NEW YORK OFFSHORE WIND SUPPLIER FORUM

9:30 a.m.–10:00 a.m. Welcome and Introductory Remarks
Richard Kauffman, Chairman of Energy and Finance for New York
Welcome and Introductory Remarks
Hon. Kathy Hochul, Lieutenant Governor, New York State

10:00 a.m.–11:00 a.m. Intro to Offshore Wind and New York State Program Update

11:00 a.m.–11:45 a.m. Panel 1: U.S. Offshore Wind: A 2030 Forecast

11:45 a.m.–12:00 p.m. Break

12:00 p.m.–12:45 p.m. Panel 2: Translating European Supply Chain Experience to New York

12:45 p.m.–1:00 p.m. Keynote Address
Alicia Barton, President and CEO, NYSERDA

1:00 p.m.–1:45 p.m. Lunch

1:45 p.m.–2:00 p.m. Break

2:00 p.m.–4:00 p.m. Matchmaking Roundtables

4:00 p.m. Closing Remarks
Welcome and Introductory Remarks

Richard Kauffman
Chairman of Energy and Finance for New York
Keynote Address

Hon. Kathy Hochul
Lieutenant Governor, New York State
Program Update and Intro to Offshore Wind

New York State Offshore Wind

New York State Energy Research and Development Authority
New York State will commit to building:

up to 2,400 megawatts of offshore wind power by 2030, enough to power up to 1.2 million homes.
Achievement of New York’s offshore wind goals will result in significant benefits across the State

- Carbon Reduction
- Infrastructure
- Air Quality & Health
- Workforce
NEW YORK STATE OFFSHORE WIND MASTER PLAN
Charting a Course to 2,400 Megawatts of Offshore Wind Energy

Roadmap for advancing the development of offshore wind in a cost-effective and responsible manner
Collaborating in a 10 GW Regional Market
Advancing interactions between stakeholders

- Environmental
- Maritime
- Commercial Fishing
- Jobs and Supply Chain
New York issued an comprehensive solicitation to develop 800 MW or more of offshore wind power.
Competitive solicitation to purchase ORECs for projects from 200 to 800 MW or more for up to 25 years

Released: November 8, 2018
Bids Due: February 14, 2019
Award(s): April 2019
Contract(s): June 2019
2018 Solicitation: Evaluation Criteria

70% Price
20% Economic Benefits
10% Project Viability
2018 Solicitation:
New York Supply Chain Opportunity

- Economic Benefit Criteria
- NY Supplier Opportunity Requirement
- NY Supply Chain Database
- Project Labor Agreements
- Prevailing Wage Requirements
Empire State Development

ESD offers incentives that make New York an attractive and cost-competitive location for offshore wind businesses.

Beyond traditional incentives, ESD invests in major infrastructure projects that benefit communities and industry.
Fostering offshore wind by investing $15 Million in workforce development and infrastructure advancement
Supporting the growth of an industry by studying

New York’s ports and manufacturing assets

Manufacturing
Staging
Operations and Maintenance
National Offshore Wind Research and Development Consortium

the first federally funded public-private partnership focused on advancing research and development to accelerate the offshore wind industry in the United States
Components of the Offshore Wind Supply Chain
Turbine Array Connected to Shore
Components of the Offshore Wind Supply Chain

Wind Turbines

8–12 MW
Components of the Offshore Wind Supply Chain
Foundations, Offshore Substation, and “Wet Transmission”
Components of the Offshore Wind Supply Chain

Cable-landfall and On-shore Transmission
Components of the Offshore Wind Supply Chain
Installation and Support Vessels
Components of the Offshore Wind Supply Chain
On-shore Marshalling and Equipment Staging

- Nacelle
- Hub
- Blades
- Tower
- Offshore Turbine
- Offshore Substation
- Onshore Substation
- Onshore Services
- Vessels
- Export Cable
- Cable Landing
- Array Cables
- To Onshore Substation
- From Offshore Substation
Offshore Wind Supply Chain Ecosystem

- Offshore Wind Developer
  - Project Development
  - Component Manufacturing ("OEMs & Tier 1")
  - Raw Materials, Parts, and Supply ("Tier 2, 3")

NEW YORK OFFSHORE WIND SUPPLIER FORUM
Offshore Wind Supply Chain Ecosystem

Offshore Wind Developer

- Resource Assessment, Engineering, and Permitting Studies
- Logistics
- Transmission and Interconnection
- Construction and Installation Services
- Turbine Supply Agreements

Component Manufacturing ("OEMs & Tier 1")

Raw Materials, Parts, and Supply ("Tier 2, 3")

2019-2025 New York Phase 1 Projects

NYSERDA
Offshore Wind Supply Chain Ecosystem

Offshore Wind Developer

- Resource Assessment, Engineering, and Permitting Studies
- Logistics
- Transmission and Interconnection
- Construction and Installation Services
- Turbine Supply Agreements

Project Development

Component Manufacturing ("OEMs & Tier 1")

Raw Materials, Parts, and Supply ("Tier 2, 3")

New York Phase 1 Projects (2019-2025)

Blades
Towers
Nacelle
Generator
Foundations

NEW YORK OFFSHORE WIND SUPPLIER FORUM

NYSERDA
Questions?

nyserda.ny.gov/offshore wind
offshorewind@nyserda.ny.gov
Panel 1

US Offshore Wind: A 2030 Forecast

Moderator: Doug Pfeister
Managing Director, North America Renewables Consulting Group (RCG)

Panelists
Bill White, EnBW
Christer af Geijerstam, Equinor
Sunny Gupta, Ørsted
Lars Thaaning Pedersen, Vineyard Wind
Cumulative Offshore Wind Power Contracts Forecast
For six northeastern states through 2030

Source: RCG analysis
Cumulative Offshore Wind Power Contracts Forecast

Example – foundations and vessels

Source: RCG analysis
Cumulative Offshore Wind Power Contracts Forecast

Denmark is a dominant force in European offshore wind turbine manufacturing

Source: RCG analysis
Projects On Line:
- EnBW Baltic 1 – Baltic Sea (48 MW)
- EnBW Baltic 2 – Baltic Sea (288 MW)

Projects Under Development:
- Hohe See – North Sea (497 MW)
- Albatros – North Sea (112 MW)
- He Dreihrt – North Sea (900 MW)

Future Areas for Development:
- Formosa 3 – Taiwan
- Castle Wind – CA
- East Wind – MA, NY, NJ
U.S. Market Entry Priorities:
• Offices in NJ, MA, and CA
• Focus on market opportunities in:
  o New England
  o New York
  o New Jersey
  o California

Goal:
• Develop cost-effective clean energy while maximizing local content, close collaboration with communities and stakeholders
Empire Wind

**Site Key Data**

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<table>
<thead>
<tr>
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<tr>
<td><strong>Area</strong></td>
<td>79,350 acres (124 sqm)</td>
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<tr>
<td><strong>Water Depth</strong></td>
<td>65-130 ft</td>
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<tr>
<td><strong>Distance to shore</strong></td>
<td>From 14 miles</td>
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<tr>
<td><strong>Capacity</strong></td>
<td>Up to 2 GW</td>
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Ørsted pioneered the offshore wind industry and is the global leader with a footprint across Europe, Asia, and the US.

Unrivalled track-record in offshore wind
Ørsted cumulative constructed offshore wind power capacity (MW)

Pre-2009: Project by project
Post-2009: Industrialised approach to planning and execution of offshore wind projects

Selected projects

Vindeby
First offshore wind farm in the world
Turbine capacity: 0.45 MW
Nr. of turbines: 11
Rotor diameter: 35 m
Distance to shore: 1.8 km

Horns Rev 1
First large scale offshore wind farm in the world
Turbine capacity: 2 MW
Nr. of turbines: 80
Rotor diameter: 80 m
Distance to shore: 18 km

Walney Extension
The largest operational offshore wind farm in the world
Turbine capacity: 7.825 MW
Nr. of turbines: 87
Rotor diameter: 154-164 m
Distance to shore: 19 km

Hornsea 1
The world's largest offshore wind farm once constructed
Turbine capacity: 7 MW
Nr. of turbines: 174
Rotor diameter: 154 m
Distance to shore: 120 km

Note 1: Ørsted will, in accordance with the Dutch tender regulation, build Borssele 1 and 2 within four years from November 2016 with a flexibility of 1 year.
Ørsted US Offshore Wind’s Portfolio
Robust and geographically diverse portfolio of offshore wind assets: potential for 10GW

Northern Lease Area
2GW

Southern Lease Area
3.5GW

Virginia
12MW

Block Island
30MW

South Fork
130MW

Skipjack
120MW

Revolution Wind
600MW

RI/MA leases
1.3GW

Garden State Offshore Energy
1.2GW

Ørsted development projects
Deepwater Wind projects in operation
Deepwater Wind projects with revenue contracts secured/soon to be secured
Deepwater Wind development projects
Offshore Wind Installation Harbors
The Harbor Case Studies

Port of Esbjerg, Denmark

<table>
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<tr>
<th>Characteristics</th>
<th>Port Specifics</th>
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<tr>
<td>Harbour Investments</td>
<td>USD 150m (phase 2)</td>
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<tr>
<td>Area Size for Wind</td>
<td>600K sqm / 150 acres</td>
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<tr>
<td>Local Jobs (project*)</td>
<td>150</td>
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Port of Belfast, United Kingdom

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<th>Characteristics</th>
<th>Port Specifics</th>
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<tbody>
<tr>
<td>Harbour Investments</td>
<td>USD 90m (phase 1)</td>
</tr>
<tr>
<td>Area Size for Wind</td>
<td>200K sqm / 50 acres</td>
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<tr>
<td>Local Jobs (project*)</td>
<td>200</td>
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Port of Taichung, Taiwan

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<th>Characteristics</th>
<th>Port Specifics</th>
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<tr>
<td>Harbour Investments</td>
<td>70 (phase 1)</td>
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<tr>
<td>Area Size for Wind</td>
<td>200K sqm / 50 acres</td>
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<tr>
<td>Local Jobs (project*)</td>
<td>250</td>
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Supporting Supply-chain Categories:
- Terminal Operations
- Secondary Steel
- Stevedoring
- Coating Services
- Marine Services
- Equipment Repairs
- Tugboat Services
- Crane Services
- Transport & Logistics
- Construction
- Hospitality Services
- Engineering
- Ship Chandler Services
- Professional Services

Supporting Vocational Categories:
- Electricians
- Mariners
- Carpenters
- Linemen
- Mechanics
- Crane drivers
- Welders
- Truck drivers
- Painters
- Engineers
- Longshoremen
- Office admin

(*) = estimated per installation project excl. port construction and primary component manufacturing related jobs
50/50 PARTNERSHIP:
UNIQUE BLEND OF LOCAL AND GLOBAL EXPERTISE

- **Leading provider** of renewable power in the United States with more than 6,500 MW of owned and operated facilities in 22 states.

- Part of Iberdrola, the **world leader** in the renewable energy industry (30+ GW in operation), and 10 GW of offshore wind under development, construction, or operations.

- **One of the world’s leading** Renewable Infrastructure fund management companies with over $7 billion under management.

- **Long-term, clean energy infrastructure focus** with 6,000+ MW offshore development portfolio in North America, Europe, Asia and Australia.

**VINEYARD WIND**

- **JV Team lead from and focused only on Massachusetts**
  - Offices in New Bedford and Boston
  - World-class technical team with experience building some of the earliest and largest offshore wind farms in the world matched with local staff with first-hand knowledge of the waters, shores, and communities where the project is located.
**PROJECT OVERVIEW**

**COMPETITIVE PRICING**
- 800MW project for MA includes a fixed, low cost for generation and transmission.

**FIRST IN THE WATER**
- December 2017: Submitted state and federal permits with MEPA, EFSB, and BOEM. Most mature large-scale offshore project in US.
- PPA submitted for regulatory approval.
- EFSB hearing and SDEIR conducted.

**ECONOMIC BENEFITS**
- Project will generate $1.87 billion of direct economic benefits to Massachusetts.
- Project will create 3,600 new jobs, beginning in 2018, over 80% of which will be located in Southeastern MA.
- Host Community Agreement with Barnstable providing town revenue during project lifetime.
Panel 2

Translating European Supply Chain Experience to New York

Moderator: Liz Burdock
CEO and President, the Business Network for Offshore Wind

Panelists
Joshua Weinstein, DNV-GL
Jan Jorgensen, Fred Olsen
David Nemetz, JDR Cables
Jason Folsom, Siemens Gamesa
Dirk Kassen, Smulders
Keynote Address

Alicia Barton
President and CEO
New York State Energy Research and Development Authority
Roundtable Sessions
Matchmaking

2:00 p.m. – 4:00 p.m.
Grand Ballroom
Matchmaking

Round 1
Matchmaking

Round 2
Matchmaking Round 4
Matchmaking
Round 5
Matchmaking

Round 6
Matchmaking

Round 7
Matchmaking

Round 8
Matchmaking

Round 9
Matchmaking

Round 10
NEW YORK OFFSHORE WIND SUPPLIER FORUM

Matchmaking

Round 11

NEW YORK STATE OF OPPORTUNITY. NYSERDA
Matchmaking

Round 14
Matchmaking

Round 15
Closing Remarks

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