EBC New Hampshire Program

Offshore Wind – Collaboration
Toward a Gulf of Maine Consortium
Welcome

Robert Varney

Chair, EBC New Hampshire Chapter

President, Normandeau Associates
Welcome to Eversource Energy

William J. Quinlan

President

New Hampshire Operations
Program Introduction and Offshore Wind: A History of Collaboration

Bob LaBelle
Program Co-Chair and Moderator
Retired (BOEM)

Curt Thalken
Program Co-Chair and Moderator
Senior Vice President
Normandeau Associates, Inc.

Environmental Business Council of New England
Energy Environment Economy
Offshore Wind Update: BOEM Process for Planning, Leasing, & Development

Darryl François

Chief, Engineering and Technical Review
Office of Renewable Energy Programs
BOEM
Offshore Wind Update

BOEM Process for Planning, Leasing, & Development

October 24, 2019

EBC New Hampshire Offshore Wind Program

Darryl François, Office of Renewable Energy Programs
Chief, Engineering & Technical Review
Energy Policy Act 2005 Key Mandates

- Outer Continental Shelf Lands Act as Amended
- Safe operations and protection of the environment
- **Coordination** with affected State, local, & tribal governments & relevant Federal agencies
- Fair return for use of OCS lands
Intergovernmental Task Forces

- Affected **State, local, & tribal governments & Federal agencies**
- Does not replace consultation under existing Federal laws & regulations
- **Regional collaboration is key**
- Forum to:
  - **Educate** each other about permitting, statutory responsibilities, & stakeholders’ issues
  - **Exchange data** about biological & physical resources, uses, & priorities
  - **Continue dialogue** about renewable energy activities throughout the leasing process
- **BOEM considers task force input in our renewable energy leasing decisions**
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OCS Renewable Energy Authorization Process

**Planning & Analysis**
- Intergovernmental Task Force
- Call for Information & Nominations (Call)
- Area Identification
- Environmental Reviews
- 2 Years

**Leasing**
- Proposed Sale Notice (PSN)
- Final Sale Notice (FSN)
- Auction
- Issue Lease(s)
- 1-2 Years

**Site Assessment**
- Site Characterization
  (i.e. Geophysical & Geological Surveys, Biological Surveys, etc.)
- Site Assessment Plan (SAP)
  (i.e. Meteorological buoy or tower)
- 5 Years

**Construction & Operations**
- Construction & Operations Plan (COP)
- Facility Design Report (FDR)
- Fabrication & Installation Report (FIR)
- Decommissioning
- 2 Years (+25)
Offshore Wind Development Status

Planning activities
- **NY Bight** – identify wind energy areas; NY lease sale
- **Gulf of Maine** – initial task force meeting December 2020

Leasing
- **15** commercial wind energy leases in the Atlantic (**8** NE)

Site Assessment Plans
- **7 approved** (MA, RI, VA, MD, MA, NJ, NY)

Construction and Operations Plans (COP)
- **5 processing** (**3** in the Northeast)
  - Vineyard Wind (submitted December 2017)
  - South Fork (submitted June 2018)
  - Bay State Wind (submitted March 2019)
  - Skipjack (submitted April 2019)
  - Ocean Wind (submitted August 2019)
- Ongoing survey activity
- **Up to 6 COPs expected** within next 12 months
What’s in a COP? (Construction & Operations Plan)

- Project Plan with supporting data & information for siting, construction, operation, & conceptual decommissioning of a renewable energy facility
- BOEM conducts review to determine if information provided in the COP is sufficient to initiate NEPA review, Section 106, & other consultations
- BOEM issues Notice of Intent to prepare an EIS (Environmental Impact Statement)
- Other items included: Navigation Risk Assessment, Design and Installation Verification Agent, Safety Management System
Northeast Ocean Data Portal is a Resource

- BOEM shares data with the Portal from its sources (Marine Cadastre, Environmental Studies Program Information System); will link to Portal from Marine Minerals Information System
- Portal team added wind project-specific data (COPs & Draft EIS information, related links)
- Stakeholders use the Portal
- BOEM uses the Portal as a tool to inform decisions
For More Information

• Bureau of Ocean Energy Management
  www.boem.gov

• Renewable Energy Program
  www.boem.gov/Renewable-Energy

• A Citizen’s Guide to BOEM’s Renewable Energy Authorization Process
  https://www.boem.gov/KW-CG-Broch/

• Regulatory Information

• Environmental Studies Public Information System (ESPIS)
  https://marinecadastre.gov/espis/#/
Role of the Massachusetts Clean Energy Center (MassCEC)

Bruce Carlisle

Senior Director, Offshore Wind
Massachusetts Clean Energy Center
Offshore Wind
Overview

- MassCEC
- Offshore wind process
- Pre-market efforts and infrastructure investments
- MA procurements
- Observations
Our Mission: Grow the state’s clean energy industry while helping to meet the Commonwealth’s renewable energy, climate, and economic development goals.

**INVEST**
Invest in programs that increase **clean energy adoption** by residents, businesses and communities.

**CONNECT**
Connect employers, job seekers, students, communities and **investors** within and across the clean energy industry.

**INNOVATE**
Help to spur innovation through **infrastructure, funding and technology development support**.
MassCEC – offshore wind

• Advance and support the responsible development of offshore wind and increase local jobs and economic activity in offshore wind

  - **Planning, Analysis and Engagement** – Technical projects and stakeholder engagement on fisheries, wildlife, met-ocean, transmission, etc.

  - **Sector Development** – In coordination with partner agencies, expand MA-based manufacturing and services and workforce development

  - **Research, Monitoring and Evaluation** – Support for and collaboration with MA institutions, with industry and government, to advance technology innovation, learn from early deployments, and expand offshore energy research in Commonwealth
Offshore wind process

- Bureau of Ocean Energy Management lead agency for renewable energy development in federal waters (OCS)
- MassCEC and Energy & Environmental Affairs lead representatives for MA
  - 2009: Formation of Intergovernmental Task Force - advise BOEM in the planning, siting, and analysis
  - 2010-2011: Request for Interest; Call for Interest and Nominations
  - 2011-2012: Identification of Wind Energy Areas
  - 2013 and 2015: Competitive auctions / lease sales
  - 2018: Competitive auction/lease sale
- Fisheries and habitat working groups, community meetings and workshops, public hearings
Request for Interest area

Call for Interest and Nominations area

Wind Energy Area
Pre-market efforts

• Marine surveys and studies: Advancing understanding of distribution and abundance
  - Whales, sea turtles
  - Marine birds
  - Benthic surveys
  - Regional fisheries studies

• Met-ocean data
  - Regional reference and validation site to industry standards

• Transmission studies
  - Infrastructure analysis to connect OSW
  - OSW impacts during severe cold spell
  - ISO study underway on integration of 4-7 GW of OSW
Offshore leases and status

- Orsted/Eversource, #486, 487, 500
  - South Fork Wind - 130 MW (LIPA)
  - Revolution Wind - 700 MW (RI & CT)
  - Sunrise Wind - 880 MW (NY)
  - Bay State Wind
- Vineyard Wind (CIP/Avangrid), #501
  - Vineyard Wind 1 - 800 MW (MA)
- Equinor, #520
- Mayflower Wind (Shell/EDPR), #521
- Vineyard Wind 2, #522
Massachusetts procurements

• 2016 energy diversity law: utilities to solicit 1,600 MW of cost-effective offshore wind
• 2017 - DOER and utilities issue 1st RFP for long-term contracts for offshore wind energy
  - 400 MW base proposal, up to 800 MW
  - Generator lead line and expandable transmission
  - 3 developers: multiple bids 200 – 800 MW
• Vineyard Wind selected for 800 MW project in May 2018; contract approved April 2019
• RFP #2: Bids received August 23, selection of project(s) November 8
Massachusetts procurements

• 2018 statute increasing procurement to 3,200 MW, pending study:
  - Necessity, benefits and costs
  - DOER may require utilities to jointly and competitively solicit and procure proposals for offshore wind energy transmission

• DOER study released May 31, recommended:
  - Moving forward with up to 1,600 MW
  - Predictable procurements: 800 MW in 2022, 2024 and, if necessary, 2026
  - Potential for separate solicitation for independent transmission in 2020 prior to OSW solicitation in 2022
Sector development

- Ports and infrastructure assessment
- OSW Supply Chain Directory – inventory of business information and capabilities
  - Version 2.0 release late September
- Supply chain forums - Connecting OSW industry with local businesses
- MassCEC FY20 grant solicitation OSW supply chain and infrastructure ~$1.25M
- Workforce training and development
  - MassCEC grant awards FY19 - $720,000
  - GWO safety and technical training
  - Education programs and certificates
  - MassCEC FY20 grant solicitation ~$1M
Observations

- BOEM Task Force is an excellent framework for the OCS process; but it needs to be augmented by state-led stakeholder and community engagement.
- Market conditions in US have changed significantly in the past 3 years.
- Robust spatial data to support a planning and siting process; but more information will be needed.
- MA, NH, and ME are well-positioned for the regional coordination and collaboration that will be required for Gulf of Maine.
State Agency Perspectives:
Offshore Wind Overview

Joe Doiron

Deputy Director &
State Energy Program Administrator
NH Office of Strategic Initiatives
New Hampshire Energy Outlook

Joe Doiron

October 24, 2019

Manchester, NH
About OSI

- OSI provides information, data & guidance to assist decision-makers on issues pertaining to energy use, development, land protection & community planning.

- We guide the state's future growth through public policy development, education, research, & partnership building.
Energy Division

- The Office of Strategic Initiatives operates several Energy Programs in partnership with both private and public entities to promote a sustainable, environmentally sound and least-cost energy future for New Hampshire.

- We function as the Governor’s Energy Office & we are administratively attached to the Office of the Governor.
Offshore Wind Task Force

- 1/2/19: BOEM Request Letter from Gov. Sununu
- 2/7/19: Meeting with Acting Director Cruickshank
- 4/17/19: BOEM Acknowledgment Letter
- Regional effort with Maine & Massachusetts
- Separate NH state level inter-agency working group
- Additional state focus on transmission planning, environmental impacts, and economic development
Task Force Meeting

- December 12th is the tentative date
- More details available within the next two weeks
- TBD location
- Task Force membership TBD
Regional Partnership

- Collaborative
- Positive working relationship
- Constant communication
- “Enough of the pie to go around”
Offshore Wind Observations
Gulf of Maine has some of the best wind resources anywhere in the world

Considerably stronger than mid- and southern Atlantic coast states
Federal Waters in Gulf of Maine

- Federal Waters are between 3 to 200 miles offshore
Gulf of Maine Bathymetry

- Gulf of Maine will likely require floating offshore wind turbines, due to water depth >100 meters
- This technology is not yet at commercial scale, but rapidly nearing.
Policy Observations
Consistent with the 10-Year State Energy Strategy. (Including)

- Ensuring a secure, reliable, & resilient energy system.
- Adopt all-resource energy strategies & minimize government barriers to innovation.
- Achieve environmental protection that is cost-effective & enables economic growth.
Cost Effectiveness

- All signs point to a future in which offshore wind is more affordable and reliable.
- Addressing energy costs is a critical goal for New Hampshire.
- Studies conducted for the Vineyard Wind project, have shown the potential for savings in regional wholesale electric prices.
Vineyard Wind Historical Analysis

- In January 2018, New England experienced a “bomb cyclone” with prolonged freezing temperatures.
- Due to winter constraints of natural gas supply, due to limited pipeline infrastructure, wholesale electric rates spiked as high at $436/MWh on Jan 5th, 2018.
  - Equivalent to 43.6 cents/kWh
  - For perspective, current default service energy rates are approximately 9 cents/kWh
Vineyard Wind Historical Analysis

- Vineyard Wind has contracted with MA to build an 800MW offshore wind farm.
- Using actual weather data during the 2018 “Bomb Cyclone,” Vineyard Wind commissioned a study to model their potential impact, had their project been operational during the 4 day period in 2018.
Vineyard Wind Historical Analysis

- “An 800 MW wind farm would have produced enough lower-cost electricity to reduce regional wholesale electric prices by nearly $20 per megawatt hour (MWh), saving New England customers over $31 million”
- “An in-service 800 MW wind farm would have reduced carbon dioxide (“CO2”) emissions from New England power generators by 67,485 metric tons – the equivalent of removing 14,358 cars from the road for a year.”
Environmental Policy

- Potentially the least cost option in a region in which there is a patchwork of aggressive GHG emission reduction goals.
- Emissions reduction through economically competitive resources.
Benefits

- Addresses high energy costs
- Renewable generation
- Economic (jobs, supply chain, etc.)
- Reliability and resiliency applications for the grid
Governor Sununu is 100% supportive of pursuing Offshore Wind in the Gulf of Maine.

New Hampshire is ramping up for Offshore Wind

This is a long process of stakeholder engagement, permitting, and siting of potential future resources

Likely 6-10 years away from operational wind farms in the Gulf of Maine
Questions?

Joe Doiron
Joseph.Doiron@osi.nh.gov
603-271-2155

Offshore Wind Lead:
Matthew Mailloux
Matthew.Mailloux@osi.nh.gov
State Agency Perspectives: Economic Opportunities

Taylor Caswell

Commissioner

NH Department of Business & Economic Affairs
State Agency Perspectives: Protecting New Hampshire’s Ocean & Coastal Resources

Ted Diers
Administrator
Bureau of Watershed Management Administration
NH DES

Doug Grout
Chief of Marine Division
Department of Fish and Game
State of New Hampshire
Protecting New Hampshire’s Ocean and Coastal Resources AND Uses

Ted Diers, Administrator
Watershed Management Bureau
New Hampshire Department of Environmental Services
Northeast Regional Ocean Council (NROC)

- Formed in 2005 by New England governors

- Federal partners participate as equals (rotating state and federal co-chairs)

- Concurrence between NROC priorities and EO 13840
  - Improve access to data to inform decisions
  - Facilitate coordination among Federal, State, tribal, and local governments, ocean industries, and other ocean stakeholders
Northeast Ocean Data Portal

- Source of over 4,000 map products showing the footprint of activities and resources
- Federal, state, and stakeholder provided data
- Customized to address regional stakeholder and agency needs
- Informed and vetted by regional stakeholders and experts

www.NortheastOceanData.org
COMMERCIAL FISHING DATA VIEWS
[VESSSEL MONITORING SYSTEM DATA]

March 10, 2017
BOEM announces
3 unsolicited bids
for offshore wind
leases in federal
waters south of
MA and NY

March 1
fewer
views before

April 14, 18 - 20
New England Fishery
Management Council
meetings

greater and more frequent
views after

INCREASE IN
OVERALL SITE USE &
DATA DOWNLOADS

Bandwidth increased
7x
2015-2018

Wind farm
proposals
vs. squid
fishing

SOURCE: Energy Management, Deepwater Wind, Bureau of Ocean
Energy Management, Northeast Ocean Data
Northeast Ocean Data Portal - Selected Uses

**Planning and Management**
- USCG Port Access Route Study (PARS) – Nantucket Sound
- US Navy identify areas for testing underwater autonomous vessels and potentially affected stakeholders
- CT Blue Plan for Long Island Sound
- NYSERDA Offshore Wind Master Plan
- Boston Harbor Barrier Feasibility Study
- MA oil and hazardous materials flow study

**Regulatory and Siting**
- Offshore wind – used by developers, consultants, states, federal agencies, and stakeholders
- NEMAC Mussel Farm sited in Mass Bay – first shellfish farm in federal waters on Atlantic Coast
- Manna Fish Farm Alternative Siting Analysis
- Proposed Atlantic Link Transmission Cable through the Gulf of Maine – proposed and alternative routes and permitting process details provided via Portal

**Regulatory and Siting (continued)**
- EPA to review other agency EA and EIS and comment on other agency actions
- USACE Regulatory Division permitting
- BOEM Guidelines for Renewable Energy Activities

**Education and Research**
- UMass Dartmouth; UMass Boston
- UMaine
- Brown
- Boston University
- URI
- Island Institute
- Pew
What’s in it for NH?

- Small state in a big ocean.
- Limited say in activities in federal waters
- Limited resources for data collection and evaluation
- Learn from others
Resources and uses

• Offshore nexus to state coastal resources

• Users/resources have to be FROM somewhere and going TO somewhere

• Coastal communities are already impacted

• What do you care about?
Groundfish Fleet Activity via VMS (2015-2016)
Gillnet Fishery Activity
(Total and 90% Activity via multiple Ports via VTR (2011-2015))
AIS Vessel Tracking Data (2017)
Baleen Whale Abundance (2019)
Commercial Whale Watching Areas (2015)
Mixed Ocean Uses

![Map of Mixed Ocean Uses](image-url)
Coastal and ocean uses and resources

603-271-3289
Ted.Diers@des.nh.gov
New England Fishery Management Council
Roll in Offshore Wind Energy Development

Doug Grout
Chief of Marine Fisheries
NH Fish and Game Department
Fisheries Conservation and Management Act (1976)

- Expanded Federal Jurisdiction – Exclusive Economic Zone (200 mile limit)
- Created the Councils (NOAA Fisheries/Councils Process)
- Established National Standards
- Requirements for Fishery Management Plans (FMPs)
  - Consistent with National Standards
  - Mandatory and Discretionary Components
  - Relation to Other Applicable Laws (OALs)
  - Commerce Department Secretarial Review
- Essential Fish Habitat (EFH; Designations and Consults)
Develop and amend fishery management plans for approval/implementation by the National Marine Fisheries Service (NMFS) on behalf of the Secretary of Commerce.
Council Membership

• Voting members (18 on NEFMC)
  - Federal designee – (NOAA Fisheries Regional Administrator)
  - State designees - marine fishery management official
  - Appointed by Secretary of Commerce from Gov. recommendations

• Non-voting members
  - USFWS Regional Director
  - USCG Regional Commander
  - Executive Director of Marine Fisheries Commissions
  - US Department of State representative
• **Council Staff**
  - Executive Director
  - Technical staff
  - Administrative staff
  - Plan Development, Action, and Monitoring Teams

• **Advisory Groups**
  - Advisory Panels
  - Scientific and Statistical Committee
  - Other groups?
Conduits for Public Input

- Fishing Community (fishermen, processors, group reps.)
- State Fisheries Officials (represent stakeholder interests in states)
- Others (scientists, ENGOs, public/seafood consumers)
Why are the Councils engaged with the process of Offshore Wind Energy Development?

Potential Impacts to:
- Marine Resources (fish, shellfish, ecosystem, etc.)
- Science surveys that monitor marine resources
- Essential Fish Habitat
- Fisheries
1. Scale and scope
   - 15 commercial wind energy leases in the Atlantic
   - Upcoming lease sale in New York

2. Site Assessment Plans (SAP)
   - 7 approved (MA, RI, VA, MD, MA, NJ, NY)

3. Construction And Operations Plans (COP)
   - 4 project in progress (Vineyard Wind, South Fork, Bay State Wind and Skipjack)
   - 7 additional projects expected within next 12 months
Fall 2010-2016
Northeast Fishery Science Center Trawl Survey Biomass, Winter skate
Affected Northeast Fisheries Science Center surveys

• Nearly all long-term fishery-independent surveys will be affected.
  ▪ Integrated benthic/Atlantic sea scallop
  ▪ Spring and autumn bottom trawl
  ▪ Surf clam
  ▪ Ocean quahog
  ▪ EcoMon (plankton, physical oceanography)
  ▪ North Atlantic Right Whale
Vessel Operation Impacts

- Survey Vessel is four stories high (85’ air draft). Vessel may not clear the turbine blades.
- Survey Vessel currently restricts operations to > 1 n mi from Block Island wind installation.
- NOAA aerial surveys will have to operate at higher altitudes. (Dolphins will not be detectable.)
• **Mid-Atlantic Fishery Management Council (MAFMC)**
  - Share information and updates
  - Collaboratively draft comments to BOEM
    - Allows for coordinated messaging from both Councils
    - Shares the workload of reviewing materials and writing comments
    - Ensure that important issues aren’t missed
    - Councils share offshore energy policies – these originated with MAFMC
  - Maintain joint offshore wind webpage (http://www.mafmc.org/northeast-offshore-wind)
    - Includes background information, links
    - Councils comments
    - Notices to mariners
• **NOAA Fisheries wind team**
  - Cross-disciplinary team of NOAA Fisheries staff at Regional Office in Gloucester and North East Fisheries Science Canter (NEFSC)
  - NEFMC and MAFMC staff participate to the extent possible given agency guidelines and ability to share information
  - Team briefings are critical for staying up to date on developments (monthly calls, email distribution list, internal website)
  - Divide and conquer approach to attending numerous wind-related meetings
  - Team approach is great for sharing concerns about projects and analytical approaches/workload
  - Provides information on location of marine resources, fisheries and ocean habitat and impacts to surveys
NEFMC partnerships

- **RODA** – Responsible Offshore Development Alliance (https://rodafisheries.org/)
  - Broad membership-based *coalition of fishing industry associations and fishing companies* with an *interest in improving the compatibility of new offshore development with their businesses.*
  - Overlap in leadership and membership with Council
  - Share information about RODA initiatives via Council meetings and mailings
  - Council staff can provide technical expertise to support RODA’s efforts
NEFMC partnerships

• **ROSA** - Responsible Offshore Science Alliance
  - independent organization dedicated to providing for and advancing regional research and monitoring of fisheries and offshore wind interactions in federal waters through collaboration and cooperation in order to:
    - (a) Increase salient and credible data on fisheries and wind development; and
    - (b) increase the understanding of the effects of wind energy development on fisheries and the ocean ecosystems.
  - Members: wind energy developers, fishing industry representatives, NOAA Fisheries, States, Councils
  - Council has a seat on the Executive Council, and will be involved in technical committees
NEFMC partnerships

- **Offshore wind developers**
  - Distribute information via Council meetings and mailings
  - Provide updates at Habitat Committee and Council meetings
  - Informal staff to staff connections to stay up to date on projects
NEFMC adopted policies on offshore energy development in June 2018 (link to policies)

Will be considering whether updates are warranted given potential for floating offshore wind in the Gulf of Maine

Council has sent 13 comment letters related to renewable energy since 2011; 8 of these during 2018-2019 (link to letters)

Collaborate to develop comments (MAFMC and NOAA Fisheries staff) and draft letters (MAFMC staff)

Work through Habitat Committee and/or full Council
Council Policy on Wind Energy

• **Policy Goal:** The Council supports policies for US energy development including wind energy development and operations that will sustain the health of marine ecosystems and fisheries resources while minimizing the risks to the marine environment and fisheries.
1. **Best management practices** should be employed to avoid adverse impacts on fish habitat & prevent conflicts with other user groups, including recreational and commercial fisheries.

2. **Developers** should engage early with the fishing industry and Federal and state agencies.

3. **Transmission cables** should not be placed in areas with sensitive fish habitat such as shellfish beds, fish spawning and/or nursery habitat areas, submerged aquatic vegetation (SAV), or hard/structured habitat.
4. The **best available technology** should be utilized for **transmission cable installation** to **reduce potential impacts on aquatic ecosystems**. This may include horizontal directional drilling to avoid impacts to sensitive fish habitat.

5. **Transmission cables** should be **buried to an adequate depth to reduce conflicts with other ocean uses**, including fishing operations. **Cables should be monitored after installation** to ensure bathymetry is restored, and after large storm/meteorological events to ensure cables remain buried.

6. Project proposals should **evaluate the expected impacts from scour and sedimentation beyond the footprint of the wind facilities**. These should consider changes in currents. These **scour impacts should be minimized to the extent possible**.
7. Wind service platforms should implement adequate fuel spill response plans and protocols for support vessels and platforms, and these plans should:

- Include the identification of sensitive marine habitat;
- Include methods to track the movement of spills;
- Ensure adequate response equipment is immediately available; and
- Allow researchers to have timely access to impacted areas, as needed.

8. Research and monitoring should be conducted to better understand the impacts of persistent electromagnetic fields around transmission cables on aquatic species.
9. **Noise generated by wind facilities should be minimized**, including sounds produced **during surveys** (e.g., survey vessels), **construction** (e.g., pile driving, hammers), and **operations** (e.g., spinning turbines). **Research and monitoring** should be initiated to evaluate the **short- and long-term impacts of wind facility noise** on the environment/ecosystem.

10. **Safety and navigation threats** (e.g., radar disruption, vessel collisions, and security threats) should be **routinely monitored** in **areas** where **fishing operations** are permitted **near wind facilities**. Safety issues should be efficiently identified and addressed using best management practices.
11. The Council supports the development of a compensatory mitigation fund for damages that occur to the marine environment and fish habitat as well as damages to fishing vessels, their gear, and operations/revenues, as a result of wind activities.
• Questions?
Offshore Wind Developer Perspectives

Ken Bowes
Vice President, Offshore Wind Siting & Permitting
Eversource Energy

Bill White
Managing Director
EnBW North America

Environmental Business Council of New England
Energy  Environment  Economy
Offshore Wind Power
New England’s Next Great Maritime Industry

October 24, 2019
Regional Energy Landscape

Since 2013, More Than 4,600 MW of Generation Have Retired or Announced Plans for Retirement in the Coming Years*

- An additional 5,000 MW of remaining coal and oil are at risk of retirement
- These resources have played a critical role in recent winters when natural gas supply is constrained
- With no additional gas pipeline capacity the region will need reliable alternatives
- Offshore wind will be an important part of the solution

*ISO-NE 98
Offshore Wind Opportunity

Offshore Wind can support the region’s priorities for economic development and reduce energy costs

- In recent years, New England residents and businesses have borne some of the highest energy costs in the nation
- Utility scale offshore wind provides reliable, low cost renewable power with limited visual impact
- Large scale projects create incentives to draw supply chain and grow local economies
- Deployment of new technologies has driven significant cost reduction globally and regionally

Benefits of Offshore Wind:
- Create jobs in emerging high tech industry
- Support local and regional economies
- Provide low cost, clean energy
- Meet reliability needs
- Achieve New England’s carbon reduction goals
Our Partnership Continues to Grow

**Global Leadership**
20+ years experience building offshore wind farms

**Proven Expertise**
25 successful offshore wind farms totalling 5.6 GW capacity

**Record of Success**
On-budget and on-time large-scale projects

**Transmission Expertise**
Premier energy company and electric transmission builder in New England

**New England Roots**
Deep-rooted knowledge of the region’s electrical system

**Longstanding Leader**
100+ year history of operation in Connecticut

Our Partnership

Recently expanded unregulated partnership in Northeast offshore wind assets

Now the largest offshore wind developer in the U.S.

**Partnership includes:**
- Bay State Wind (MA)
- Constitution Wind (CT)
- Revolution Wind (RI & CT)
- South Fork Wind (NY)
- Sunrise Wind (NY)
- Additional lease areas off Southern New England
Capacity Factors

*Offshore wind enjoys the highest capacity factors among renewable energy sources*

- **Large Imported Hydro**: > 95%
- **Offshore Wind**: 50-60%
- **Onshore Wind**: 37%
- **Solar**: 15-25%

### Offshore Wind Generation vs Electricity Demand During Afternoon Hours (January)

- **Offshore Wind Profile**
- **Electricity Demand**
Offshore wind is projected to grow from 30 MW today (Block Island) to 17,000+ MW by 2030 and is expected to create approximately 160,000 new U.S. jobs.
Ports & Installation Vessels Are A Key Infrastructure Constraint For This New Industry

Our vision is to develop New London State Pier Into World Class Offshore Wind Hub

- Strategically located close to Lease Areas
- Well-protected harbor with deep-water access enables utilization of next-generation Installation Vessel
- Existing sophisticated marine industries and workforce
Thank you
EBC New Hampshire Offshore Wind Program: Collaboration Toward a Gulf of Maine Consortium

Bill White, Managing Director
EnBW North America

Manchester, NH
October 24, 2019
EnBW AG is a fully integrated German utility

### One of the largest German utilities
- 5.5 m customers
- 13 GW generation portfolio
- Stable shareholder structure
- 22,000 employees

### Balanced risk-return profile
- Focus on renewables and grids
- ~68% EBITDA contribution from low-risk business
- Solid investment grade ratings

### Key financial figures
- Revenue: €21 bn ($23.5 bn)
- Adj. EBITDA: €2.2 bn ($2.5 bn)
- Group net profit/loss: €0.3 bn ($0.34 bn)

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**Four business segments**

<table>
<thead>
<tr>
<th>Sales</th>
<th>Grids</th>
<th>Renewable Energies</th>
<th>Generation &amp; Trading</th>
</tr>
</thead>
</table>

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1. As of 31 December 2018
2. E&P Business (Exploration & Production) via VNG Norge AS sold in 2018 (closing was in autumn 2018)
Energiewende: Bringing a German concept to the U.S.

- *Energiewende* is the German vision for an immediate and revolutionary transition to a clean, reliable, and affordable energy supply.

- Following Fukushima, EnBW, as a major German utility, began transforming its own energy fleet by advancing renewables, including offshore wind.

- EnBW constructed Germany’s 1st commercial offshore wind farm and is completing two projects in the North Sea that together will be Germany’s largest offshore wind project.

- EnBW has nearly 1,000 MW offshore wind operating and an additional 3,000 MW offshore wind under development globally.

- Through EnBW North America, EnBW is bringing its German expertise and commitment to creating clean and affordable energy to the U.S.

Dr. Frank Mastiaux, CEO - EnBW AG

“As the developer of Germany’s first commercial-scale offshore wind project, EnBW is excited to join states on both coasts in their dedication and efforts to meet their clean energy and climate change goals.”
EnBW | Offshore wind portfolio

EnBW Hohe See: 497 MW
EnBW Albatros: 112 MW
- 71+16 = 87 x Siemens SWT 7.0-154 on monopile foundations
- Commissioned in 2019
- Shareholders: ~50.1% ENBW & ~49.9% Enbridge

EnBW Baltic 2: 288 MW
- 80 x Siemens SWT 3.6-120 on monopile and jacket foundations
- Commissioned in 2015
- Shareholders: ~50.1% ENBW & ~49.9% Macquarie, PGGM & ArVW

EnBW Baltic 1: 48.3 MW
- 21 x Siemens SWT 2.3-93 on monopile foundations
- Commissioned in 2011
- Shareholders: ~50.1% ENBW & ~49.9% 19 municipal utilities
- 1st commercial offshore wind farm in Germany

EnBW He Dreih: ~900 MW
- Winner in first German offshore tender
- 1st and largest zero subsidy bid
- Commissioning planned for 2025
EnBW North America’s goals for the North American offshore wind market include:

- Delivering clean, renewable power at an affordable price
- Helping states to meet and advance their clean energy and climate targets
- Working collaboratively with the states and local communities as partners throughout the lifetime of the project while advancing economic development priorities
- Supporting fisheries and marine wildlife protection efforts
EnBW North America’s Interests in U.S.

**US West Coast**
- EnBW NA is the majority owner of Castle Wind LLC, developing the first floating offshore wind project with local developer Trident Winds
- E3 study finds that CA will need approximately 10 GW offshore wind by 2040 to reach its SB100 targets at the least cost
- Castle Wind has signed a Community Benefit Agreement with the City of Morro Bay, a fishermen’s agreement with local fishermen, and an MOU with local Monterey Bay Power Community

**US East Coast**
- EnBW North America formed project development company East Wind LLC
- East Wind participated in the BOEM Massachusetts auction with an exit bid of $128MM
- Engaging with BOEM, NY, and NJ in the establishment of the New York Bight WEA
- Working with NH, MA, ME on advancing offshore wind in Northern New England
- Offices in Boston & Jersey City
Regional Wind Speeds

Northeast Ocean Data, 2019.
Regional Water Depths

Northeast Ocean Data, 2019.
Regional Vessel Traffic (2017)

Northeast Ocean Data, 2019.

2017 All Vessel Transit Counts
- > 500
- 200 - 500
- 100 - 200
- 60 - 100
- 40 - 50
- 20 - 40
- 10 - 20
- 1 - 10
Evolution of Massachusetts Area

Massachusetts Call Area, 2010.

Massachusetts Wind Energy Area, 2012.
Suggestion: Multi-State Wind Energy Area
Moderated Discussion

Moderator: Barry Needleman, McLane Middleton

Panelists:

• Ken Bowes, Eversource Energy
• Taylor Caswell, NH Department of Business and Economic Affairs
• Darryl François, BOEM
• Bill White, EnBW North America
EBC New Hampshire Program

Offshore Wind – Collaboration
Toward a Gulf of Maine Consortium