

New York Offshore Wind Public Webinar

+4,300 Megawatts of Offshore
Wind in Development



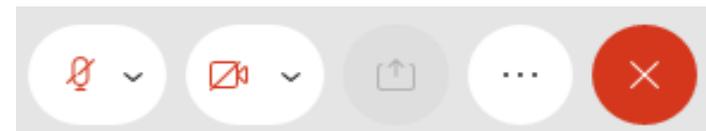
NYSERDA

February 10, 2021

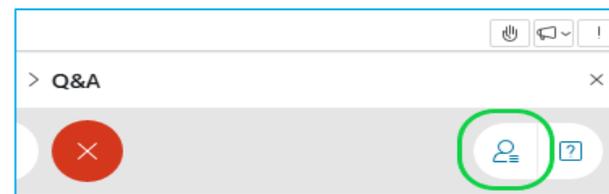
Meeting Procedures

Participation for Members of the Public:

- > Members of the public will be muted upon entry.
- > Questions and comments may be submitted in writing through the Q&A feature at any time during the event.
- > If technical problems arise, please contact Sal.Graven@nyserda.ny.gov



You'll see  when your microphone is muted



Agenda

- > New York's Climate Law and Nation-Leading Offshore Wind Goal
- > 2021 State of the State Announcements
 - Julia Bovey, Director of External Affairs, Equinor Wind US
- > Research and Regional Collaboration
 - New Studies
 - NYSERDA-led Research Updates
 - Regional Research Coordination and Funding
 - Technical Working Group Updates
 - National Offshore Wind R&D Consortium Updates
- > Coming Soon – Education Opportunities

New York's Climate Law

Signed into law in 2019, the Climate Leadership and Community Protection Act (CLCPA) charts a path towards a clean energy economy



NYSERDA



New York is committed to
100% clean
carbon-free electricity

by 2040

most aggressive in the nation



Offshore Wind

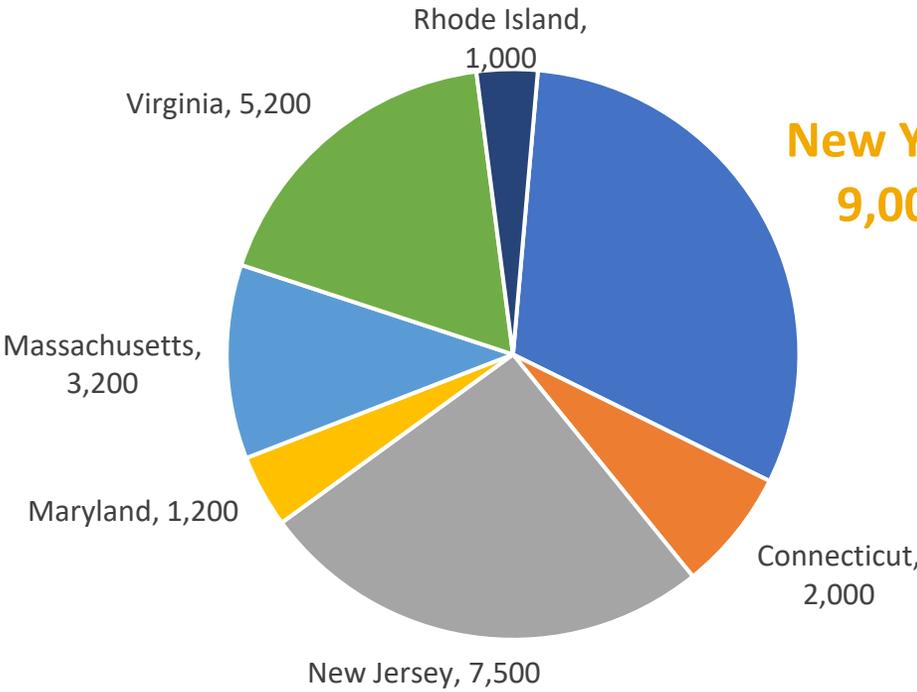
**9,000
megawatts**

by 2035

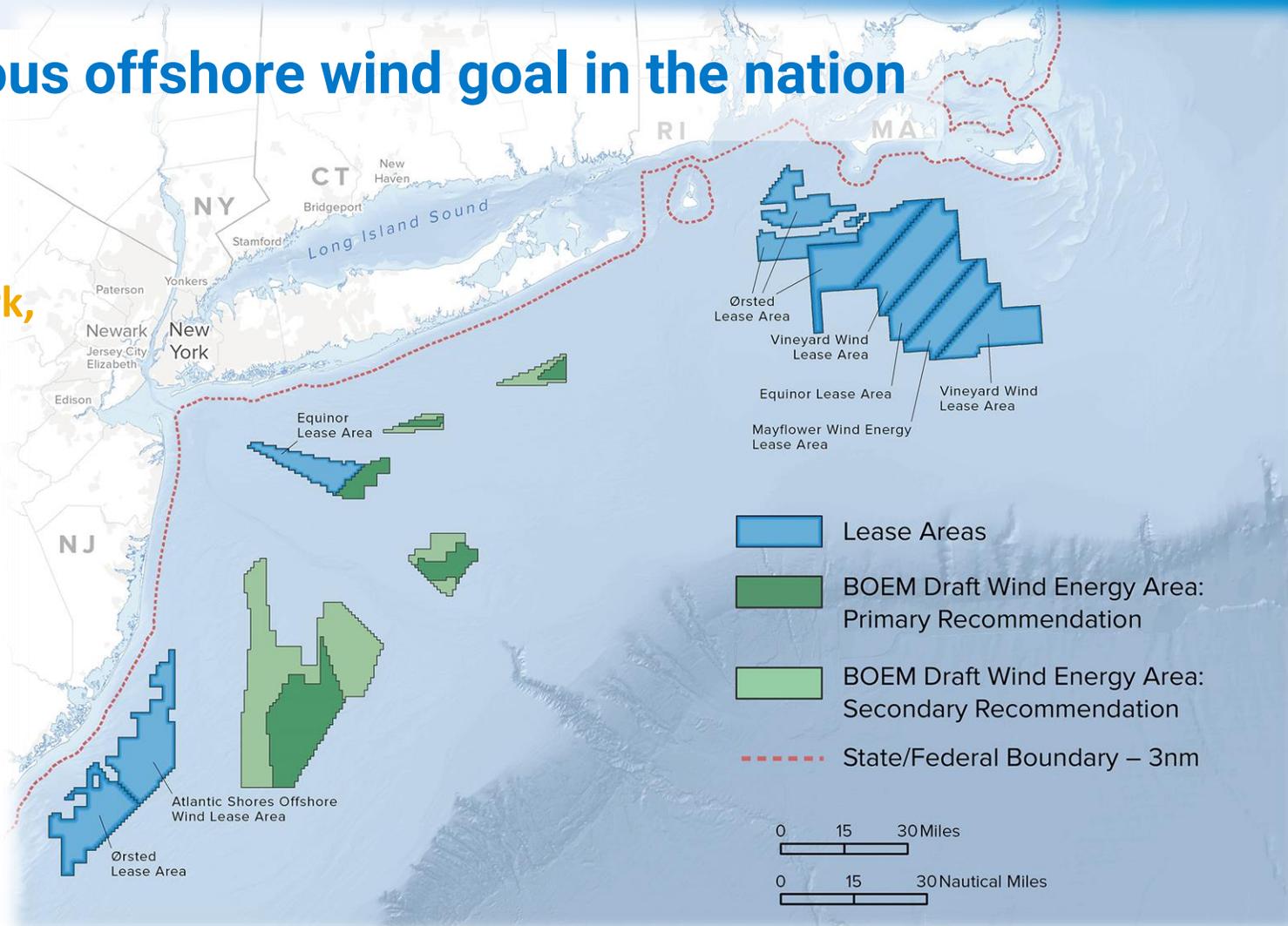
enough to power
up to 6 million homes
in New York

Regional Offshore Wind Market Potential of 31.5 GW

New York has the most ambitious offshore wind goal in the nation



Offshore Wind Goals by State (MW)





Beacon Wind & Empire Wind 2 will Deliver Nearly
2,500 Megawatts

Public and Private Investment of
\$644 Million in NY Ports



Combined, These Projects will Deliver
\$14 BILLION
in Direct Investments and
8,600 GOOD-PAYING JOBS

New York has made the
LARGEST
Combined Renewable
ENERGY
AWARDS
ever by a U.S. State



NYSERDA



24 Large-scale Land-based Renewable Projects Awarded to Deliver
2,200 Megawatts

Which is Equivalent to Powering Over
560,000 Homes for 20 Years

CLEAN ENERGY **PROJECTS WILL**

- ✓ Stimulate New York's economic recovery from COVID-19
- ✓ Prioritize disadvantaged communities
- ✓ Create good-paying short- and long-term jobs
- ✓ Help decarbonize New York's power sector and combat climate change

Offshore Wind Procurements

NYSERDA issues competitive solicitations for offshore wind energy and contracts with offshore wind developers to purchase offshore renewable energy certificates (ORECs).



New York's Second Offshore Wind Solicitation

- > Launched July 2020
- > At least 1,000 MW and up to 2,500 MW of offshore wind
- > Included a **multi-port strategy** and requirement for offshore wind generators to partner with any of the 11 prequalified New York ports to stage, construct, or manufacture key components, or coordinate operations and maintenance activities
- > Bids received for four offshore wind projects and complementary port infrastructure investments

Evaluation Criteria:

70% Price

20% Economic Benefits

10% Viability



Awards Announced for Largest Renewable Energy Procurement in US History - 2,490 MW

Empire Wind 1 (816 MW)

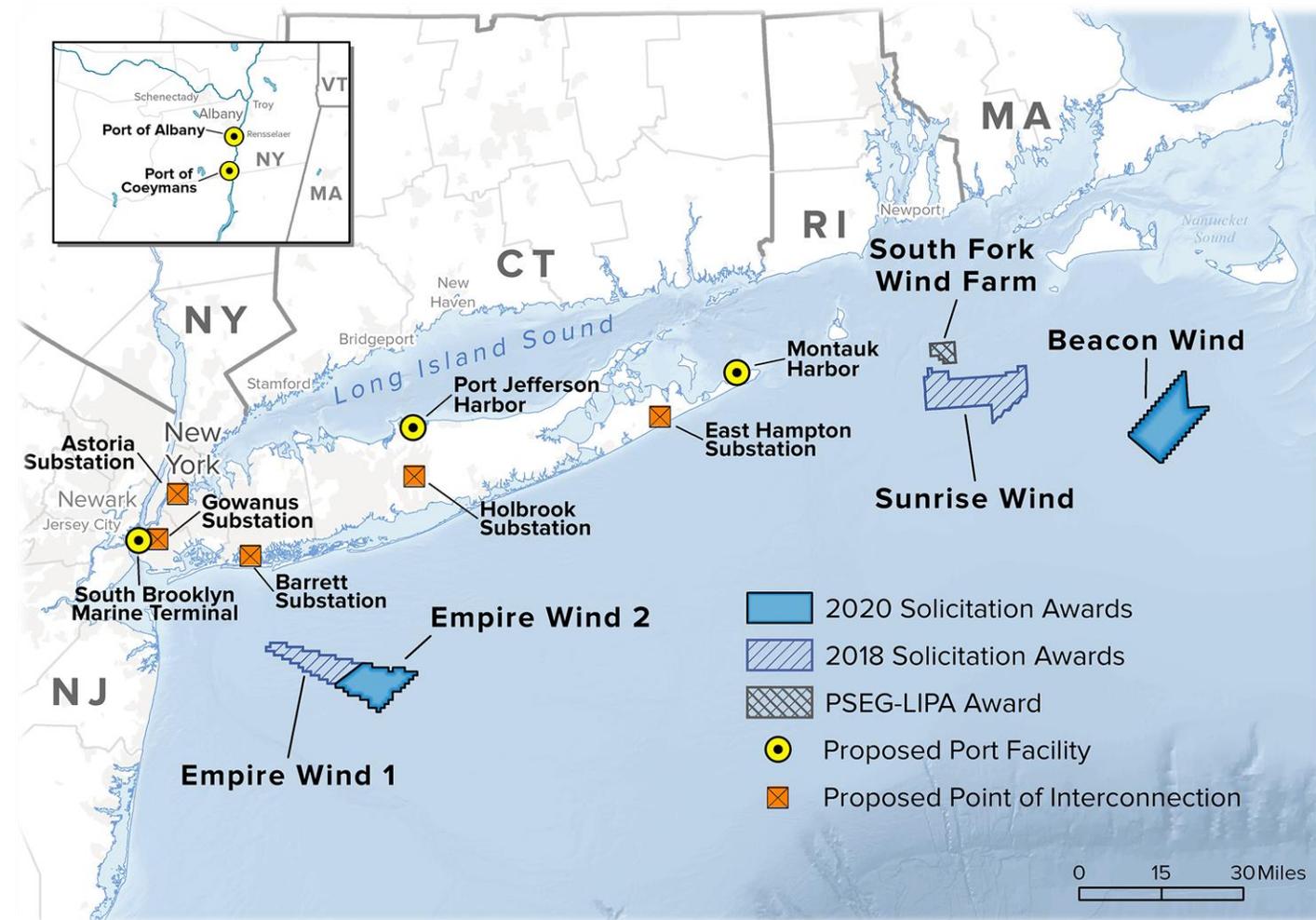
NEW: Empire Wind 2 (1,260 MW)

South Fork Wind Farm (130 MW)

Sunrise Wind (880 MW)

NEW: Beacon Wind (1,230 MW)

Total of ~ 4,300 megawatts in active development





February 2021 Update

Julia Bovey
Director, External Affairs



Driven by purpose, inspired by vision, guided by values

Our purpose

Turning natural resources into energy for people and progress for society

Our vision

Shaping the future of energy

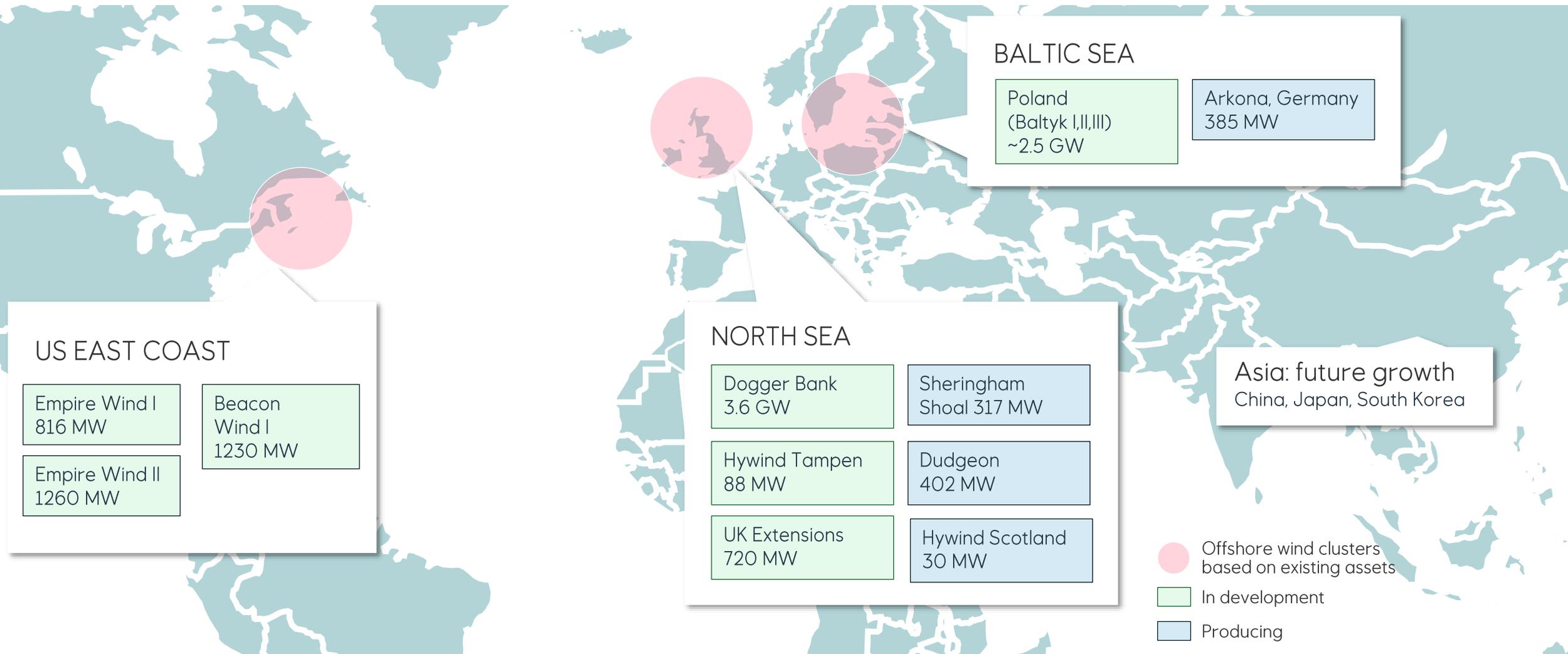
Our values

Open, courageous, collaborative and caring

Our strategy

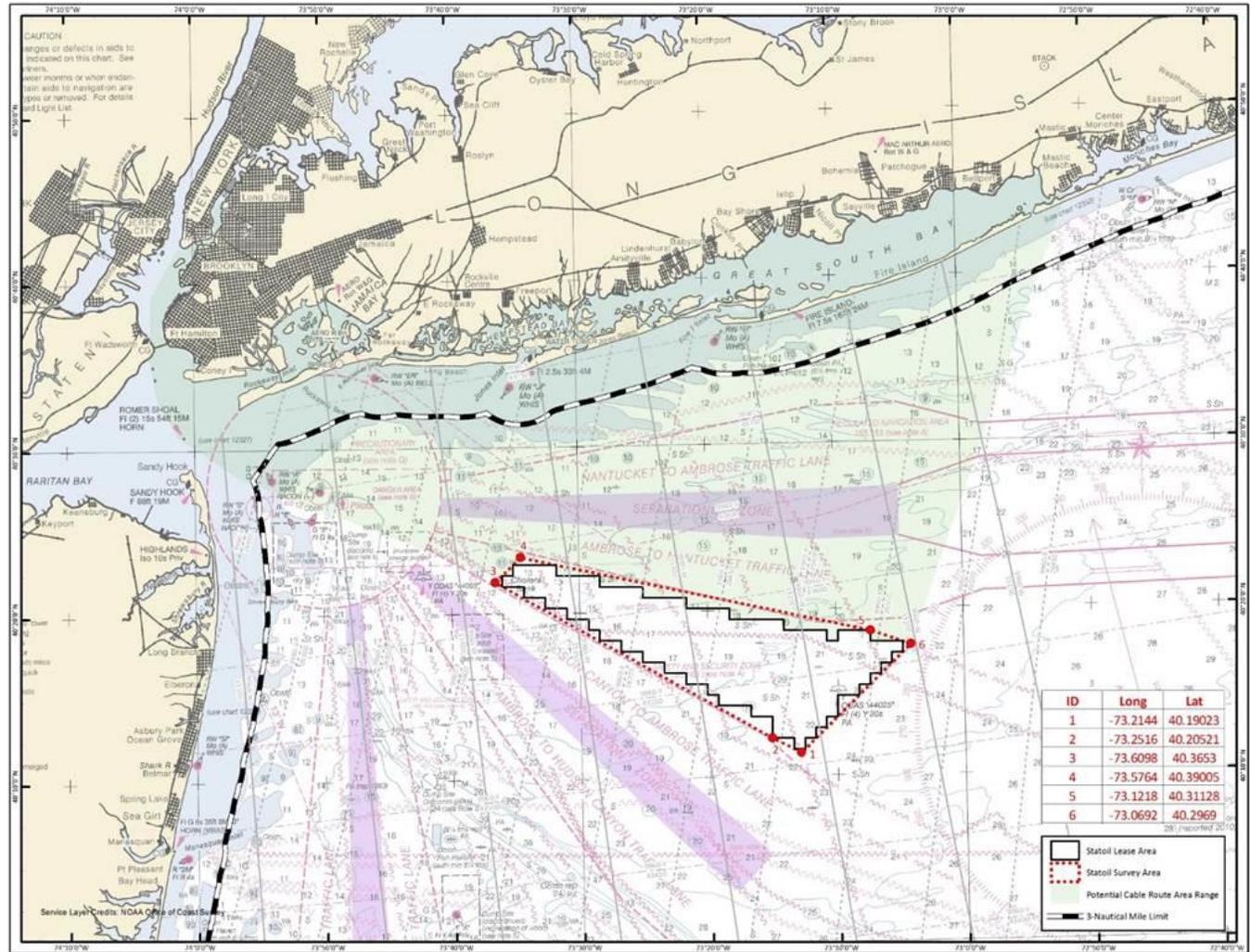
Always safe, high value, low carbon

Creating value from scale in regional clusters

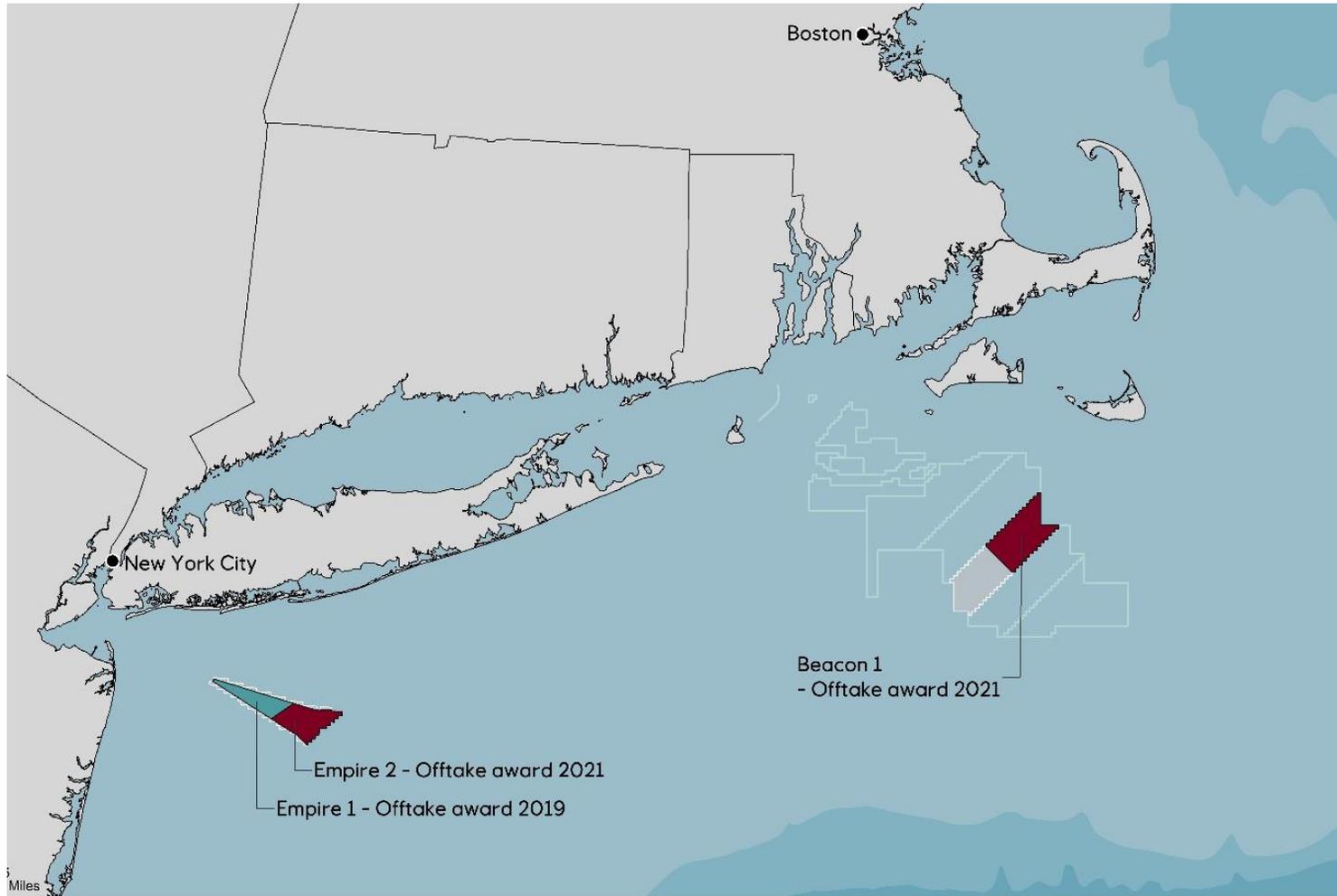


Empire Wind 1

- Awarded by NYSERDA in 2019
- NYSERDA award capacity: 816 MW
- Turbines to be assembled at South Brooklyn Marine Terminal
- Foundations: Gravity-Based (Concrete) manufactured in New York state
- Operations and Maintenance (O&M) base in south Brooklyn
- Proposed onshore substation: South Brooklyn
- Next generation turbines
- Water depth: 65 – 100 ft
- Commercial Operations Date: mid-2020s



New Award: Empire Wind 2, Beacon Wind 1



- 2500 MW of renewable power = 1.3 million homes
- \$47 million in workforce development, innovation and community benefits
- \$25 million to support regional monitoring of wildlife and key commercial fish stocks
- 5,200 total direct jobs supported by both projects
- Combined \$4.5 billion in value added to NYS economy

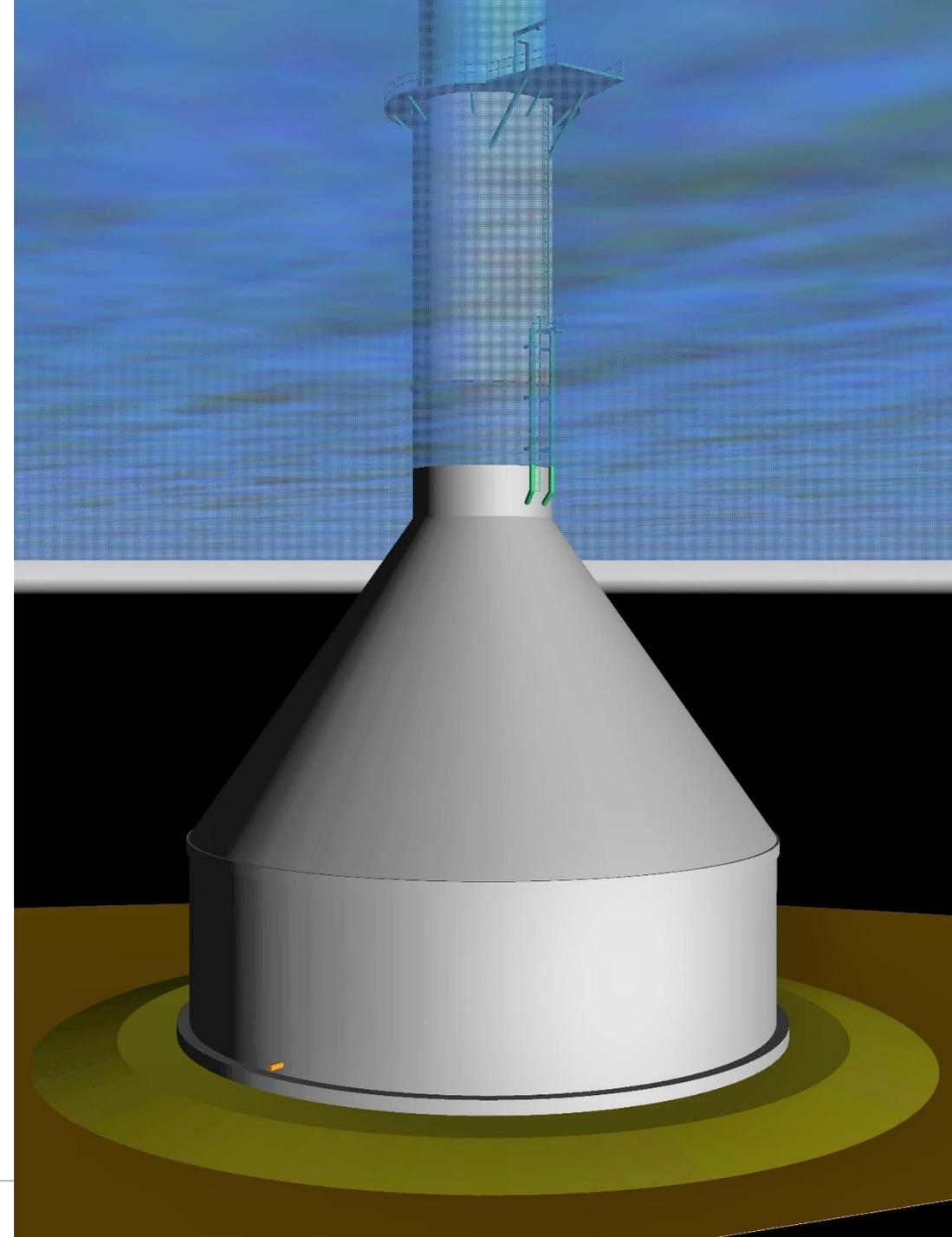


Empire Wind 2 Key Facts

- 1,260 MW project
- Power delivered directly to Nassau County on Long Island' South Shore at the Barrett Substation
- Commercial Operations Date: late 2027
- Continued use of Gravity-Based Foundations fabricated in New York

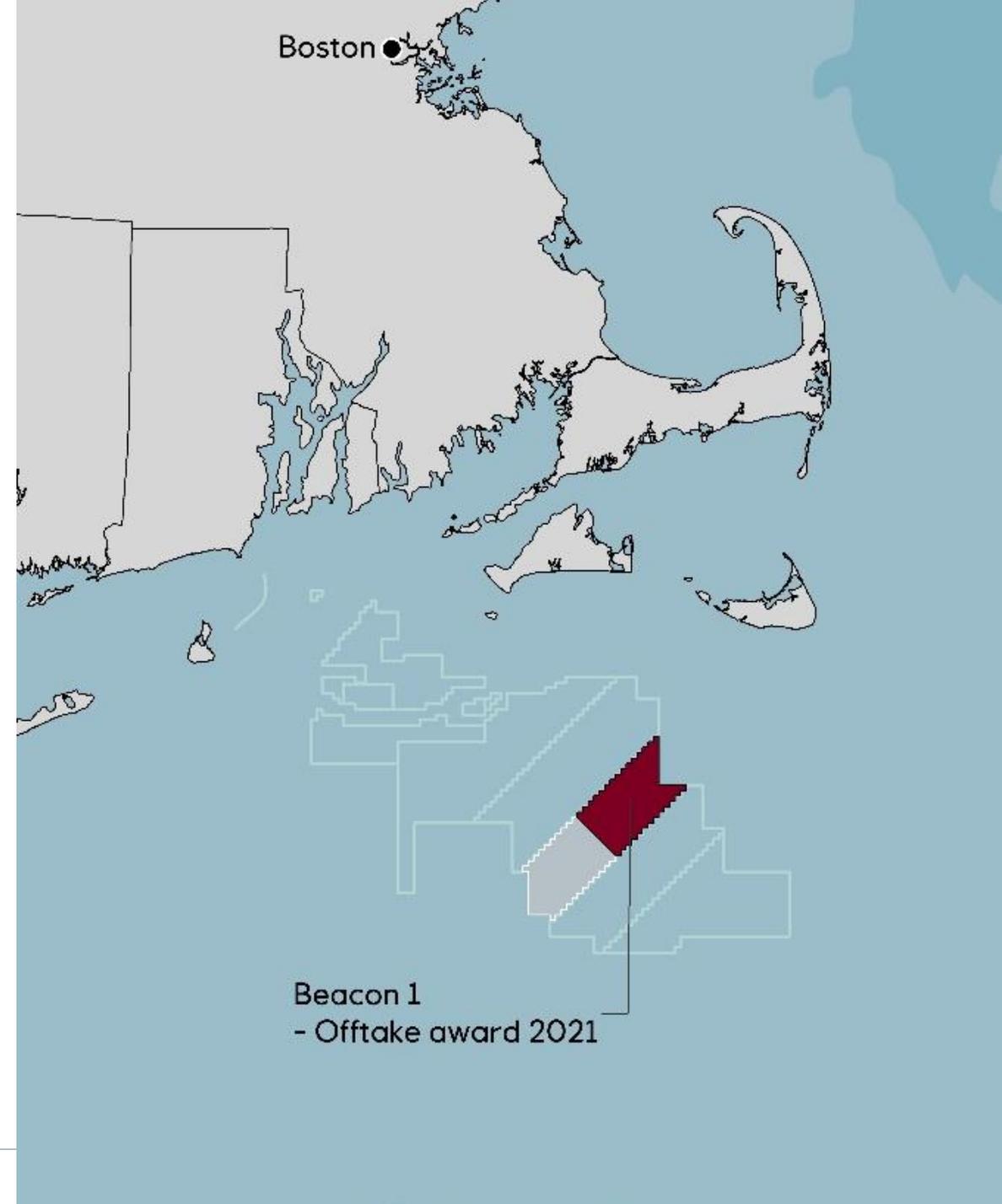
Empire Wind's "Gravity-Based Structure" (GBS) Foundations

- Creating significant new infrastructure and supply chain opportunities for New York along with new, long-term jobs including manufacturing "Gravity-Based Structure" (GBS) foundations in New York.
- The GBS manufacturing process itself is expected to create more than 1,000 direct jobs and nearly 4,000 indirect jobs in New York.



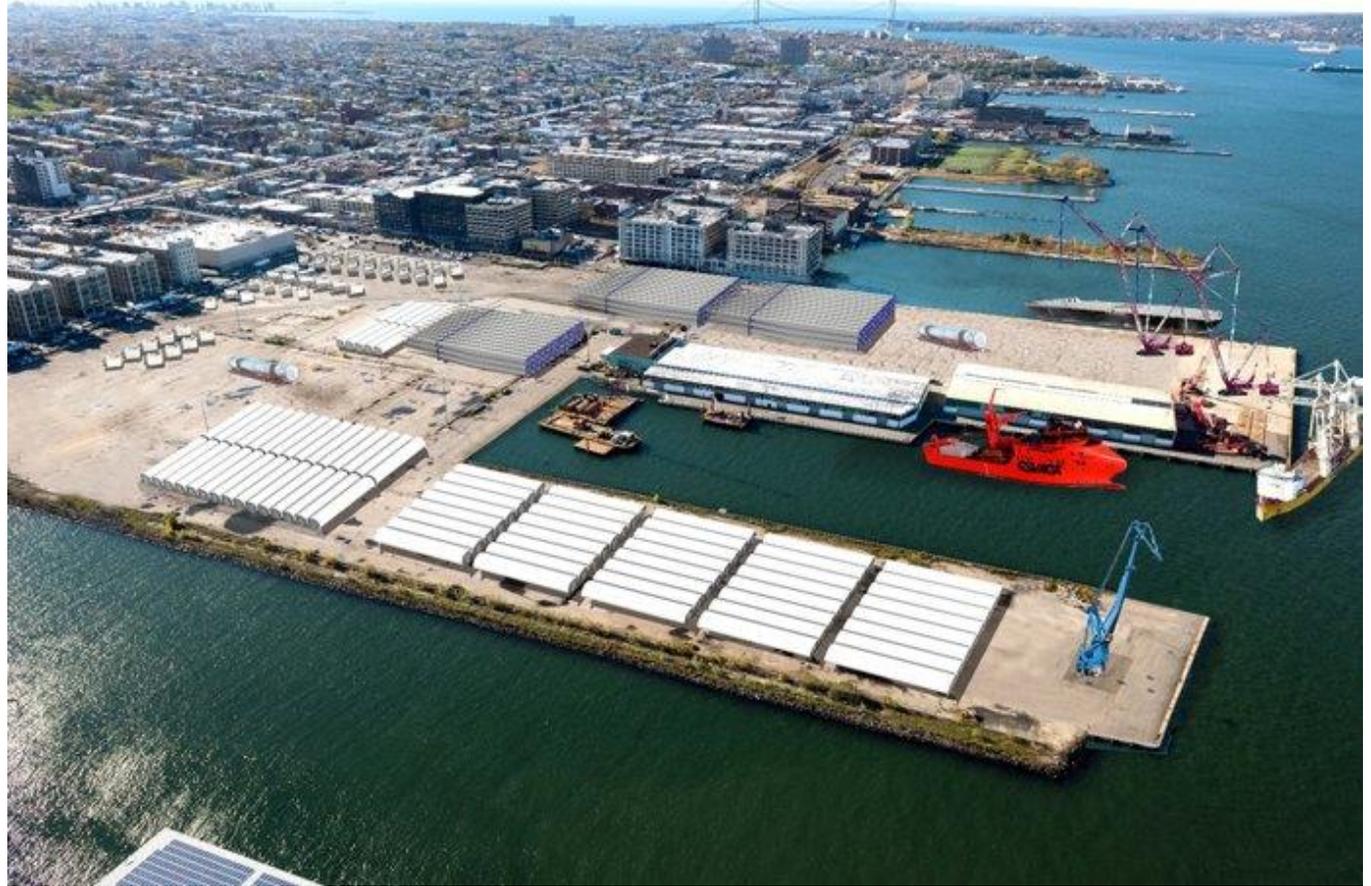
Beacon Wind 1 Key Facts

- 1,230 MW project
- Power delivered into Astoria substation in Queens
- Commercial Operations Date: 2028
- Use of HVDC technology



- Staging facility for Empire Wind 1, 2, and Beacon Wind
- Assembly for broader New York OSW industry
- One of largest dedicated OSW port facilities in U.S. (73 acres)
- Shared investment by New York State , NYC, and Equinor
- 1,000 short-term jobs by 2028, 200 long-term jobs
- Community engagement center will be established adjacent to SBMT to support education and outreach for the South Brooklyn community

SBMT: Staging and Assembly



SBMT: Long-term O&M Hub



- Equinor's East coast Operations & Maintenance (O&M) Hub
- Base for Empire Wind and Beacon Wind
- Supported by "service operations vessels" which house workers for two-week shifts. Vessels return to base every two weeks for crew change, refueling, and re-provisioning

Port of Albany: Key Facts



- First offshore wind tower manufacturing facility in U.S.
- Partnering with Marmen, Inc. and Welcon A/S
- Produce components for Empire Wind 1, 2, and Beacon Wind
- Shared investment by New York State, Equinor, and others
- 500 short-term jobs, 300 long-term jobs, in operation in 2023

- Continued collaboration and planning with **NY Offshore Wind Training Institute**, Farmingdale State College, and SUNY Maritime College
- Ongoing collaboration with NY **labor unions** to identify and fill any potential skills gaps for assembly ports
- Focus on **“just transition”** with recruitment for permanent O&M workers in the communities surrounding each project’s interconnection point
- Ongoing analysis of current US certification and how they correspond to Global Wind Organization certifications to **ease workforce transition**

Workforce development



Equinor's commitment to community engagement

More than 1,000 interactions with community members, elected officials, fishermen, environmental activists, scientists, educators, and concerned individuals.

Careful stakeholder mapping and analysis ensuring no communities or concerns are overlooked.

Collaboration and accountability in our work with leading environmental and scientific stakeholders.

Dedication to a just transition, consulting with Environmental Justice communities seeking cleaner air, job training, and access to economic development opportunities

Commitment to responsiveness, showing stakeholders how we've incorporated their feedback into our work and our plans.

Plans for deeper engagement, now that we've won the NY competition, preparing for open houses and other events for interested citizens and affected communities.





Equinor initiatives & partnerships

SUNY Maritime & Farmingdale: offshore wind training program planning

Columbia University – Center for Global Energy Policy: research on new ideas to solve challenges in the energy space

SUNY Stony Brook – CEAS: wind resource assessment and optimization research

SUNY Stony Brook – SoMAS: Atlantic sturgeon monitoring in lease area

Wildlife Conservation Society: funding for real-time detection and monitoring of whales, making NY Bight safer for marine mammals

Waterfront Alliance: Working with diverse group of NY Harbor stakeholders to ensure environmentally sustainable working waterfront

Atlantic Marine Conservation Society: supporting Long-Island-based regional nonprofit protecting marine mammals

National Offshore Wind Research and Development Consortium

Responsible Offshore Development Alliance (RODA)

Responsible Offshore Science Alliance (ROSA)

National Renewable Energy Laboratory (NREL) Advisory Committee

Climate Jobs NY

NYS Offshore Wind Training Institute

Fisheries outreach

- Equinor fisheries liaisons, hundreds of engagements with local fisheries.
- Consultation on project layouts to allow for safe navigation and fishing throughout lease areas
- Detailed follow up showing how feedback was incorporated into development plans
- Monthly port hours
- Newsletters, social media, one-on-one calls, open hours, webinars, virtual meetings
- Modify survey schedules to avoid areas with active seasonal fishing
- Funding studies/developing partnerships



Julia Bovey

Director, External Affairs
jbov@equinor.com

www.empirewind.com

Twitter: @EquinorWindUS

5 Projects, 5 Ports

With this announcement,
New York State now has

**5 OFFSHORE
WIND PROJECTS**

in active development



- > Many NY port facilities have potential to support the offshore wind industry
- > New York now has 5 wind industry ports, more than any other state



Montauk Harbor



Port of Albany



Port of Coeymans



South Brooklyn Marine Terminal



Port Jefferson/East Setauket

Offshore Wind Training Institute

\$20 million Offshore Wind Training Institute (OWTI) launches with first solicitation

- > **\$3 million solicitation LIVE NOW** to support Disadvantaged Communities and/or Priority Populations, or promote the development of the OSW supply chain in NYS
- > Awards expected in summer 2021, and selected training institutions will aim to begin training workers later this year
- > The OWTI will educate 2,500 New York workers
- > The OWTI is administered by Stony Brook University and Farmingdale State College

See our
website:
PON
4595



Research and Regional Collaboration

New Studies

Updates on NYSERDA-Led Research

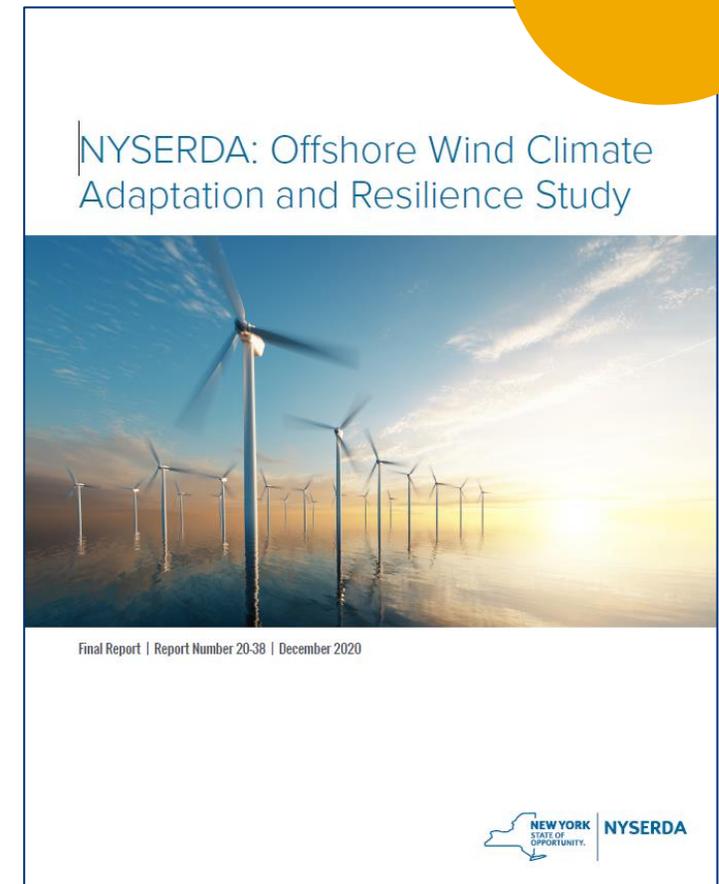
Technical Working Groups

Regional Research

Climate Adaptation and Resiliency Study

Published
TODAY!

- > Responds to NYSERDA's 2020-2023 Strategic Outlook and goals
- > Seeks to aggregate, build knowledge of, and distill **climate adaptation and resiliency considerations** that may be relevant to OSW in New York
- > Seeks to identify resilient design strategies that the industry can consider to support New York in meeting its offshore wind objectives
- > **First industry sector “deep dive” into the topic of resiliency from NYSERDA:** harbinger of more to come on this strategic topic across all of NYSERDA's programs



New York Power Grid Study

Now
Available

As part of the 2020-2021 enacted State Budget, New York State announced passage of the **Accelerated Renewable Energy Growth and Community Benefit Act (Act)**

- > The Act instructed the State to conduct a **Power Grid Study** to inform transmission systems investments that will be necessary to achieve the clean energy goals of the CLCPA.

The PGS consists of three component studies:

Utility Study: Conducted by the Joint Utilities on local transmission and distribution (LT&D) needs;

Zero Emissions Study: scenario-based study to analyze transmission, generation, and storage options for achieving 70% renewable generation by 2030 and a zero emissions grid by 2040

OSW Study: Study of offshore and onshore bulk-power transmission scenarios to illustrate possible solutions to integrate the mandated 9,000 MW of offshore wind

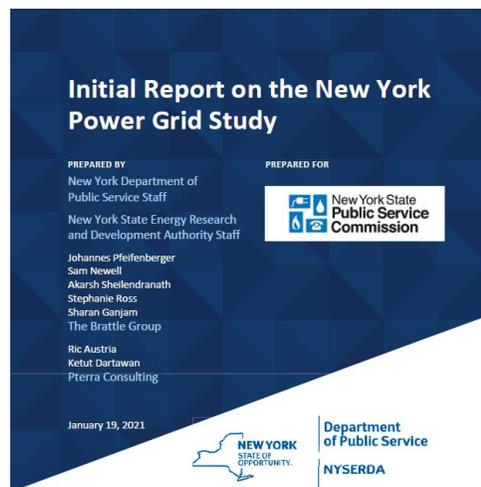


New York Power Grid Study Offshore Wind

Now
Available

The New York State Department of Public Service has prepared an initial report of findings and recommendations, published 1/19/2021

DPS Matter Master: 20-00905/20-E-0197



Findings

- Through radial lines, 9,000 MW of offshore wind generation can be integrated without requiring major bulk transmission upgrades
- Interconnecting a maximum amount of OSW in the New York City area (6+ GW) would be advantageous
- Permitting complexities in the NY Harbor and Long Island Sound will require careful planning
- “Meshed” configuration of offshore transmission provides flexibility

Updates on NYSERDA-Led Pre-Development

Pre-development Updates

- > Metocean FliDAR Buoys (Hudson North & Hudson South) have completed 1 full-year of data collection and deployment! Go to: oswbuoysny.resourcepanorama.dnvgl.com
- > The Ocean Endeavor has completed NYSERDA's geophysical surveys in the New York Bight! <http://nyserdageosurvey.ene.com/>
- > The 3-year digital aerial survey of wildlife in the New York Bight (2016-2019) is being finalized. Data is available: https://remote.normandeau.com/remote_about.php



Regional Research and Collaboration

> Regional Wildlife Science Entity (**RWSE**)

- The [Organizational Vision](#) is the result of an 18-month engagement effort and outlines:
 - The stakeholder engagement effort used to develop the document
 - RWSE mission and objectives
 - Proposed RWSE organizational structure
 - Vision for pilot funding requirements and initial research activities
- Proposals due March 2021

> Regional Offshore Science Alliance (**ROSA**)

- NY is a member of the Executive Committee and Advisory Council – guides research and monitoring goals for the organization
- NY is a member of the Interim Guidance Document Working Group

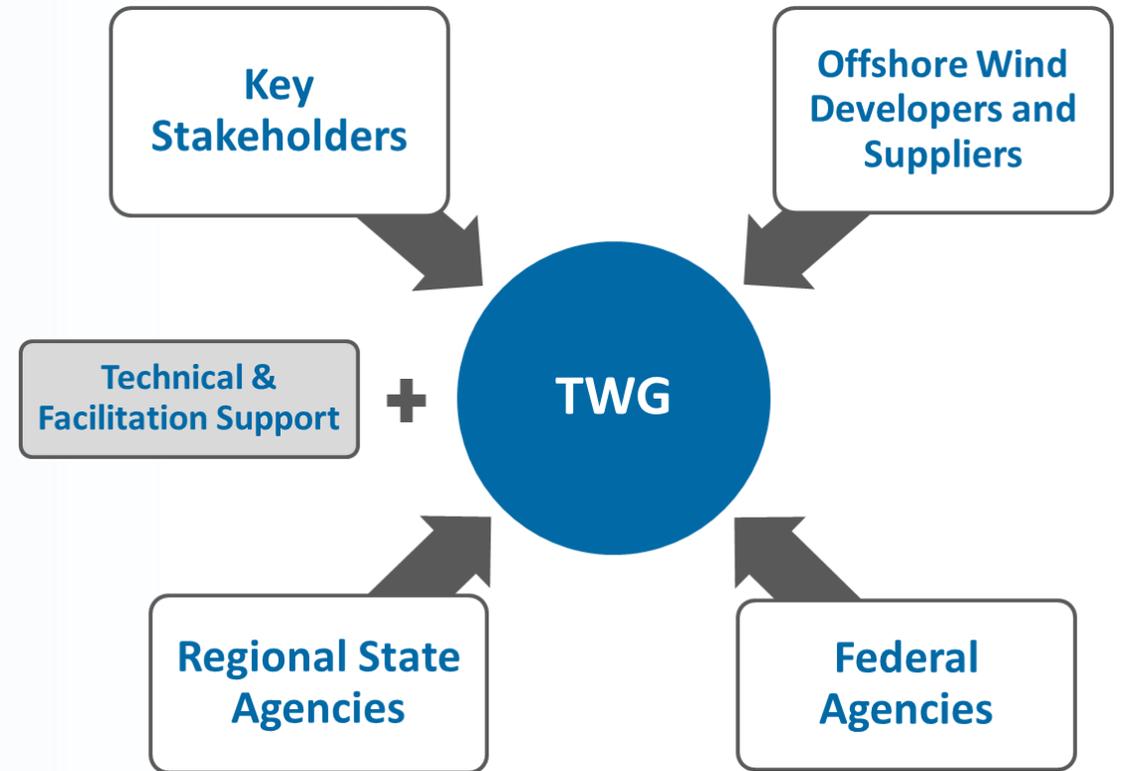
2020 OSW RFP - Environmental and Fisheries Requirements

- > Reaffirmed continued engagement of the E-TWG and F-TWG to incorporate necessary feedback in the decision-making process to ensure the environmentally responsible development.
- > Standardized Environmental and Fisheries Mitigation Plans include new components:
 - A narrative that describes the developer's approach and philosophy towards environmental and fisheries mitigation
 - A standardized version that highlights specific details on how such approaches and philosophies will be implemented.
 - New requirements to mitigate potential impacts to wildlife from noise, vessel strikes, and lighting.
- > New York was **first in the nation** to include a requirement of \$10,000 per MW for the winning bidder to support regional monitoring of wildlife and key commercial fish stocks to better understand and minimize the potential impacts generating nearly **\$25 million** split between both wildlife and fisheries regional monitoring

OSW Technical Working Groups

Collaborative Engagement with Key Stakeholders

- Unique points of view and targeted interests
- Cross-borders and geographies
- Powerful representative voices
- Active problem-solving roles in NYS policy and program development

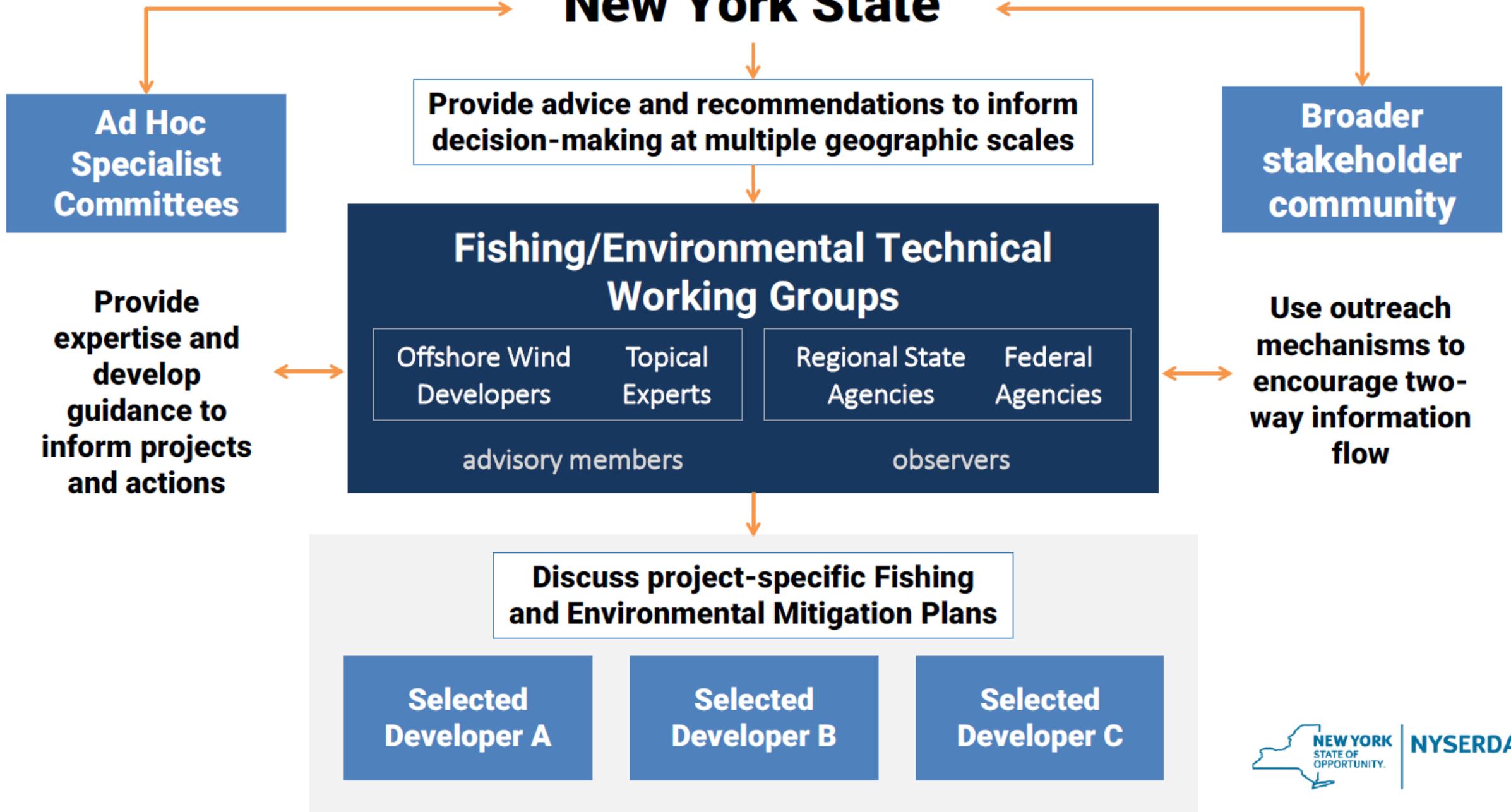


Environmental
Fisheries
Maritime
Jobs and Supply Chain



NYSERDA

New York State



E-TWG Updates

- > Scientific Research Framework to Understand the Effects of Offshore Wind Energy Development on Birds and Bats in the Eastern United States, Feb 2021
- > Environmental Data Standardization and Sharing Supporting Data Transparency Requirements for Offshore Wind Energy Projects Supplying Power to New York State, March/April 2021
- > 2020 State of the Science Workshop on Offshore Wind and Wildlife held November 16-20, next workshop planned for 2022
- > Scheduled to meet virtually six times in 2021, summaries available on www.nyetwg.com

2020 State of the Science on Offshore Wind and Wildlife: Cumulative Impacts

- > Purpose: understand and avoid cumulative impacts to wildlife from offshore wind development
- > 2021: Seven working groups developing a research agenda of key studies that could be conducted in the next 3-5 years to improve our understanding of cumulative biological impacts as the offshore wind industry develops in the eastern United States



Updates on NYSERDA-Led Research

5 Contracted Studies

- > Wildlife Distribution Modeling in the New York Bight; Ecology and Environment
- > Multi-Scale Relationships Between Marine Predators and Forage Fish; Biodiversity Research Institute
- > Development of Monitoring Protocols for Nanotag Studies at Offshore Wind Farms; US Fish and Wildlife Service
- > Strategies and Tools to Address Commercial Fishing Access in Offshore Wind Farms; National Renewable Energy Laboratory (NREL)
- > Creation of a Fishermen's Data Trust for effective inclusion of fishermen's knowledge in OSW decision making; Responsible Offshore Development Alliance (RODA)



F-TWG Updates

- > Reminder that F-TWG has a new website: <https://www.nyftwg.com/>
- > Held two virtual meeting in the summer of 2020, planned 4 virtual meetings for 2021
- > Creation of an **Informational OSW Video** for recreational fishermen:
https://youtu.be/loBg7dBLE_g
- > Continuation of the **OSW Cabling Activities Document**
 - Develop a fact-based synthesis of knowledge on topics related to cabling associated with offshore wind
 - Final version expected late winter / early spring 2021
- > Creation of a draft **Overview of Fisheries Compensation Document**
 - Summary of existing information to provide background details on the current state of play
- > Released today: **Offshore Wind Opportunities for Experienced Mariners Report**
 - Utilized feedback from fishing industry and developers

Offshore Wind Job Opportunities for Mariners

At the advice and guidance of the State's Fisheries Technical Working Group (F-TWG), NYSERDA commissioned a study to:

- > **Understand the skills and qualifications held by the local maritime industry** and the skills required to work in offshore wind jobs to **determine the most applicable jobs to mariners**
- > Identify ways for experienced mariners to **complement their income** and forecast the number of opportunities available
- > Focus mainly on **supplemental part-time work** that would allow for the maritime industry to maintain their traditional means of making a living

Published
TODAY!



National Offshore Wind R&D Consortium

National OSW Research & Development Consortium (NOWRDC)

Goal:

Facilitate a nationally-focused, not-for-profit organization collaborating with industry on prioritized R&D activities to reduce levelized cost of energy (LCOE) of offshore wind in the U.S. and maximize other economic and social benefits

Desired Impacts:

- Innovations directly responsive to the technical and supply chain barriers faced by offshore wind project developers in the U.S.
- Build strong networks connecting technology innovators, investors, and industry
- Increase U.S. content and job opportunities

Consortium Funding:

\$41 M (\$20.5 DOE funds, matched by NYSERDA) – plus state (MA, VA, MD) and member contributions



OSW R&D Solicitations To Date

1st
Solicitation
Closed
12/31/2019
\$17M

2nd
Solicitation
Closed
10/19/2020
Est. \$9M

\$26 million

- ✓ Total 150+ proposals received
- ✓ Total \$20M+ projects selected for award

Pillar 1: Plant Technology Advancement

Pillar 2: Power Resource and
Physical Site Characterization

Pillar 3: Installation, O&M and
Supply Chain Solutions



R&D Awards to date: **13** contracts executed

Lead Contractor	Project Title
NREL	Shared Mooring Systems for Deep-Water Floating Wind Farms
Principle Power Inc.	Innovative Deepwater Anchoring Configurations and Components for Semi-Submersible Floating Wind Farms (DeepFarm)
RCAM Technologies	A Low-Cost Modular Concrete Support Structure & Heavy Lift Vessel Alternative
NREL	A Validated National Offshore Wind Resource Dataset with uncertainty Quantification
Stony Brook University	Computational control co-design approach for offshore wind farm optimization
General Electric Co.	Impact of Low-Level Jets on Atlantic Coast Offshore Wind Farm Performance
Cornell University	Reducing LCoE from offshore wind by multiscale wake modeling
NREL	Wind Farm Control and Layout Optimization for U.S. Offshore Wind Farms
Triton System, Inc.	Innovative Anchoring System for Floating Offshore Wind
Tufts University	Physics based digital twins for optimal asset management
Woods Hole Oceanographic Institution	Development of a Metocean Reference Site near the Massachusetts and Road Island Wind Energy Areas
University of Maine	Design & Certification of Taut-synthetic Moorings for Floating Wind Turbines
Tagup Inc.	Survival Modeling for Offshore Wind Prognostics

R&D Awards to date: additional 12 in contract negotiation with NOWRDC

Lead Proposer	Project Title
Principle Power Inc.	Demonstration of Shallow-Water Mooring Components for FOWTs (ShallowFloat)
Virginia Tech Univ.	Dual-Functional Tuned Inerter Damper for Enhanced Semi-Sub Offshore Wind Turbine
University of Massachusetts Amherst	Techno-Economic mooring configuration and design for floating offshore wind turbines in shallow waters
NREL	20GW by 2035: Supply Chain Roadmap for Offshore Wind in the US
NREL	Development of Advanced Methods for Evaluating Grid Stability Impacts
General Electric Co.	Enabling Condition Based Maintenance for Offshore Wind
General Electric Co.	Radar Based Wake Optimization of Offshore Wind Farms
Crowley Marine Services	Technical Validation of Existing U.S. Flagged Barges as a “Feeder” Solution for the U.S. Offshore Wind Industry
Exmar Offshore Co.	Feasibility of a Jones Act Compliant WTIV Conversion
ESTEYCO SL	Self-Installing Concrete Gravity-Base Substructure Sizing for 15MW Turbine
Texas A&M	Vibratory-Installed Bucket Foundation for Fixed Foundation Offshore Wind Towers
MARIN USA	Comparative Operability of Floating Feeder Solutions

R&D Webinars and Events in 2021

- **March 19:** Grid Interconnection
- **November 8-10:** Annual Technical Symposium
 - Watch recorded video from [2020 Symposium](#)
- **Monthly webinars:** by subject matter, to be announced
- **For more information about NOWRDC:**
info@nationaloffshorewind.org
<https://nationaloffshorewind.org/news>

Coming Soon: Offshore Wind Youth Action Program (OWYA)



- > The Offshore Wind Youth Action Program (OWYA) will include a **toolkit of educational materials and activities** with the objective of engaging middle and high schoolers in learning about offshore wind and getting involved in the clean energy movement
- > Check out the **Nov. 5 Listening Session** on NYSERDA's YouTube channel
- > Visit **nyserdera.ny.gov/OWYA** to sign up for the Program email list

Coming Soon:

Learning from the **Experts**

- > Upcoming webinar series facilitated by NYSERDA's offshore wind team and **featuring outside experts** who will present on key offshore wind technologies, development practices, and research findings
- > To receive notices of upcoming webinars, **sign up for the offshore wind email list at offshorewind.ny.gov**.

Questions?