Leading Light Wind recognizes that the transition to a clean energy economy will not be possible without the leadership of many advocates and communities on the front line of climate change. We will give special consideration to the histories, experiences, and needs of overburdened communities and individuals on the frontlines of climate change.

Our team understands the importance of listening to and working with these communities to achieve a just transition and include all stakeholders in the benefits of offshore wind development.

Creativity

The development of any offshore wind project is a complex challenge and we cannot do it alone. We are working to identify the shared interests of different stakeholders, create opportunities for mutual learning and understanding, and collaboratively develop actionable goals. Our team is working with stakeholders to identify opportunities and achieve desired outcomes over the full life cycle of the project.

Connectivity

We believe that early, frequent, and clear communication with stakeholders influences project decision-making for the better. We acknowledge that uncertainties are inevitable during project development and commit to being transparent about project needs and interests. To the greatest extent possible, we will provide project materials and resources to stakeholders and the public and track the progress of our commitments.

Figure 9-1. Leading Light Wind follows these principles to understand and respond to stakeholders at every stage of project development.

Planned activities

Our stakeholder engagement activities are rooted in the belief that those who may be affected by the project have a right to be involved in project development and to influence decision-making.

We recognize that **stakeholders contribute valuable local and expert knowledge** to project development. We are seeking input from diverse stakeholders to design future and continued engagements, with the goal of co-designing engagement activities that are accessible and provide meaningful opportunities to shape the project.

Our stakeholder engagement activities will shed light on nuanced challenges and identify opportunities to maximize the benefits created by the project.

We will engage with stakeholders early and often, building accountability and trust. During each phase of the project, we will engage the appropriate stakeholders, with an eye toward developing a stakeholder outreach process that is inclusive and considers the full scope of potentially affected parties while directing engagement efforts toward lifting up and including those historically disenfranchised by large-scale infrastructure planning and development decisions.

We have identified options for engagement activities with stakeholders and Tribal Nations including, but not limited to, residents and businesses, elected officials, environmental and environmental justice groups, community-based organizations, economic and workforce development organizations, higher education, and labor unions.

Because each stakeholder is unique, our outreach team will develop an engagement activity that is appropriate for the opportunity and based on stakeholder input and guidance. Potential engagement activities include the following:

[redacted]

Figure 9-2. The Leading Light Wind team has experience engaging with stakeholders in a variety of ways.

[redacted]

Leading Light Wind is committed to engaging stakeholders in ways that are accessible and welcoming. These are some of the considerations that inform the work of our outreach team:

- Assume a range of education levels, cultural contexts, language proficiencies, digital access, physical access, employment/childcare timing, and understanding of the project development process and offshore wind industry so materials and activities provide maximum coverage.
- Expand outreach through various digital mediums (TV, podcasts, newsletters, outreach calendar, fact sheets, social media).
- Expand direct contact (via print mailings and canvassing).
- Use visuals or diagrams where possible.
- Explain where the project is in the development process and how input matters (i.e., what might change).
- Have relevant documents readily available.
- Simplify the process of participation.
- Provide several ways for a person to participate (i.e., in person, remote, next day).

When evaluating the success of stakeholder engagement activities, our outreach team considers the following metrics:

- Diversity of outreach channels
- Coordination with community-based partners/trusted partners
- Notification lead time
- Meeting times-of-day
- Language (translation and interpretation)
- Legibility (plain language)
- Transparency and context
- Cultural, racial, and ethnic relevance
- Meeting location accessibility (including in-person and virtual options)

Leading Light Wind's external affairs team is comprised of experts in economic development, equity-driven community planning, communications, marine, labor, and tribal affairs, in addition to technical subject matter experts. The combination of our team's diverse skill sets aim to reach a broad audience and offer stakeholders a holistic understanding of project activities. Key external affairs team members and their contact details are listed in Table 9-1.

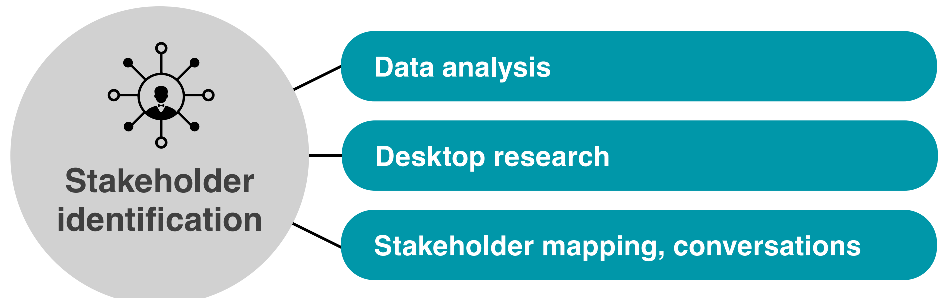
Name	Roles/responsibilities	Contact information
Wes Jacobs	Project Director	wjacobs@invenergy.com
Michael Porto	External Engagement Director	mporto@invenergy.com
Sarah Dougherty	Community Engagement Manager	sdougherty@invenergy.com
Jeff Lee Romero	Director of Economic Development	jleeromero@invenergy.com
Amy Varghese	VP of External Affairs	amy.varghese@energyre.com
Brian Kerkhoven	Labor Liaison Officer	bkerkhoven@invenergy.com
Carmen Bernett	Agency Liaison Officer	cbernett@invenergy.com
Sarah Hudak	Fisheries Liaison Officer	shudak@searisksolutions.com
Hope Luhman	Tribal Liaison Officer	hope@appliedculturalheritage.com
Lia Yoo	Project Analyst	lyoo@invenergy.com
Jamie Grant	Senior External Engagement Associate	jgrant@invenergy.com

Table 9-1. Leading Light Wind external affairs team.

9.2 Identifying and engaging key stakeholders

Strategies to identify stakeholders

Leading Light Wind will interact with New Jersey communities and interested stakeholders throughout the full life cycle of the project. We have developed a multipronged approach to identify and understand key project stakeholders' perspectives, which includes data analysis, desktop research, and stakeholder conversations. We will regularly update this assessment to reflect recent data and research, and we will be responsive to stakeholder feedback.



- **Data analysis.** We have used publicly accessible spatial data to help identify project stakeholders. Our analysis preliminarily relies upon the 2020 Decennial Census, which provides population data at the census tract level for a wide range of indicators, and New Jersey's Statewide Overburdened Communities Map, which identifies census block groups that meet criteria related to income, race and ethnicity, and English proficiency.
- **Desktop research.** We have conducted desktop research with the goal of identifying organizations that may be project stakeholders.
- **Stakeholder mapping and conversations.** We are actively engaging in stakeholder conversations with the goal of better understanding local culture, history, and context, and identifying additional stakeholders beyond those identified through desktop research. These conversations are informed by prior research and our team's existing relationships to be sensitive to potential planning fatigue, resources, and staff capacities.

Key stakeholders and Tribal Nations

Using the strategies described above, our goal is to develop a stakeholder outreach process that is inclusive and considers the full scope of interested parties with a particular emphasis on groups that may have been historically overlooked during project development and planning. These include, but are not limited to, overburdened communities (OBCs) and New Jersey Small, Minority, Woman, or Veteran-owned Business Enterprises (SMWVBEs).

To date, the project has had more than 40 introductory briefings with various stakeholders (this does not include agency meetings). See Attachment 9.1 for Letters of Support for the project.

Overburdened communities

New Jersey's groundbreaking Environmental Justice Law, established in 2020, defines an OBC as any census block group that meets one or more of the following criteria based on data collected in the most recent United States Census:

- At least 35% of the households qualify as low-income households (at or below twice the poverty threshold as determined by the United States Census Bureau).
- At least 40% of the residents identify as minority or members of a State-recognized tribal community.
- At least 40% of the households have limited English proficiency (without an adult who speaks English "very well" according to the United States Census Bureau).

[redacted]

We understand the importance of engaging OBCs in project development. As the project matures, we will continue to assess where the Leading Light Wind project area might impact an OBC, whether directly or indirectly, and take the necessary steps to avoid, minimize, or mitigate those impacts. Leading Light Wind is also committed to making opportunities available to the communities that have experienced the greatest environmental and health impacts from traditional energy development, with an emphasis on OBCs. As described further below and in Section 8, we will establish a community benefits program that fosters expanded opportunities for OBCs to participate in the offshore wind industry.

New Jersey SMWVBEs

Leading Light Wind will invest in New Jersey offshore wind infrastructure, supply chain, workforce development, and other in-state investments that will further the development of New Jersey as a regional hub for offshore wind.

[redacted]

Tribal Nations

Leading Light Wind values the key role of Native American Tribes and Tribal Nations in the development of offshore wind. We recognize the unique histories of Indigenous peoples and respect their ancestral relationship with the land and water. Leading Light Wind is engaging with the leaders of Native American Tribes and Tribal Nations, as well as community members to understand their needs and interests in the development of the project. The project is proposing the Leading Light Wind **Tribal Support Fund**, [redacted]

Additional stakeholders

In addition to the stakeholders described above, we will engage residents and business owners, local and county elected officials, environmental and environmental justice groups, community-based organizations including faith-based organizations, economic and workforce development organizations, higher education, labor unions, and other interested stakeholders identified through the stakeholder identification process noted above.

The offshore components of the project are not expected to be visible to onshore communities. However, they may potentially affect stakeholders that are active within the wind farm area. Section 11 and Section 10 describe how we are working collaboratively with commercial and recreational fishermen as well as other project stakeholders to develop an environmentally responsible project.

Residents. We will engage residents who live in communities in the vicinity of the project to share project information and solicit input on project development. In addition, we will engage with civic organizations and other neighborhood-based groups such as homeowners' associations, tenant associations, community gardens, and friends' groups for local libraries and parks. As it relates to the prebuild infrastructure, we have conducted outreach to the potentially affected towns to identify their processes, preferences, and points of contact. The ongoing dialogue with the local communities will be critical for the project's ability to plan, permit, construct, and operate the project. Generally, we will tailor stakeholder outreach efforts to each community by providing translation and interpretation services as needed, using diverse and creative outreach channels, identifying accessible meeting spaces and times-of-day, and partnering with community-based organizations and local elected officials to help amplify our message and build trust. Through the stakeholder engagement process, our project team will deepen our understanding of local issues and community concerns. Our goal is to be a leader in the conversation about the benefits of the offshore wind industry, with a particular focus on educating youth about exciting career opportunities in clean energy and related fields. Leading Light Wind will engage residents within the impact area (or frontline communities) through the following activities:

[redacted]

[redacted]

Local businesses. Leading Light Wind is engaging businesses at the individual and organizational level, and tailoring stakeholder outreach efforts to each community. Leading Light Wind's goal is to partner with several local entities to support the development of a local supply chain, as discussed in Section 8, and is engaging and establishing partnerships to provide local businesses with equitable access to offshore wind opportunities.

Elected officials. Leading Light Wind is engaging state, county, and local elected officials who represent the communities in the vicinity of the project or that may have an interest in the offshore wind industry. Within New Jersey, stakeholders include legislative leadership, legislators representing coastal districts, and legislators with districts overlapping the transmission and supply chain facilities involved in the project. Invenergy has also, prior to this solicitation, engaged with the Governor's office to introduce the project. We will continue to work with local and county elected officials along the coast and other areas involved in construction and transmission to build support for the project, inform them of project activities, and identify strategic partnerships to engage their constituents. Our goal is to build trust and leverage the platform elected officials have to explain and advance the offshore wind industry in New Jersey. Our conversations thus far have been generally positive, recognizing the American-led and labor investment aspect of our project. We aim to have regular check-ins with elected officials to ensure they are always aware of our activities, and to garner support for our efforts to build a project that New Jerseyans welcome.

Leading Light Wind Energy Equity Credit

Leading Light Wind is committed to an equitable energy transition, one that can provide the environmental, health, and climate benefits of offshore wind to all residents of New Jersey while addressing the regressive nature of utility bills where low-income families must pay far more of their share of income. As part of our community benefits program, we are establishing an Energy Equity Credit to reduce energy burden in New Jersey. Energy burden refers to the percentage of household income spent on energy utility costs. A household is considered Energy-Burdened when 6% or more of household income is spent on energy costs, including 3% for electricity. [redacted] **The program would provide direct assistance to over 200,000 low-income, Energy-Burdened households in New Jersey by reducing their monthly electricity bill increase from our project by 50%.**

Environmental and environmental justice groups. Within New Jersey, environmental and environmental justice groups are important partners in the transition to a clean energy economy. [redacted] We will continue to engage environmental stakeholders throughout project development. Our initial conversations with these groups identified broad support for the offshore wind industry, its many benefits for OBCs, and a recognition more must be done to reach the wider public. Leading Light Wind recognizes that environmental and environmental justice groups have helped

Figure 9-3. The offshore components of Leading Light Wind are not expected to be visible to onshore communities.

pave the way for the offshore wind industry, and that diversity is an asset to economic development. As such, we plan to build from their existing efforts, and invest in their capacity, through the following activities.

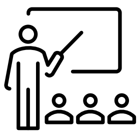
[redacted]

[redacted]

Nonprofit organizations, including community-based organizations as well as economic and workforce development organizations. We are engaging a wide range of nonprofit organizations that are active within the communities in the vicinity of the project. We are focusing engagements with nonprofit organizations that provide programming for science, technology, engineering, and mathematics (STEM) education and economic and workforce development (see Section 8 for more detail). [redacted]

- **Leading Light Wind Scholars Program.** [redacted]
- **Boys & Girls Clubs of Monmouth County.** [redacted]

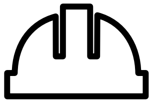
- **Liberty Science Center.** [redacted]
- **Children's Environmental Literacy Foundation (CELF).** [redacted]



Higher education. We are engaging higher education institutions with a focus on innovation, scientific research and monitoring, and workforce training. [redacted] Our main goal of engagement with New Jersey higher education institutions is to develop deep, meaningful relationships that can better the project and also provide a practical experience for their students to enter the clean energy, STEM, and marine science fields.

Leading Light Wind will work closely with our higher education partners to provide data-driven industry insights to enhance offshore wind training curriculum and professional opportunities. For example, Leading Light Wind has internal expertise advise on curriculum development related to engineering, operations and maintenance, maritime, and economic development, as well as help facilitate implementation offering to help teach or facilitate programming. Our **Leading Light Wind Applied Science Grant program** (ASG) [redacted]

[redacted]



Labor unions. Leading Light Wind recognizes the historical significance of the labor movement in New Jersey and throughout the region, and we are engaging closely with labor unions. We will build upon this heritage and create new pathways into the middle class by engaging with labor throughout the project. [redacted]

Please see Section 8 for more detail regarding labor union outreach and engagement.

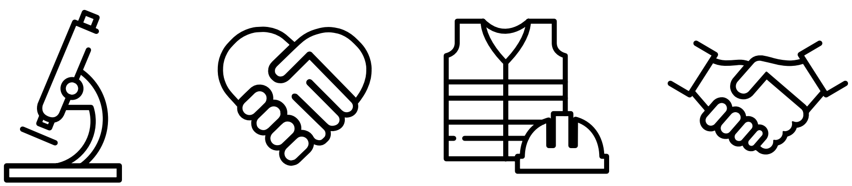
Community benefits program

If successfully awarded a contract by New Jersey, we are prepared to establish a $150 million community benefits program [redacted] The community benefits program encompasses Leading Light Wind's required funding for the Research and Monitoring Initiative (RMI), partnerships, and the creation of the Energy Equity Credit that would provide

[redacted]

direct assistance to over 200,000 low-income, Energy-Burdened households in New Jersey by reducing their monthly electricity bill increase from our project by 50% (see Table 9-2). [redacted]

To provide focus to our partnerships, Leading Light Wind has identified the following broad categories for investment:



Leading environmental research | **Empowering local communities** | **Building an inclusive next-gen offshore wind workforce** | **Accelerating the offshore wind supply chain**

Leading environmental research

Leading Light Wind will provide support for environmental and fisheries research that fosters innovation and collaboration within the offshore wind industry.

We believe the natural environment and offshore wind can coexist and thrive. To that end, we will support innovative research in the marine, fisheries, and environmental fields, as described in further detail in Section 10 and Section 11.

As US-focused research priorities are still being organized and coordinated, we will engage with regional science organizations to help ensure that investment in research is strategic and that it advances knowledge in the right areas and as quickly as possible.

We will use research, data, and stakeholder feedback to support decision-making throughout the life cycle of the project — including development and planning, design and permitting, construction, operations, and decommissioning. We seek to maximize the impact of research efforts such as data collection, methodology, analysis, and dissemination by collaborating with other developers, particularly those in adjacent lease areas taking on similar initiatives.

Leading Light Wind is actively engaging with federal and state agencies and other developers in the Bight, to conduct project-related monitoring in scientifically valid ways that further the knowledge of movements and the potential impact on wildlife in the region. Leading Light Wind is currently collaborating with other developers to obtain data on the biological characterization of our lease area through the deployment of a multi-client lidar buoy. Monitoring provides an excellent platform for bolstering a shared understanding of the Bight and the larger Atlantic Ocean ecosystems and requires deliberate collaboration and coordination.

Empowering local communities

We will improve youth education, climate resilience, public health, and air quality with a focus on supporting the most at-risk, frontline members of our local communities. We believe in a holistic, just transition that goes beyond workforce retooling to invest in and give voice to communities that have been historically excluded from economic opportunities and overburdened with environmental injustices.

To help address the multifaceted issues facing our coastal communities, throughout our development process Leading Light Wind will support community-driven initiatives that are geared toward improving quality of life, resilience, and empowering residents.

As such, we will consider sense of place and neighborhood character in the design of any onshore assets, including our O&M site, offering opportunities for co-benefits, community input, and beautification when feasible. The project has committed to designing waterfront facilities to adhere to Waterfront Alliance's WEDG program, standards that ensure resilience, ecological, and public access benefits in communities where waterfront operations take place. Our project team is discussing partnerships with organizations that reimagine recycled wind turbine components to improve public spaces see Figure 9-4).

We know that youth engagement is critical, as early exposure to opportunities will help foster the education and career pipelines the new clean energy economy will require. Leading Light Wind will support youth programming to reinforce civic engagement and create access to future wealth-building opportunities.

Building an inclusive next-generation offshore wind workforce

Leading Light Wind will support workforce development and education programs focused on pathways for priority populations and members of overburdened communities to access high-quality green jobs. We are committed to building a diverse and inclusive workforce that meets the needs of the offshore wind industry and creates high-quality jobs for New Jersey residents.

As an American-based company, Leading Light Wind understands the value of union labor in building out the American middle class. We recognize the historic inequities that specific communities have faced when it comes to accessing union jobs and other opportunities for wealth-building. We also recognize the once-in-a-generation opportunity to leverage the clean energy transition to redress legacies of inequality.

To foster a just transition in New Jersey and facilitate equitable access to opportunities, we will direct workforce training investments to institutions and organizations that are embedded in, and primarily serve, OBCs and priority populations (see Section 8).

Figure 9-4. Leading Light Wind is in discussions to partner with organizations such as Newton Brown Urban Design Blade-Made that re-imagines recycled wind turbine components to improve urban sites.

Accelerating the offshore wind supply chain

Leading Light Wind will foster the long-term sustainability of the offshore wind industry in New Jersey through various investments, including supporting capacity and access for Tier 3 and Tier 4 suppliers. We understand the immense potential that the clean energy transition brings for the revitalization of local economies.

In addition to Leading Light Wind's proposed investments in the New Jersey Wind Port, Port of Paulsboro, and an O&M site, we are committed to an equitable economic development strategy, one that empowers local entrepreneurs, innovators, and small businesses, especially those from OBCs. We know that these entities bring the greatest value to their communities and are most likely to reinvest in local neighborhoods, sharing the benefits of the new clean energy economy widely. Through our community benefits program, we are committed to reducing barriers to entry into offshore wind and investing in innovative solutions for the clean energy industry at large.

We are actively building relationships with local institutions, businesses, and community-based organizations to identify specific opportunities for initial partnership and investment. We are intentional about pursuing partnerships that support existing offshore wind initiatives that have been established by the State, reflect the priorities of communities affected by the project, and provide benefits specifically to OBCs, environmental justice communities, and other priority populations. Leading Light Wind has established the following partnerships and funding commitments (Table 9-3), which are conditional upon a successful award from New Jersey. Letters of Intent that further describe the nature of these partnerships are provided in Attachment 9.2.

Partnership	[redacted]
Leading environmental research	
Leading Light Wind Strategic Environmental Initiatives Fund	
Rutgers University	
Empowering local communities	
Leading Light Wind Fisheries Accelerator Fund	
Leading Light Wind Tribal Support Fund	
Leading Light Wind Offshore Wind Scholars Program	
Zeem Solutions Charging Hub	
Boys & Girls Clubs of Monmouth County	
Neighborhoods for a Sustainable Future	
Liberty Science Center	
Children's Environmental Literacy Foundation	
Waterfront Alliance	
Gotham Whale	
Building an inclusive next-generation offshore wind workforc	
Mid-Atlantic States Career & Education Center	
Newark School of Data Science and Information Technology	
Hudson County Community College	
New Jersey Community College Consortium	
New Jersey Institute of Technology	
Rowan College of South Jersey	
Accelerating the offshore wind supply chain	
Waves to Wind Program	
New Jersey Manufacturing Extension Partnership	
Paulsboro Community Economic Development Program	
Offshore Wind Innovation Campus (in partnership with Newlab)	
Leading Light Wind Applied Science Grant Program	
Rowan University	
New Jersey Wind Institute	
Total	

Table 9-3. List of partnerships and commitments to New Jersey.

Strategy for New Jersey government entities

Leading Light Wind is implementing a strategy to engage New Jersey government entities throughout project development, permitting, construction, operation, and decommissioning. Our approach prioritizes early and active information-sharing, focuses discussions on potential issues, and creates collaborative identification of solutions. As described in the Agency Communications Plan, we submitted to BOEM (revised March 2023), we will abide by the following guiding principles:

- **Transparency and accountability.** Collaborate and consult with agencies at every stage of development, starting early to identify key issues, resolve challenges, and achieve buy-in.
- **Responsible development.** Strive to site, construct, and operate the project responsibly, with the goal to minimize environmental and community impacts. Leading Light Wind seeks input from agency experts on resource impacts and means to avoid, minimize, and mitigate impacts.
- **Ongoing monitoring.** Once operational, conduct ongoing monitoring to minimize risks to resources.

Leading Light Wind will designate primary points of contact for engagement with New Jersey government entities, who will regularly share updates regarding project schedule, milestones, status, and planned activities; clearly identify challenges and solutions related to permits and resources associated with the project; and maintain open lines of communication. Coordination will occur through a combination of in-person or virtual meetings, conference calls, and e-mail or hard copy correspondence. [redacted]

We recognize that our strategy will evolve based on project activities and shared experiences of the project leads, agencies, and stakeholders. Our preliminary list of objectives includes:

- Provide timely and consistent updates on the project.
- Maintain a repository of accurate and current contact information for the project sponsors, government entities, and other points of contact.
- Engage with agencies at key project stages, milestones, and deliverables.
- Facilitate focused discussion of potential issues.
- Allocate dedicated time and space for agencies and the project sponsors to work toward collaborative solutions.
- Recognize agency staff and time constraints, ensuring communications are clear, concise, and meaningful.

Leading Light Wind has identified the following New Jersey government entities that would potentially consult on the project, either in permitting roles and/or providing resource expertise. We will regularly update this list as project development progresses.

[redacted]

[redacted]

10
Environmental protection plan and emissions impacts

Solicitation requirements

Checklist item	Section reference
Analysis of the anticipated environmental benefits and environmental impacts of the Project (N.J.A.C. 14:8-6.5(a)(11)(xiv))	Section 10.1
A scientifically rigorous description of all associated environmental impacts from pre-construction activities through decommissioning including, but not limited to, environmental, water use, water quality, avian, marine mammals, sea turtle, noise, aesthetics, tourism, navigation, endangered species, sea-bed disruption of marine life, morbidity or mortality among avian, mammal or benthic populations, emissions of combustion by products to the air or soil or other toxic releases to the ocean, or solid waste generation (N.J.A.C. 14:8-6.5(a)(11)(xiv)(1))	Attachment 10.3
Specifically describe how the Applicant's activities will be coordinated with the NJDEP Ecological Baseline Studies, and indicate how each resource issue, if impacted, will be addressed (N.J.A.C. 14:8-6.5(a)(11)(xiv)(2))	Attachments 10.1 and 10.3
The anticipated CO2 emissions impact of the Project (N.J.A.C. 14:8-6.5(a)(8))	Attachments 10.1 and 10.3
Provide information regarding the direct emissions impacts of the Project, including CO2, SO2, and particulate matter ("PM2.5"), as well as other relevant environmental impacts, such as impacts on the marine environment (N.J.A.C. 14:8-6.5(a)(11)(xiv)(3))	Attachment 10.1
Provide an assessment of environmental impacts form the Project compared to other similar Class I renewable energy projects (N.J.A.C. 14:8-6.5(a)(11)(xiv)(4)	Attachment 10.1
Environmental impacts (direct and comparative) must be quantified to the extent that they are significant, and it is possible to quantify them (N.J.A.C. 14:8-6.5(a)(11)(xiv)(5)	Attachment 10.1
The comparative environmental impacts shall be monetized, to the extent possible, for evaluation as part of the overall cost-benefit analysis (see Section 3.1) (N.J.A.C. 14:8-6.5(a)(11)(xiv)(6)	Attachment 10.3
A scientifically rigorous description of associated environmental impacts from pre-construction activities through decommissioning, on bats, commercially important finfish and shellfish, aquatic invertebrates, seagrass beds, wetlands, and other sensitive habitats	Attachment 10.3
Maps that identify the locations of sensitive marine, coastal, and terrestrial habitats that are within or in the vicinity of the entire Project footprint (including the onshore footprint), including but not limited to: freshwater wetlands, Special Areas as defined by N.J.A.C. 7:7-9 (including shellfish habitat, surf clam areas, prime fishing areas, finfish migratory pathways, submerged aquatic vegetation, shipwreck and artificial reef habitats, and endangered or threatened wildlife or plant species habitats), Habitat Areas of Particular Concern, Essential Fish Habitat, sand borrow areas, commercial fisheries management areas and reserves, estuary reserves, classification of areas under the jurisdiction of the Pinelands Commission, and Green Acres encumbrances	Attachments 10.1 and 10.3
Information regarding the Project's direct emissions of NOx during the development, construction, operation, and decommissioning of the Project that is consistent with the emissions impacts reported in the Application Form, including a full accounting of emissions produced from vehicles, vessels, and machinery	Attachment 10.2

Checklist item	Section reference
A description of the baseline and monitoring data that the Applicant intends to collect from pre-construction through decommissioning regarding the spatial and temporal presence of marine mammals, sea turtles, and avian species	Attachment 10.2
A description of how the Applicant plans to make the baseline and monitoring data available to NJDEP and other designated parties consistent with the Data Management and Availability Plan requirements	Attachment 10.3
A description of any commitments to fund research related to the assessment and avoidance of environmental impacts, including impacts to marine wildlife, in addition to the required fee	Attachment 10.1
A description of the considerations related to identifying the cumulative impacts of New Jersey's offshore wind development plans as well as interactive impacts with offshore wind development plans in neighboring states	Attachment 10.1
A description of how the Application will identify (or has identified) environmental stakeholders, any outreach that has occurred to date, and how the Applicant proposes to communicate with those stakeholders during pre-construction activities through decommissioning, as well as a plan for transparent reporting of how stakeholders' concerns were addressed	Attachment 10.1
A description of lighting controls for the Project	Attachments 10.1 and 10.3
A description of the expected impact of noise during the development, construction, operation and decommissioning of the Project, on marine life and onshore communities	Attachment 10.1
A description of how onshore elements of the Project will be compatible with surrounding land use and communities, and will safeguard environmentally and culturally sensitive areas	Attachment 10.1
A description of the potential impact of the Project on OBCs, as defined in New Jersey's Environmental Justice Law N.J.S.A.13:1D-157	Attachment 10.1
If impacts to an OBC are anticipated during or after construction, including, but not limited to, increased noise, dust, impervious surface, truck traffic, or loss of tree canopy or open space, the Applicant shall (1) include a community engagement plan specific to the impacted OBC, as part of the required content described in Section 3.9 and (2) identify local government entities and relevant stakeholders or community-based organizations, and propose control measures to avoid, minimize, or otherwise offset those impacts	Attachment 10.1
A description of how the direct and avoided emissions of the Project, as reported in the Application Form, were calculated, including all assumptions used in preparing estimates of direct and avoided emissions	Attachment 10.1
A description of any innovative measures that will be employed to minimize embodied carbon, that is, carbon and other greenhouse gas emissions associated with the manufacture, transportation, installation, maintenance, and disposal of materials comprising the Project	Attachment 10.1
A description of how the Applicant plans to avoid, minimize, and/or mitigate any releases of oil, particulate matter, or hazardous materials that may arise during the development, construction, operation, or decommissioning of the Project	Attachment 10.1
A visibility study that presents visual simulations of the Project from the nearest coastline point, including, at a minimum, clear, partly cloudy, and overcast conditions during early morning, mid-afternoon, and late day, as well as one simulation at night with the turbines lit under clear conditions	Attachment 10.2
Required Data Management and Availability Plan (requirements listed in Attachment 7)	Attachment 10.3

10 Environmental protection plan and emissions impacts

10.1 Summary: Our commitment to the environment

Leading Light Wind believes that the natural environment and offshore wind energy development can mutually coexist and thrive.

Our approach and philosophy to development is based on the concept that coexistence is achievable by carefully evaluating existing uses from the lease area, along the submarine and terrestrial cable routes, to the POI, avoiding impacts where feasible, and where needed, reducing impacts through mitigation.

Leading Light Wind has developed an Environmental Protection Plan (EPP) to guide us in avoiding, minimizing, and mitigating adverse construction and operations impacts on environmental resources within the project area. We have also developed a Data Management and Availability Plan to ensure the robust and transparent collecting and sharing of relevant project data throughout the life of the project, and an Infrastructure Monitoring Plan (IMP) that describes how project components may be utilized for monitoring environmental resources and contributing to regional science. All three plans are attached to this bid as Attachments 10.1 through 10.3.

Leading Light Wind believes a comprehensive environmental management program that aims to avoid or minimize adverse environmental impacts and promote beneficial impacts throughout project development should be:

- Developed in early and frequent consultation and coordination with relevant agencies, stakeholders, and Tribal Nations
- Based on robust baseline site characterization developed in consultation with relevant stakeholders
- Evidence-based and grounded in the latest science
- Incorporated into spatial planning (e.g., project siting and design)
- Applied throughout the project lifecycle (e.g., survey strategies, construction methods, and operations and maintenance activities)

Most importantly, we recognize the importance of adaptive management and will continue to evolve its procedures for evaluating, mitigating, and monitoring impacts to environmental resources through the full project lifecycle.

As the project evolves, the three plans appended to this bid will be refined to incorporate learnings from agency, stakeholder, and Tribal engagement, pre-construction survey activities, the development of the Construction and Operations Plan, BOEM's Programmatic Environmental Impact Statement, subsequent project-specific environmental analysis, and monitoring efforts.

Protecting New Jersey's environmental resources

Leading Light Wind is committed to developing the project in an environmentally responsible manner that protects New Jersey's marine and coastal environments. New Jersey has many unique, dynamic habitats for coastal, marine, and terrestrial wildlife and we share in the state's goals to protect these habitats for future generations.

Figure 10-1. Leading Light Wind seeks to protect New Jersey's unique and dynamic habitats and minimize the impacts of the project.

We understand the social, cultural, and economic value that these natural resources provide to the state of New Jersey and its residents. We seek to maintain these areas and minimize the impacts of the project.

Leading Light Wind has developed Environmental Protection, Data Management and Availability, and Infrastructure Monitoring Plans (Attachments 10.1 through 10.3). We are actively engaging with agencies, Tribal Nations, stakeholders, and research institutions to reduce the potential impacts of the project on New Jersey's unique natural resources. These plans are interrelated and are meant to support the development of our environmental management program.

Environmental benefits and emission impacts

Due to its zero-emission production of electric power, renewable energy sources such as offshore wind have the potential to offset significant volumes of pollutant emissions from the fossil-fired fleet of the electric power generation sector relying on natural gas and coal for fuel. Offsets of directly emitted particulate matter ($PM_{2.5}$), and $PM_{2.5}$ precursor compounds including sulfur dioxide (SO_2) and oxides of nitrogen (NOx) from fossil-fired generation will result in significant beneficial environmentally related health outcomes, particularly for environmental justice communities, racial and ethnic minority communities, and other socially vulnerable populations that historically have been disproportionally impacted by emissions from fossil power plants located in their midst.

Further, offsets of carbon dioxide (CO_2) releases will result in a significantly reduced carbon footprint for New Jersey and the region that will help mitigate the effects of global climate change. Governor Murphy's Executive Order No. 315 sets a target of 100% clean energy by 2035, therefore, the carbon reduction strategies offered by Leading Light Wind move New Jersey a significant way forward in the achievement of its own climate goals.

The Leading Light Wind Environmental Protection Plan provides a complete and detailed analysis and monetization of the positive impacts realized by the State of New Jersey from the significant reduction of fossil fleet emissions that will result from the long-term operation of the offshore wind projects and production of millions of megawatt-hours of clean energy, not just during the 20-year OREC period, but for 30 or more years, bringing New Jersey forward to its clean energy transition.

10.2 Plan summaries

Environmental Protection Plan

The EPP (Attachment 10.1) demonstrates our understanding of the onshore and offshore environmental resources within the project area, the potential impacts to those resources, and the actions needed to properly mitigate any adverse impacts that may occur during all phases of the project.

Where impacts cannot be avoided, the EPP describes how impacts can be minimized, and, if necessary, mitigated. The EPP also contains an emissions assessment of the project. The emissions assessment evaluates the emissions of pre-construction, construction, operations, and decommissioning activities within the project area, which includes all onshore and offshore project components.

Leading Light Wind will implement environmental protection measures, including those described in Attachment 6 of the NJBPU Offshore Wind Third Solicitation Guidance Document ("Environmental Protection Plan Requirements and Recommendations") to address any identified environmental impacts. Additionally, the EPP describes our approach to engaging with environmental stakeholders, commitments to environmental research and innovation throughout the region, and an assessment of cumulative impacts of offshore wind development in New Jersey.

Data Management and Availability Plan

The Data Management and Availability Plan (data plan; Attachment 10.2) describes data collected as part of the EPP and the Fisheries Protection Plan and the procedures we will follow to organize and manage data over the life of the project. The data plan describes the standards for data cataloging and management, data standardization procedures, and data transparency, sharing, accessibility, tools, and best practices.

[redacted]

Figure 10-2. The EPP describes the environmental resources in the project area, as well as potential impacts and mitigations during all phases of the project.

[redacted]

Data-sharing pathways may vary and are dependent on dataset type and existing and forming data warehouses. [redacted]

Leading Light Wind will also share data with NJBPU and the New Jersey Department of Environmental Protection (NJDEP) on an iterative basis as soon after collection as practicable once the data is finalized, but no later than the public release of the Construction and Operations Plan. [redacted]

We will make every effort to remove barriers to web accessibility when sharing data externally. Given that publicly available resources will be utilized in data collection efforts, resulting map figures, data collection forms, and other materials will comply with the Americans with Disabilities Act to the greatest extent practicable.

Infrastructure Monitoring Plan

The IMP (Attachment 10.3) assesses and characterizes the use of project infrastructure as environmental and ecological monitoring platforms to advance relevant regional research and monitoring efforts.

The IMP considers the entire footprint of the project, including the offshore project area and associated infrastructure (turbine arrays, foundations, and converter stations), cable routes, landfall location, and terrestrial routes. It focuses on how infrastructure associated with the project may be leveraged to support an overall monitoring plan to the benefit of science, communities, industry, and the project. In this context, Leading Light Wind considers infrastructure able to support monitoring to include both stationary project infrastructure (as previously described) and mobile support structures such as vessels and aerial platforms (planes and drones).

This plan outlines our approach to leveraging onshore and offshore infrastructure for data collection and monitoring. The plan articulates how monitoring efforts will align with regional research objectives, including the New Jersey Research and Monitoring Initiative (RMI). The IMP describes our adaptive management approach and discusses opportunities to work collaboratively with and leverage relevant work from federal and state partners, academic institutions, other ocean user groups, and developers of other offshore wind projects in the region. [redacted]

This plan is preliminary, requiring both further project design and consultation with agencies, academic institutions, and regional science entities engaged in regional environmental and ecological monitoring activities. We have initiated discussions with potential partners described above to develop specific monitoring studies related to marine mammal detection and impact assessments, fisheries monitoring through non-extractive methods, and fisheries modeling to assess potential impacts to commercially important fisheries stocks. Next steps to advance this IMP include developing and implementing specific study plans with partners best suited to the relevant subject areas.

We will continue to engage with regional science collaboratives to align IMP objectives with identified regional priorities, to facilitate research and monitoring that addresses knowledge gaps, and to ensure data collection efforts promote portability and comparability of the data with ongoing work throughout the region. The express aim of these efforts is to inform responsible decision-making and development of offshore wind.

10.3 Engaging with the environmental community

As a committed industry partner, Leading Light Wind will build upon NJBPU's and NJDEP's efforts to integrate multifaceted stakeholder engagement strategies throughout every stage of the project. Openness is a core value and cornerstone of our approach to engaging with and sharing data with relevant stakeholders.

Figure 10-3. Leading Light Wind values stakeholder input in developing a successful project that maximizes potential benefits.

Relevant stakeholders include regulatory agencies, marine users, research organizations (e.g., universities, regional consortiums, RMI), leading subject matter experts, environmental nongovernmental organizations (NGOs), and local residents, in addition to Tribal Nations. A comprehensive description of our stakeholder engagement strategy is provided in Section 9.

Stakeholders contribute valuable local and expert knowledge to project development and will be treated with respect by our team. This includes clearly communicating how stakeholder input will influence project decision-making and how stakeholder engagement will be continuously supported over the long term. By engaging early and often, we are building accountability and trust to deliver a project that maximizes potential benefits.

Leading Light Wind is committed to working with communities and stakeholders at every stage of development to ensure local voices are sought and heard, for the well-being of communities and the project's surrounding ecosystem.

The robust and comprehensive planning process is led by our team of communication directors and liaison officers, including a Fisheries Liaison Officer and a Tribal Liaison Officer (see Section 9 for further detail).

Leading Light Wind will continue to engage with the general public through web postings, social media notifications, a project newsletter, open houses, and public hearings to share project information and address comments and questions.

We are committed to involving frontline communities and those directly affected by project development in the decision-making process. Supporting equitable access to opportunities is what we define as successful stakeholder engagement. We are actively engaging agencies and stakeholders to address their concerns and questions and will do so throughout the project lifecycle. These engagements are and will continue to be based on these principles:

- **Transparency and accountability:** Coordinating, collaborating, and consulting with agencies, communities, and other stakeholders at every stage of development, starting early to identify key issues, resolve challenges, and establish feedback loops
- **Responsible development:** Minimizing environmental and community impacts with input from agency experts, communities, and other stakeholders on resource impacts and means to avoid, minimize, and mitigate such impacts

Regionally, we are actively engaging with the Bureau of Ocean Energy Management (BOEM), the US Army Corps of Engineers (USACE), and the Environmental Protection Agency (EPA). We are working collaboratively with the other lessees in the Bight through coordination facilitated by the American Clean Power Association.

[redacted]

10.4 Environmental partnerships

Our lead developer, Invenergy, leverages over 20 years of experience supporting and implementing environmental research programs that advance practices for environmentally responsible energy infrastructure development, construction, and operations. For example, among numerous other onshore research activities, including leveraging project-focused surveys to advance the state of knowledge of a variety of ecological subjects, from 2013 to 2017, Invenergy led a multi-year study that validated the use of deterrent technology to minimize impacts to bats from operational land-based wind energy facilities.[1]

[1] Romano, B.W., Skalski, J.R., Townsend, R.L., Kinzie, K.W., Coppinger, K.D., Miller, M.F., *Evaluation of an Acoustic Deterrent to Reduce Bat Mortalities at an Illinois Wind Farm* (2019), The Wildlife Society, www.wildlife.onlinelibrary.wiley.com.

[redacted]

[redacted]

[redacted]

[redacted]

Figure 10-4. Leading Light Wind is committed to developing our project in an environmentally responsible manner that protects New Jersey's marine and coastal environments.

11 Fisheries protection plan

Solicitation requirements

Checklist item	Section reference
A scientifically rigorous description of the marine resources that exist in the Project area, including biota and commercial and recreational fisheries, that is informed by published studies, fisheries dependent data, fisheries-independent data, and, where feasible, fishing communities' shared ecological knowledge, and identifies species of concern and potentially impacted fisheries	Section 11.3
Maps that identify the locations of sensitive marine and coastal terrestrial habitats and fisheries that are within or in the vicinity of the Project footprint, including but not limited to: Special Areas as defined by N.J. Admin. Code Chapter 7 - Coastal Zone Management Rules, Subchapter 9 (including shellfish habitat, surfclam areas, prime fishing areas, finfish migratory pathways, submerged aquatic vegetation, shipwreck and artificial reef habitats, and endangered or threatened wildlife or plant species habitats), Habitat Areas of Particular Concern, Essential Fish Habitat, commercial fisheries management areas and reserves, and estuary reserves	Section 11.3
Identification of all potential impacts on fish and on commercial and recreational fisheries off the coast of New Jersey from pre-construction activities through decommissioning	Section 11.4
A plan that describes the specific measures the Applicant will take to avoid, minimize, and/or mitigate potential impacts on fish, and on commercial and recreational fisheries	Section 11.4
A description of the considerations related to identifying the cumulative impacts of New Jersey's offshore wind development plans, as well as interactive impacts with offshore wind development plans in neighboring states	Section 11.4
A description of any commitments to fund research related to the assessment and avoidance of fisheries impacts, in addition to the required fee described in the introduction to Section 3.10	Section 11.4
An explanation of how the Applicant will provide reasonable accommodations to commercial and recreational fishing for efficient and safe access to fishing grounds	Section 11.4
A description of how the Applicant will identify (or has identified) commercial and recreational fisheries stakeholders, any outreach that has occurred to date, and how the Applicant plans to engage with those stakeholders during pre-construction activities through decommissioning, as well as a plan for transparent reporting of how stakeholder concerns were addressed	Section 11.5
A description of the Applicant's plan for addressing loss of or damage to fishing gear or vessels from interactions with offshore wind structures, array or export cables, survey activities, concrete mattresses, or other Project-related infrastructure or equipment	Section 11.5

11 Fisheries protection plan

11.1 Summary

Leading Light Wind is dedicated to promoting coexistence between offshore wind development and sustainable commercial and recreational fisheries.

We recognize the significant economic and cultural importance of fisheries to New Jersey and are actively gathering essential data to facilitate responsible project planning that allows fishing activities to continue to thrive in the project area. By fostering collaboration and understanding, we strive to deliver renewable energy to New Jersey while safeguarding the livelihoods of the fishermen, the fisheries resources they harvest, and the ecosystems they rely upon. This Fisheries Protection Plan describes how Leading Light Wind intends to identify and mitigate potential adverse impacts to fish and fisheries within the project area.

Leading Light Wind's fundamental approach to offshore wind development is rooted in the belief that fishing communities and the advancement of offshore wind energy can coexist and prosper together. Leading Light Wind is taking

proactive steps to engage with the fishing community with the goal of avoiding negative impacts to local fisheries. To achieve this goal, Leading Light Wind's Fisheries Protection Plan (FPP) will implement the following core principles throughout the course of the project:

Applying transparency and accountability. Transparency and accountability are crucial in fostering trust, ensuring environmental stewardship, and promoting effective stakeholder engagement for responsible development of offshore wind energy.

Conducting open, regular, and timely communication. Maintaining transparent and frequent dialogue with fisheries stakeholders is vital to minimize conflicts, maximize safety measures, and develop mutually beneficial solutions that support both renewable energy development and fishing communities.

Respecting fishing community concerns. Leading Light Wind recognizes that commercial and recreational fishery user groups are key stakeholders, and we will continue to respect the concerns of the fishing communities and supporting businesses.

Leading with best available science. Basing decisions on best available science allows for objectivity and credibility in addressing the ecological and socioeconomic implications of offshore wind projects.

Incorporating diverse experiences. Considering a wide range of perspectives and experiences among fisheries stakeholders allows for a planning process that can better address social, environmental, and economic considerations. This inclusivity leads to informed decision-making that aligns with the needs and values of diverse stakeholders.

Both the offshore wind and fisheries sectors play pivotal roles in supporting coastal communities, promoting economic growth, and ensuring a sustainable future. Shared goals, such as sustainable resource management and environmental stewardship, create opportunities where both industries thrive harmoniously. **By working together, we can achieve a balance that maximizes the potential of offshore wind energy while preserving the cultural heritage and economic vitality of the fishing industry, leading us toward a more resilient and sustainable future.**

11.2 Importance of New Jersey fisheries

New Jersey boasts a rich and diverse range of fisheries thanks to its extensive coastline along the Atlantic Ocean. The fisheries sector not only contributes significantly to the state's economy, but also holds immense cultural significance, serving as a source of heritage, tradition, and community identity. New Jersey's fisheries support a wide range of associated industries, including seafood processing, tourism, and marine research. The sustainable management and preservation of New Jersey's fisheries are essential for promoting ecological balance, maintaining the livelihoods of fishing communities, and preserving this invaluable natural resource for future generations.

Commercial fisheries

New Jersey is the world's leading supplier of surfclams and ocean quahogs and a significant producer of other highly valued commercial species such as sea scallops, blue crab, and American lobster. Between 2010 and 2021, New Jersey commercial fisheries averaged an annual contribution of over $2.1 billion in landings revenue. [1] As such, the continued success and preservation of New Jersey's commercial fisheries are essential for the well-being of coastal communities, the promotion of regional seafood, and the overall vitality of the

[1] NOAA Fisheries Office of Science and Technology, Commercial Landings Query. Available at: www.fisheries.noaa.gov/foss.

Figure 11-1. The fisheries sector in New Jersey not only contributes significantly to the state's economy but also holds immense cultural significance, serving as a source of heritage, tradition, and community identity.

state's economy. Commercial fisheries are a crucial component of New Jersey for several reasons:

- **Economic contribution:** Commercial fishing operations generate significant economic activity in the state. They provide employment opportunities for fishermen, processors, distributors, and other related industries. The revenue generated from commercial fishing activities contributes to the local economy, supporting businesses and communities.
- **Food security:** Commercial fisheries supply fresh seafood to meet the demand for local and regional consumption. They play a crucial role in ensuring a sustainable and reliable source of protein for residents, promoting food security and reducing dependence on imported seafood.
- **Cultural heritage:** Fishing has a long-standing tradition and cultural significance in coastal communities of New Jersey. Seafood products are not only a source of protein and other essential nutrients but are also an important part of the state's culinary traditions. Commercial fisheries preserve and celebrate this heritage, contributing to the cultural identity and sense of place for many residents. The industry helps maintain the traditions and knowledge passed down through generations.
- **Environmental stewardship:** Commercial fisheries in New Jersey are dedicated to sustainable practices and environmental stewardship. They often work closely with regulatory bodies and conservation organizations to promote responsible fishing practices, protect marine ecosystems, and ensure the long-term viability of fish stocks.
- **Tourism and recreation:** The commercial fishing industry attracts tourists and recreational enthusiasts who appreciate the maritime atmosphere and seafood offerings. Visitors come to experience fishing charters, seafood festivals, and waterfront dining, providing a boost to local tourism and supporting the broader hospitality sector.

The significance of New Jersey's commercial fishing communities cannot be overstated. Fisheries contribute to the state's economy, provide livelihoods for coastal communities, and are deeply intertwined with its cultural heritage. It is crucial to ensure the sustainable coexistence of fisheries with offshore wind development to safeguard this invaluable resource. By promoting effective collaboration, maintaining transparent communication, and employing mitigation strategies, Leading Light Wind aims to strike a balance that allows for the continued prosperity of the fishing industry and the growth of offshore wind.

Recreational fishing

Recreational fishing is immensely popular in New Jersey due to the state's rich coastal waters and abundant fishing opportunities. In 2019, New Jersey had the fifth greatest reported number of recreational fishing trips in the United States with over 13.3 million reported trips.[2] The extensive network of artificial reefs strategically placed along New Jersey's coastline has become a haven for diverse marine life while significantly enhancing the appeal of recreational fishing. Anglers are drawn to these areas as they offer reliable fishing grounds and the chance to catch prized sportfish.

The recreational fishing industry generates substantial economic benefits to New Jersey through expenditures on fishing equipment, boat rentals, charters, fuel, accommodations, and dining. The state's thriving recreational fishery attracts a plethora of non-residents, with approximately 40% of anglers between 2010-2018 reported as being from out-of-state.[2] As a result,

[2] National Marine Fisheries Service. 2022. Fisheries Economics of the United States, 2019. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-229A, 236 p.

the recreational fishing sector plays an important role in supporting local businesses and creating jobs in sectors such as tourism, hospitality, boat manufacturing, retail, and more.

Apart from economic benefits, recreational fishing is deeply ingrained in the social fabric of New Jersey, fostering a sense of community and connection with nature. By connecting people to their coastal heritage, recreational fishing fosters a sense of pride in local fishing traditions while honoring and preserving cultural roots. Anglers often play an essential role in conservation and environmental stewardship efforts by actively participating in citizen science programs, collecting valuable data on fish populations and habitat conditions. As such, recreational fishing communities often advocate for environmental protections and work alongside conservation organizations to safeguard the health and integrity of New Jersey's coastal and marine ecosystems.

The recreational fishing industry in New Jersey goes beyond just catching fish. It enhances social bonds, preserves cultural heritage, stimulates economic growth, fosters conservation efforts, and promotes environmental awareness. The industry's multifaceted benefits contribute to the overall well-being of communities, while highlighting the importance of sustainable fishing practices and the protection of New Jersey's marine ecosystems for future generations.

Figure 11-2. Recreational fishing fosters a sense of pride in local fishing traditions while honoring and preserving cultural roots.

11.3 Existing marine resources and fisheries in project area

By identifying the existing marine resources and fisheries in the project area, Leading Light Wind can make informed decisions that minimize potential impacts on fish populations and their habitats and promote effective coexistence between offshore wind farms and the fishing industry. The establishment of pre-development baseline characterizations is imperative for identifying any specific and/or cumulative effects of offshore wind energy development.

As a component of our Construction and Operation Plan (COP) submission to the Bureau of Ocean Energy Management (BOEM), Leading Light Wind will conduct a thorough analyses of existing baseline conditions for marine resources and fisheries. We have completed an initial review of resources which will be followed in the coming year by a much more detailed analysis. To inform baseline conditions in the project space, Leading Light Wind is reviewing stock assessment data from both state and federal survey efforts, existing scientific literature, and ongoing research efforts directed towards understanding the dynamics of the marine environment. Information from the New Jersey Department of Environmental Protection (NJDEP) Ocean Wind Power Ecological Baseline Studies,[3] NJ Energy Master Plan,[4] NYSERDA Offshore Wind Master Plan,[5] and BOEM Environmental Studies Program,[6] among others provide additional context to the region.

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[3] Geo-Marine, Inc., and New Jersey Department of Environmental Protection. Office of Science. (2010). Ocean/Wind Power Ecological Baseline Studies. Department of Environmental Protection, Office of Science. Available at: www.dep.nj.gov/offshorewind/resources/#ecological-baseline-studies.

[4] New Jersey Board of Public Utilities (NJ BPU). 2019. 2019 New Jersey Energy Master Plan. Available at: www.nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf.

[5] New York State Energy Research and Development Authority (NYSERDA). 2017. New York State Offshore Wind Master Plan: Fish and Fisheries Study Final Report: 2020 Pages.

[6] Bureau of Ocean Energy Management (BOEM). (n.d.). *Current Environmental Studies – Atlantic.* www.boem.gov/environment/environmental-studies/ongoing-environmental-studies/current-environmental-studies.

To supplement the available data on existing marine resources and fisheries in the project area, Leading Light Wind is conducting an array of scientifically rigorous surveys including benthic, geophysical, and geotechnical analyses in line with BOEM's guidelines for fisheries monitoring.[7] These surveys aim to gather project area-specific information, particularly regarding fish and benthic macroinvertebrate communities. The preliminary findings from these surveys are outlined in the Environmental Protection Plan (EPP) attachment.

To augment the survey and buoy data, the Fisheries Liaison Officer (FLO) from Leading Light Wind is engaging with fisheries stakeholders, including the commercial and recreational fishing communities. Additionally, we are working with government agencies, researchers, and other stakeholders to identify data gaps in fisheries research and monitoring. The NJDEP's Research and Monitoring Initiative, along with collaborative efforts like the (2023), jointly developed by NOAA, BOEM, and the Responsible Offshore Development Alliance (RODA), identify research priorities and areas of insufficient data. Further, Leading Light Wind is engaging with the Responsible Offshore Science Alliance (ROSA) to support and align with regional efforts to coordinate fisheries research.

The following sections provide insight into the existing marine resources of the project area.

- **Fish and invertebrates in project area:** provides an overview of marine species in the project area.
- **Fish species of concern:** sensitive, threatened, and endangered species: details sensitive, threatened, and endangered marine species in the project area.
- **Commercial and recreational fisheries in project area:** characterizes commercial and recreational fish and fisheries within the project area.
- **Marine and coastal habitats:** identifies sensitive, ecologically important, and/or economically valuable areas for fisheries in the project area that may be subject to associated state and/or federal management regulations.

This robust data provides us the opportunity to characterize resources, assess potential impacts and to develop appropriate avoidance, minimization, and mitigation measures.

Fish and invertebrates in project area

This section seeks to identify fish and invertebrate species located in the project area. The Greater Bight is home to a variety of prolific fisheries, including sea scallops, surfclams, ocean quahogs, and squid. Most fish and invertebrate species in New Jersey waters are seasonal in distribution, feeding and spawning in nearshore habitats in the spring and summer and travelling to warmer offshore waters in the winter.[8] The terms "pelagic," "demersal," and "benthic" are often used to describe different ecological zones in marine ecosystems. These terms are not mutually exclusive, and some species can exhibit a certain degree of overlap throughout their life cycles.

Pelagic species are organisms that primarily inhabit the open water column of the ocean away from the shoreline or the bottom. They are typically not closely associated with the seabed or any specific substrate. Some pelagic species, known as highly migratory species (HMS), undertake extensive migrations for purposes such as breeding feeding, or finding suitable environments. Several commercial and/or recreationally important pelagic species in the project area, discussed more in depth in the "Commercial and recreational fisheries in project area" section below, include squid, menhaden, tuna, shark, billfish, herring, striped bass, tautog, bluefish, and mackerel.

Demersal species are organisms that live and feed near or on the seabed, often in close association with the substrate. Some demersal species have a close association with physical structures, such as reefs, rocks, seagrass beds, and wrecks. These structure-associated organisms rely on these physical structures for various purposes, including shelter, spawning grounds, and access to food resources. Summer flounder, black sea bass, monkfish, scup, and winter flounder are a few commercially and/or recreationally important demersal species in the project area.

Benthic species reside on or within the seabed itself, including burrowing species, species attached to substrate, and species which move freely along the seafloor. Examples of commercially important benthic species in the project area include sea scallops, surfclams, ocean quahogs, and lobster.

[7] Bureau of Ocean Energy Management (BOEM) Office of Renewable Energy Programs. 2023. Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. Department of the Interior.

[8] Geo-Marine, Inc., & New Jersey Department of Environmental Protection. Office of Science. (2010). Ocean/Wind Power Ecological Baseline Studies. Department of Environmental Protection, Office of Science. Available at: www.dep.nj.gov/offshorewind/resources/#ecological-baseline-studies.

Community assemblage and abundance is largely dependent on environmental characteristics, including depth, salinity, substrate, currents, season, and temperature. The biological processes of many marine invertebrates in the Mid-Atlantic are driven by a unique oceanographic feature called the Cold Pool. The Cold Pool lies near the seafloor and extends over the mid- and outer- shelves from Cape Cod, Massachusetts to Cape Hatteras, North Carolina. The formation of this cold, bottom-trapped and nutrient-rich pool is driven by seasonal temperatures and winds. The seasonal cycles of the Cold Pool affect ecological processes such as organism maturation, migration, spawning, refuge, and feeding.

Table 11-1 provides a list of marine fish and invertebrate species that may exist in the project area, including associated Endangered Species Act (ESA) status and possible essential fish habitat (EFH) presence. Fisheries species of concern that may be encountered in the project area are described in "Fish species of concern: sensitive, threatened, and endangered species", and commercially important fisheries are detailed in "Commercial and recreational fisheries in project area" below.

Species **NJ-listed endangered species	**Scientific name**	**ESA status** E=Endangered, T=Threatened, P=Proposed, C=Candidate	**EFH in project area** E=Eggs, L/EJ=Larvae/Early Juvenile, J=Juvenile, A=Adults
American eel	*Anguilla rostrata*		
American lobster	*Homarus americanus*		
American shad	*Alosa sapidissima*		
Atlantic butterfish	*Peprilus triacanthus*		E, L/EJ, J, A
Atlantic herring	*Clupea harengus*		E, L/EJ, J, A
Atlantic horseshoe crab	*Limulus polyphemus*		
Atlantic mackerel	*Scomber scombrus*		
Atlantic menhaden	*Brevoortia tyrannus*		
Atlantic salmon	*Salmo salar*	E	J, A
Atlantic sea scallop	*Placopecten magellanicus*		E, L/EJ, J, A
Atlantic sturgeon**	*Acipenser oxyrinchus oxyrinchus*	E/T	
Atlantic surfclam	*Spisula solidissima*		J, A
Atlantic torpedo ray	*Torpedo nobiliana*		
Barndoor skate	*Dipturus laevis*		
Bay anchovy	*Anchoa mitchilli*		
Black sea bass	*Centropristis striata*		L/EJ
Blackbelly rosefish	*Helicolenus dactylopterus*		
Blue crab	*Callinectes sapidus*		
Blue shark	*Prionace glauca*		L/EJ, J, A
Bluefish	*Pomatomus saltatrix*		A
Butterfish	*Peprilus triacanthus*		

Table 11-1. Fish and Invertebrates potentially encountered in marine project area.

Species **NJ-listed endangered species	**Scientific name**	**ESA status** E=Endangered, T=Threatened, P=Proposed, C=Candidate	**EFH in project area** E=Eggs, L/EJ=Larvae/Early Juvenile, J=Juvenile, A=Adults
Clearnose skate	*Raja eglanteria*		E, L/EJ, J, A
Common sand dollar	*Echinarachnius parma*		
Common thresher shark	*Alopias vulpinus*		E, L/EJ, J, A
Conger Eel	*Conger oceanicus*		
Cusk	*Brosme brosme*		
Fourspot flounder	*Hippoglossina oblonga*		
Giant manta	*Manta birostris*	T	
Gulf Stream flounder	*Citharichthys arctifrons*		
Haddock	*Melanogrammus aeglefinus*		
Horseshoe crab	*Limulus polyphemus*		
Jonah crab	*Cancer borealis*		
Jonah crab	*Cancer borealis*		
Long-finned squid	*Doryteuthis pealeii*		E, J, A
Monkfish (goosefish)	*Lophius americanus*		E, L/EJ
Northern kingfish	*Menticirrhus saxatilis*		
Northern puffer	*Sphoeroides maculatus*		
Northern sand lance	*Ammodytes dubius*		
Northern sea robin	*Prionotus carolinus*		
Northern sea urchin	*Strongylocentrotus droebachiensis*		
Northern short-finned squid	*Illex illecebrosus*		E
Ocean pout	*Macrozoarces americanus*		
Ocean quahog	*Artica islandica*		J, A
Oceanic whitetip shark	*Carcharhinus logimanus*	T	
Purple-spined sea urchin	*Strongylocentrotus purpuratus*		
Red hake	*Urophycis chuss*		
Red-eye round herring	*Etrumeus sadina*		
Rosette skate	*Leucoraja garmani*		
Roughtail stingray	*Bathytoshia centroura*		
Sand tiger shark	*Carcharias taurus*		L/EJ, J, A
Scup (porgy)	*Stenotomus chrysops*		J, A
Sea raven	*Hemitripterus americanus*		

Table 11-1 (continued). Fish and Invertebrates potentially encountered in marine project area.

Species **NJ-listed endangered species	**Scientific name**	**ESA status** E=Endangered, T=Threatened, P=Proposed, C=Candidate	**EFH in project area** E=Eggs, L/EJ=Larvae/Early Juvenile, J=Juvenile, A=Adults
Shortfin mako shark	*Isurus oxyrinchus*		E, L/EJ, J, A
Shortnose sturgeon**	*Acipenser bervirostrum*	E	
Silver hake (whiting)	*Merluccius bilinearis*		
Skipjack Tuna	*Katsuwonus pelamis*		A, J
Smooth dogfish	*Mustelus canis*		E, L/EJ, J, A
Spanish mackerel	*Scomberomorus maculatus*		
Spiny dogfish	*Squalus acanthias*		J, A
Spot	*Leiostomus xanthurus*		
Spotted Hake	*Urophycis regia*		
Striped bass	*Morone saxatilis*		
Striped sea robin	*Prionotus evolans*		
Summer flounder (fluke)	*Paralichthys dentatus*		J,A
Tautog (blackfish)	*Tautoga onitis*		
Tilefish	*Lopholatilus chamaeleonticeps*		
Weakfish	*Cynoscion regalis*		
White hake	*Urophycis tenuis*		
White Shark	*Carcharodon carcharias*		J, A
Windowpane flounder	*Scophthalmus aquosus*		
Winter flounder	*Pseudopleuronectes americanus*		J, A
Winter skate	*Leucoraja ocellata*		J
Witch flounder	*Glyptocephalus cynoglossus*		E
Yellowtail flounder	*Limanda ferruginea*		

Sources:

Leading Light Wind benthic surveys (2022-2023).

Curtice, C., J. Cleary, E. Shumchenia, and P.N. Halpin. 2016. Marine-life Data and Analysis Team (MDAT) technical report on the methods and development of marine-life data to support regional ocean planning and management. www.seamap.env.duke.edu/ models/MDAT/MDAT-Technical-Report-v1_1.pdf.

NOAA Fisheries. Essential Fish Habitat Mapper. 2021. Available at: www.habitat.noaa.gov/apps/efhmapper/.

National Marine Fisheries Service (NMFS). 2019. ESA Section 7 Mapper. Available at: www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-criticalhabitat-ingormation-maps-greater.

New Jersey Department of Environmental Protection (NJDEP), NJ Fish & Wildlife. New Jersey's Endangered, Threatened, and Special Concern Species: Species Assessment Reports.

Fogarty, M., and C. Perretti. 2016. Distribution and biomass data for fish species along the U.S. east coast from about Cape Hatteras north to Canadian waters, created by the Northeast Fisheries Science Center for the Northeast Regional Ocean Council. www.northeastoceandata.org/ data-explorer/?fish.

Mid-Atlantic Regional Ocean Council. 2023. Mid-Atlantic Ocean Data Portal. Available at: www.portal.midatlanticocean.org/.

New York State Energy Research and Development Authority (NYSERDA). 2017. New York State Offshore Wind Master Plan: Fish and Fisheries Study Final Report: 2020 Pages.

Table 11-1 (continued). Fish and Invertebrates potentially encountered in marine project area.

Fish species of concern: sensitive, threatened, and endangered species

Based on available data, five ESA-listed fish species could occur in the project area: the Atlantic salmon, Atlantic sturgeon, shortnose sturgeon, giant manta ray, and oceanic whitetip shark. Marine mammal and sea turtle ESA-listed species are described in the EPP attachment.

Atlantic salmon [Endangered][9]

The Atlantic salmon (*Salmo salar*) is listed as an endangered species under the Gulf of Maine distinct population segment (DPS) ESA. Atlantic salmon are anadromous species which live and grow in both salt and freshwater. Atlantic salmon spawn and develop through their juvenile stages in freshwater before migrating to the open ocean to feed, grow, and mature. Due to both environmental and anthropogenic factors, the only remaining wild populations of Atlantic salmon in the United States are located within the Gulf of Maine DPS in the western North Atlantic. All Atlantic salmon sold on the public market is commercially cultured. There is no critical habitat for Atlantic salmon located within or near the project area.

Atlantic sturgeon [Endangered/Threatened]

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is divided into five DPSs — the Bight, Chesapeake Bay, Carolina, and South Atlantic, and Gulf of Maine. The Atlantic sturgeon is listed as federally endangered and state endangered under all but the Gulf of Maine DPS, which altered the listing status from endangered to threatened in 2012.[10] Like salmon, sturgeon are anadromous fish that spawn and hatch in freshwater river systems before migrating to sea where they reach adulthood before returning to their birthplace to spawn. Atlantic sturgeon grow slowly and mature late, with sexual maturity ranging between 11 and 21 years in populations from the Hudson River area. Spawning occurs interannually, and periods vary between sexes. Atlantic sturgeon eggs are released in riverine systems and require hard substrate for successful attachment and maturation.[11] Critical habitat for the Atlantic sturgeon is shown in Figure 11-3; no critical habitat is designated within the project development area. To promote responsible development in alignment with our environmental track record, we will seek to prioritize strategies and locations that minimize impacts to the Atlantic sturgeon and its designated critical habitat.

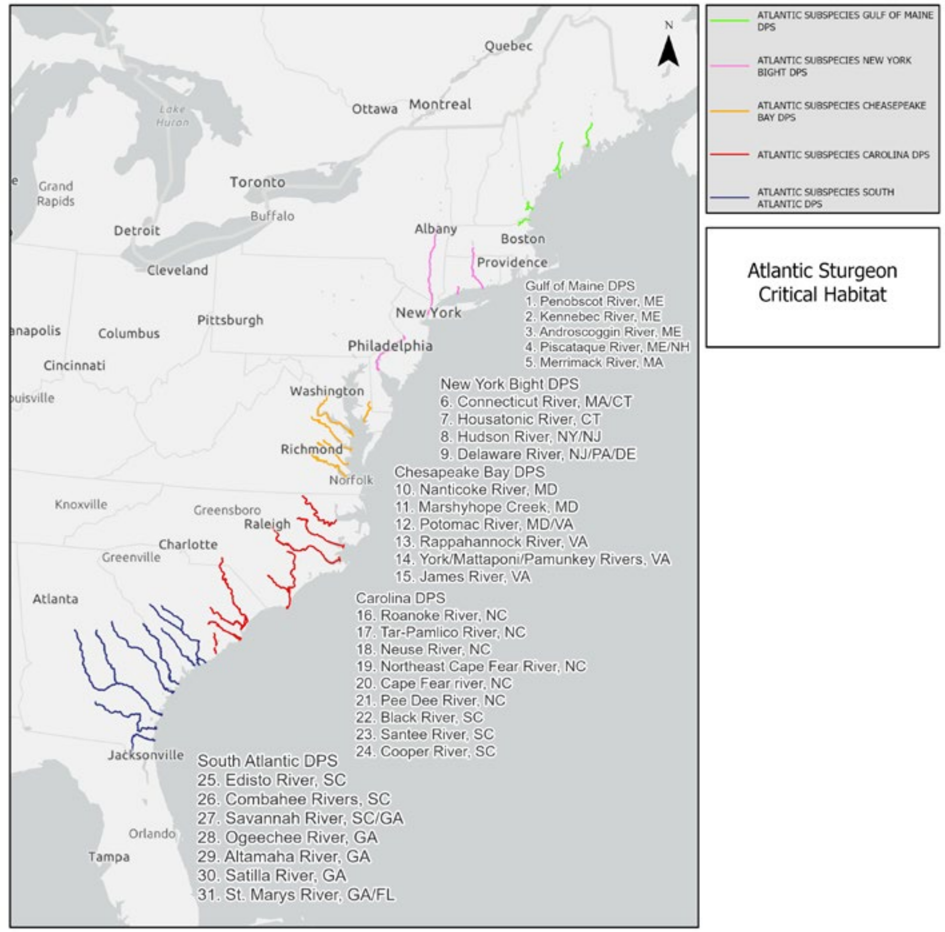

Figure 11-3. Designated critical habitat for the Atlantic sturgeon.

Shortnose sturgeon [Endangered]

The shortnose sturgeon (*Acipenser bervirostrum*) is listed as ESA-endangered in New Jersey and throughout its range. Unlike Atlantic sturgeon, shortnose sturgeon are amphidromous fish who mostly reside in their natal rivers,

[9] NOAA Fisheries. 2023. Species Directory. Available at: www.fisheries.noaa.gov/species-directory/threatened-endangered.

[10] National Marine Fisheries Service (NMFS). 2012. Threatened and endangered status for distinct population segments of Atlantic sturgeon in the Northeast Region. 77 FR 5880.

[11] NOAA Fisheries. 2023. Species Directory. Available at: www.fisheries.noaa.gov/species-directory/threatened-endangered.

although they may make short migrations into salt water for feeding purposes. Maturity is typically reached between seven to ten years of age in the Hudson River population, with males typically spawning every one to two years and females spawning every three to five years.[11] Critical habitat has not been designated for this species,[12] but given the species usual confinement to rivers, this species is unlikely to be encountered in the project development area.

Giant Manta Ray [Threatened]

The giant manta ray (*Manta birostris*) is listed as threatened throughout its range. The giant manta ray is a highly migratory species, with migration timing varying widely depending on environmental conditions and season among other factors. Giant manta rays tend to be solitary, usually aggregating for feeding, cleaning, and mating purposes. Along the East Coast, giant manta rays are generally found in southern waters in water temperatures between 19 and 22°C, although they have been documented in the Mid-Atlantic and New England regions in rare cases.[11] As such, encounters with giant manta rays in the project area are unlikely.

Oceanic Whitetip Shark [Threatened]

The oceanic whitetip shark (*Carcharhinus logimanus*) was listed as threatened throughout its range in 2018. Once considered abundant and common, the oceanic whitetip shark population experienced significant decline from commercial species bycatch and fin sales in international markets. There is no publicly available stock assessment data for oceanic whitetip in the Atlantic, but they are known to almost exclusively reside in deep waters along and past the continental shelf. Consequently, oceanic whitetip sharks are unlikely to be encountered within the project development area, which is located in shallower depths than this species is typically located.[11, 13]

Commercial and recreational fisheries in project area

This section assesses the commercial and recreational fishing activities in the project area. In assessing the uses of the planned development area by fisheries, Leading Light Wind made a deliberate effort to integrate

Figure 11-4. Leading Light Wind commissioned Fisheries Assessment Reports to characterize the current and historical use patterns by fisheries in the project area.

scientific data from relevant sources and traditional ecological knowledge. By incorporating both empirical information and the cumulative wisdom derived from the experiences and observations of the fishing community, we seek to provide a comprehensive and nuanced perspective that captures the intricacies and complexities of these uses in the area.

[redacted] Throughout this process, we will adhere to the existing guidelines provided by these federal agencies regarding approaches to fisheries assessments.

[12] US Fish and Wildlife Service (USFWS). 2020. Environmental Conservation Online System (ECOS). Available at: www.ecos.fws.gov/ecp/.

[13] National Marine Fisheries Service (NMFS). 2023. Draft Recovery Plan for the Oceanic Whitetip Shark (*Carcharhinus longimanus*). NMFS, Office of Protected Resources. Silver Spring, Md. 62 pages.

[14] Sea Risk Solutions. 2023. Leading Light Wind (OCS-A 0542) Fisheries Assessment Report: Lease Area. Unpublished, available on request.

[15] Sea Risk Solutions. 2023. Leading Light Wind (OCS-A 0542) Fisheries Assessment Report: New Jersey Export Cable Routes. Unpublished, available on request.

[redacted]

Commercial fisheries

[redacted]

[redacted]

Similar to the offshore lease, the most common gear types utilized along the offshore export cable corridors include scallop dredges, clam dredges, and bottom trawls. Approaching shore, bottom trawling becomes more prevalent, and elevated concentrations of gillnets and pot gear are found seasonally bordering artificial reefs in New Jersey state waters.[15]

Within the offshore lease, the top ten species of economic importance, from highest to lowest, include sea scallops, surfclam, ocean quahog, other/confidential species, *Loligo*/longfin squid, summer flounder/fluke, black sea bass, *Illex*/shortfin squid, monkfish, and scup.[16] The total and proportional landings and landed revenue of these species are displayed in Table 11-3.

Other commercially important species outside of the lease area and along the export cable corridor include menhaden, American lobster, bigeye tuna, and golden tilefish.

The ports of Cape May/Wildwood (NJ), Newport News/Hampton (VA), Fairhaven/New Bedford (MA), and Atlantic City (NJ) derive the greatest portions of revenue from the lease.[16] As sea scallop fishing effort declined in the Lease, port reliance shifted away from ports that primarily land scallops towards ports that more heavily process SCOQ. The port of Atlantic City (NJ), which is primarily contributed to by SCOQ, appears to be most reliant on the lease compared to all other ports.[14]

[redacted]

[16] National Marine Fisheries Service (NMFS). 2021. Landing and Revenue Data for Wind Energy Areas, 2008-2019. Accessed 06 Sept 2022. www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/WIND/ALL_WEA_BY_AREA_DATA.html.

[17] Tanaka, K. R., Torre, M. P., Saba, V. S., Stock, C. A., & Chen, Y. 2020. An ensemble high-resolution projection of changes in the future habitat of American lobster and sea scallop in the Northeast US continental shelf. Diversity and Distributions, 26(8), 987–1001. www.doi.org/10.1111/ddi.13069.

[redacted]

[redacted]

[redacted]

Surfclam and ocean quahog populations have historically been separated by depth, with ocean quahogs inhabiting deeper waters than surfclams. However, warming ocean waters has caused surfclam populations to shift further offshore and northward, leading to increased overlap between the two species.[17, 18] Current regulatory framework allows harvesting of only surfclam or ocean quahog during a single fishing trip — not both. As a result, fishermen often avoid areas with high surfclam and ocean quahog overlap due to the additional labor required on deck to separate the species and potential fines associated with harvesting both.[19] If there were to be a regulatory change permitting the harvesting of both species, it could potentially lead to increased fishing activity in previously avoided areas where the two species coexist, impacting future lease use.

Recreational fisheries

Minimal recreational fishing effort is reported in the lease itself, and no party/charter revenue was reported over the available data years between 2008 and 2017.[16] Some larger recreational vessels may make trips through the lease area to reach offshore fishing destinations towards the shelf break, and the Leading Light Wind FLO is engaging with recreational fishermen and New Jersey charter vessel operators to garner more information about popular fishing destinations offshore. Leading Light Wind will provide a detailed analyses of these findings in the COP.

Most recreational anglers in New Jersey fish from shore, and roughly a third of anglers report fishing from a private boat. Recreational fishing activity tends to peak in warmer summer months and decrease throughout the winter. Key recreational fish species targeted in New Jersey waters include black sea bass, bluefin tuna, bluefish, red hake, striped bass, summer flounder (fluke) tautog (blackfish), weakfish, winter flounder, and yellowfin tuna.[15, 20] Summer flounder, bluefish, and black sea bass are among the most common species caught. Recreational species that are proportionally harvested the most include yellowfin tuna, red hake, and bluefin tuna.[15]

Marine and coastal habitats

New Jersey coastal and marine habitats are varied and diverse, providing habitat to numerous species through all life stages. Both state and federal entities have sought to protect these habitats to maintain productive fisheries and support habitat restoration efforts. This section identifies sensitive, ecologically important, and/or economically valuable areas for fisheries in the project area that may be subject to associated state and/or federal management regulations.

Commercial fisheries management areas and reserves

This section provides an overview of major fisheries management authorities and commercial fisheries management areas within the project space.

[18] Hofmann, E. et al. 2018. An Overview of Factors Affecting Distribution of the Atlantic Surfclam (*Spisula solidissima*), a Continental Shelf Biomass Dominant, during a Period of Climate Change. Journal of Shellfish Research. National Shellfisheries Association. www.doi.org/10.2983/035.037.0412.

[19] Powell, E. N., Klinck, J. M., Munroe, D. M., Hofmann, E. E., Moreno, P., & Mann, R. 2015. The value of captains' behavioral choices in the success of the surfclam (*Spisula solidissima*) fishery on the U.S. mid-Atlantic coast: A model evaluation. Journal of Northwest Atlantic Fishery Science, 47, 1–27. www.doi.org/10.2960/J.v47.m701.

[20] National Marine Fisheries Service (NMFS). 2022. Fisheries Economics of the United States, 2019. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-229, 236 p. www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-economics-united-states.

Leading Light Wind is located in the Mid-Atlantic region of the United States. The Mid-Atlantic Region includes New York, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia. In New Jersey state waters, the New Jersey Department of Environmental Protection is the primary agency responsible for the conservation and management of natural resources, including fisheries. In federal waters, the Mid-Atlantic Fishery Management Council is the primary authority overseeing fisheries management in the project area.

Due to the migratory nature of marine organisms and proximity of the project area to the Northeast region, several species are jointly or primarily managed by the New England Fishery Management Council, Atlantic States Marine Fisheries Commission, and/or NOAA Fisheries (National Marine Fisheries Service). These entities play vital roles in the management and conservation of state and federal waters off of New Jersey, ensuring the sustainability of fish populations and the protection of marine resources.

Fishery management plans provide the basis for management of fishery resources in federal waters, allowing Councils to enact specific management measures, such as fishing seasons, quotas, and closed areas. The Mid-Atlantic Fishery Management Council oversees the following seven fisheries management plans:

- Summer flounder, scup, and black sea bass
- Mackerel, squid, butterfish
- Atlantic surfclam and ocean quahog
- Atlantic bluefish
- Tilefish
- Spiny dogfish (co-managed with New England Fishery Management Council)
- Monkfish (co-managed with New England Fishery Management Council)

The Atlantic sea scallop fishery management plan is primarily overseen by the New England Fishery Management Council (NEFMC) and NOAA Fisheries. Under this plan, scallop rotational areas are designated each fishing year; these areas periodically open and close to scallop harvesting. In 2022, the Bight scallop rotational area, shown in Figure 11-6, was designated as a closed rotational area, or an area where scallop harvesting is prohibited. This closed rotational area overlaps with approximately 1.9 square miles of the northeastern-most portion of the lease, or roughly 1.5% of the lease area.[14]

[redacted]

Due to the minimal overlap with the project area, no substantial changes in scallop fishing activity are anticipated.

American lobster is managed by the Atlantic States Marine Fisheries Commission (ASMFC) in cooperation with the individual states within the region. The commission works collaboratively with state agencies and stakeholders to develop and implement management measures, such as fishing quotas, size limits, trap limits, and seasonal restrictions, to ensure the sustainable management of the American lobster fishery. The project area is

[21] Mid-Atlantic Regional Ocean Council. 2023. Mid-Atlantic Ocean Data Portal. Available at: www.portal.midatlanticocean.org/.

divided between lobster conservation management Areas 4 in the north and 5 in the south, displayed in Figure 11-7. These areas have designated seasonal closure periods where lobster harvesting is prohibited. To reduce conflicts with lobster fishermen, Leading Light Wind considers these seasonal closures in the timing and location of their planned development activities.

Several broad management areas exist for other commercial fisheries in and around the project area, including those for Atlantic herring, Atlantic red drum, monkfish, skate, Atlantic spiny dogfish, and black sea bass. Potential impacts and mitigation measures to fish and fisheries are described in Section 11.4.

[redacted]

Essential fish habitat and habitat areas of particular concern

Essential Fish Habitat (EFH) and Habitat of Particular Concern (HAPC) is a federal designation to provide certain habitats protection and restoration for fisheries continued use. NOAA Fisheries has designated essential fish habitat for 55 species found in New England and the Mid-Atlantic region within the project area. Table 11-4 displays all essential fish habitat and habitat of particular concern over various life stages for species in the project area.

Summer flounder (*Paralichthys dentatus*) is the only identified fisheries species with identified HAPC in the project area. Inshore, EFH for summer flounder is defined as all estuaries where summer flounder are present. Juveniles generally use estuarine habitats and open bay areas as nursery areas in water temperatures greater than 37°F and salinities between 10-30 parts per thousand. Summer flounder HAPC are designated for any EFH area containing macroalgae, seagrasses, or freshwater or tidal macrophytes in either loose aggregations or beds.[22] NOAA Fisheries has designated the coast of New Jersey as HAPC for summer flounder populations in submerged aquatic vegetation. These HAPCs are based on local submerged aquatic vegetation and mapping, but federal designation is for the entire coastline and estuarine areas.

New Jersey designated special areas

Special areas are defined as areas so naturally valuable, important for human use, hazardous, sensitive to impact, or particular in their planning requirements, as to merit focused attention and special management rules [New Jersey Administrative Code (NJAC) § 7:7-9.1]. These areas play a crucial role in the protection, preservation, and sustainable management of the state's coastal resources, balancing economic development while safeguarding the overall health of the coastal zone.

Some of the designated New Jersey special areas relevant to fish and fisheries include shellfish habitat, surfclam areas, shipwreck and artificial reef habitat, and prime fishing areas. Leading Light Wind will consider these sensitive areas in our cable siting and installation plan. Other special areas related to specialized habitat are discussed in the EPP attachment.

Shellfish habitat. Shellfish habitat refers to a designated area within the coastal zone that is recognized for its importance in supporting shellfish populations, such as production for hard clams (*Mercenaria mercenaria*), soft

[22] Mid-Atlantic Fishery Management Council (MAFMC). 1998. Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan. Dover, DE. 398 p. + appendices. Available at: www.mafmc.org/s/SFSCBSB_Amend_12.pdf.

[redacted]

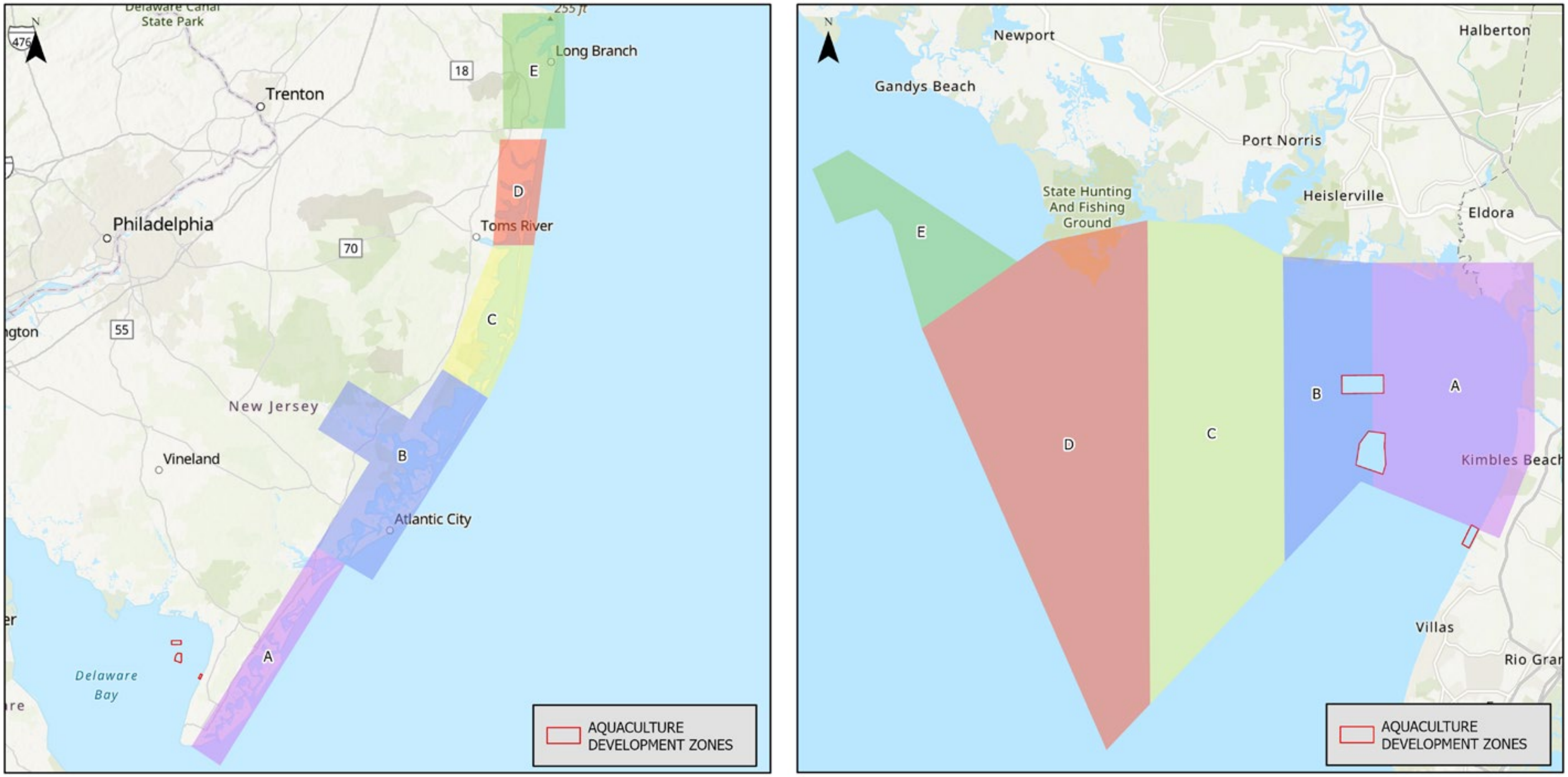

Figure 11-8. New Jersey designated shellfish aquaculture leases.[25] Leading Light Wind's export cable landing site is located in Atlantic Coast Lease D at the Manasquan River Inlet.

clams (*Mya arenaria*), eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), or blue mussels (*Mytilus edulis*) (NJAC § 7:7-9.2). This includes areas designated as shellfish culture areas leased by the state for aquaculture activities. New Jersey has designated over 36,000 acres of shellfish aquaculture leases for raising hard clams and oysters along the Atlantic Coastal estuaries and Delaware Bay, managed by the Bureau of Marine Habitat and Shellfisheries. Figure 11-8 displays the designated New Jersey shellfish lease sections and aquaculture development zones. Leading Light Wind's export cable landing site at Sea Girt is located in Atlantic Coast Lease D at the Manasquan River Inlet.

Surfclam areas. Surfclam areas are defined as coastal waters which can be demonstrated to support significant commercially harvestable quantities of surf clams, or areas important for recruitment of surf clam stocks (NJAC § 7:7-9.3). Surfclams constitute the largest molluscan fishery in New Jersey, and New Jersey has historically led the nation in terms of surfclam landings. [redacted] Figure 11-9 displays active surfclam and ocean quahog fishing between 2015-2016. A moderate portion of the project

[25] New Jersey Department of Environmental Protection (NJDEP), NJ Fish & Wildlife. 2021. Commercial Shellfish Aquaculture. NJDEP. www.dep.nj.gov/njfw/fishing/marine/commercial-shellfish-aquaculture/.

[redacted]

area can be described as a surfclam area. Surfclam fishing activity is also addressed in the "Commercial and recreational fisheries in project area" section above.

Shipwrecks, artificial reefs, and prime fishing grounds. Wrecks and obstructions tend to create fish aggregating habitat. As such, areas with greater structure are correlated with greater recreational fishing intensity. Shipwreck and artificial reef habitat special areas include all permanently submerged or abandoned remains of vessels and other structures, including, but not limited to, artificial reefs, anchors, quarry rocks or lost cargo, which serve as a special marine habitat or are fragile historic and cultural resources (NJAC § 7:7-9.13). Prime fishing areas include tidal water areas and water's edge areas that have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity (NJAC § 7:7-9.4).

Figure 11-10 displays NJDEP artificial reef habitats and prime fishing areas. There are three artificial reef sites in the vicinity of the project area: Sea Girt, Manasquan Inlet, and Axel Carlson. [redacted]

[redacted]
Our Fisheries Communication Team is coordinating with fisheries users of these locations to minimize impacts to fishing activity by considering timing of development activities, notifying mariners in advance of planned activities, and maintaining open and frequent dialogue with the fishing community.[15]

11.4 Protecting New Jersey's fish and fisheries

This section seeks to identify and discuss potential impacts on fish and fisheries throughout the various stages of development and delves into specific measures and strategies that may be employed to reduce these impacts. Additionally, it outlines commitments made by Leading Light Wind to fund research focused on assessing and avoiding impacts on fisheries, with the goal of promoting the long-term sustainability of fish and fisheries alongside renewable energy.

There is ample evidence of climate change's influence on fisheries resources in the Mid-Atlantic region with documented changes in species distributions and productivity. The spatial and temporal shifts of these species have resulted in alterations to traditional fishing grounds, necessitating adjustments to fishing practices and strategies. These climate-induced impacts to fisheries resources and their reliant industries are already underway independent of wind energy development, and changes are projected to persist in the foreseeable future. It is crucial to remain vigilant and aware of the persistent drivers of change as we work towards supporting a sustainable future for both people and the environment.

In alignment with BOEM's best management practices and mitigation measures,[26] the hierarchy of avoiding, minimizing, and mitigating potential impacts to fish and fisheries plays a vital role in promoting the sustainable coexistence of the project and marine ecosystems. Leading Light Wind adopts this hierarchy as our systematic approach to address potential conflicts and reduce the adverse effects on fish populations and fisheries.

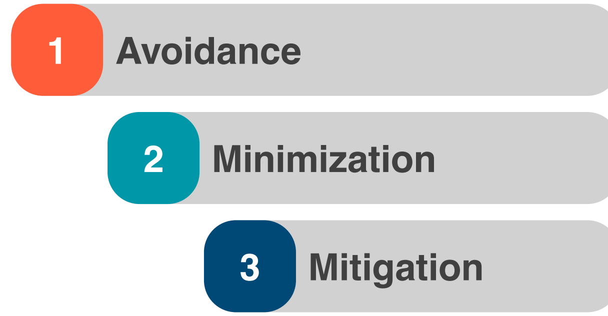

Figure 11-11. Leading Light Wind follows a systemic approach to address potential conflicts and reduce adverse effects on fish and fisheries.

1

The first step in the hierarchy is **avoidance**, which involves identifying and selecting routes, locations, and operational time frames that avoid interference with fishing grounds, fish habitats, migration patterns, and spawning areas not already avoided through the BOEM call process. By avoiding these areas, Leading Light Wind aims to prevent direct harm to fishermen, fish populations, and their habitat. This can be achieved through comprehensive site assessments, stakeholder engagement, and thorough environmental impact assessments that consider the needs of fish, fishermen, and fisheries.

2

When complete avoidance is not feasible, the next step is **minimization**. This entails implementing measures to reduce potential impacts on fish and fisheries during the various stages of offshore wind development. For example, technologies and construction techniques can be employed to minimize underwater noise, which can disrupt fish behavior and communication. Adjusting turbine placement and cable routing can also help minimize habitat fragmentation and preserve important fish migration routes. Operational planning, from survey through installation, reduces spatial and temporal overlap with fishing activities, especially during peak fishing seasons. Implementing best practices during construction and operation, such as sediment and erosion control measures, can minimize sedimentation and habitat disturbance.

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[26] Bureau of Ocean Energy Management (BOEM) Office of Renewable Energy Programs. 2014. Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf, Final Report on Best Management Practices and Mitigation Measures. Department of the Interior.

3 If impacts cannot be fully avoided or minimized, the next step is **mitigation**, which is achieved through restorative action or offsetting measures. Mitigation measures are designed to address residual adverse effects by implementing compensatory actions that provide alternative habitats or greater/equivalent ecological benefits than the impacts caused by the offshore wind project. Examples of mitigation may include creating artificial reefs or fish aggregation structures to provide new habitats, investing in habitat restoration projects, supporting fisheries research and monitoring programs, contributing to fisheries innovation/resilience funds, or contributing to conservation initiatives that protect fish populations and their habitats.

Recognizing the potential impact of offshore wind development on fisheries, we participate in and fully support the efforts well underway to develop optimal plans for identification and facilitation of appropriate fisheries compensation where demonstrated losses occur.

Overall, the mitigation hierarchy serves as a framework to substantively reduce impacts to fish and fisheries through responsible planning, minimizing conflicts, and protecting the ecological integrity of marine ecosystems. Leading Light Wind will implement this hierarchy to ensure responsible development of the project that balances the need for renewable energy with the preservation of vital fish populations and sustainable fisheries.

A more comprehensive examination of the potential effects on fish and fisheries will be conducted as part of the COP submission. The review presented below should be regarded as initial findings that will undergo further scrutiny.

Fish and fisheries mitigation strategies

Fish and fisheries are inextricably interconnected, forming an intricate relationship where the well-being of one significantly influences the other. The health and sustainability of fish populations directly impact the viability and productivity of fisheries, while the fishing industry's practices and management decisions can profoundly affect fish populations and their ecosystems. Recognizing this interdependence is vital for implementing effective and responsible development strategies that promote the long-term health of both fish and fisheries.

Existing uses of the project space, including fisheries, were considered during the wind energy area identification and leasing process. However, there are still areas where fishing grounds and offshore wind development will overlap, making it necessary to find a way for both industries to coexist. Fishermen need to be able to access fishing grounds in order to continue the sustainable harvest of fisheries resources, while offshore wind developers must build within the predetermined areas to capture the wind resource and meet the relevant state and federal renewable energy goals. Therefore, it is crucial to find a harmonious balance that allows for the coexistence of fisheries and offshore wind development, so both industries can thrive without significant detrimental effects on one another.

The Special Initiative for Offshore Wind (SIOW) Fisheries Mitigation Project is actively engaged in formulating a transparent and just process to establish a fisheries compensatory mitigation fund and identify a third-party administrator. Leading Light Wind supports these endeavors and actively participate in discussions within the American Clean Power (ACP) Fisheries Subcommittee to determine the most effective approach for creating and implementing this fund.

Leading Light Wind will complete a detailed assessment of potential impacts as a required component of the COP and will work diligently to identify reasonable modifications and strategies that allow efficient and safe access to fishing grounds, support effective use of the offshore wind resource, and minimize potential impacts on fish and fisheries. The following list outlines some of the potential impacts on fisheries throughout all stages of project development and associated mitigation strategies:

[redacted]

[redacted]

[redacted]

[redacted]

The impacts of offshore wind farms on fish and fisheries are still an active area of research. The actual effects can vary depending on the specific characteristics of each wind farm and the local marine ecosystem. The New York Bight Draft Programmatic Environmental Impact Statement will analyze the potential impacts of wind energy development activities in the Bight, as well as the change in those impacts that could result from adopting programmatic avoidance, minimization, mitigation, and monitoring. Environmental Impact Assessments and monitoring will be conducted to better understand and mitigate these potential impacts.

Understanding cumulative impacts of offshore wind development

In order to fully comprehend the cumulative impacts of offshore wind development, there is a pressing need for a standardized and regional approach to fisheries research and monitoring. Establishing baseline conditions provides a critical reference point to assess changes and evaluate the effectiveness of mitigation measures. Collaborating with local fisheries stakeholders is equally vital, as they possess invaluable knowledge and insights about the intricacies of the marine ecosystem and can provide firsthand observations that may not be captured by scientific studies alone.

[27] The Wind Turbine Radar Interference Mitigation Working Group is a federal interagency group formed under a Memorandum of Understanding in 2014 between the US Department of Defense, US Department of Energy, Federal Aviation Administration, NOAA, and BOEM. www.windexchange.energy.gov/projects/radar-interference-working-group.

Figure 11-12. Both the offshore wind and fisheries industries play a vital role in supporting the New Jersey economy.

Ultimately, a synthesis of hard sciences, such as environmental monitoring, data analysis, and modeling, with soft sciences, including social, economic, and cultural studies, is necessary to fully grasp the scale and magnitude of impacts stemming from offshore wind development.

Leading Light Wind recognizes the importance of collaboration and coordination with other Bight lessees in understanding the cumulative impacts of offshore wind development. Moreover, we support transparent data reporting that better enables stakeholders to assess combined project impacts, aiding decision-making and fostering trust, credibility, and collaboration. We acknowledge that each lessee plays a crucial role in achieving a comprehensive understanding of the cumulative effects and we are committed to working collaboratively to ensure the sustainable coexistence of offshore wind and other marine uses in the region.

In collaboration with the fisheries community and other Bight developers, Leading Light Wind plans to conduct fisheries monitoring surveys that complement existing data and evaluate potential changes in fisheries. Led by consultations with fisheries stakeholders, BOEM's Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf,[28] and ROSA's Offshore Wind Project Monitoring Framework and Guidelines,[29] we may employ otter trawl surveys, scallop and SCOQ dredge surveys, ventless trap surveys, fish pot/trap surveys, benthic video/photography, and other non-extractive sampling methodologies. In developing the fisheries monitoring plan, we will consider NOAA Fisheries guidance[30, 31] to prioritize strategies that minimize risks to protected species.

By coordinating efforts with other lessees and working together with key fisheries stakeholders (expanded upon in Section 11.5) Leading Light Wind will implement monitoring efforts that are comprehensive, consistent, and responsive to the specific needs and concerns of the local fishing communities. This collaborative and standardized approach will enable a more accurate understanding of the cumulative impacts of offshore wind development on fisheries, ultimately supporting the sustainable coexistence of renewable energy and thriving marine ecosystems.

Commitment to research

For more than two decades, Leading Light Wind's lead developer, Invenergy, has made the advancement of science a core principle of its business, recognizing the importance of robust data to inform evidence-based decision making and supporting responsible development. Invenergy is actively involved in sponsoring environmental research programs and conservation initiatives aimed at advancing practices for responsible energy infrastructure development while improving coexistence with the surrounding environment. Ongoing initiatives are detailed annually in the Invenergy Impact Report.

Recognizing the pressing need to better understand the potential impacts of offshore wind energy on the marine environment, we are establishing our own

[28] Bureau of Ocean Energy Management (BOEM) Office of Renewable Energy Programs. 2023. Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. Department of the Interior. www.boem.gov/sites/default/files/documents/about-boem/Fishery-Survey-Guidelines.pdf.

[29] Responsible Offshore Science Alliance (ROSA). 2021. Offshore Wind Project Monitoring Framework and Guidelines. www.rosascience.org/wp-content/uploads/2022/09/ROSA-Offshore-Wind-Project-Montioring-Framework-and-Guidelines.pdf.

[30] NOAA Fisheries: Greater Atlantic Region. 2023. Permitting Considerations for Fisheries Surveys and Monitoring Activities to Support Offshore Wind Energy Development. www.fisheries.noaa.gov/s3/2023-06/NOAAFisheriesGreaterAtlanticRegionPermittingConsiderationsforFisheriesSurveysforOffshoreWindDevelopment20Jun2023.pdf.

[31] NOAA Fisheries: Greater Atlantic Region. 2023. Technical Assistance on Protected Species Best Management Practices and Risk Reduction Measures for Fisheries Surveys and Monitoring Activities to Support Offshore Wind Energy Projects Development. www.fisheries.noaa.gov/s3/2023-06/NOAAFisheriesGreaterAtlanticRegionProtectedSpeciesBestManagementPracticesandRiskReductionMeasuresforOffshoreWindFisherySurveys20Jun2023.pdf.

collaborative alliances, endorsing endeavors to address fisheries concerns, and contributing to the NJ Research and Monitoring Initiative (RMI). With the aim of enhancing our understanding of the individual and cumulative impacts of offshore wind, **Leading Light Wind has committed [redacted] to partnered initiatives and an additional [redacted] in project funding aimed at advancing our understanding of the ocean environment.** To this end, Leading Light wind has identified key areas of environmental research that form an overarching framework for identifying opportunities and initiatives that will address critical knowledge gaps and provide the information needed to inform both baseline and regional understanding of the impacts and potential benefits of offshore wind. These priority areas will guide decision-making around environmental research partnerships and were designed to specifically align with the regional research priorities of the NJ RMI, Regional Wildlife Science Collaborative (RWSC), and ROSA. Specifically, Leading Light Wind endeavors to advance projects that address the following:

- **Technological advancements** that enhance ability of developers to conduct environmental resource surveys, fisheries monitoring initiatives, project construction, or operations and maintenance more efficiently, safely and responsibly
- **Regional/population level dynamics** particularly studies/data development to improve model estimation and inference (i.e., climate and ocean data, habitat variables, phenology)
- Solutions to **improve avoidance, minimization, and mitigation** of impacts to species and habitats or sensitive features
- Study of mechanisms to **promote co-existence of offshore development** with existing ocean uses/users

[redacted]

[redacted]

In partnership with Rutgers University, if successfully awarded a contract in New Jersey, we will commit [redacted] to support both fisheries monitoring initiatives and projects that improve the viability of the fishing industry to operate within future wind farms.

[redacted]

Further, Leading Light Wind will continue to develop these partnerships with a focus on the fisheries stocks of critical importance and in recognition of the evolving data and information needs to ensure the responsible development of our project as well as continued alignment with the needs of affected communities and resources. Details on environmental partnership commitments are detailed in the EPP attachment. Through these partnerships and activities, we amplify our impact in the communities where we live, work, and operate, forging a path towards a sustainable future that benefits both our ecosystems and communities.

11.5 Engagement and collaboration with fisheries stakeholders

We are committed to actively engaging fisheries stakeholders and incorporating input into development decisions as it is imperative to the mission of coexistence with the fishing community. Leading Light Wind commenced early consultations with regulatory agencies including BOEM and NOAA Fisheries with the goal of better understanding regulatory requirements, verifying compliance with applicable laws and regulations, and staying up to date with fisheries research initiatives and results. We will establish an interagency coordination plan to increase formal engagement with state and federal regulatory agencies as the project moves into the COP submission and review process.

Several key fisheries regulators in the Bight offshore wind energy space include BOEM, NOAA Fisheries, NJDEP, Mid-Atlantic Fishery Management Council (MAFMC), New England Fisheries Management Council (NEFMC), and Atlantic States Marine Fisheries Commission (ASMFC). They are responsible for managing and conserving fisheries resources and play a crucial role in assessing potential impacts, developing mitigation measures, and ensuring compliance with regulations.

In addition to our direct engagement with the fishing industry, fisheries stakeholders will have many opportunities to directly engage with regulatory agencies and provide feedback on Leading Light Wind development activities through public meetings and comment periods. This section details how we have identified fisheries stakeholders and employ strategies to garner crucial feedback from the fishing community.

Fisheries Communication Plan and fisheries team

The Leading Light Wind Fisheries Communication Plan, available on the project website, provides a strategic framework to facilitate effective communication and engagement between the project and the fishing industry. It aims to establish clear channels of communication, promote transparency, and address the potential impacts of offshore wind farms on fishing activities. The plan is updated and refined over time through feedback and guidance from fisheries stakeholders. Key elements detailed in the plan include establishment of the Fisheries Communication Team, stakeholder identification, strategies for effectively engaging various stakeholder groups, mechanisms for addressing conflicts and finding mutually acceptable solutions, and procedures for addressing lost or damaged gear due to project activities.

The **Gear/Loss Claim Form** provides a method for processing claims for lost or damaged fishing gear. The form was based on a general template created across joint developers using BOEM's Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries.[32] The form is available within the Fisheries Communication Plan, on the Leading Light Wind Mariners page, and distributed within each Mariner Update that notifies mariners and key stakeholders of planned project activities in the shared ocean space.

The **Leading Light Wind Fisheries Communication Team**, identified within the Fisheries Communication Plan, is a specialized group of individuals who aim to bridge the connection between the fishing industry and the project. The fisheries team and external affairs team works in conjunction to provide accurate and timely information about the offshore wind project, including its location, design, development schedule, potential impacts on fishing activities, and mitigation measures. The FLO, Sarah Hudak, acts as a direct line of communication with fisheries stakeholders and relays feedback to the

[32] Bureau of Ocean Energy Management (BOEM) Office of Renewable Energy Programs. 2022. Draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585. Department of the Interior.

Table 11-5. Leading Light Wind fisheries communication team members.

Name	Roles/responsibilities	Contact information
Wes Jacobs	Project Director, Primary F-TWG Representative, Primary ACP Fisheries Subcommittee Representative	wjacobs@invenergy.com
Laura Morse	Director, Environmental Compliance and Strategy	lmorse@invenergy.com
Annette Ehrhorn	BOEM Project Coordinator	annettelehrhorn@boem.gov
Sarah Hudak	Fisheries Liaison Officer, Secondary F-TWG Representative, Primary ACP Fisheries Subcommittee Representative	sarahhudak@leadinglightwind.com
Ron Larsen	Fisheries Liaison Support	ronlarsen@searisksolutions.com
Kirsten Barnstead	Senior Associate of Environmental Compliance and Strategy; Scientific Survey and Data Management Lead	kbarnstead@invenergy.com

broader team to ensure fisheries concerns are appropriately addressed. We are actively seeking Fisheries Industry Representatives (FIRs) — individuals or associations who can offer impartial representation for their fishing communities — to effectively tackle industry-specific issues and enhance the involvement of the fisheries sector in decision-making processes related to offshore wind energy development. As team members are added to support these efforts, contact information and roles/responsibilities will be updated to reflect changes throughout the project life cycle. The fisheries team is listed in Table 11-5.

Leading Light Wind is actively seeking a Marine Affairs Manager and Fisheries Representatives to join our Fisheries Communication Team. By bringing on board experts with deep knowledge and experience in marine affairs and fisheries, Leading Light Wind aims to ensure effective engagement and understanding between the offshore wind development and fishing sectors. Through the addition of these key roles, Leading Light Wind seeks to establish a strong foundation for ongoing cooperation with fisheries stakeholders.

Identification of fisheries stakeholders

Leading Light Wind places a strong emphasis on stakeholder identification as a crucial step in our offshore wind development process. We seek to understand the wide range of perspectives, concerns, and priorities of the fisheries sector to develop mutually beneficial relationships and establish a foundation for productive dialogue throughout the project's lifecycle.

Leading Light Wind took a proactive approach to identify key stakeholders early in the project through comprehensive stakeholder mapping exercises, extensive community outreach efforts, and close collaboration with regulatory agencies and local fisheries organizations. We prioritized engagement with consultants who possessed both (1) extensive experience in the fisheries and/or renewable energy sectors and (2) a deep understanding of the local context. From these consultants, we commissioned comprehensive preliminary assessments of current and historical fisheries uses of the project area. These reports served as the foundation for recognizing and understanding the key stakeholders and communities impacted by the project. Findings of the report were validated and supplemented by engagement with the local fishing community.

In the Bight offshore wind energy space, several fisheries stakeholders have an interest in the development and operation of the Leading Light Wind project. Some of the key fisheries stakeholders include these:

- **Commercial fishermen:** Commercial fishermen who operate in and surrounding the project area rely on the region's fisheries resources for their livelihoods and may have concerns about potential impacts on their fishing operations, including changes in fishing grounds, access restrictions, and potential interactions with offshore wind infrastructure. As referenced in section 11.3, the primary commercial users of the project space are scallop, surfclam, and ocean quahog fishermen.
- **Recreational fishermen:** Recreational fishermen, including anglers and charter boat operators, rely on the region's coastal waters for recreational fishing activities, which contribute to the local economy. These stakeholders have an interest in preserving their access to fishing grounds and ensuring that offshore wind development does not disrupt their fishing experiences.

There is limited recreational fishing activity within the project area, although relatively high activity does exist approaching cable landing sites near artificial reef systems. Some recreational transit occurs through the project area to reach popular fishing destinations at the shelf break.

- **Fishing industry associations and organizations:** Various fishing associations and organizations represent the collective interests of commercial and recreational fishermen. These groups, [redacted] and many New Jersey recreational fishing organizations advocate for the protection of fishing rights, sustainable fisheries management, and the inclusion of fishing industry perspectives in offshore wind decision-making processes. These organizations play a vital role in facilitating dialogue and representing the views of their members.
- **Fisheries science and research institutions:** Fisheries scientists and researchers, including NOAA Fisheries, ROSA, educational institutions, and other fisheries science-based organizations, contribute valuable knowledge and expertise to the understanding of the ecological and socioeconomic impacts of offshore wind on fisheries. They are involved in conducting studies, assessing potential impacts, and providing recommendations for sustainable coexistence between offshore wind and fisheries.
- **Fisheries management councils:** Regulatory agencies including but not limited to the NJDEP Marine Councils, MAFMC, NEFMC and ASMFC are some of the key fisheries regulators in the Bight offshore wind energy space. They are responsible for managing and conserving fisheries resources and play a crucial role in assessing potential impacts, developing mitigation measures, and ensuring compliance with regulation.
- **Other offshore wind lessees:** Offshore wind developers share an objective of harnessing offshore space for renewable energy production while prioritizing the sustainable coexistence of various marine uses, particularly fisheries. Considering the substantial overlap of fisheries stakeholders among projects within the Bight, incorporating other lessees as key stakeholders optimizes the ability to address fisheries stakeholder concerns and reduce outreach strain. Engaging in collaboration with other lessees also enhances the potential to deliver shared benefits to the affected community and contribute to collective efforts aimed at comprehensively understanding the cumulative impacts of offshore wind.

Through our thorough stakeholder mapping exercises, engagement with interested groups and individuals, community consultations, and outreach events, Leading Light Wind has established meaningful connections with residents, fishermen, and other community members and laid the groundwork for effective and inclusive stakeholder engagement throughout the project's lifecycle. By employing a multifaceted approach, we are now leveraging and benefiting from our established relationships with key stakeholders.

Engagement strategy and collaboration with fisheries stakeholders

The intersection between renewable energy projects and fisheries activities necessitates a comprehensive and inclusive approach to ensure the long-term sustainability of both industries. Leading Light Wind firmly believes that engaging and collaborating with a diverse range of fisheries stakeholders leads to better-informed decisions and balanced outcomes.

Leading Light Wind is required to submit a progress report to BOEM every six months as part of its commitment to ensuring transparency. Progress reports, which can be viewed publicly on BOEM's New York Bight Lessee Activities page, provide an account of conducted and planned outreach and showcase how stakeholder feedback has influenced the design or implementation of the project over time. Similarly, this section offers an overview of past, ongoing, and anticipated outreach with fisheries stakeholder groups.

Engagement with commercial and recreational fishing industry

Fishing communities possess a wealth of on-the-ground experience that can enhance understanding of the local environment and marine ecosystems in ways that conventional science may not be able to adequately capture. By actively engaging with commercial and recreational fishermen, Leading Light Wind aims to foster trust, address conflicts, and achieve a balanced approach that benefits both industries and the marine ecosystem.

The following engagement approaches and examples have been and/or will be used by Leading Light Wind throughout the development process:

- **Information sharing and transparency:** We strive to provide clear and transparent information about project timelines, construction activities, and

[33] Bureau of Ocean Energy Management (BOEM). 2022. Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0542).

Figure 11-13. Leading Light Wind Fisheries Liaison Officer, Sarah Hudak making a dock visit to Shark River, NJ.

potential impacts to fishermen. Regular in-person and emailed updates, newsletters, Mariner Updates that inform fishermen of ongoing and planned development activities, and a dedicated page for mariners on the Leading Light Wind website are some of the methods used so fishermen have access to the latest information.

- **Port/dock visits:** Port visits refer to scheduled visits, usually by the FLO(s), to ports and fishing communities. The purpose of these visits is to engage directly with commercial and recreational fishermen, fostering communication and building relationships. FLOs provide information about the offshore wind projects, address concerns, and gather feedback from the fishing community. We strive to conduct monthly port visits and/or joint port hours with other Bight Lessees to reduce outreach strain on fishermen and enhance collaboration between developers.
- **Fishermen advisory groups and organizations:** Fishermen advisory groups are committees or organizations composed of representatives from the fishing industry who provide input, advice, and guidance on the planning, design, and operation of offshore wind projects. The purpose of these groups is to communicate the interest and concerns of fishermen so they are considered during the development and implementation of offshore wind farms. Leading Light Wind attends fishing expositions, such as the NJ Saltwater Fishing Expo, to directly engage and build relationships with fishing organizations.
- **Joint research and studies:** Leading Light Wind is committed to collaboration with fishermen and academic institutions to conduct research and studies on the ecological and socioeconomic impacts of offshore wind projects. These efforts are further outlined in Section 11.4. Insight and active involvement from fishermen better inform the planning and design of wind farms and identification of potential mitigation measures.
- **Stakeholder meetings and workshops:** Organized meetings and workshops provide an opportunity to disseminate information about project development, discuss specific concerns voiced by fisheries stakeholders, and gather input from fishermen. These forums allow for conversations on potential impacts, fishing access, and any specific concerns raised by the fishing community.
- **Active involvement of the fishing industry:** Recognizing that the expertise and valuable knowledge held by local fishermen as ocean experts, Leading Light Wind is actively exploring avenues to involve fishermen beyond the planning phase and integrate them into project activities. Economic opportunities for fishermen are described in the "Opportunities for fishing industry members" section below.

Engagement with fisheries scientists and researchers

Leading Light Wind places significant value in partnerships with local scientific organizations and educational institutions, whose expertise in the regional ecosystem enables a more comprehensive and context-specific approach to project planning and implementation. By fostering a targeted approach to funding, we hope to promote meaningful collaborations and the advancement of projects that align with our objectives.

Leading Light Wind is involved in ongoing discussions with scientific and educational institutions, outlined in section 11.4, regarding partnerships in conducting fisheries monitoring and research related to the ecological and socioeconomic impacts of offshore wind. We aim to formulate fisheries monitoring strategies that encompass a wider regional perspective, enabling us to better assess the cumulative impacts of offshore wind over larger scale. Additionally, we are garnering feedback from fisheries industry members, scientists, and regulators on topics or areas that may require additional funding, with the goal of allocating resources and funding to support meaningful independent research initiatives that add to our collective understanding of the ocean environment.

With New Jersey coastal communities being potentially affected by project development, we have directed efforts towards collaborating with both New Jersey and partnered institutions that have shown promise or expertise in advancing renewable energy in the context of fish and fisheries. Given the historical significance of surfclam and scallop in the lease area, we have been engaging heavily with Rutgers University and the Virginia Institute of Marine Science, who have considerable experience in shellfish science and positive working relationships with the regional fishing community. [redacted] We intend to sustain engagement with these institutions and others, striving to support impactful initiatives directly relevant to the project area and our understanding of the marine environment.

In our commitment to spearheading America's transition to renewable energy, Leading Light Wind strives to provide training and opportunities for the upcoming generation of the workforce.

As such, we are engaged with educational institutions to explore avenues for collaboration and identify potential opportunities for involvement (see "Commitment to research" above). [redacted]

[redacted] Active involvement with these educational and scientific organizations has cultivated numerous relationships and opened a multitude of future prospects for collaborative fisheries research.

Engagement with fisheries management councils

Through active engagement with fisheries managers, we seek to align our project objectives with established regulations, contribute to effective fisheries management, and support the sustainable coexistence of offshore wind energy and fishing activities. This collaborative approach promotes transparency, fosters dialogue, and helps strike a balance between renewable energy development and the protection of valuable marine resources. Several key fisheries management bodies in the project area and Bight include the NJDEP Marine Councils, MAFMC, NEFMC, and the ASMFC.

Regional fisheries management councils play a crucial role in the sustainable management of fisheries resources in their respective regions. Leading Light Wind attends Council meetings to stay informed about the latest policies, guidelines, and scientific research related to fisheries. Attending these meetings allows us to engage in meaningful dialogue with Council members, stakeholders, and the fishing industry, fostering trust, understanding, and long-term cooperation. Additionally, Council meetings often serve as platforms for providing offshore wind development updates and soliciting feedback from the fishing community.

Engagement with other offshore wind energy developers

The rapid growth of offshore wind energy presents numerous challenges and uncertainties that must be addressed to ensure the responsible and sustainable development of these projects. Given that offshore wind developers share the objective of promoting renewable energy while ensuring the coexistence of fisheries, collaboration is crucial to collectively and harmoniously attain a comprehensive understanding of the operational environment within which our projects operate.

As the number of offshore wind projects increases, stakeholders have expressed fatigue, exhaustion, or a sense of being overwhelmed due to the demands of participating in multiple project-related activities. With the goal of alleviating outreach strain, the Leading Light Wind FLO actively participates with other project liaisons in the ACP New York Bight Fisheries Working Group, which aims to coordinate outreach efforts, streamline communication channels, and share resources. Some of the current strategies being employed include establishment of a common calendar to track significant fisheries stakeholder events, joint port hours, coordinated engagement forums at Council meetings, trade shows, and other topic-based workshops, and the development of a centralized platform or quarterly newsletter that consolidates updates from all projects in a unified location.

The Fisheries Communication Team participates in the ACP Fisheries Subcommittee and ACP New York Bight Working Group which has a broader mission to apply the collective wisdom gained across offshore wind energy projects to formulate effective solutions. Several initiatives currently being worked on by the subcommittee include the establishment of a fisheries compensation fund and a communications plan to advance the long-term relationships of the recreational fishing sector with the offshore wind industry. By sharing lessons learned and adopting a unified approach to problem-solving, the subcommittee seeks to cultivate a sustainable and effective relationship between developers and stakeholders.

[redacted]

Leading Light Wind supports collaboration on joint research and development initiatives, including open data sharing and joint testing of new technologies and methodologies. By pooling resources and working collaboratively, we hope to accelerate innovation, enhance efficiency, and achieve a more comprehensive understanding of the environmental context in which our projects operate.

Opportunities for fishing industry members

As the only American-led offshore wind project in the Bight, Leading Light Wind places significant value on inclusion and advancement of the local workforce. **By hiring locally and involving the affected community, we strive to maximize project benefits and contribute to the long-term socioeconomic development of New Jersey.** We will prioritize leveraging the expertise of local fishing industry members and seek to create opportunities that mutually benefit both the fishing and offshore wind sectors. By fostering collaboration and offering meaningful work, we aim to promote synergy between these industries and ensure shared benefits for all stakeholders involved.

Leading Light Wind has employed regional fishermen to act as **scouts** in advance of survey vessels to identify potential gear and fishing conflicts prior to survey activity. By employing experienced fishermen who are familiar with local fishing grounds and practices, we can better assess and address potential impacts on fishing activities while minimizing disturbances to fishing operations. We aim to continue the utilization of scouts throughout the development process.

Figure 11-14. Leading Light Wind employs experienced fishermen who are familiar with local fishing grounds and practices to minimize disturbances to fishing operations.

To further facilitate effective collaboration and minimize the impact on fishing activity during offshore development activities, we have engaged fishing community members as **offshore fisheries liaison representatives (OFLRs)**. These individuals act as direct points of contact between the fishing community and the offshore development team, ensuring seamless communication and understanding. Hiring representatives with a deep understanding of fishing practices is optimal for fostering collaboration and avoiding or mitigating potential disruptions to fishing activities.

Additionally, we are soliciting commercial and recreational fishermen to act as **fishing industry representatives (FIRs)**. These representatives serve as crucial intermediaries, advocating for and addressing the interests and concerns specific to their respective industries throughout the offshore wind energy development process. Working collaboratively with the FLO, FIRs play a pivotal role in fostering effective dialogue and promoting a sustainable coexistence between offshore wind energy and the fishing industry.

Leading Light Wind will explore the provision of **dockside vessel support services** to members of the fishing industry. This support may include access to docking facilities, maintenance and repair services, and logistical assistance. By providing these services, we aim to minimize disruptions to fishing operations and ensure efficient and safe access to fishing grounds. As the project advances in its development, Leading Light Wind will actively explore opportunities to provide **training and employment to fishermen** in roles such as vessel operations, vessel maintenance, offshore wind farm installation, and ongoing maintenance activities.

Lastly, we are exploring opportunities to engage the fishing industry in cooperative **fisheries research and monitoring efforts**. Through ongoing discussions with industry members, we have gained valuable insights and generated innovative ideas to enhance coexistence between the offshore wind and fishing sectors. These ideas include exploring fishing gear modifications to optimize maneuverability and effectiveness in wind farm areas, undertaking offshore reseeding initiatives for surfclam populations, including automatic identification systems on individual turbines to enhance navigation, and exploring the potential for offshore aquaculture leveraging turbine scour materials. By supporting projects that fishermen deem important, Leading Light Wind aims not only to foster coexistence with the fishing industry but also to contribute to its growth and prosperity.

These are just a few examples of how fishing industry members can be actively engaged in the offshore wind development process. As our collaboration progresses, we remain committed to exploring additional avenues to integrate fishermen into various aspects of the development, fostering long-term harmony between the offshore wind and fishing industries.

11.6 Leading Light Wind looking forward

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

12
Project timeline

Solicitation requirements

Checklist item	Section reference
A timeline for the permitting, licensing, and construction of the Project (N.J.A.C. 14:8-6.5(a)(13)	Section 12.3
A detailed implementation plan and schedule that highlights key milestone activities and completion dates during the permitting, financing, design, equipment solicitation, manufacturing, shipping, assembly, in-field installation, testing, equipment Commissioning and service start-up (N.J.A.C. 14:8-6.5(a)(2))	Section 12.2
Indicate the equipment's delivery time once an order has been placed (N.J.A.C. 14:8-6.5(a)(2)(i)(12))	Section 12.2
Specify the expected time requirements in the aggregate from start to finish as well as the time required to accomplish each specify activity related to Project design, resource monitoring, impact studies, permitting, construction and decommissioning activities, with associated milestones delineated for each category of activity (N.J.A.C. 14:8-6.5(a)(13))	Section 12.3
Identify potential sources of delays in the Project schedule, and how those delays could be mitigated, or if not mitigated, how they would affect the overall Project schedule	Section 12.4
A timeline for development of the prebuild Infrastructure, including engineering, siting/permitting, procurement, construction, back feed/testing, and the start of commercial operation	Section 12.2

12 Project timeline

12.1 Summary

The Leading Light Wind team has developed a detailed project execution plan that integrates the critical development, procurement, and construction activities of the project. The project schedule has been developed to optimize permitting activities and minimize execution risks, and incorporates the following:

1. Achievable commercial operation date (COD)
2. Minimized interface risks tied to critical development and procurement activities
3. Strategic planning to minimize and mitigate risk to critical path work activities
4. Effective resource management in a constrained environment for labor, equipment, and materials

2022 Lease acquisition

Development

Ongoing community engagement; establish community benefits program; complete comprehensive environmental survey program; and secure required permits and investments.

[redacted] **Start of construction/financial close**

Construction

Create thousands of jobs through construction of onshore components and operations and maintenance (O&M) infrastructure, and manufacturing and installation of offshore components.

[redacted] **Commercial operations date (COD)**

Operations

Create long-term O&M jobs and generate 2,000+ MW to support federal and state clean energy goals.

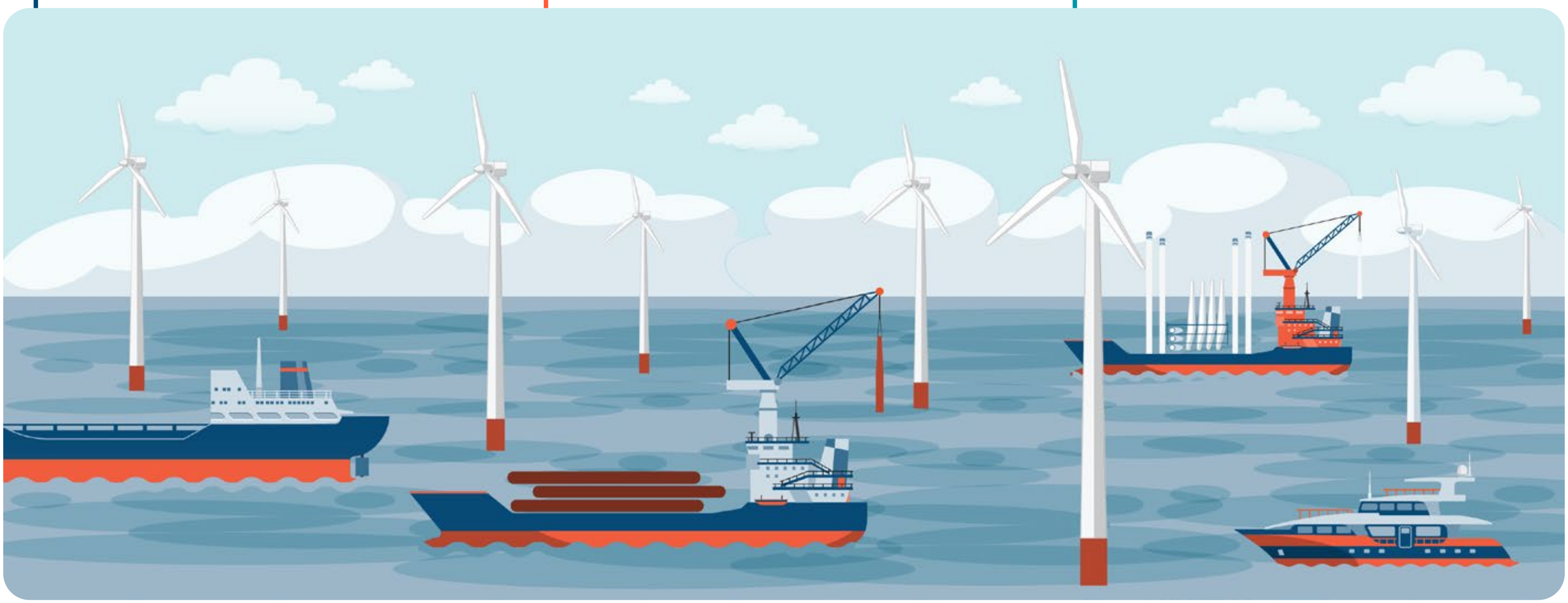

Figure 12-1. Schedule timeline.

The overall project schedule was developed around discrete and integrated work packages and incorporates contracting and procurement strategies to maximize productivity and optimize project delivery. The project schedule has been informed by these factors:

[redacted]

The main drivers behind Leading Light Wind's critical path and target COD include these:

[redacted]

To manage the risk of delay in the schedule, we have developed several schedule-driven risk management strategies. [redacted]

[redacted]

Conservative and appropriate estimation of schedule activities will allow the project to maintain the project's critical path.

Early submittal of permit applications will enable the project to move through the state and federal reviews ahead of competing projects, resulting in permit acquisition within the baseline schedule. This schedule reflects the historical federal and state agency review timelines and has not incorporated recent commitments to accelerate such review processes.

Detailed project schedules for our project alternatives are provided in Attachment 12.1 and 12.2. The schedule is focused on the development, siting, permitting, engineering, and financing efforts, leading into the procurement, manufacturing, installation, and commissioning of the primary project components.

As discussed below, primary project components include WTGs, foundations, an HVDC transmission system that includes an offshore converter station (OFCS) and onshore converter station (ONCS), HVDC export cables, HVAC inter-array cables, and one or more points of interconnection (POIs).

[redacted] These target milestones are based on reviewing the interdependencies and expected durations of the major project drivers, including commercial, development, permitting, engineering, and construction activities for the project. To inform and refine this schedule, we have initiated key development efforts and conducted extensive outreach and engagement with lenders, permitting agencies, potential suppliers/vendors, and construction contractors.

To date, key actions have included the following:

[redacted]

[redacted]

Agencies consulted include these:

[redacted]

Table 12-1. Leading Light Wind has consulted with federal and state agencies.

Development, permitting, and construction

The schedule from award notification illustrates an overall development, permitting, and construction duration of [redacted] from offtake award to COD. The project schedule has been developed in conjunction with a procurement strategy for major materials required for the project.

We have incorporated challenges such as allowable construction windows due to environmental constraints and the availability of resources for parallel activities, while accounting for overall permitting timelines that constrain the start of construction of specific work packages. We conducted the following key activities to validate the targeted COD date:

[redacted]

[redacted]

[redacted]

Figure 12-2. Leading Light Wind has engaged in early communications with key agencies to understand the permitting process.

We have reviewed project schedule activities with construction contractors, including the following:

[redacted]

Environmental restrictions

Leading Light Wind understands and intends to comply with the allowed construction windows for the proposed submarine installation components of the project, including work in shallow water/nearshore and federal waters. Based on a preliminary review of previous USACE permits for similarly scoped projects and conditions, the following are the anticipated submarine construction windows:

- **Nearshore waters and land points:** Memorial Day to Labor Day (cable landing point easement)
- **Nearshore waters and land points:** Memorial Day to Labor Day (Atlantic Sturgeon, Blue Crab harvest, migratory fish, Winter Flounder)
- **Federal waters:** May to December (daylight piling only)

We have incorporated these windows into the overall project schedule, and these are key drivers to achieving the targeted COD date. Based on a construction start date of [redacted] our schedule utilizes and leverages the allowable windows to the maximum extent practical. In the event of a schedule delay due to unforeseen conditions, we have investigated several preliminary alternatives to mitigate the risk to the project. We will continue to develop these during future project development activities.

Based on our current schedule, the project takes advantage of the allowed windows and incorporates the previously mentioned construction seasons into the project schedule for installation in shallow/nearshore New Jersey and federal waters. [redacted]

Given the risks and associated impacts, our team has evaluated site-specific metocean, geotechnical and geophysical, and environmental data to confirm that the vessels proposed to execute the work have captured a realistic view of the overall campaign durations for installation infrastructure at this scale. Seasonality of the weather windows can drastically change the overall efficiency of the campaign. Such conditions have been incorporated into the overall project schedule, particularly regarding the installation of foundations, WTGs, and the OFCS.

12.2 Project implementation and assumptions

[redacted]

State and local permitting

[redacted]

[redacted]

[redacted]

Federal COP and NEPA

The COP approval process is primarily managed and governed by BOEM in conjunction with cooperating agencies. BOEM will review the COP and conduct the NEPA environmental review of the COP through an Environmental Impact Statement (EIS). BOEM will coordinate the EIS development with cooperating agencies, including Tribal, federal, state, and local government entities with jurisdiction, special expertise, or related decision-making capacity. BOEM and cooperating agencies will issue a joint Record of Decision (i.e., One Federal Decision) that will support all related agency decisions.

[redacted]

[redacted]

[redacted]

Table 12-2. Critical milestones.

Project site assessment and environmental/cultural reviews

Our COP will describe all proposed onshore and offshore construction, operation, and decommissioning activities. It will describe the existing environmental conditions, provide information on impact-producing factors, and propose measures for avoiding, minimizing, mitigating, and monitoring environmental impacts. The COP will contain information on the following topics:

- Air quality
- Aviation radar
- Benthic environment
- Birds and bats
- Cultural, historic, and other resources of Tribal concern
- Department of Defense and other national security uses
- Electronic magnetic fields
- Essential fish habitat
- Existing coastal use and socioeconomic use
- Fisheries
- Floodplain limits
- Geophysical and geotechnical
- Hazardous materials
- Marine archaeological resources
- Marine mammals
- Munitions and explosives of concern and unexploded ordnance
- Navigation safety risks
- Oceanography and metocean
- Sea floor habitat
- Sea turtles
- Sensitive biological resources and habitat specific to New York and New Jersey jurisdictions
- Socioeconomic and environmental justice
- Underwater acoustics
- Water quality
- Wetland delineation and identification
- Wildlife

[redacted]

[redacted]

[redacted]

Facility Design Report and Fabrication and Installation Report

In parallel with the COP process, we will develop, review, and finalize, with our suppliers, consultants, and project team, all technical documentation required by BOEM (i.e., Facility Design Report and Fabrication and Installation Report) relating to the design, fabrication, and installation of the project.

[redacted]

Figure 12-4. Federal and state permit overview.

We will then present a robust, credible, and validated set of technical assumptions to achieve project certification through an appointed Certification Verification Agency. [redacted]

Major material procurement

Leading Light Wind is advanced in its positioning and discussions with the marketplace to secure reservation slots for Tier 1 project materials and equipment. [redacted]

Securing reservation slots of these major materials in the early stages of the project will help de-risk procurement and ensure backfeed generation is available to support wind turbine commissioning offshore. Reservation commitments early in the development period remove the procurement from the critical path and allow the project adequate time to respond with mitigation measures in the unlikely event of major delays in sourcing as the project develops detailed design packages.

[redacted]

[redacted]

Table 12-3. Equipment procurement milestones.

[redacted]

Onshore construction and prebuild infrastructure

Permitting

For the purposes of this section, Leading Light Wind is assumed to be constructing the prebuild infrastructure. The prebuild infrastructure will require numerous permits from NJDEP and other state agencies. See Section 14 for the project's complete permitting plan for more information. Additionally, Leading Light Wind will frequently engage with stakeholders such as nongovernment organizations, tribes, fisheries, and special interest groups, including potential project opponents, to share information and hear their ideas. Frequent and regular engagement with agencies and stakeholders provides the necessary feedback to inform project planners and allow coordinated adjustments to project decisions and developments.

We also recognize the importance of New Jersey townships' ability to regulate certain activities in addition to the state agency permits. Given the required location of onshore project components, local permits will be required [redacted]

The primary permit required from the towns and the counties will be local road opening permits depending on either county or town ownership of the specific road. We will work closely with the road owner (town or county) administrators, engineers, and planning boards on road selection, size of the cable box, construction timing, navigating existing underground utilities, and restoration activities to ensure the project's activities will be least disruptive and impactful to the local population.

[redacted]

We have conducted outreach to the potentially affected towns to identify their processes, preferences, and points of contact. The ongoing dialogue with the local communities will be critical for the project's ability to plan, permit, construct, and operate the project.

State and local permit applications for construction of the project would be cross-walked with the federal permitting requirements and submitted concurrent with the federal USACE permits, approximately [redacted] prior to the BOEM's submission of its Draft Environmental Impact Statement.

Engineering

Conceptually, engineering has already started to support the prebuild infrastructure. Detailed design will commence in [redacted] to allow sufficient time to collect appropriate utility mapping and coordinate engineering with local townships and state agencies. Detailed design will incorporate optimized duct bank ampacity configuration for [redacted] and coordinating manhole positioning and HDDs along environmental sensitive areas and crossings necessitating non-invasive means of routing.

Procurement

Procurement of major duct bank materials and conduit will occur in [redacted]

Construction

[redacted]

infrastructure

Following approval from the New Jersey Department of Environmental Protection (NJDEP) and a Record of Decision from BOEM, we expect to start construction of the ONCS in [redacted] The overall construction duration is expected to be [redacted] To support this overall construction schedule, certain long-lead manufacturing and procurement will commence prior to this date to ensure the critical path for COD is maintained. Below are additional details related to onshore construction activities included in the critical path:

- **Mobilization.** [redacted] This early mobilization will allow for construction field offices to be installed, material to be received and unloaded at designated material storage yards, and construction management staff to be prepared for immediate start of construction following approval of the ROD. [redacted]
- **Public road ROW duct bank installation.** Installation of the public road ROW duct bank will start immediately following approval of the ROD. [redacted]

[redacted]

Figure 12-5. HVDC and electrical interconnection schedule.

- **Horizontal directional drilling (HDD).** [redacted] The project-specific export cable installation for Leading Light Wind will interface directly with the coffer dam, onshore HDD landfall, and onshore transition joint bay. Dedicated crews will be tasked with the terrestrial cable route leading to the landfall site, which will lead to submarine aspects of construction and separate crews/vessels. Early engagement with relevant stakeholders will facilitate timely execution. Marine portions of the cable installation are discussed in the next section and nearshore restrictions are considered and included in the plan.
- **Onshore transmission routing.** [redacted]

[redacted]

Right-of-way construction timeline

[redacted]

[redacted]

Figure 12-6. ROW scenario schedule.

[redacted]

Onshore converter station

We will establish an early HVDC supplier partnership and contract to de-risk long material procurement lead times and construction schedules. Based on market constraints, we prefer to use the same fabricator to manufacture the project's onshore and offshore HVDC system components. [redacted]

[redacted]

[redacted]

Backfeed/testing

[redacted]

[redacted]

complete

Commercial operations

[redacted]

Offshore construction

Below are additional details related to offshore construction activities included in the critical path.

Foundations

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Submarine cable

We have engaged several export and inter-array cable suppliers to establish early reservation agreements to confirm capacity for project execution. [redacted]

We anticipate that dedicated crews will be engaged for each component previously described, as different installation vessels will be required based on the construction parameters required for the various stages working from the OCS into federal waters and toward state shallow/near waters at the landfalls. Further discussion on the construction windows for the submarine installations is provided in Section 13. [redacted]

Wind turbine generators

We have positioned ourselves with WTG supply partners to ensure project viability and facilitate flexibility in the overall project infrastructure. [redacted] These factors have been incorporated into the broader planning. Adequate float has been incorporated for a successful installation campaign.

Ports and marshaling

[redacted] The site configuration and layout have been reviewed and deemed acceptable by proposed OEM WTG turbine suppliers. The project has also considered contingency storage locations to support foundations and cable storage as needed to mitigate available storage at manufacturers.

HVDC offshore converter station

We will establish an early HVDC supplier partnership and contract with an offshore fabricator to deliver the jacket foundation for the OFCS. Based on market constraints, we prefer to use the same fabricator to manufacture the project's topside module. Project size/capacity will determine the OFCS module installation requirements.

[redacted]

Figure 12-7. [redacted]

[redacted]

HVDC system synchronization

Once both the onshore and offshore converter stations are internally commissioned, energization and synchronization commissioning will begin in [redacted]. WTG installation and commissioning is expected to start during the HVDC system synchronization, [redacted] Once all WTGs are powered, SCADA and grid code testing will follow and the project will reach COD in [redacted] (see Figure 12-8).

Considerations for smaller project size

Leading Light Wind has also considered a smaller project size. The major design differences are listed below, but as a summary [redacted]

[redacted]

Figure 12-8. WTG and foundation schedule.

[redacted] Development activities and timelines are expected to remain unchanged. [redacted] would also remain the marshaling port for T&I activities.

A detailed schedule for a smaller project size is found in Attachment 12.2.

Development

Development will be relatively unchanged when considering a smaller project size. The same state and federal permits will be required in either case. Surveys required for design purposes will also be the same.

WTGs

[redacted]

Foundations

The design of the foundations would continue to be a [redacted]. The difference in the foundations scope will be a [redacted]

[redacted]

HVDC system

[redacted]

Inter-array cables

Inter-array cables in a smaller case are expected to utilize the same manufacturer but [redacted]

Export cable

[redacted]

12.3 Potential project risks and opportunities

[redacted]

Our project team has taken a proactive approach to risk management and has developed effective strategies to mitigate these risks. Our team has developed an evergreen risk register, in which all project risks are detailed based on team input and market feedback. These risks are appropriately ranked and mitigants for these risks are developed in collaboration between the different project workstreams.

Early risk identification is key to ensure the proper contingency is built into the project schedule. By implementing these strategies and monitoring risks on an ongoing basis, we are confident that we can successfully deliver the project while minimizing the impact of risks. Table 12-4 discusses major risks and mitigants already identified.

Foundation manufacturing and supply

[redacted] As part of the partnership, we intend to establish fixed steel pricing ahead of project execution to minimize overall project execution risk.

[redacted]

[redacted]

Vessel transportation and berth availability at quayside should consider multiple vessels (cable lay vessel, wind installation vessel) berthing at once for loadouts of foundations. Transportation and installation studies will be carried out to further de-risk this activity.

WTG supplier

[redacted]

WTG and foundation installation

[redacted]

[redacted]

HVDC (offshore and onshore converter stations)

[redacted]

The converter stations will be commissioned and ready to backfeed prior to the phased/staged energization process. [redacted]

HVAC (transmission)

We will look to engage with local contractors and vendors when routing HVAC cable from the ONCS to POI locations. This specialized expertise has already proven to be highly effective during suitability and feasibility assessments of the initial cable route. Constructability reviews have been performed to reduce routing risk and overall execution risk. [redacted]

HVAC inter-array cable supply and installation

[redacted] Careful appraisal of the subcontractor's installation schedule will enable us to de-risk potential delay impacts from foundations and WTG installation. [redacted]

Export cable supply and installation

[redacted] Thorough cable type testing and minimal cable handling before laydown will prove to de-risk cable damage. Installation at the landfall presents permitting hurdles with respect to [redacted]

Testing, terminations, and commissioning

This project presents many complexities in an offshore environment with respect to interface between foundations, cables, and the WTG contractor. A well-considered commissioning process, reviewed by experienced third-party commissioning specialists, will prevent delays and allow the project to adapt to unforeseen events. [redacted]

Prebuild infrastructure

[redacted]

Ports and marshaling

[redacted]

13
Interconnection plan

Solicitation requirements

Checklist item	Section reference
A plan for interconnection, including engineering specifications and costs (N.J.A.C. 14:8-6.5(a)(14))	Section 13.2
Applicants shall show that they are currently in the PJM queue or that the project is PJM queue eligible (N.J.A.C. 14:8-6.5(a)(10)(ii)), and when the Project would expect to be eligible to receive Capacity Injection Rights associated with the SAA	Section 13.4
Document tasks required and discuss issues associated with electrical interconnection, including the distance between the Project and the specified point to interconnect with the electrical grid (N.J.A.C. 14:8-6.5(a)(14)(i))	Section 13.2
Land acquisition requirements, new equipment to be installed, upgrades to existing equipment required, and any feasibility studies required and the timeframe for review must be identified (N.J.A.C. 14:8-6.5(a)(14)(ii))	Section 13.2
Indicate the location of transmission lines and all points of interconnection to the PJM system serving New Jersey (N.J.A.C. 14:8-6.5(a)(14)(v))	Section 13.2
The capacity the Project plans to request under the terms and conditions delineated in the SAA Order, including an explanation of how this capacity value relates to the energy production profile of the Project	Section 13.4
If applicable, specification of which LCS circuit (1,200 MW Larrabee 230 kV, 1,200 MW Atlantic 230 kV, or 1,342 MW Smithburg 500 kV) the Project proposes to utilize	Section 13.4
Provisions for reactive compensation and harmonic filtering at the HVDC converter stations at the Larrabee Collector Station	Section 13.2
For Applicants proposing capacity beyond that accommodated by SAA Capability, the incremental capacity the Project plans to utilize, including an explanation of how this capacity value relates to the energy production profile of the project	N/A
For Applicants proposing capacity beyond that accommodated SAA Capability, supporting documentation for the use of the P50 and P90 estimates of the TSUC reported in the Application Form	N/A
For Applicants proposing capacity beyond that accommodated by SAA Capability, any draft or final interconnection studies conducted by PJM, or by a study conducted by a third party, including the Feasibility Study, System Impact Study, and Facility Study relating to the proposed Project	N/A
Proposed detailed legal structures to govern the relationship among the SAA developer, Prebuild Infrastructure developer, and other offshore wind developer(s) utilizing the Prebuild Infrastructure, as applicable. The proposal should include the key terms of such relationships, to the extent that such Applicant determines such structures to be necessary or desirable to attract financing and enhance commercial deliverability for its applicable scope(s), subject to Board modification and approval	Section 13.3
Prebuild Infrastructure design parameters as listed in Attachment 10	Section 13.3
Offshore Transmission Network preparation requirements as listed in Attachment 11	Section 13.2

13 Interconnection plan

13.1 Summary

As required in the Solicitation Guidance Document, [redacted] The project's submarine high-voltage direct current (HVDC) cable route was designed to minimize impacts on marine resources and users of marine space. State and federal agencies were consulted on routing constraints and their feedback was taken into account during submarine route design. The preliminary preferred and alternative submarine cable routes are described briefly below.

For the optional prebuild infrastructure portion of the bid, [redacted]

Careful consideration has been given to all the existing constraints at and near the National Guard Training Center (NGTC) at Sea Girt. [redacted] The extensive data package provided by the New Jersey Department of Military and Veterans Affairs (NJDMAVA) that operates the base significantly helped with the landfall site selection.

From the landfall at NGTC, our team proposes [redacted] These routes are designed to minimize impacts on communities and the environment. For all the routes, we propose to install HVDC cables [redacted]

[redacted]

[redacted]

[redacted]

Engineering specifications for the prebuild infrastructure are outlined below. Leading Light Wind worked with engineering consultants [redacted] and several civil construction contractors to determine the cost estimates for the prebuild infrastructure.

The proposed legal structures to govern the relationship among the SAA developer, prebuild infrastructure developer, and other offshore wind developer(s) utilizing the prebuild infrastructure are also discussed below. They offer a balanced approach to management and operation of the prebuild assets and allocation of risk between the prebuild owner and the generators utilizing the infrastructure.

Finally, this section also discusses the interconnection facilities, procedures, and timing for our project.

As the lead developer of Leading Light Wind, our proposal is informed by **Invenergy's extensive experience in PJM** (described in further detail in Section 1) as well as a thorough understanding of the interconnection process and PJM queue reform as approved by the Federal Energy Regulatory Commission (FERC). Our proposal is also informed by and benefits from Invenergy's substantial experience developing and constructing complex, long-distance transmission infrastructure in highly challenging geographic, regulatory, social, and environmental settings in New York, Kansas, Missouri, and New Mexico.

13.2 Interconnection plan

Leading Light Wind intends to deliver power to LCS using [redacted] This includes an offshore converter station, HVDC submarine cable, HVDC underground cable routed through the prebuild infrastructure, and an onshore converter station. This section discusses some of the most unique challenges to the proposed interconnection plan including details on the submarine HVDC export cable route and converter station design.

Submarine HVDC export cable route options

The preliminary submarine HVDC cable routes, along with the routing analysis methodology and data used, are summarized here and are described in detail in Section 2.2. A short summary of the submarine HVDC cable routes is provided below.

[redacted]

Table 13-1. Preliminary HVDC export cable routes.

[redacted]

Figure 13-1. Preliminary submarine HVDC cable routes to NGTC Sea Girt.

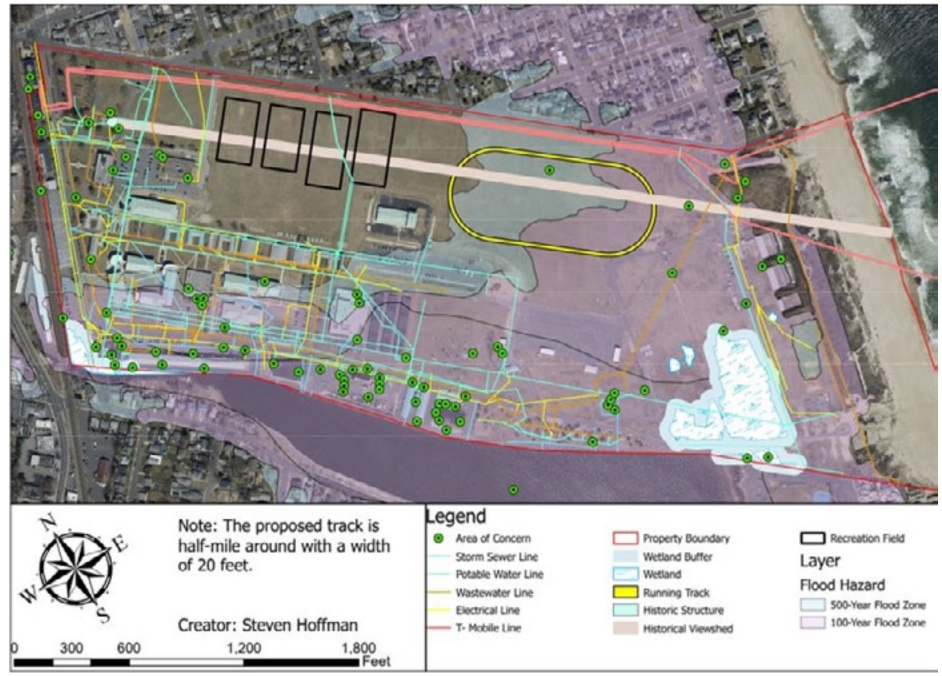

Figure 13-2. NGTC environmental constraints and developable area, from NJDMAVA data package.

Cable landfall site: NGTC

As required in the Solicitation Guidance Document, the cable landfall will be located on federal property at NGTC within Sea Girt Borough, abutting Manasquan Borough. A more detailed description of NGTC Sea Girt is provided in Section 2.2 and was compiled from the documents shared by the NJDMAVA, which operates the base.

[redacted]

[redacted]

Figure 13-3. Proposed landing location at NGTC Sea Girt.

Converter station design details for the project

Section 2 discusses the procurement of converter stations for the project, which offers alternatives using [redacted]

Provisions for reactive compensation and harmonic filtering at the ONCS

[redacted]

[redacted]

[redacted]

[redacted]

Offshore transmission network (OTN) preparation at the OFCS

Leading Light Wind will accommodate future additions of OTN equipment in the topside and jacket foundation designs for the OFCS. This includes the space and additional weight of OTN equipment to be added in the future. The project has developed a preliminary design of major equipment to accommodate the additional space and structural support. The major equipment is as discussed in Table 13-2.

[redacted]

Table 13-2. Preliminary major equipment.

A conceptual topside design is included in Attachment 13.1 and one view is provided herein (Figure 13-4). The actual space required for each component is much more than the above dimensions to allow for required clearances and ease of maintenance of the equipment. For example, the transformer is expected to be [redacted] and the room is designed for [redacted].

[redacted]

Figure 13-4. OTN OFCS topside layout.

This equipment is shown below in a simplified single line diagram in Figure 13-5. [redacted] Shunt reactors are connected near these breakers to offset cable capacitance.

[redacted] Additional drawings and details for the OTN equipment are available in Attachment 13.1.

[redacted]

Figure 13-5. OTN single line diagram.

[redacted]

Figure 13-6. OTN control room layout.

13.3 Prebuild infrastructure: Design parameters and contractual terms

We worked closely with [redacted] to develop constructable, efficient, minimally disruptive, and cost-effective routes for the prebuild infrastructure. We also worked closely with [redacted] to develop a safe, flexible, effective, and cost competitive prebuild infrastructure design. Details are discussed in the following sections. Some key highlights include these:

[redacted]

[redacted]

Proposed prebuild infrastructure routes (NGTC Sea Girt to LCS)

Leading Light Wind developed terrestrial routes for prebuild infrastructure that would be specific to our project being selected to install the prebuild infrastructure. If another developer is selected to deliver this scope, Leading Light Wind will use their routes and infrastructure.

[redacted]

Section 2.2 outlines the evaluation process of the landscape between NGTC and the LCS. [redacted]

[redacted]

By using publicly available data from the New NJDEP, we developed the map book showing environmental constraints available in Attachment 13.2. This map book shows the routes, locations of cable vaults, HDDs, and other trenchless crossings. An overview of the environmental constraints map book is shown in Figure 13-7.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Proposed route diagrams and cable vault locations

[redacted]

[redacted]

[redacted]

The diagrams illustrating the indicative cable vault locations and available constraints and utility information along the [redacted] are shown in Attachment 13.2. However, these locations are subject to change when detailed utility information has been received and specific cable supplier has been selected.

Submarine cable approach to NGTC Sea Girt

We propose to make landfall in the southeast part of NGTC Sea Girt, as described in Section 13.2. [redacted]

[1] NJDEP, Natural and Working Lands Strategy Scoping Document, 2021. www.nj.gov/dep.

[redacted]

Figure 13-9. Leading Light Wind proposed submarine cable approach options.

Design parameters and studies for the prebuild infrastructure

[redacted]

Table 13-3. Underlying prebuild infrastructure design attributes.

Underlying design attributes, demonstration of due separation, and independence of each transmission circuit

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Proposed duct bank configuration

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Range of expected circuit capacities

[redacted]

[redacted]

Rating scenarios for the proposed prebuild infrastructure

[redacted]

[redacted]

[redacted]

Proposed cable vault configuration

Our proposed cable vault configuration is outlined below. The configuration will be revised in later design stages once utility, geotechnical, and environmental data is available.

[redacted]

[redacted]

[redacted]

[redacted]

Special cable vaults or duct bank/conduit segments

[redacted]

Technological viability of the proposed technology

Proven industry design solutions will be utilized. Regarding transition and cable vault designs that can be supplied, we will consider what has been implemented at many installations worldwide: for example, using glass-reinforced concrete or cement-free concrete pre-cast modules that are more beneficial to the environment. The majority of the other material is PVC and concrete which is widely used and available. The construction equipment including the trenching, excavating, and drills for HDDs is established and reliable.

[redacted]

[redacted]

Specific features strengthen grid reliability objectives regarding safety, resilience, integration, and redundancy

Access to the ends of the duct banks will be provided for inspection, maintenance, and repair. [redacted]

Configuration and submarine cable separation and routing at landfall

[redacted]

[redacted]

Location of transition vaults

[redacted]

Onshore HDDs and bores

[redacted]

[redacted]

[redacted]

[redacted]

Prebuild configuration at or near LCS

[redacted]

[redacted]

[redacted]

Construction details for the prebuild infrastructure

Constructability of the proposed prebuild design

Multiple constructability measures must be considered to execute a project of this size. [redacted]

Directional drilling/boring method and details

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Proposed contractual structure and legal terms for the prebuild infrastructure

[redacted]

[redacted]

Our proposed Infrastructure Shared Use Agreement and Summary of Terms for the prebuild infrastructure is provided as Attachment 13.5.

13.4 Interconnection procedures

Queue eligibility and timing

[redacted]

Project configuration and interconnection facilities

As discussed in our Executive Summary and elsewhere, we are proposing the following project configurations:

[redacted]

The project will connect to the PJM transmission system via the LCS as awarded by the NJBPU via the first SAA solicitation. [redacted]

[redacted]

[redacted]

[redacted]

14 Permitting Plan

Solicitation requirements

Checklist item	Section reference
A list of all State, and Federal regulatory agency approvals, permits, or other authorizations required pursuant to Sate, and Federal law (N.J.A.C. 14:8-6.5(a)(10))	Section 14.2
Identify all applicable Federal and State statutes and regulations and municipal code requirements, with the names of the Federal, State, and local agencies to contact for compliance (N.J.A.C. 14:8-6.5(a)(2)(iv))	Section 14.2
Identify all local, State, and/or Federal permits and/or Federal permits and/or approvals required to build and operate the Project and the expected time to obtain such permits and/or approvals (N.J.A.C. 14:8-6.5(a)(10)(iii))	Section 14.2
Identify the nature of the Applicant's ocean lease and land ownership requirements for all aspects of the Project, including all required interconnection areas (N.J.A.C. 14:8-6.5(a)(10)(iv))	Section 14.3
Progress must be demonstrated in securing leases and land required, and Applicants shall propose a plan for accomplishing remaining steps toward acquiring leases or land ownership (N.J.A.C. 14:8-6.5(a)(10)(v))	Section 14.3
Indicate the type and number of entities securing leases or owning land (N.J.A.C. 14:8-6.5(a)(10)(v))	Section 14.3
A plan for accomplishing remaining steps toward acquiring leases or land ownership (N.J.A.C. 14:8-6.5(a)(10)(v))	Section 14.3
Demonstrate adequate financial resources to acquire any land and/or leases needed to undertake the Project (N.J.A.C. 14:8-6.5(a)(10)(vii))	Section 14.3
A list of all local regulatory agency approvals, permits, or other authorizations required pursuant to local law	Section 14.2
A list of all State, Federal and local regulatory agency approvals, permits, or other authorizations required to develop, expand, or otherwise utilize port facilities	Section 14.4
A strategy, including the expected timeline, to obtain each required permit and/or approval	Section 14.2
Identify the land ownership requirements for the port facilities included in the Project	Section 14.4
Identify the land ownership requirements for the port facilities included in the Project	Section 14.4
Identify each appropriate local, State, and/or Federal agency the Applicant has contacted for land acquisition issues and provide a summary of the required arrangements	Section 14.5
Copies of all submitted permit applications and any issued approvals and permits (N.J.A.C. 14:8-6.5(a)(10))	Section 14.7
Filings made to any other regulatory or governmental administrative agency including, but not limited to, any compliance filings or any inquiries by these agencies (N.J.A.C. 14:8-6.5(a)(10)(ix))	Section 14.7

Permitting schedule

[redacted]

Table 14-1. Permitting schedule.

[1] See Table 14-4, Permit matrix, for details on permits and approvals.

14 Permitting Plan

14.1 Summary

Leading Light Wind prepared this Permitting Plan in support of the proposed project on Lease Area OCS-A 0542 to demonstrate a complete, credible, and achievable plan for successfully obtaining necessary permits.

The advantages our team brings to the Permitting Plan:

We have significant wind development experience. Over the past 20 years, Invenergy and its affiliates have successfully developed more than 30 GW of projects that are in operation, construction, or contracted, including 18.6 GW of onshore wind. energyRe has 10.5 GW of generation projects and over 500 miles of transmission projects under development. Our development experience enables us to proactively plan for permitting requirements and apply a proven permitting methodology at all project stages.

We have a history of proactive and strong stakeholder engagement. Together, Invenergy and energyRe have worked with regulators, stakeholders, and Tribes to permit complex projects. We recognize that early engagement with regulatory agencies is key to developing strong and lasting relationships that promote effective project permitting.

We know the federal, state, and local regulatory requirements. In addition to our understanding of proactive engagement with agencies at all levels, Leading Light Wind has a comprehensive understanding of federal, state, and local regulatory requirements. We have developed a tried-and-true

strategy for preparing complete applications and obtaining all required permits within strict timeframes. This Permitting Plan applies demonstrated successful approaches from prior projects. It strategically addresses environmental impacts through an iterative design and assessment process that allows for avoidance, minimization, and mitigation of impacts while meeting the proposed schedule.

We're already working with agencies and the community. Leading Light Wind is engaged in robust conversations with myriad stakeholders including communities, elected leaders, environmental, environmental justice, and community organizations, local businesses, Tribes, labor unions, and higher education. Leading Light Wind has proposed a community benefits program to partner with many of these stakeholders with a particular focus on overburdened communities (OBCs).

The sections below describe our permitting approach and understanding of the permitting requirements for the project. We also discuss the ocean lease and land ownership and port considerations, and provide a summary of existing permits and agency engagement conducted to date.

14.2 Permitting approach

Successful projects require engaging regulatory agencies and other stakeholders in clear, concise, and meaningful dialogue, early and often, throughout the life of the project. This Permitting Plan reflects our approach of early and active information-sharing, focused discussion of potential issues, and collaborative identification of solutions.

Our team is proactively engaging with federal, state, and local agencies on permits and consultations that will support the development of Lease Area OCS-A 0542. Our team has established relationships of trust with regulatory staff and stakeholders built on honest and open communication. Our guiding principles to cultivate mutually respectful relationships in support of project success include these:

Transparency and accountability. Collaboration and consultation with agencies, communities, and other stakeholders at every stage of development, starting early to identify key issues, resolve challenges, and work together.

Responsible development. Minimizing environmental and community impacts with input from agency experts and other stakeholders on resource impacts and means to avoid, minimize, and/or mitigate such impacts.

Ongoing communication. Long-term communication with agencies and stakeholders to support project operations, including compliance monitoring.

The project's permitting strategy and timeline are discussed in the following sections, with a primary focus on sensitive resources of importance to federal, state, and local agencies and stakeholders.

Permit submittals for project construction would begin following the completion of the Bureau of Ocean Energy Management's (BOEM's) Draft Environmental Impact Statement (EIS) for the project, [redacted] Following federal permit submissions, New Jersey Department of Environmental Protection (NJDEP) permits would be submitted shortly thereafter.

These federal and state permit reviews are [redacted] Local authorizations are assumed a conservative one year review time but could be filed concurrently with the state permits on a case-by-case basis. The schedule for these permit submittals, which is driven by the federal process, will be constantly reevaluated as agency and stakeholder engagement evolves.

Table 14-4 at the end of this section includes a list of the required federal, state, and local permits, approvals, and related consultations as well as the anticipated time frames for agency review and authorization.

Federal permitting

The federal approval of an offshore wind project encompasses the review and approval of a Construction and Operations Plan (COP) by BOEM. The COP includes a description of all planned facilities, including prebuild infrastructure, onshore and support facilities, as well as anticipated project easements.

The COP describes activities related to the project including construction, commercial operations, maintenance, decommissioning, and site clearance procedures. The COP provides the basis for analyzing environmental and socioeconomic effects and the operational integrity of the developer's proposed construction, operation, and decommissioning activities.

BOEM will review the COP and conduct the National Environmental Policy Act (NEPA) review of the COP through an EIS. As we must adhere to multiple federal laws (see Table 14-4, Permit matrix, at the end of this section), BOEM and identified cooperating agencies will evaluate our project in a single EIS and issue a joint Record of Decision (ROD; i.e., One Federal Decision).

As the lead agency, BOEM manages and advances the NEPA process, ensures the environmental and technical review process is conducted properly, and prepares and delivers an EIS for public review (Figure 14-1). BOEM will coordinate the EIS development with cooperating agencies, including Tribal, federal, state, and local government entities with jurisdiction, special expertise, or related decision-making capacity.

As the COP is being prepared, we will support BOEM's coordination and consultation with cooperating agencies listed in Table 14-4, such as the US Coast Guard (USCG), US Environmental Protection Agency (USEPA), US Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA), US Fish and Wildlife Service (USFWS), US Department of Defense (DoD), Bureau of Safety and Environmental Enforcement (BSEE), and the NJDEP.

Early engagement with cooperating agencies is critical to ensure that the joint NEPA analysis meets all agency requirements or standards, considers all connected and cumulative actions of cooperating agencies, and specifically addresses the agency action under consideration to effectively support cooperating agency decision making.

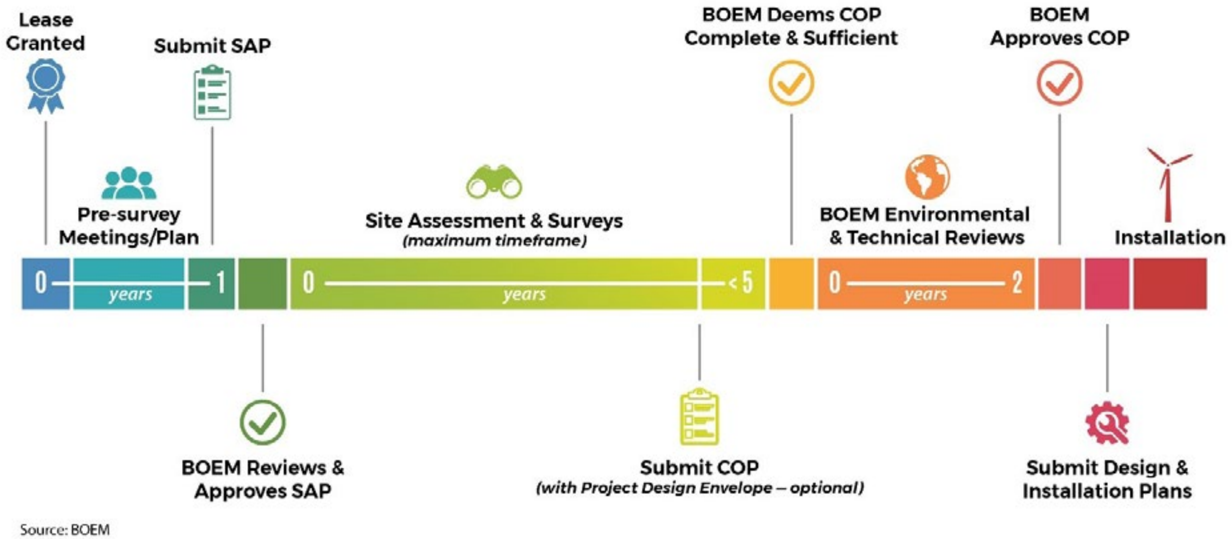

Figure 14-1. Overview of the BOEM process.

Opportunities

Coordination with federal, state, and local agencies will occur throughout the NEPA process, from data collection to preparation of the COP, review, and approval of the COP, and during construction, operation, and decommissioning.

Of note to the federal permitting process, BOEM is preparing a Programmatic EIS (PEIS), as announced in its Notice of Intent to Prepare a Programmatic Environmental Impact Statement for Future Wind Energy Development in the New York Bight (2022). The PEIS will analyze the potential impacts of wind energy development activities in the Bight, as well as identify programmatic avoidance, minimization, mitigation, and monitoring measures that would apply to future offshore wind projects in the Bight. The stated purpose of the PEIS is to help BOEM make timely decisions on COPs submitted for the Bight.

[redacted] We have also actively engaged in the PEIS

NEPA process, including participating in public meetings, and submitting scoping comments on the Notice of Intent. Invenergy's scoping comments recommended that BOEM coordinate with the lessees and agencies with jurisdiction by law or special expertise in the Bight and encouraged BOEM to adopt guiding principles in developing and analyzing avoidance, minimization, mitigation, and monitoring measures.

[redacted]

Leading Light Wind will prepare a comprehensive, complete COP that will include information specified in 30 CFR Part 585 to a level of detail that will minimize the time required for BOEM to deem it complete. The COP will include the baseline information requirements and impact producing factors relevant to all onshore and support facilities, as well as anticipated project easements for construction, commercial operations, maintenance, decommissioning, and site clearance procedures.

We will define the project design envelope to provide the maximum design scenario and flexibility described in this Permitting Plan, including the type and number of wind turbine generators (WTGs), foundation types, offshore converter station (OFCS), cable types, and installation techniques. The COP will provide information BOEM needs to fully comply with requirements under other applicable federal laws, including but not limited to NEPA, Clean Air Act, Clean Water Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Marine Mammals Protection Act, and National Historic Preservation Act.

[redacted]

The Permitting Dashboard is a tool for federal agencies, project developers, and interested members of the public to track the federal government's environmental review and authorization processes for large or complex infrastructure projects aimed at improving coordination, transparency, and accountability. A Coordinated Project Plan (CPP) will be developed by federal agencies in partnership with Leading Light Wind. The CPP will provide a comprehensive view of project milestones and schedule agreed to by all parties and help ensure accountability. In developing the CPP, agencies will collaborate to establish the following:

- Roles and responsibilities for all entities with permitting responsibilities
- Technical and administrative permit compliance processes
- A permitting schedule with interim and final milestones, with potential focus areas for additional interagency coordination noted
- Potential avoidance, minimization, and mitigation strategies
- Plans and a schedule for public and tribal outreach and coordination

[redacted]

Leading Light Wind will engage early with cooperating agencies so that the joint NEPA analysis accurately describes the project and alternatives, addresses agency requirements and standards, and considers the necessary connected and cumulative actions in the vicinity of the project. Verifying that these elements are addressed accurately within the NEPA document will assist the cooperating agencies' decision-making process.

Data collection

Leading Light Wind has established protocols for offshore and onshore data collection and surveys to characterize the lease area and transmission corridors to inform the federal permitting process. This data will also support the preparation and submittal of a COP to BOEM. [redacted]

[redacted]

Through an in-depth desktop analysis of all available data for each resource in and around the lease area and transmission corridors, we identified significant existing information for characterizing the site and evaluating potential impacts. This information will also inform the federal permitting process by providing existing and historical information. Key studies include the NYSERDA aerial digital surveys, Atlantic Marine Assessment Program for Protected Species, and the Northwest Atlantic Seabird Catalog, shown in Figure 14-3.

The recent aerial digital surveys conducted by NYSERDA from 2016-2019 provide quarterly, high-resolution photographs of all marine animals present on the sea surface captured beneath the survey plane in each season. The NYSERDA aerial digital surveys identified birds, marine mammals,

[redacted]

sea turtles, and occasionally sharks, rays, and large fish in the study area for characterizing the existing environment. Leading Light Wind is working with federal and state agencies, research organizations, and other Bight leaseholders to identify data gaps and scientific needs to support targeted data collection efforts for the preparation of the COP. We are also participating in NYSERDA's Environmental Technical Working Group (E-TWG), Fisheries Technical Working Group (F-TWG), Maritime Technical Working Group (M-TWG) and are members of the Responsible Offshore Science Alliance (ROSA) and Regional Wildlife Science Collaborative (RWSC), contributing to conversations regarding the development of a regional science plan and guidance.

Additionally, **Leading Light Wind has committed [redacted] to establish a fund for investment in scientific research related to offshore wind** that will be independent of and in addition to the $10,000/MW Research and Monitoring Initiative (RMI) requirement and any federal and state permit-required monitoring. [redacted]

[redacted]

[redacted]

New Jersey state and local permits

State approval of our offshore wind project will lie heavily with the NJDEP. Permits and authorizations from NJDEP include but are not limited to waterfront development activities, review for consistency with the Coastal Zone Management Program, land use permits including development in the coastal zone under the Coastal Area Facilities Review Act (CAFRA), cultural and historic resources review, threatened and endangered species review, and use or diversion of State-owned or encumbered Green Acres land (if applicable).

Permits, authorizations, or reviews from other state agencies will be driven by the final siting of transmission facilities and associated potential impacts, and may include right-of-way crossings with [redacted] Within these permit applications and consultations, descriptions of all planned facilities, including prebuild infrastructure, onshore and support facilities, as well as any real estate agreements, will be required. If the project is selected in the solicitation for power purchase, but not for the prebuild infrastructure, state permitting is anticipated to be significantly reduced as there would be no terrestrial components to the project, no crossings of public land, and no landfall at the NGTC.

Several nexuses between state and federal permitting exist. In New Jersey, NJDEP will review offshore wind projects in federal waters under the Coastal Zone Management Act (CZMA). The CZMA authorizes states to participate in federal consistency review for projects which have a reasonable and potential effect on state jurisdictions and resources within the state's coastal zone. This allows New Jersey to assess the consistency of the project offshore with the state's federally approved Coastal Management Program. It is assumed that NJDEP will participate in the project's NEPA as a cooperating agency and that this coastal zone management consistency review would occur concurrent with NEPA. Because Leading Light Wind will require an EIS through the federal BOEM process, a New Jersey-specific environmental review typically undertaken for major construction projects will not be required in accordance with NJDEP Executive Order 215, Section 7.

Figure 14-4. Ongoing dialogue with the local communities will be critical for the project's ability to plan, permit, construct, and operate.

Prior to, and throughout the state permitting processes, Leading Light Wind will regularly engage with agencies and stakeholders such as nongovernment organizations, Tribes, fisheries and special interest groups, including potential project opponents, to share information and hear their ideas. Regular engagement with agencies and stakeholders provides the necessary feedback to inform project planners and allows coordinated adjustments to project decisions and developments. To that end, Leading Light Wind is currently engaged with a myriad of stakeholders, Tribes, NJDEP, and other agencies in regular information sharing meetings to foster a greater understanding of the project and to identify the required information for permitting and project success. In these meetings, we have provided early development and design information to obtain agency feedback to inform project decisions and refine the permitting approach to avoid and/or minimize project impacts. See Section 9 for additional information about Leading Light Wind's engagement activities.

Leading Light Wind also recognizes the importance of New Jersey townships' ability to regulate certain activities in addition to the state permitting agencies. Given the required locations of onshore project components, [redacted]

[redacted] In addition, Leading Light Wind will submit soil erosion and stormwater control plans to both the Freehold and Ocean Soil Conservation Districts to address soil erosion control, stormwater runoff, and local road cleanliness.

[redacted]

State and local permitting is anticipated to run concurrently with federal permitting. For a more complete schedule of the permitting process, see Table 14-4 and Section 12.

Combining commitment and strategy

Leading Light Wind's strategy for successful permitting, as described above, combines a commitment to collaborating and building trust with permitting agencies with a process of continuous assessment of methods to avoid, minimize, and mitigate impacts on environmental, social, and cultural resources. Based on a comprehensive understanding of regulatory requirements, the sections that follow highlight our commitments and strategy to addressing sensitive and protected resources and ocean users.

Ensuring navigation safety

[redacted]

[redacted]

[redacted]

Protecting air quality

[redacted]

[redacted]

[redacted]

[redacted]

Maintaining water quality

[redacted]

Protecting biological resources, sensitive habitats, and threatened and endangered species

[redacted]

[redacted]

Honoring cultural resources

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Ensuring consistency with coastal zone policies

[redacted]

Acquiring easements for submerged lands

[redacted]

Preserving wetlands and waterbodies

[redacted]

Conserving open space, recreation

[redacted]

[redacted]

Recognizing overburdened communities

[redacted]

14.3 Ocean lease and land ownership

Ocean lease

Leading Light Wind will be located within BOEM Lease Area OCS-A 0542, approximately 40 miles east of Atlantic City, NJ and part of the Bight. Invenergy Wind Offshore LLC holds a 100% interest in the lease area. The lease has an effective date of May 1, 2022, and initial term of 39 years, further divided into a preliminary term (1 year), a site assessment term (5 years), and an operations term (33 years). Per the lease, these terms may be modified or extended. A copy of the full BOEM lease for the Leading Light Wind project is provided in Attachment 2.1.

Submarine export cable

The submarine export cable route that will deliver the power generated by the project to the PJM grid will navigate through federal and state-owned waters off the coast of New Jersey. [redacted] Through a provision in the BOEM lease, the project has the right to one or more easements for the purpose of installing and siting the export transmission cable(s).

Terrestrial routes and prebuild infrastructure

As described in greater detail in Section 2, the terrestrial cable route and all infrastructure associated with the prebuild infrastructure will begin at the NGTC in Sea Girt, the designated landing area for submarine cables, and traverse multiple townships to eventually interconnect to the Larrabee Collector Station (LCS) site in Howell Township at the Point of Demarcation designated by the NJBPU. The proposed onshore converter station (ONCS) will be sited where Mid-Atlantic Offshore Development (MAOD) proposed their converter station solution in the State Agreement Approach (SAA). [redacted]

[redacted]

Business entity and financing plan

Leading Light Wind is owned and funded by its co-developers, Invenergy and energyRe, along with a consortium of investors including Blackstone, CDPQ, FirstLight PSP, and Ullico Infrastructure Fund. Currently, the project is financed 100% by sponsor equity. The financial strength and financing experience of each entity are described in detail in Section 5.

14.4 Ports considerations

Leading Light Wind will be utilizing port facilities in New Jersey to support our marshaling and O&M activities. Development and operation of an O&M port, or any waterfront facility, is an intensive development activity that will require multiple regulatory reviews and approvals on federal, state, and local levels.

[redacted] We are mindful that existing conditions and operations can have an impact on environmental review, permitting, and future operational compliance. Sites that have previously housed or actively house materials that can harm human health and the environment can have additional risk. If port development results in any remedial investigations, we will coordinate closely with NJDEP to ensure any harmful materials or soils are handled, stored, transported, and disposed of in accordance with all applicable rules, regulations, and best practices.

For Leading Light Wind's wind turbine assembly and staging port, also known as a marshaling port, Leading Light Wind [redacted] The New Jersey Wind Port is located in Lower Alloways Creek, Salem County, New Jersey. The facility is partially owned and partially leased from PSE&G by NJEDA. No permits pertaining to the construction of the New Jersey Wind Port are anticipated to be required as Leading Light Wind would lease space at the wind port and all site development activities would be conducted by others.

Our preferred O&M port location for the life of the project is [redacted]

[redacted]

14.5 Permitting status

Leading Light Wind has sought permits and authorizations with federal and state of New Jersey agencies to support project design and engineering. A summary of permitting activities and their status are provided in Table 14-2. Copies of all approvals are provided in Attachment 14.1. In addition, Table 14-3 includes a summary of Leading Light Wind's engagement with federal and New Jersey agencies pertaining to project development activities in New Jersey. Several of these engagements directly informed or preempted seeking permit authorizations.

[redacted]

Table 14-2. Permit application status.

[redacted]

Table 14-3. Agency engagement summary.

Federal, state, and local permitting

[redacted]

Table 14-4. Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

Federal, state, and local permitting

[redacted]

Table 14-4 (continued). Permit matrix for Leading Light Wind.

15 Operations and maintenance plan

Solicitation requirements

Checklist item	Section reference
An O&M plan for the 20-year contract term for each phase of the Project (N.J.A.C. 14:8-6.5(a)(7))	Attachment 15.1
Detail routine, intermittent, and emergency protocols (N.J.A.C. 14:8-6.5(a)(7)(i))	Section 15.3
Demonstrate that the Applicant has the financial capacity and technical expertise to perform all necessary upkeep/maintenance over the life of the Project (N.J.A.C. 14:8-6.5(a)(7)(ii))	Section 15.4
Identify the primary risks to the built infrastructure and how the potential risks, including, but not limited to, hurricanes, lightning, fog, rogue wave occurrences, and exposed cabling, shall be mitigated (N.J.A.C. 14:8-6.5(a)(7)(iii))	Section 15.2
Describe the emergency shut down provisions in the event of a need for the immediate stoppage of turbine blades (N.J.A.C. 14:8-6.5(a)(7)(iv))	Section 15.3
Identify specific and concrete elements to ensure both construction and operational cost controls (N.J.A.C. 14:8-6.5(a)(7)(v))	Section 15.5
Provide proof of insurance typical of the industry (N.J.A.C. 14:8-6.5(a)(7)(vi))	Section 15.6
Provide a complete O&M plan for the life of the plant (N.J.A.C. 14:8-6.5(a)(7)(viii))	Attachment 15.1
Identify the projected plan for the subsequent operational term, assuming any necessary Federal lease agreements are maintained and renewed (N.J.A.C. 14:8-6.5(a)(7)(vii))	Section 15.5
If the Applicant has selected an O&M contractor, identify the contractor, and demonstrate that it has the financial capacity and technical expertise to perform all necessary upkeep/maintenance over the life of the Project	Section 15.4
Identification of the port(s) that will be used to support O&M of the Project and the activities that will be conducted at each port	Section 15.2
Describe how the built infrastructure will be made climate resilient to withstand expected climate impacts	Section 15.2
Address the potential for cable exposure over the lifetime of the project and provide plans for reburial, if necessary	Section 15.2
Address the length of equipment downtime and timing of repair and replacement for the mitigation measures associated with potential risks, including, but not limited to, hurricanes, lightning, fog, rogue wave occurrences, and exposed cabling	Section 15.3
A detailed description of the vessels that will be used for the O&M of the Project, and how Jones Act compliance will be addressed for each vessel and/or vessel class	Section 15.2
A detailed description of the types of condition monitoring technology the Applicant is going to use and the assigned probability of failures relating to certain potential risks	Section 15.2
A detailed description of the regular foundation monitoring measures to be employed that will produce reliable data regarding foundation integrity and degradation, both during and beyond the 20-year OREC period, as well as potential foundation strengthening and retrofit measures to be taken	Section 15.2
A description of any non-standard insurance product that you may seek, with respect to the Project	Section 15.6

15 Operations and maintenance plan

15.1 Summary

The operational strategy for Leading Light Wind will leverage the extensive asset management, operations and maintenance (O&M), and remote operations experience of Invenergy Services to maximize the performance of the project and ensure safe and reliable delivery of power to our customers.

As discussed in Section 1 and Section 7, **Invenergy Services** is the asset management and operations affiliate of Invenergy and will operate and maintain the Leading Light Wind project.

Invenergy Services operates and maintains over 20 GW of energy projects, including wind, solar, storage, and natural gas facilities. With over 18 years of in-house operations experience, Invenergy Services utilizes its extensive experience and industry knowledge to tackle the challenges of operating and maintaining clean energy assets, with a focus on safety, long-term ownership, and exceptional performance of each project under its management.

Invenergy Services has a strong track record of success, having **received the Excellence in Operations award three times** from the American Clean Power Association (formerly known as the American Wind Energy Association).

15.2 Detailed operations and maintenance plan

Leading Light Wind is focused on benefiting ratepayers by providing an O&M strategy that reduces site downtime and operational cost while prioritizing the health and safety of the employees and the environment.

The O&M strategy will be accomplished with the following:

- A **custom-built vessel logistics plan** that utilizes a [redacted]
- An **O&M port** that allows for safe personnel transfer and material storage
- A **robust health and safety program** leveraging Invenergy's culture of safety

A **comprehensive monitoring and inspection plan** to identify incipient equipment issues and reduce unplanned events

A **wind turbine generator (WTG) model that will be purpose-built** to withstand the environmental challenges of the lease area

As discussed in Section 2, the Leading Light Wind project includes WTGs, an offshore converter station (OFCS), an onshore converter station (ONCS), and the inter-array and export cables needed to transmit power to the grid. Each system will be designed and operated to provide reliable generation and transmission of the project's electricity.

A detailed and complete O&M plan for the 20-year OREC period can be found in Attachment 15.1. The O&M plan is a living document, subject to ongoing reviews and updates to capture lessons learned from project operations and industry advancements. Additional details to supplement Attachment 15.1 can be found below in the following subsections.

Vessel logistics

Leading Light Wind has developed an O&M vessel strategy that aligns with the Jones Act while maintaining a focus on prudent cost efficiency to deliver value to New Jersey ratepayers.

As the primary solution for O&M personnel to access the WTGs and OFCS platform, [redacted]

The vessel is expected to transit back to the O&M port at the conclusion of the [redacted] shift cycle and remain at port for approximately [redacted] for provisioning, refueling, and shift changes before returning to the project location. Thus, the wind farm will be staffed nearly continuously throughout the year, allowing rapid access to troubleshoot issues and return faulted turbines to service.

[redacted]

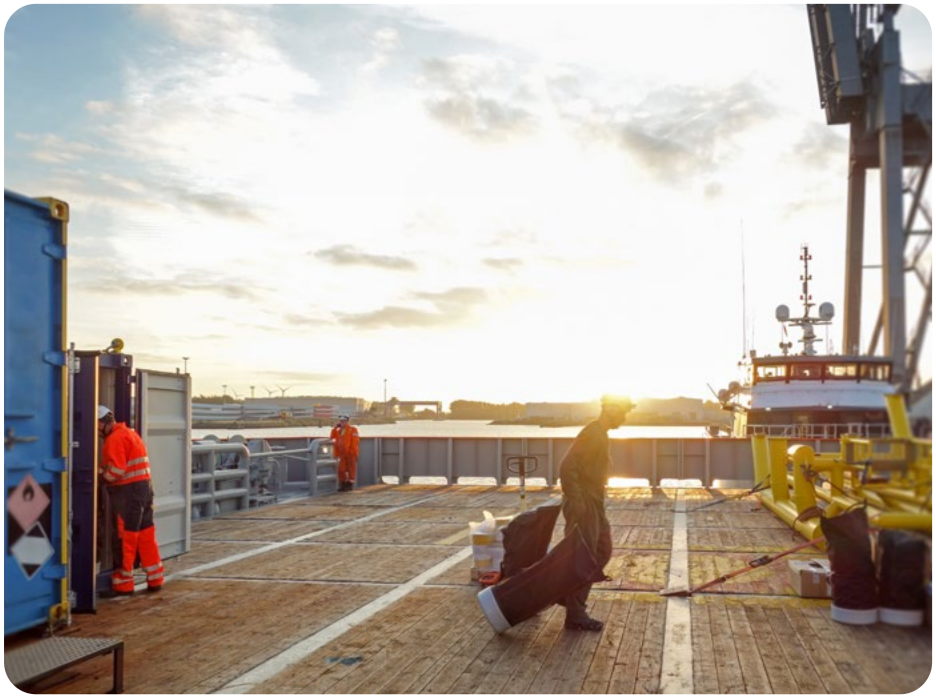

Figure 15-1. [redacted]

[redacted]

Service operations vessel

[redacted]

Crew transfer vessel

[redacted]

Major maintenance (at the hub height)

[redacted]

[redacted]

[redacted]

O&M port facility

Leading Light Wind contracted COWI Consulting Inc. to provide marine support services in support of our O&M port selection, which included site assessment, technical feasibility review, and preliminary designs. [redacted]

[redacted] our O&M port selection criteria, which is as follows:

- Waterfront access
- 3+ acres upland
- Water draft (+25 feet) and navigational channel access
- Proximity to offshore lease area (100 nm)
- Quay Length of +350 feet
- Warehouse (20k square feet) and office buildings (10,000 square feet)
- Availability for future development/manufacturing
- Proximity to overburdened communities to leverage workforce opportunities
- Brownfield development
- Access to utilities

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

O&M port activities

[redacted]

O&M port sustainability and resiliency considerations

As part of our O&M port development, Leading Light Wind is committed to constructing and utilizing a sustainable and resilient facility that reduces risks for our assets, and to the extent possible, upland communities. We will pursue certifications such as Envision, the Waterfront Edge Design Guidelines (WEDG), and Leadership in Energy and Environmental Design (LEED) to mitigate current and future climate risks, such as sea level rise, extreme heat, and worsening storms. See Attachment 15.2, Section 5: "Sustainability considerations" for additional details.

[redacted]

[redacted] We intend to use WEDG to guide our elevation strategy and fendering/mooring system design, as well as to explore options for implementing ecologically enhanced bulkhead and shoreline stabilization measures.

Health and safety approach

Leading Light Wind is fully committed to providing a safe and healthy workplace offshore. The process will leverage the culture of safety of our primary project developer, Invenergy. As discussed in detail in Section 1 and elsewhere, Invenergy has an established safety track record as a developer and operator of renewable energy and other complex energy infrastructure projects. In 2022 alone, Invenergy technicians cumulatively received over 42,000 hours of safety training. All operating sites within Invenergy's portfolio host tech new hire training that all techs must undergo when they come to Invenergy. Among other topics, the training covers hazard recognition, PPE and proper equipment use, working as a team and following safety protocols. [redacted] Invenergy has also implemented an early recognition, reporting and intervention telehealth service that employees can utilize to remedy aches and pains they may experience on the job or at home.

Leveraging Invenergy's existing culture of safety, Leading Light Wind will meet or exceed the safety standards put forth by BOEM, Bureau of Safety and Environmental Enforcement (BSEE), Occupational Safety and Health Administration (OSHA), International Maritime Safety Committee within the International Maritime Organization (IMO:MSC), Coast Guard, and other relevant regulating bodies throughout the development, construction, and operation phases of the project.

Leading Light Wind will contribute to New Jersey's high standard of safety by:

- Heightening awareness of the personal safety of every worker and contractor at all Leading Light Wind sites
- Obliging anyone to stop work any time an unsafe condition or potential hazard is identified
- Maintaining a best-in-class near-miss reporting and incident investigation process
- Utilizing policies, procedures, training, tools, and equipment to perform work safely and without incidents, meeting or exceeding applicable laws and regulatory requirements
- Continually improving targets and objectives using data, and remaining committed to regulatory compliance
- Assuring our safety culture is reflected in any hired contractors and subcontractors

Site monitoring

Invenergy Services currently implements and operates a suite of clean energy services including on-site operation and maintenance, balance of plant, remote operations, asset management, energy management, remote monitoring, engineering technical support, and data analytics.

Remote monitoring

Leading Light Wind will establish a 24/7 remote monitoring and control center at the O&M facility discussed above. This facility will leverage the robust existing remote monitoring expertise within Invenergy Services, which currently maintains the **Invenergy Control Center** (and backup control center facility) in the company's corporate headquarters in Chicago (Figure 15-5).

The Invenergy Control Center is staffed around the clock with real-time operators, power schedulers, and supervisory control and data acquisition (SCADA) support personnel. They constantly monitor the status of the operating equipment in the field, communicate in real time with project stakeholders, address faulted turbines, and perform remote troubleshooting and resetting of impacted units.

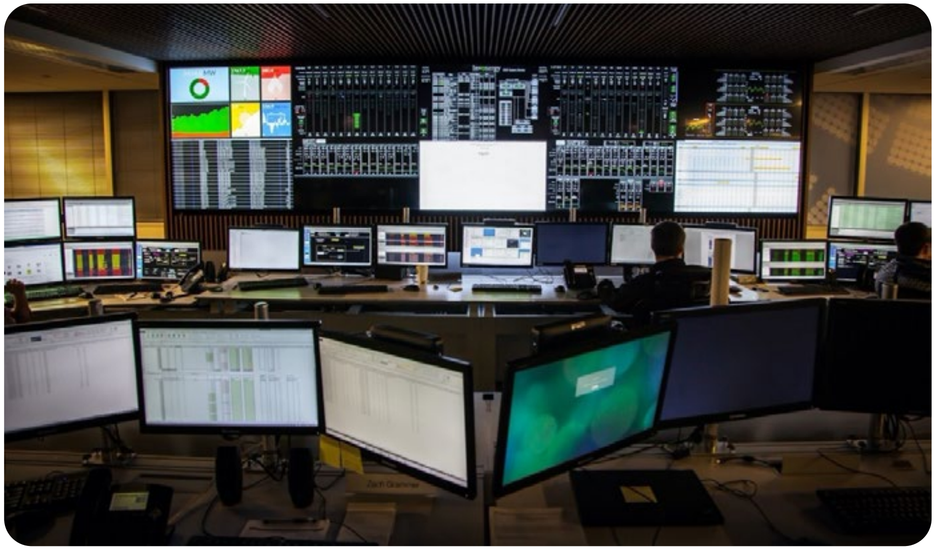


Figure 15-5. Invenergy Services maintains the 24/7 Invenergy Control Center in Chicago.

Invenergy Control Center staff coordinate closely with the field operations teams to provide real-time feedback about equipment status and assist with safely addressing maintenance or troubleshooting needs.

WTG monitoring

[redacted]

Substation monitoring

[redacted]

Cable monitoring

Subsea cables are a critical component of an offshore wind project and are exposed to risks including electrical component failure, natural disaster, damage from anchors and fishing gear, abrasion, and exposure to corrosive seawater. Regular monitoring will help the project identify any failures that require repair or prevent potential failures.

[redacted]

[redacted]

Foundation monitoring

Foundation monitoring will include a combination of remote monitoring and visual inspection. [redacted]

Risk to built infrastructure

Leading Light Wind has performed an evaluation of the primary risks to the built infrastructure during the O&M phase. The list in Table 15-5 will continually be updated leading up to and during the O&M phase of the project.

[redacted]

Table 15-5. Risk to built infrastructure.

15.3 Routine, intermittent, and emergency protocols

During the project's operating life, planned preventative maintenance activities will be performed on a cyclical basis to verify the equipment is functioning within the design specifications and remains fit for electricity generation and transmission.

[redacted]

The following sections provide additional details on the planned outage requirements for these system configurations, including the frequency and duration of such outages and the anticipated scopes of work.

Routing protocols (scheduled maintenance activities)

As previously mentioned, a 20-year view of scheduled and corrective maintenance for the project can be found in Attachment 15.1. The subsections below offer greater detail into the individual components and their anticipated downtime.

Wind turbine generators

[redacted]

Offshore and onshore converter stations

As discussed in Section 2, the HVDC transmission system for the project will consist of an OFCS, submarine cable system, ONCS, and underground cable system. [redacted]

[redacted]

Offshore and onshore cables

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Foundations

[redacted]

O&M port

[redacted]

[redacted]

Intermittent protocols (predictive, unscheduled, and corrective maintenance)

We have developed a scheduled maintenance plan to allow the early identification and mitigation of equipment faults at the site through regular annual inspections and maintenance. [redacted]

[redacted]

[redacted]

Emergency protocols (automatic shutdown, remote shutdown, and emergency stop)

The entire system, WTGs, substations, cabling, and other equipment are designed to provide real-time feedback on operating conditions and mitigate the consequences should an abnormality or fault occur. The equipped safety systems monitor operational parameters and can automatically initiate a shutdown if predetermined limits are exceeded.

The primary environmental limitations that may impact the operation of WTGs and lead to automatic shutdowns include wind speed and temperature. Table 15-6 provides the minimum and maximum wind speed limits [redacted] The maximum wind speed limit is a safety feature of the WTGs to protect the units from damage during periods of extremely high sustained winds.

Table 15-7 states the minimum and maximum operating temperatures [redacted] The operating temperature range is a safety feature of the WTGs to protect the units from damage when operating during periods of extreme heat or cold.

In addition to automated safety systems within the equipment, remote and local control to shut down the equipment is available via the SCADA system discussed in detail in Section 15.2. In the event of a safety incident, remote shutdown of one or all WTGs can occur to rapidly accommodate safety personnel, such as the USCG. For grid stability or safety, the entire wind farm can be remotely deenergized if required by the transmission system operator.

[redacted]

[redacted]

15.4 Financial capacity and technical expertise

Leading Light Wind expertise

Financial capability

Regarding the financial capability of Leading Light wind, refer to Section 4.

O&M expertise

Please refer to Section 1, which outlines the operational experience of Invenergy Services, the asset management and operations affiliate of Invenergy that will operate and maintain the project.

O&M contractors and suppliers

Where applicable, we will establish service contracts with vetted suppliers known in the industry for their qualifications and capability. [redacted]

15.5 Cost controls

Cost drivers and mitigations

Construction cost control

Leading Light Wind's construction and logistics plan for the manufacture, transportation, storage, and installation of the project aligns with our priorities of bringing family-sustaining jobs and new investment to New Jersey, minimizing power cost, delivering a timely and reliable project, and prioritizing the environment and safety of all workers involved in the project.

Leading Light Wind intends to evaluate (and implement wherever appropriate) cost-effective measures to increase the resilience of the project and reduce costs. These are likely to include the following:

[redacted]

Operational cost control

During the operational phase Leading Light Wind will constantly be looking for opportunities to reduce costs, improve efficiency, and maximize lifetime asset value while also maintaining an ongoing commitment to safety and equipment reliability. This ownership mentality is reflected in the ongoing operating practices deployed at Invenergy's existing onshore wind portfolio – achieving considerable cost efficiencies during operations while maintaining strong fleet availability.

Cost controls specific to Leading Light Wind are likely to include the following:

[redacted]

[redacted]

[redacted]

Consideration for subsequent operational terms

[redacted]

The O&M plan for the subsequent term will mirror the current operating procedures outlined in Attachment 15.1 with a specific focus on conditional monitoring of aged hardware aimed to identify irregularities and fatigue as components get closer to their end of life. The data-driven identification and selective replacement of components through the utilization of conditional monitoring will help ensure the wind farm continues to efficiently operate up to the type certification date.

15.6 Proof of insurance

[redacted]

We will procure and maintain an insurance program for both the construction and operational phase in accordance with offshore wind industry standards, project risk exposures, and compliance with lender requirements.

We may elect to review non-standard insurance products at our discretion based on project risk exposures and risk appetite.

[redacted]

16 Decommissioning plan

Solicitation requirements

Checklist item	Section reference
A decommissioning plan for the Project including provisions for financial assurance for decommissioning and which complies with any applicable State and Federal statutes and/or regulations (N.J.A.C. 14:8-6.5(a)(9))	Sections 16.2 and 16.5
Estimate an expected useful economic life for the technology and installation area proposed (N.J.A.C. 14:8-6.5(a)(9)(ii))	Section 16.4
Specify a Project decommissioning plan for the technology and installation area proposed (N.J.A.C. 14:8-6.5(a)(9)(i))	Section 16.2
Include the anticipated cost of decommissioning the Project based on applicable and/or anticipated regulatory and engineering requirements (N.J.A.C. 14:8-6.5(a)(9)(ii))	Section 16.5
Provide the necessary future funding. Segregated de-commissioning funds shall be required (N.J.A.C. 14:8-6.5(a)(9)(ii))	Section 16.5
Description of prior Applicant decommissioning experience	Section 16.3
Description of how decommissioned components will be recycled, reused or disposed of	Section 16.2

16 Decommissioning plan

16.1 Summary

Leading Light Wind worked with leading engineering consulting firm COWI A/S to put together a Project Decommissioning Plan. That plan is focused on the offshore scope of the decommissioning process. A resulting report from COWI A/S is provided as Attachment 16.1.

This decommissioning plan draws from a wide variety of sources, including these:

- **State (with a focus on New Jersey) and federal requirements.**
- **American Clean Power Association's Offshore Compliance Recommended Practices, published in collaboration with the US offshore wind industry and several federal agencies.**
- **Nine Construction and Operations Plans (COPs) available on the Bureau of Ocean Management's (BOEM's) website as of April 2023.**

For bid alternatives that include the prebuild infrastructure, this section also includes discussion of the scope and process for associated decommissioning activities that would be specific to the prebuild scope.

The Project Decommissioning Plan included herein is based on present-day technology. However, noting that decommissioning will occur more than three decades after submission of this proposal, it is reasonable to assume that regulations, industry standards, and technology will continue to evolve. Our team intends to be responsive to these changes and to prioritize opportunities to minimize environmental impacts and reduce costs.

16.2 Project Decommissioning Plan

The decommissioning process generally resembles the reverse of the installation process. Specific activities for each system component are listed in the subsections below.

In accordance with Title 30 of the Code of Federal Regulations (CFR), Section 285,[1] a decommissioning application will be submitted to the Bureau of Safety and Environmental Enforcement (BSEE) for approval two years before the expiration of the lease. Requirements for the content of the decommissioning

[1] See 30 CFR Part 285 Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf, Subpart I, Decommissioning (2023).

application are specified in Section 285.906. Following approval of the application, a decommissioning notice will be submitted to BSEE at least 60 days before decommissioning activities commence.

During the decommissioning phase, careful inventory will be taken of all items to be removed. As items are removed from the seabed, they will be counted and noted as removed in the inventory. The removal and clearance process will be completed within two years of the termination of the lease in accordance with the requirements of Section 285.902(a) of 30 CFR Part 285 and the lease for OCS-A 0542.

Additionally, to facilitate compliance with Section 285.910(b), a seafloor survey of the lease area will be conducted to verify site clearance where applicable. Within 60 days of removing all facility and cable components, a written report will be submitted to BSEE.

The disposal process for each component will follow a preferred hierarchy. Where possible, items will be reused. Recycling is the next preferred alternative, followed by incineration with energy recovery. Disposal at an appropriate solid waste facility will be the final resort.

We anticipate that recycling will be possible for all major components, including fiberglass blades. Although fiberglass is traditionally not considered recyclable, new technology from Carbon Rivers has achieved 99.9% recycled-glass fiber purity from end-of-life waste streams like wind turbine blades, as shown in Figure 16-1. Our partnership with Rowan University [redacted]

Wind turbine generators and foundations

[redacted]

The WTGs will then be disassembled in a similar manner to the installation process, using jack-up and heavy lift vessels as well as support vessels such as tugboats and crew transfer vessels. The rotor-nacelle assembly will first be disconnected and lifted onto a barge, as shown in Figure 16-2. This is followed by the tower, which may first be cut into smaller pieces to facilitate handling.

[redacted]

In the case of traditional foundations using a separate transition piece, the transition piece will then be removed. If the connection is grouted, the monopile will be cut below the transition piece connection to avoid cutting through multiple layers of steel. In the case of a bolted flange connection without grout, the transition piece can be simply unbolted and removed, similar to the tower.

The monopile foundations will be drained internally of sediments to 15 feet below the mudline using suction or dredging. This will enable access to cut the monopile using a high-pressure abrasive water jet, an underwater acetylene cutting torch, or a mechanical cutting tool. If necessary, ultra-high-pressure water jets can be used to clean and prepare the surface prior to cutting.

Recent monopile removals at the Blyth Offshore Wind Farm in the United Kingdom and at the Horns Rev 2 Offshore Wind Farm in Denmark were successfully executed using high-pressure abrasive water jetting.

Figure 16-3 shows a typical schematic of this process as conducted by RGL Services. During the Horns Rev 2 removal, the cutting process of the monopile, 45 mm thick and approximately two meters in diameter, took eight hours to complete.

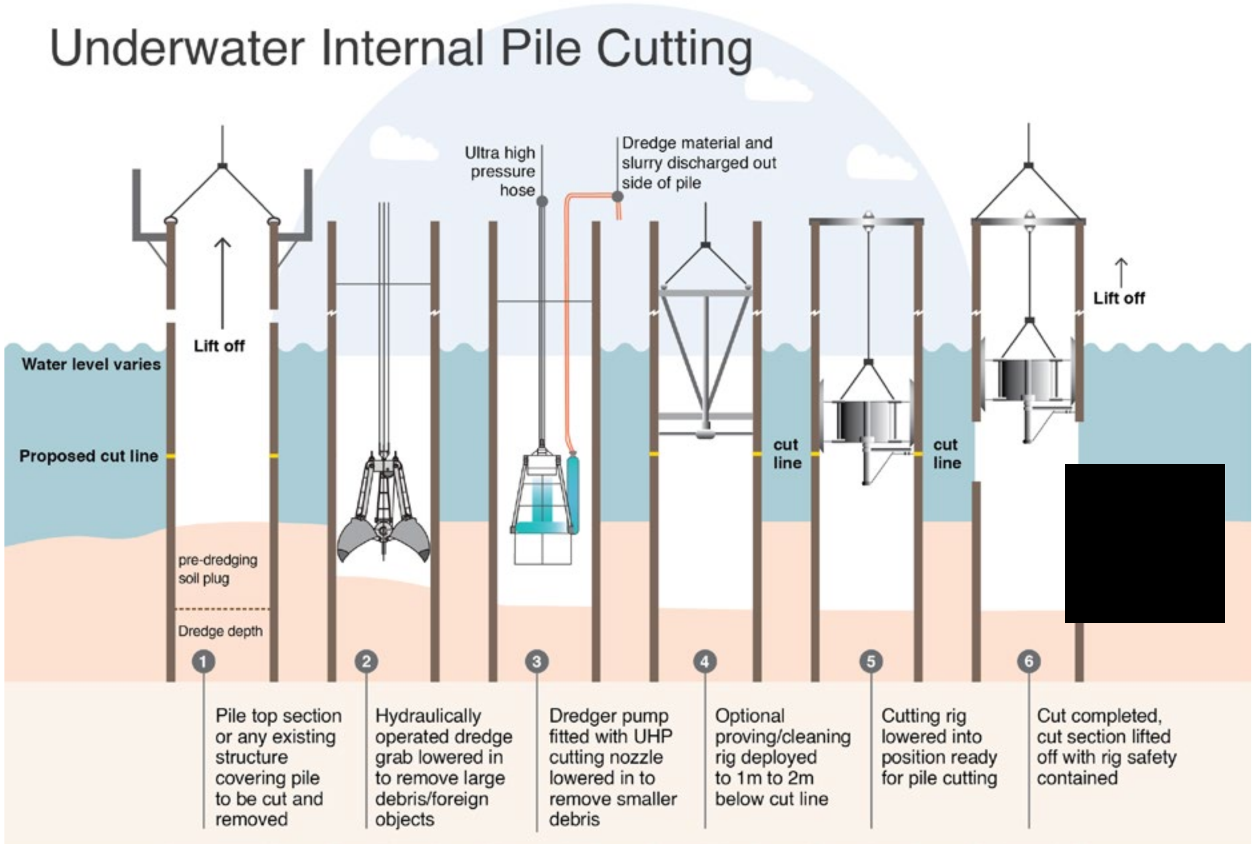


Figure 16-3. Typical process schematic for internal pile cutting and removal (image adapted from RGL; for illustrative purposes only).

The portion of the foundation above the cut will be removed per the requirements of Section 285.910(a) of 30 CFR Part 285 and may be cut into smaller pieces to facilitate handling. The portion below the cut will remain in place, and the previously removed sediment will be replaced. A vacuum pump and diver-assisted or remote-operated hoses may be used to minimize sediment disturbance and turbidity.

[redacted]

[redacted]

Removed portions of the WTGs and monopiles will be shipped to shore on barges and recycled at an appropriate facility. Before recycling, any residual

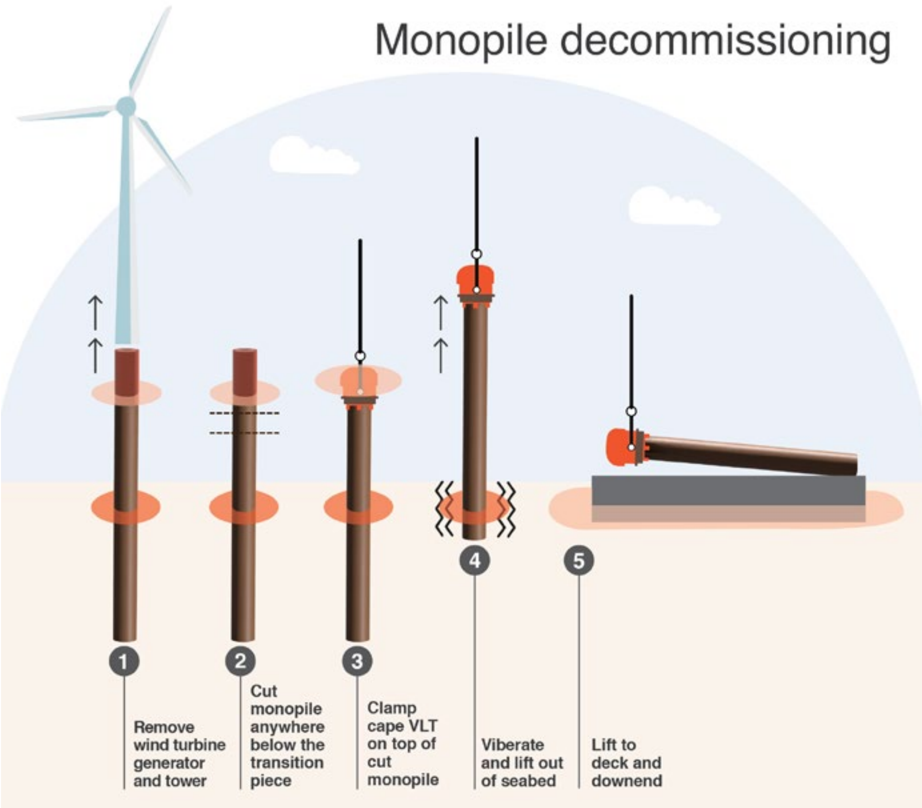


Figure 16-4. Full monopile removal process using vibratory technology (Image adapted from CAPE Holland;for illustrative purposes only).

marine growth on the monopile should either be removed or allowed to fully dry out. Based on a study of marine growth during decommissioning of offshore oil and gas structures in the United Kingdom, removal onshore was found to be more efficient that removal in situ.

As scour protection is by default required to be removed, final decisions will be subject to BSEE approval following environmental and stakeholder reviews. If approved in the decommissioning application, scour protection may be left in place to preserve any marine life in the vicinity. Alternatively, consultation with mobile gear fisheries (i.e., dredge and bottom trawl gears) may favor removal of the scour protection. If required to be removed, the scour protection will be excavated with a dredging vessel and transported back to shore for reuse or disposal.

Offshore substations and foundations

The decommissioning process of the offshore converter station (OFCS) and foundations will be similar to that of the WTGs. [redacted]

The topside will then be dismantled and removed using jack-up and heavy lift vessels as well as support vessels such as tugboats and crew transfer vessels. Depending on the capacity of the crane, major electrical equipment may need to be removed first. The topside may be cut into smaller pieces to facilitate handling. The 2022 decommissioning of the Dunlin Alpha oil platform in the North Sea involved several smaller lifts of approximately 3,500 metric tons in total, followed by a record-breaking lift of the Module Support Frame at almost 12,000 tons. Figure 16-5 shows the final lift.

The piles of the jacket foundation will then be cut at 15 feet below the mudline using a similar method for the cutting of the monopiles. If required, the piles or legs can be cut to provide access to the interior. The jacket will then be lifted out in a single lift or in pieces, and previously removed sediment will be replaced.

Removed portions of the OFCS topsides, jackets, and piles will be shipped to shore on barges and recycled at an appropriate facility. Before recycling, any residual marine growth on the jacket should either be removed or allowed to fully dry out. We note again that a study of marine growth during decommissioning of offshore oil and gas structures in the United Kingdom found that removal onshore was found to be more efficient than removal in situ.

If approved in the decommissioning application, scour protection may be left in place to preserve any marine life in the vicinity. Alternatively, consultation with mobile gear fisheries (i.e., dredge and bottom trawl gears) may favor removal of the scour protection. If required to be removed, the scour protection will be excavated with a dredging vessel and transported back to shore for reuse or disposal.

[redacted]

Inter-array cables

[redacted]

If removal is required, any cable protection measures such as rocks or concrete mattresses would first be removed using dredging vessels. Jet plowing may also be necessary to fluidize the sediment above the cables. The cables would then be extracted from the seabed and reeled onto barges. Lastly, the cable reels would be transported back to shore for further handling and recycling or disposal.

Export cables

Offshore portions of the export cables will be decommissioned in a manner similar to that for the inter-array cables.

[redacted]

Prebuild infrastructure decommissioning

[redacted]

[redacted]

16.3 Decommissioning experience

Leading Light Wind, via Invenergy, owns and operates an extensive onshore wind portfolio. Although Invenergy has not yet decommissioned an entire project, the company has successfully decommissioned several individual wind turbines within this portfolio. These efforts including working with local stakeholders and partnering with leading contracting teams to carry out decommissioning activities.

In addition, Invenergy has completed several full decommissioning studies for its projects, engaged in stakeholder discussions, and obtained quotes from suppliers for onshore decommissioning methodologies including unstacking, energetic felling, and cable/pull. With all previously performed and future decommissioning activities, our priority and focus has been (and will continue to be) safety, environmental remediation, efficient and timely use of resources, and proper disposal/recycling of all byproducts.

By the time the project alternatives presented in this proposal are ready for decommissioning, Invenergy expects to have additional experience with both decommissioning, recommissioning turbines in one-off instances, and repowering full sites of its onshore wind portfolio. This experience, and associated lessons learned, will be leveraged in the decommissioning process for the project alternatives presented in this proposal to the greatest extent possible.

16.4 Estimated economic life of major equipment

The estimated minimum economic life of major project equipment is provided in Table 16-1. Leading Light Wind will seek proper certifications for all equipment in line with industry standards, best practices, and BOEM permitting processes.

[redacted]

Table 16-1. Estimated economic life of major project equipment.

16.5 Decommissioning costs

Offshore decommissioning costs

Decommissioning costs were estimated for each of the project alternatives included in this bid [redacted]

Costs were developed for each of the major decommissioning scopes, considering the necessary durations for each task, as well as assumptions around key inputs, such as vessel requirements (and associated day rates), fuel prices and consumption, weather-related downtime, scrap value, and more.

Key data sources for the decommissioning cost analysis include these:

[redacted]

[redacted]

Table 16-3. Scrap prices for key materials.

[redacted]

[redacted]

Table 16-4. Net costs for offshore decommissioning by project alternative.

[redacted]

Prebuild infrastructure decommissioning costs

[redacted]

17 Cost-benefit analysis

Solicitation requirements

Checklist item	Section reference
The cost-benefit analysis for the Project to show net benefits for the State (N.J.A.C. 14:8-6.5(a)(11))	Section 17.1
Ratepayer net costs with explicit listing of foundations, assumptions and conditions, consistent with the Project's financial analysis (see Section 3.4), revenue plan (see Section 3.7) and values submitted din the Application Form (N.J.A.C. 14:8-6.5(a)(11)(ii))	Section 17.2
Direct, indirect and induced effects of the economic development plan described in Section 3.8 (N.J.A.C. 14:8-6.5(a)(11)(ix))	Section 17.3
Environmental net benefits, quantified and monetized as described in Section 3.9, with explicit listing of foundations, assumptions and conditions (N.J.A.C. 14:8-6.5(a)(11)(iii))	Section 17.4
Provide information on any State grants or other subsidies from the New Jersey Economic Development Authority or other agencies associated with the Project and include the subsidy as part of the Project cost-benefit analysis (N.J.A.C. 14:8-6.5(a)(11)(viii))	Section 17.5
An analysis of the potential positive and negative impacts on residential and industrial rate payers of electricity rates over the lifetime of the Project that may be caused by OREC requests (N.J.A.C. 14:8-6.5(a)(11)(xv))	Section 17.6
Monetization of the direct, indirect and induced effects of the economic development plan shown as a present value in dollars discounted to December 31, 2020, at a 7% nominal discount rate	Section 17.7

17 Cost-benefit analysis

17.1 Summary

This section provides a description and quantification of the streams of the expected benefits and costs to the state of New Jersey of the proposed Leading Light Wind offshore wind projects and associated prebuild infrastructure and energy storage. The analysis has been completed in conformance with the requirements of N.J.A.C. 14:8-6.5(a)(11). In general, all benefits and costs are presented on an annual basis in nominal terms. The annual benefit and cost streams are discounted to December 31, 2022, at a 7% nominal discount rate.[1] The results of interest include the net benefits (i.e., the present value of the benefit streams minus the present value of the cost streams) and the benefit-cost ratio (BCR) in which the present value of the total benefits stream is divided by the present value of the cost stream. In general, a project is considered cost-effective when the BCR is 1.0 or greater; all proposed projects presented herein having reached that threshold demonstrate significant worth for consideration as an investment of public funding and other valuable public goods and resources.

Proposal correspondence

As the economic benefits and costs described herein vary among the proposed projects, additional information is provided with the variances clearly labeled for proposal correspondence and described below. Note that the term "project" or "projects" may be used throughout to describe all proposed projects when differentiation and correspondence to specific proposals is not required. See Table 17-1 for a complete listing of the 3 base proposed project alternatives. Additional alternatives exist for each base proposal that impacts the costs and benefits in this analysis including with and without the prebuild infrastructure and with and without the [redacted]

[redacted]

Table 17-1. Proposed offshore wind generation projects.

Methodology

The positive economic impacts and resulting benefits to the state may be measured as follows:

"Value-added" income contributions to the state Gross Domestic Product (GDP) resulting from in-state payments for goods and services during all phases of the project including returns to labor (payments made to wage and salary employees and proprietors[2]) returns to government (including

[1] The 7% discount rate is required as per the Solicitation Guidance Document and reflects the current active (2003) recommendation regarding the use of discounting in cost-benefit analysis for public programs issued by the Office of Management and Budget Circular A-94 ("Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs").

[2] "Proprietors" are defined as self-employed individuals and unincorporated business owners providing goods and services to the project.

local and state indirect business taxes net of any state grants or other subsidies) and returns to capital (the gross operating surplus).

Improved environmental and health outcomes resulting from the expected net reductions in fossil fuel combustion emissions from the New Jersey and regional electrical generation sector relating to directly emitted $PM_{2.5}$, and $PM_{2.5}$ precursor compounds including sulfur dioxide (SO_2) and oxides of nitrogen (NOx).[3]

Reduced carbon footprint for New Jersey and the region through expected net fossil emission reductions resulting in a net decrease of carbon dioxide (CO_2) releases that will mitigate the effects of global climate change. Governor Murphy's Executive Order No. 315 sets a target of 100% clean energy by 2035. Therefore, the carbon reduction strategies offered by Leading Light Wind move New Jersey a significant way forward in the achievement of its own climate goals.[4]

The ratepayer costs of the project over the 20-year OREC period constitute the cost component of the cost-benefit analysis and the denominator of the benefit-cost ratio. The ratepayer net costs include the all-in OREC purchase price over the life of the 20-year OREC period, net of any revenue received from the sales of energy, capacity, ancillary services, and any other market payments that are returned to the ratepayers. These estimated market revenues are therefore counted as benefits and added to the numerator of the benefit-cost ratio. In addition to its use in the cost-benefit analysis, the ratepayer impacts are measured as the average resulting expected increases in residential and industrial customer bills during the OREC period (Section 17.6).

Other economic impacts not directly considered in the cost-benefit analysis are discussed with the anticipated in-state spending and job creation in our Economic Development Plan (Section 8). These include significant workforce and community benefits targeted towards members of environmental justice and overburdened communities, as well as New Jersey small business enterprises, including minority- and woman-owned businesses and veteran- and disabled-veteran-owned businesses.

As indicated in Section 17.4 and detailed in Section 10 (Environmental Protection Plan and Emissions Impacts), [redacted]

Table 17-2 provides a summary of the results of the cost-benefit analyses as described in the sections below including a summary of the direct, indirect, and induced value-added effects as derived in Section 17.3 (Line 1 in Table 17.2), the monetized net environmental and climate benefits resulting from the benefit streams of net fossil emission reductions derived in Section 17.4 (Line 2 in Table 17.2), and the ratepayer market benefit and total costs as derived in Section 17.2 (Lines 3 & 5 in Table 17.2). The total net benefits and BCR are provided in Line 6 and Line 7, respectively, in Table 17.2.

Comparing results for the same wind project in Table 17.2 demonstrate the clear advantage to the state provided by the addition of the [redacted]

[3] Particulate Matter (PM): $PM_{2.5}$ describes fine inhalable particles, with diameters generally 2.5 micrometers and smaller. The US EPA sets and reviews national air quality standards for PM under the Clean Air Act. Particles in the $PM_{2.5}$ size range can travel deeply into the respiratory tract and can affect lung function and worsen medical conditions such as asthma and heart disease. Increases in daily $PM_{2.5}$ exposure have been linked by EPA with increased respiratory and cardiovascular hospital admissions, emergency department visits, and deaths. (See US EPA, "Technical Support Document. Estimating the Benefit per Ton of Reducing Directly Emitted $PM_{2.5}$, $PM_{2.5}$ Precursors and Ozone Precursors from 21 Sectors." January 2023).

[4] According to the US government, climate change impacts on a regional, national, and global setting include changes in net agricultural productivity, human health effects, property damage from increased flood risk and natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. (See: Interagency Working Group (IWP) on Social Cost of Greenhouse Gases. 2021. "Technical Support Document - Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990." Executive Office of the President).

Table 17-2. Cost-benefit analysis summary.

[redacted]

Table 17-2 (continued). Cost-benefit analysis summary.

[redacted]

[redacted]

17.2 Ratepayer net costs

The ratepayer net costs of the project over the 20-year OREC period are calculated as the stream of annual OREC payments minus the estimated annual market revenue credits. The listing of foundations, assumptions, and conditions for development of the estimated market revenues are provided in Section 4 (Financial Analysis) and Section 7 (Revenue Plan). The Financial Analysis includes a discussion relative to the development of the OREC price and schedule during the 20-year OREC period. The Revenue Plan provides an assessment of the estimated future market revenues based on anticipated net energy production and market price projections for energy, capacity, and ancillary services. As directed by the Solicitation Guidance Document, any expected or estimated value of potential decreases in market prices attributable to the project have not been used to reduce the overall ratepayer costs of the project.

The present values of the streams of all-in OREC payments and the estimated market revenue credit components consistent with the values submitted in the Application Forms are discounted to December 31, 2022, at a 7% nominal discount rate.

The ratepayer net costs for each project base alternative (No-Prebuild Infrastructure and No-Storage) are presented in Table 17-3. Line 1 shows the total present value of the estimated OREC payments over the 20-year OREC period. Line 2 shows the total present value of the estimated market revenues and other qualifying market payments. Line 3 is the present value of the total ratepayer net costs being the total OREC payments (Line 1) minus the total market revenues (Line 2) or the present value of the net OREC cost (PVNOC).

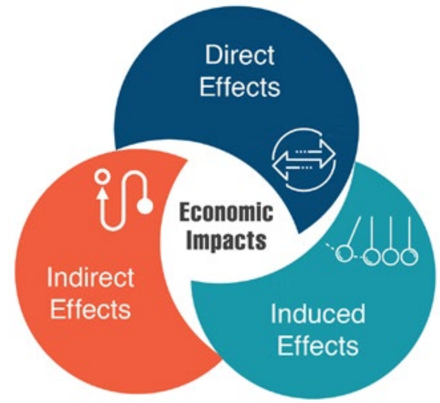
As discussed in detail in Section 2.7, the OREC cost component and market revenues of the proposed [redacted] is added to the OREC cost and benefits for those projects including the storage option and is reflected in the total ratepayer costs (Line 5) and market revenues (Line 3) in Table 17.2. A summary of the present value of the storage OREC payment adders and market revenues are provided in Table 17-4.

The OREC cost adder for those projects including the prebuild infrastructure are included in the “Prebuild Infrastructure Pricing Component” of the application forms and are the basis for the prebuild infrastructure component of the present value of the ratepayer costs included in Line 5 of Table 17-2. A summary of the present value of the prebuild OREC payment adders is provided in Table 17-5. No additional market revenue is assumed for those projects including the prebuild infrastructure.

17.3 Direct, indirect, and induced economic effects

Please see Section 8.6 of the Economic Development Plan for a detailed description of the input-output analysis methodology used to develop the direct, indirect, and induced value-added economic effects of the project that provide the basis for the value-added effects component of the cost-benefit analyses.

The stream of direct, indirect, and induced value-added totals for each project year (in nominal dollars) are discounted to December 31, 2022, at a 7% nominal discount rate. The results are presented in Table 17-6. The total values (i.e., the total value-added economic effect) in Line 4 of Table 17-6 are entered into the cost-benefit analyses as presented in Line 1 of Table 17-2.



[redacted]

As discussed in Section 2.7, the value-added effects of the proposed [redacted] facility are added to benefits for those projects including the storage option and are reflected in the value-added economic effects in Line 1 in Table 17.2. A summary of the total value-added economic impacts for the proposed [redacted] facility is provided in Table 17-6.

The projects including the prebuild infrastructure contain additional costs over the base scenario (no-prebuild) project as presented in the Bill-of-Goods tab of the application forms. [redacted]

[redacted]

17.4 Environmental net benefits

This section describes the calculation of the environmental net benefits of the project, particularly the monetization of the stream of benefits expected to result from the net fossil emission reductions caused by the project. The methodologies for the calculation of the volumetric measures of the with-project and without-project net fossil emission reductions are provided in the Environmental Protection Plan (EPP; Attachment 10.1). No other potential environmental benefits or disbenefits of the project as described in the EPP are considered in the cost-benefit analyses due to the large uncertainties involved in quantifying and monetizing these impacts.

The monetization of the benefits provided by net fossil emission reductions has its conceptual basis in the reduction of economic damages caused by exposure to air pollution externalities borne by society. Therefore, clean energy electrical generation projects that offset polluting-generation technologies such as coal and natural-gas-fired turbines produce climate and other environmental social benefits that offset these social costs stemming from the streams of damages to the environment, the climate, and the public health.

The annual “social cost of emissions” therefore is the monetary value of the net harm to society associated with adding harmful fossil combustion emissions to the atmosphere in a given year. Although direct emissions result from the development, construction, operation, and decommissioning of the project, leading to an increase in emissions, the size, scope, and longevity of the proposed wind energy projects will provide significant net fossil emission reductions, typically resulting in emission “payback” periods of less than one year.[5]

As per Executive Order 13990, the Interagency Working Group (IWG) on Social Cost of Greenhouse Gases of the US government released a Technical Support Document (TSD) in February 2021 providing interim estimates for the social costs of greenhouse gases, including CO_2. In calculating the

[8] The project’s emission “payback period” (typically measured in months and years) is the time required for the system emissions displaced by wind power to equal the direct life cycle emissions of the wind farm. For example, according to the National Renewable Energy Laboratory, average carbon payback periods for offshore wind are estimated to be approximately one-half year (0.50 years) when comparing to average US network carbon emission rates, and somewhat less (0.40 years) when modeling marginal displacements (i.e., the displacements of marginal generators, which typically have higher carbon emission rates). See “Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update,” National Renewable Energy Laboratory, 2021.

Figure 17-1. The proposed wind energy projects will provide significant net fossil emission reductions, typically resulting in emission "payback" periods of just a few months.

social cost of CO_2 and other greenhouse gases, the stream of future climate damage from an additional ton of emissions is estimated in terms of reduced future consumption — measured as reductions in the future national Gross Domestic Product (GDP). The social costs of CO_2, therefore, according to the US government, reflect the societal value of reducing emissions of CO_2 by one unit (i.e., one short ton or 2,000 pounds) and are the appropriate values to use in conducting cost-benefit analyses of policies that affect greenhouse gas emissions.[6]

The stream of the estimated future damages caused by an additional ton of CO_2 is discounted to its present value in the year when the additional unit of emissions was released. Due to the large uncertainties associated with the selection of an appropriate discount rate, the methodology includes the use of three discount rates ranging from 2.5% to 5%, with 3% being selected as the central case. These estimates in the 2021 IWG TSD are reported in 2020 dollars and are inflated for use in this cost-benefit analysis from 2020 to 2022 dollars using the Bureau of Economic Analysis GDP deflator.[7]

According to the 2021 IWG TSD, the social cost of CO_2 estimates increases over time. The societal harm from emissions in 2030, for example, is higher than the harm caused by emissions released in 2025 because future emissions produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change, and because GDP is growing over time and many damage categories (i.e., categories of reduced consumption) are modeled as proportional to GDP.

The full range of the social cost of CO_2 values from 2020 to 2050 is provided in the 2021 IWG TSD and used in this cost-benefit analysis with the appropriate escalation and converted from metric tons to short tons. Values for the social cost of CO_2 for use in this cost-benefit analysis for years after 2050 are set equal to the 2050 values.[8]

Multiplying the social cost of CO_2 for a specific year by the reduction in emissions in that year as a result of the project yields the monetized value of future emission changes from the perspective of that year. This value must then be discounted to the present before being included in the analysis. For this purpose, the 2021 IWG TSD recommends that the monetized value of future emission changes be discounted at the same rate used to calculate the social cost to ensure internal consistency. Therefore, future damages from climate change using the social cost of CO_2 at the 3% case are discounted in this analysis to the base year of the analysis (2022) using the same 3% rate.

Monetization values for the social costs of $PM_{2.5}$ and $PM_{2.5}$ precursor compounds, including SO_2 and NOx, are provided by the 2023 EPA TSD. The methodology used in the 2023 EPA TSD mainly reflects the use of "willingness to pay" measures for avoidance of premature death to value the stream of damages, but also includes estimates of the cost of treating or mitigating adverse health effects and hospitalizations.[9]

[6] As indicated in the 2021 IWG TSD, estimates of GDP impacts do not tell the whole story and additional physical climate risks not explicitly captured in the estimated GDP effects but with real and significant impacts to the US federal budget are also being analyzed for future budgetary planning. For example, as described in OMB (2022) "researchers have yet to determine the economic impact of climate change on important goods and services that are more difficult to quantify and monetize, but which the federal government has obligations to safeguard, limit or protect, such as biodiversity loss, increased ocean acidification, and catastrophic events. The economic cost of each must be determined in light of the irreversibility of climate change impacts, tipping points leading to non-linear changes to the climate, and heightened political instability as a result of climate impacts."

[7] The GDP Implicit Price Deflator values in the US Bureau of Economic Analysis NIPA Table 1.1.9: 127.224 (2022)/ 113.784 (2020) = 1.118 (accessed Monday, May 1, 2023).

[8] (IWG, 2021) Table A-1: Annual SC-CO2, 2020 – 2050 (in 2020 dollars per metric ton of CO_2).

[9] US EPA. January 2023. *Technical Support Document Estimating the Benefit per Ton of Reducing Directly Emitted PM2.5, PM2.5 Precursors and Ozone Precursors from 21 Sectors*.

The final step in estimating the social costs per ton is to divide the incidence of adverse health outcomes, and the economic value of those outcomes, associated with directly emitted $PM_{2.5}$, NOx and SO_2. Using this methodology, the social costs were calculated in the 2023 EPA TSD for 21 different industrial sectors including combustion from electrical generation units, with the values for electrical generation units provided nationally and by state.

These estimates in the 2023 EPA TSD are reported in 2019 dollars and are inflated for use in this cost-benefit analysis from 2019 to 2022 dollars using the Bureau of Economic Analysis GDP deflator.[10] A stream of social cost values discounted at 7% to the base year was selected for use in this cost-benefit analysis. The social cost values of $PM_{2.5}$ and $PM_{2.5}$ precursors are reported in the 2023 EPA TSD in five-year increments from 2025 to 2040, with the values for years in between being interpolated, and values after 2040 set equal to the 2040 values.

As noted, EPA reported the results for electrical generation units by state. Therefore, the valuations of the social costs for New Jersey were selected for use. However, no values were provided in the TSD for New Jersey in terms of direct-emitted $PM_{2.5}$. Therefore, the values used in the cost-benefit analysis are the average of the values provided for the additional regions comprising the Mid-Atlantic Area Council (MAAC) submarket region of PJM including Delaware, Maryland, Pennsylvania, and Washington, DC.

As with the social cost of CO_2, multiplying the social cost of $PM_{2.5}$ and $PM_{2.5}$ precursor compounds for a specific year by the reduction in emissions in that year because of the project yields the monetized value of future emission changes from the perspective of that year. This value must then be discounted to the present before being included in the analysis. For this purpose, the 7% discount rate used to calculate the initial social cost calculation was used to ensure internal consistency.

The schedule of the calculated social costs of the emissions for the entire project is provided in Attachment 17.1.

Summaries of indicative monetization results for the [redacted] and [redacted] projects for the avoided and project emissions and the net environmental benefits, using the methodologies described in the Environmental Protection Plan, are provided in Table 17-8 and Table 17-9, respectively.

Line 1 in each table provides the present value to the base analysis year of 2022 of the project emissions across all phases of the project. Line 2 provides the present value of the avoided emissions across the [redacted] operational period and Line 3 provides the net benefits, or the present value of the monetized avoided emissions minus the present value of the monetized project emissions.

[redacted]

[10] The GDP Implicit Price Deflator values in the US Bureau of Economic Analysis NIPA Table 1.1.9: 127.224 (2022)/112.318 (2019) = 1.133 (accessed Monday, May 1, 2023).

Figure 17-2. [redacted]

[redacted]

As expected, the most significant emission offsets in terms of volume are seen in CO_2 and SO_2 totals, as these two pollutants pertain particularly to power sector emissions. [redacted]

[redacted]

A summary of the monetized present-value of the total benefits of the net emission reductions expected by the [redacted] project discounted to December 31, 2022, at a 7% nominal discount rate are provided in Table 17-10. Please see Section 2.7 for a full description of the methodology and context for use of the storage emissions in the project cost-benefit analysis.

The incremental direct project emissions for the prebuild infrastructure projects due to the additional landfall civil works and onshore export cable installation were estimated using the methodology described in Section 10 and are reflected in Line 2 of Table 17-2 for the With-Prebuild projects.

[redacted]

17.5 State grants or other subsidies

The Solicitation Guidance Document states that the revenue requirements of the project shall consist of the cost of equipment, financing, taxes, construction, operation, and maintenance, offset by any state tax or production credits and other state subsidies or grants associated with the project. Therefore, it is required that any state grants and subsidies impacting the project be reported to allow transparency regarding their potential effect on the OREC price and subsequent impacts on the analysis of cost and benefits of the project. Specifically, state grants and other subsidies should be subtracted from the estimated government income component of the direct value-added discussed in Section 17.3.

[redacted]

17.6 Impacts on residential and industrial ratepayers of electricity rates

As per the requirements of N.J.A.C. 14:8-6.5(a)(11)(xv), this section presents an analysis of the potential impacts on residential and industrial ratepayers of electricity rates over the life of the project that may be caused by the OREC payments.

The key result in the rate payer impact analysis is the estimated levelized 2022 retail rate impact measured in dollars per kilowatt-hour ($/kWh) by customer class. The two required parameters are the following:

1. The present value of the ratepayer net cost (PVNOC)
2. The present value of the total New Jersey electric utilities' retail load measured in megawatt-hours (MWh)

As discussed in Section 17.2, the present values of the streams of all-in OREC payments and the estimated market revenue credit components consistent with the values submitted in the Application Form are calculated at a real discount rate of 7% back to the base analysis year of 2022. The resulting PVNOC for each project alternative is presented in Line 3 of Table 17-3.

The present value of the total New Jersey utilities' retail load relies on the combined wholesale load projections for the four largest New Jersey utilities over the 20-year OREC period. It is adjusted for line losses to convert wholesale sales to retail sales, then discounted to the base analysis year of 2022 using a 4.9% real discount rate.[11] The results are presented in Line 2 of Table 17-11.

[11] The four New Jersey electric utilities included in the analysis are Atlantic City Electric (ACE), Jersey Central Power & Light (JCPL), Electric Public Service Enterprise Group (PSEG), and Rockland Electric Company (RECO). Total sales for 2022 are presented in Table 17-13, with an escalation rate of 2% derived from the U.S. Energy Information Administration Annual Energy Outlook Electric Power Projections (Table 54). The real discount rate (4.9%) assumes a nominal discount rate of 7% and an interest rate of 2%. Line loss factor is assumed 2.2% as per the total loss component costs reported in Table 11-33 of the 2022 PJM State of Market report (monitoringanalytics.com).

[redacted]

The levelized 2022 retail rate impact ($/kWh) or expected rate increase due to cost recovery of the OREC payments by the utilities, is then calculated by dividing the present value of the ratepayer net cost by the present value adjusted New Jersey retail load (MWh), with appropriate conversion from megawatt-hours to kilowatt-hours (Line 3 of Table 17-11).

To get the monthly bill impacts, the levelized 2022 retail rate impact is then multiplied by the appropriate number of kWh for average New Jersey residential, commercial, and industrial utility bills, as provided by the US Energy Information Agency (Table 17-12). The results are provided in Lines 4, 6, and 8 of Table 17-11 for residential, commercial, and industrial customers, respectively. The percentage change in the typical monthly bill is calculated as the ratio of the monthly cost impact divided by the baseline average monthly bill. The results are provided in Lines 5, 7, and 9 of Table 17-11 for residential, commercial, and industrial customers, respectively.

Expected additional increases to the average monthly bills for residential, commercial, and industrial customers of the four major New Jersey utilities due to addition of the Prebuild Infrastructure to the projects are presented in Table 17-13.

Expected additional increases to the average monthly bills for residential, commercial, and industrial customers of the four major New Jersey utilities due to the addition of the storage project to the projects are presented in Table 17-14. (The PVNOC value provided in Line 1 of Table 17-14 is taken from Table 17-5).

Leading Light Wind Energy Equity Credit

Leading Light Wind is committed to an equitable energy transition, one that can provide the environmental, health, and climate benefits of offshore wind to all residents of New Jersey while addressing the regressive nature of utility bills where low-income families must pay far more of their share of income. As part of our community benefits program, we are establishing an Energy Equity Credit to reduce energy burden in New Jersey. Energy burden refers to the percentage of household income spent on energy utility costs. A household is considered Energy-Burdened when 6% or more of household income is spent on energy costs, including 3% for electricity.

In New Jersey there are over 200,000 families living at 125% of the federal poverty guidelines with household income of $34,688 or less. These families on average pay over 3% of their incomes for their electricity bills. To compensate for the potential increase in their utility bills due to the project, Leading Light Wind proposes to provide total credits [redacted] over 20 years depending on the size of the project awarded by NJBPU. The program would provide direct assistance to over 200,000 low-income, Energy-Burdened households in New Jersey by reducing their monthly electricity bill increase from our project by 50%.

[redacted]

17.7 Monetization of the effect of the Economic Development Plan

A description and monetization of the direct, indirect, and induced effects of the Economic Development Plan (Section 8) shown as a present value in dollars discounted to 2022 at a 7% nominal discount rate is provided in Section 17.3.

Specifically, these effects, as they pertain to the cost-benefit analysis are captured in the in-state value-added income measurements discussed in Section 17.3 and presented in Table 17-7. The present value of the total direct, indirect, and induced effects is captured in the net benefits and benefit numerator of the benefit-cost ratio displayed in Table 17-2.

Figure 17-3. Leading Light Wind is already on its way to developing environmentally and economically sustainable project alternatives that empower New Jersey communities.

Leading Light
Wind

Charting an American-led clean energy future

Application Narrative • August 4, 2023