Ørsted U.S. Offshore Wind

Presentation to UMass - Amherst

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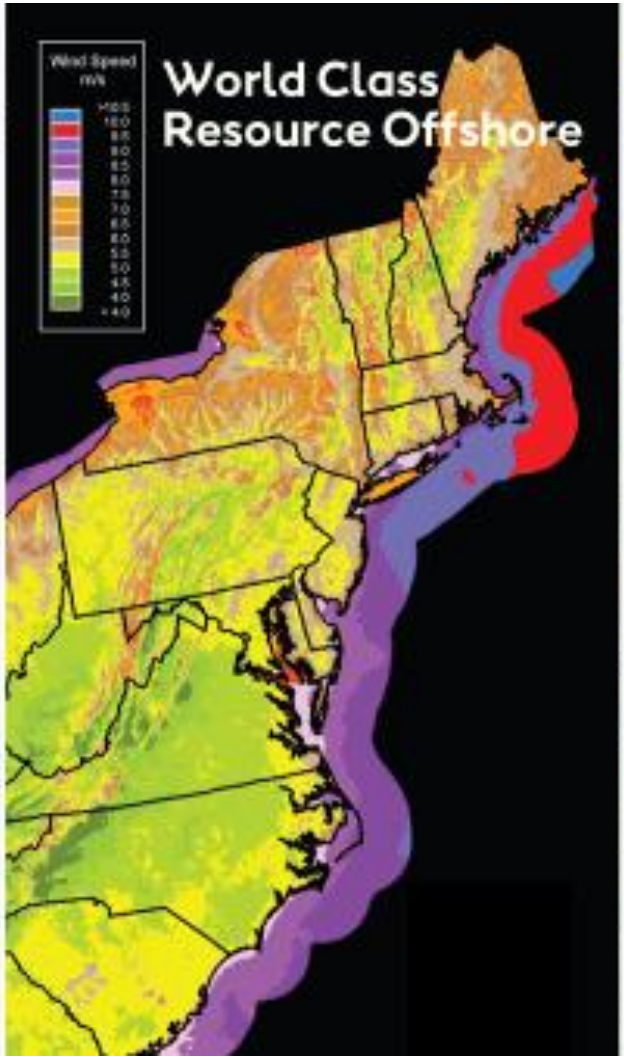
March 2020

Why Offshore Wind for New Jersey and the Region



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Ørsted offshore: global overview

Ørsted is the global leader in offshore wind

Over **5,600MW** in operation

Over **4,300MW** under construction

~1,150 turbines spinning world-wide

25 offshore wind farms in operation

1991 → **2019**

25+ years of experience and unparalleled track record

The world's **first**

America's **first**

The world's **largest**

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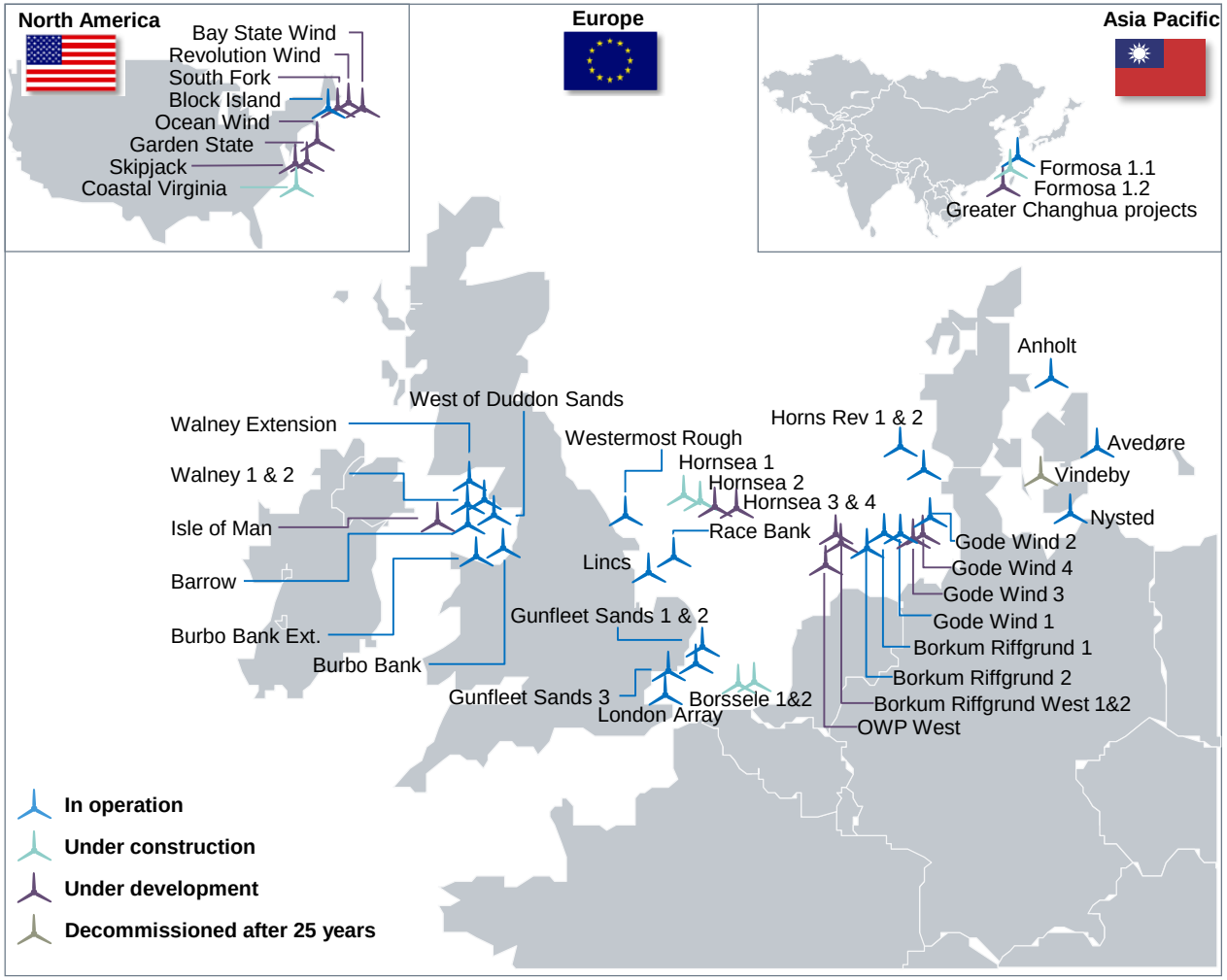
Ørsted Offshore overview

Ørsted offshore wind global footprint



Unparalleled experience and track record

1991 — 25+ years of experience and track record in the offshore wind power sector — 2018

26 offshore wind farms in operation

5 offshore wind farms under construction

5.6 GW Constructed capacity

~ 2,450 Dedicated employees

3.4 GW under construction

13 million people with clean electricity

~ 1,150 turbines World's leading operator

23 Partnerships

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Ørsted U.S. Offshore Wind

Attractive and geographically diverse portfolio of offshore wind assets: potential for 8-10GW

In Operation

Block Island Wind Farm 30MW

Awarded

Revolution Wind (50-50 JV w/ Eversource): 704MW (400MW to RI, 304MW to CT)

South Fork Wind Farm (50-50 JV w/ Eversource): 130MW

Sunrise Wind (50-50 JV w/ Eversource): 880MW

Ocean Wind (with the support of PSEG): 1,100MW

Skipjack Wind: 120MW

Coastal Virginia Offshore Wind (EPC contract): 12MW demo project

Under Development

Bay State Wind (50-50 JV w/ Eversource): up to 2GW

Garden State Offshore Energy (50/50 JV with PSEG): up to 1GW

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Ørsted built a strong integrated end-to-end business model

Ørsted Offshore core competencies

~2,450 Full-time employees

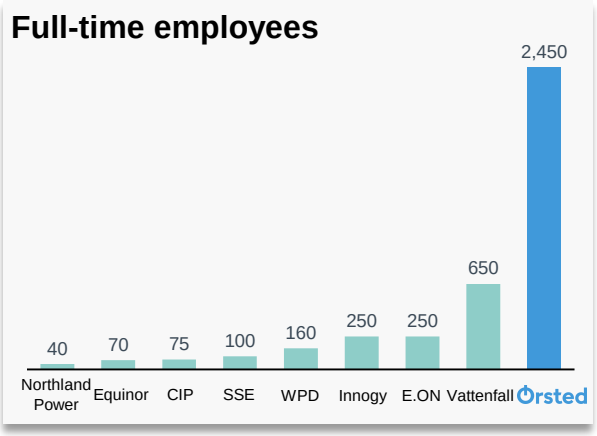
Develop ~250
Identify and mature projects

Build ~1,300
Manage construction, sourcing and supply

Operate ~700
Conduct life-cycle maintenance

Own ~200
M&A, attract capital through partnerships, asset management

- ✓ Ability to **design and optimise** projects with a **'total life-cycle cost of wind farm'** mindset
- ✓ Experience and expertise along the entire value chain allow for **better understanding and management of risks**
- ✓ End-to-end model reduces LCoE through **fast** feedback and **learning** across the entire organisation



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Environmental stewardship

- √ Environmental stewardship is our core principle: **we believe the world should run entirely on green energy**
- √ Seamlessly **collaborated and coexisted** with the fishing community and marine life for 25+ years
- √ Hired a dedicated **marine biologist** focusing on protecting marine mammals
- √ Hired local **Fisheries Liaisons** to work directly with the local fishing community

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Engagement across the spectrum of stakeholders

Local community –

Engagement early and often in the local communities near the project location

NGOs –

Local, state, regional, and national non-profits

Fishing –

Commercial and recreational, plus shore-side supply chain

Academic –

University, college, and other academic partners

Research and Development –

National labs, research institutions, private entities

Stakeholder Challenges Have Plagued the Industry

Long Island Offshore Wind Park contract with LIPA terminated in 2007

- Organized opposition group in Nassau County delayed state and federal permits

- Delays resulted in contract missing its guaranteed construction start date

Bluewater Wind Delaware contract with Delmarva Power terminated in 2011

- Rejection of cable landfall by Bethany Beach, DE delayed state permits

- Delays resulted in contract missing its guaranteed construction start date

Cape Wind contracts with Massachusetts utilities terminated in 2014

- Rejection of cable landfall and an organized opposition group delayed financial close

- Delays resulted in contract missing its guaranteed construction start date

Block Island Wind Farm delayed by over a year

- Rejection of cable landfall and an organized opposition group delayed permitting

- Project survived because contract allowed sufficient time to commence construction

(1) Local communities and organized stakeholder groups have a very significant ability to delay projects

(2) "Winning" a permit or a lawsuit isn't enough, because opponents need only to delay projects until they can't meet their guaranteed in-service dates

Stakeholder Engagement – General Principles

- **Outreach** that supports robust, inclusive, and transparent public involvement
- **Engagement** that occurs early and often, to offer stakeholders the opportunity for meaningful impact in the project development phase
- **Communication** that is consistent yet specific to each stakeholder group, in content, format, and delivery

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Stakeholders – support vs opposition

- Stakeholder engagement is as much about cultivating support as anticipating and culling opposition
- Need a balanced strategy that addresses both facets
- Sometimes "getting to neutral" is the main goal and accepting the fact that you will likely never get to no opposition
  - Example: recent meeting with NJ NGO

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Most Prominent Stakeholder Concerns

- Viewshed
- Local impacts at landfall locations
- Impacts to existing ocean users
  - Commercial fishing
  - Recreational fishing
  - Shipping and other maritime uses
- Environmental issues
  - Impacts to whales during construction
  - Don't forget the birds!
- Cost

NEPA: The Formal Opportunity for Stakeholder Feedback

- National Environmental Policy Act (NEPA)
- Early engagement may help obviate or limit the negative comments received
- Several opportunities in the process
  - Scoping process/NOI
  - Draft EIS
  - Final EIS

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Early engagement can be a double-edged sword

- Early engagement can help get provide feedback into the permitting team and engineers to influence project design, however…
- Early engagement usually lacks sufficient detail to satisfy the more particular and sophisticated stakeholders
  - For example, inquiries from local mayors of the specific benefits to their communities

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Project Design Envelope

- BOEM adopted guidance on the concept in January 2018
- Model that has been used in Europe in offshore wind development to help accommodate for rapid advancements in technology, etc
- Opportunity to submit a range of alternatives in the Construction and Operation Plan
- Can present a challenge to stakeholders in understanding the true scope of the project
- Can invite more scrutiny than needed if project developer is not careful in managing both the potential maximum or minimum extents of potential impacts

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Developer Coordination and Collaboration

- Critical to the success of the industry
- Careful to not trigger anti-competition rules
- Using trade groups such as AWEA and the Business Network for OSW
- For example, regional science initiatives (ROSA)

Developing a Stakeholder Engagement Plan – Key Sectors

1. Commercial fishers
2. Recreational fishers
3. Consumer and ratepayer advocate
4. Elected officials
5. Tribes
6. Labor and business
7. Coastal communities
8. Academic institutions and universities
9. Non-governmental organizations
10. Regulators and agencies
11. Submarine cables & offshore infrastructure
12. Maritime and shipping community
13. Onshore utilities
14. Media outlets and reporters

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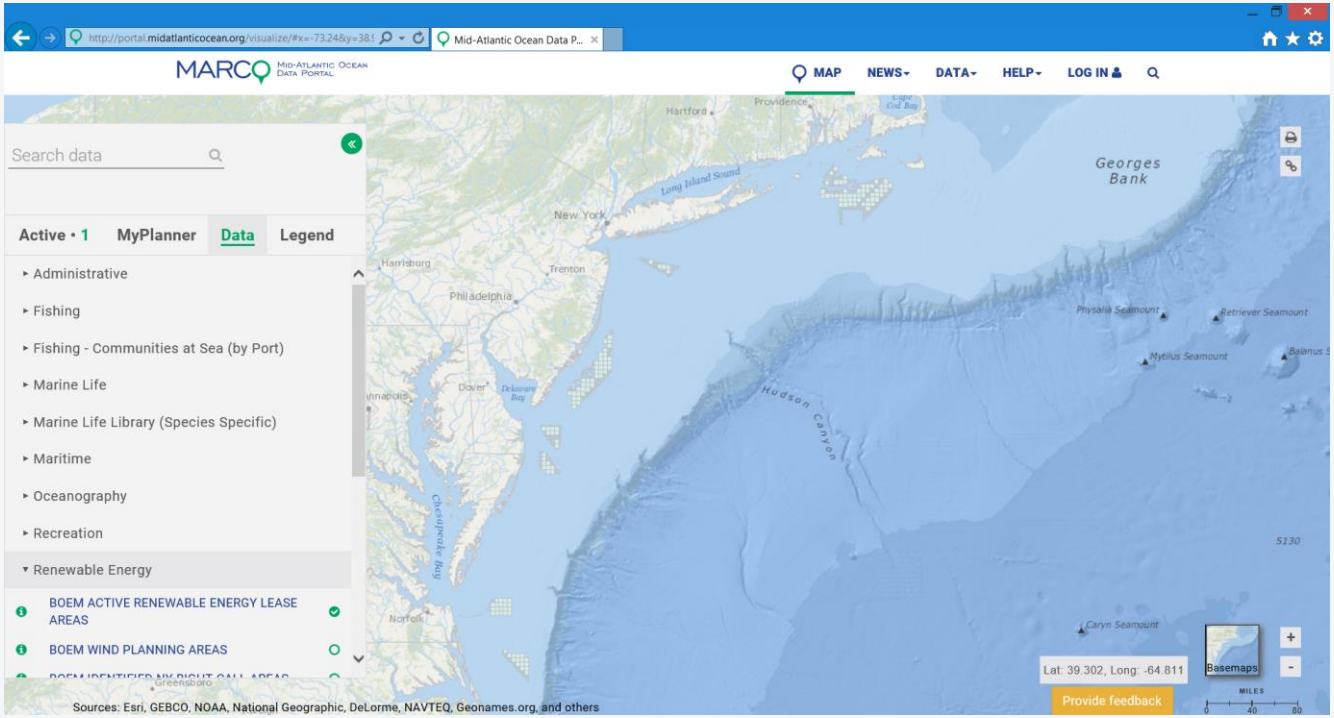
Using Spatial Data – MidAtlantic Regional Council on the Ocean



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Developing a Stakeholder Engagement Plan – Commercial Fishing

- Serious threat to offshore wind development
  - Lawsuit led by the Fisheries Survival Fund at the Empire Wind site against BOEM requesting the court to invalidate the lease; the plaintiffs claim that BOEM's process for awarding the lease failed to properly consider the planned wind farm's impact on area fish populations and habitats, shoreside communities, safety, and navigation
- Example of emotional vs evidence-based
- Positive signs: Responsible Offshore Development Alliance
- Working with the industry on issues such as layout
  - Coexistence is the goal

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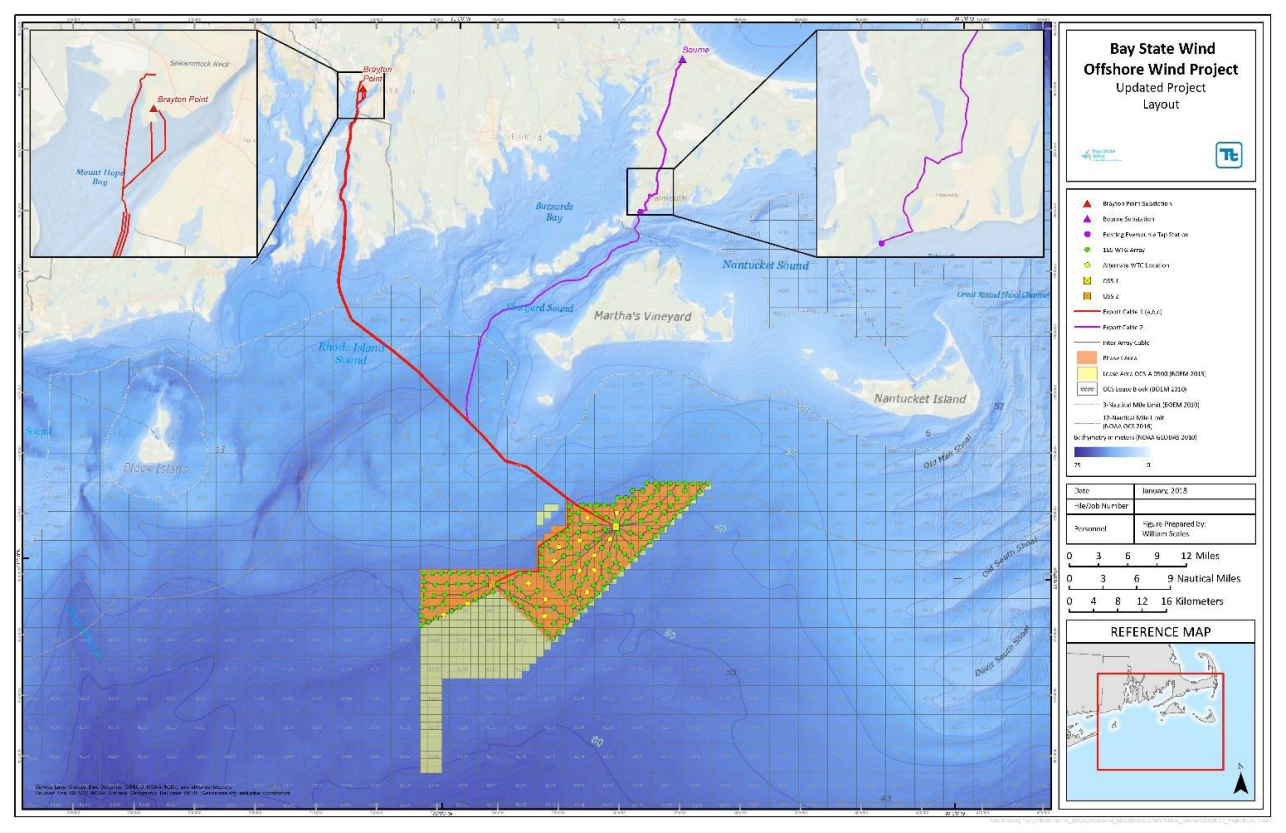
Bay State Wind – Old Wind Farm Layout



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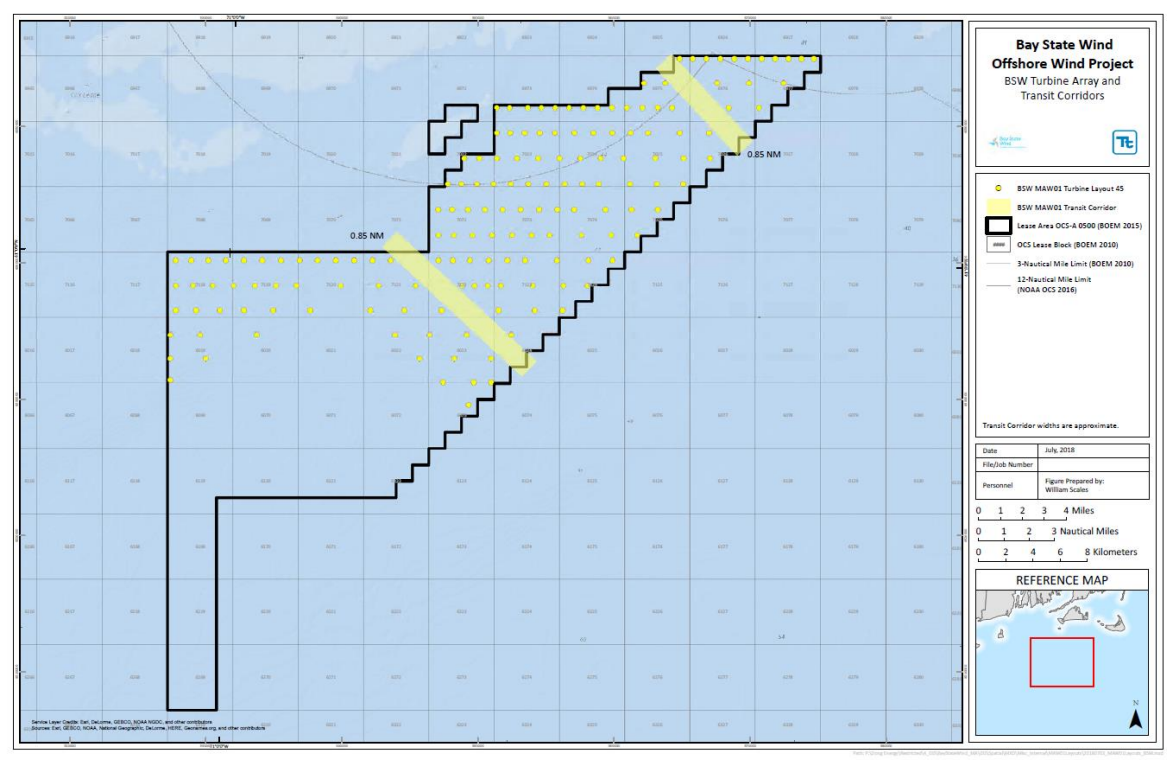
Bay State Wind – New Wind Farm Layout



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Developing a Stakeholder Engagement Plan – Recreational Fishing

- Access and EMF are primary concerns
- Can be a key supporter
  - For example, Anglers for Offshore Wind

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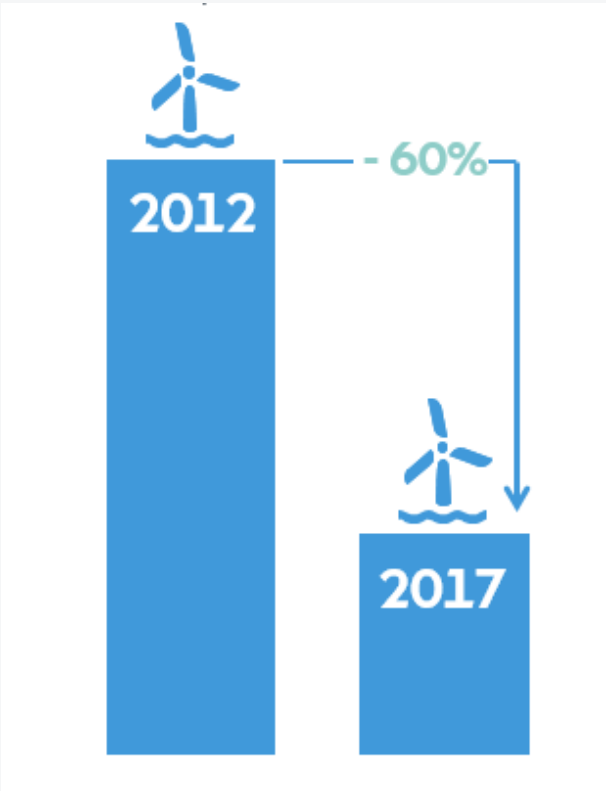
Developing a Stakeholder Engagement Plan – Consumer and Ratepayer Advocate

- The cost of offshore wind has been dramatically reduced in Europe
  - Ørsted projects have seen a 63% cost reduction over the past 6 years
- Strong expectations in the United States, especially with Vineyard Wind at $65/MWh for 20 year PPA



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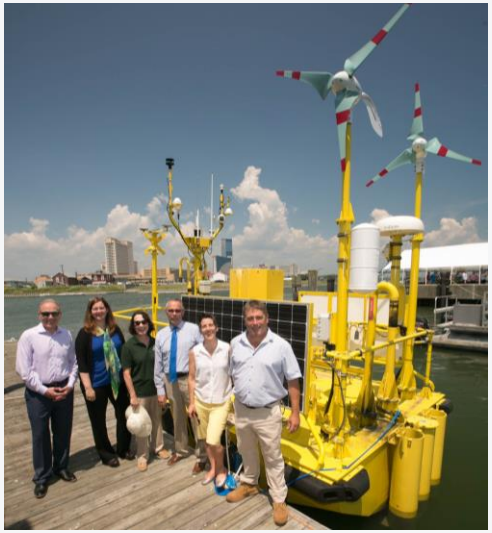
Developing a Stakeholder Engagement Plan – Elected Officials



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Developing a Stakeholder Engagement Plan – Labor, Business, and Supply Chain

- Traditionally supportive
- Overpromising is a risk
- Timing on when work and jobs materialize can be a challenging variable
- Unions in certain states are very powerful
- Supply chain development is a key driver for reducing cost, building at scale

Developing a Stakeholder Engagement Plan – Coastal Communities

- Viewshed impacts
- Cable landing, upland route, onshore substation
- Ocean Wind siting example

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Developing a Stakeholder Engagement Plan – Academic Institutions and Universities

- Opportunity to have third-party development and execution of studies
- Studies executed by leaders in the field
- Provide a bridge to students
- Challenges: overhead, schedules

Developing a Stakeholder Engagement Plan – NGOs

- ENGOs
  - Wildlife (eg, Audubon)
  - Non-wildlife (eg, Env NJ)
- NGOs
  - Not environmentally focused (eg, EJ, workforce)
- Marine mammal agreements
  - Block Island Wind Farm
  - Vineyard Wind

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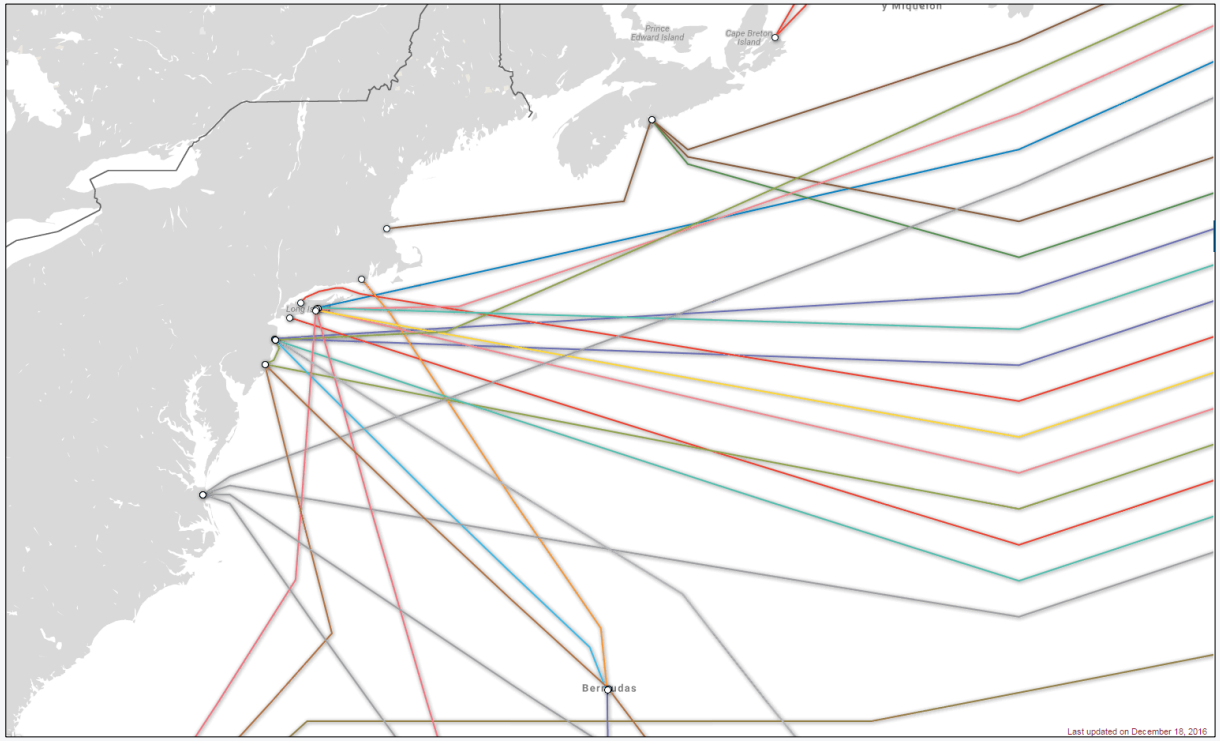
Developing a Stakeholder Engagement Plan – Submarine Cables and Offshore Infrastructure

- Traditional users of the sea bed for 100+ years
- Trade organizations are helpful
  - North American Submarine Cable Assoc
  - International Cable Protection Comm
- Positive experience with developing a cable crossing agreement for the Block Island Transmission System with the submarine cable industry



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Developing a Stakeholder Engagement Plan – Onshore Utilities

- Land side partners, but not always supportive
- Joint ventures with Eversource, PSEG

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Ørsted Offshore R&D Programme

R&D Strategy

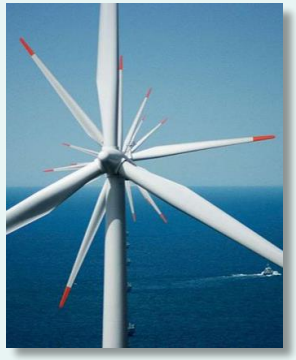
Organised into six roadmaps

Roadmap 1
Wind & Waves

Roadmap 2
Foundations, Geoscience and Marine

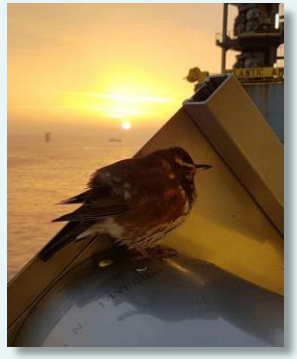
Roadmap 3
Electrical Infrastructure

Roadmap 4
WTG



Roadmap 5
Logistics

Roadmap 6
Environment



Objectives
• Enable the Pipeline • CoE Reduction • HSE Performance • Design Standard Improvements • Risk Reduction • Competence Development •

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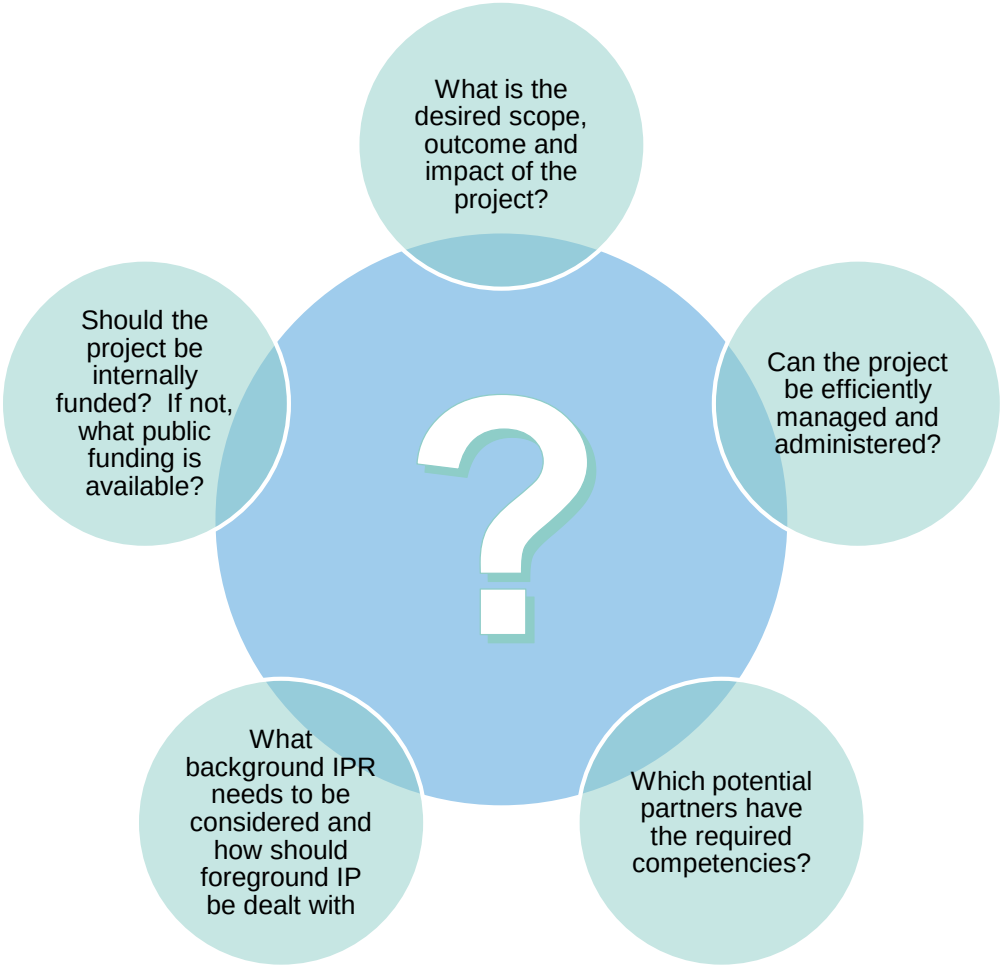
Considerations When Developing a New R&D Project



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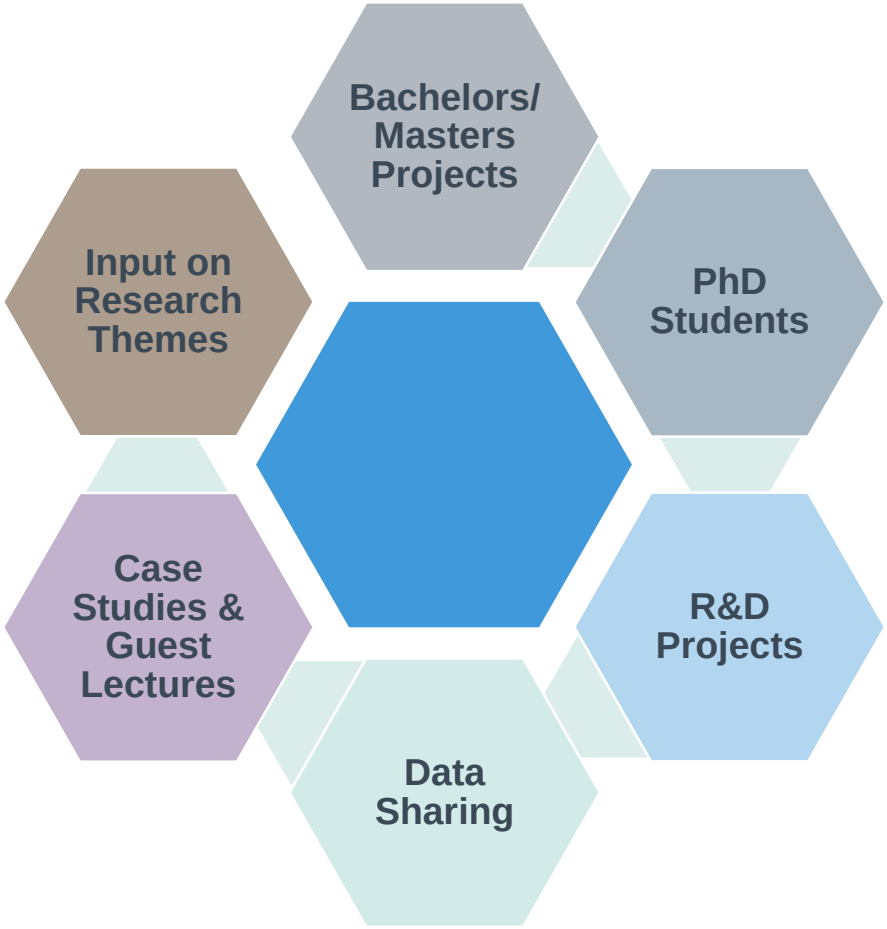
Methods of Collaboration



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The Students Projects Program (SPP)

- Opportunities for Bachelors and Masters students to develop their thesis projects in collaboration with Ørsted
- All opportunities published on Ørsted's student recruitment website
- Opportunities in a wide variety of disciplines (e.g. engineering, economics, politics, law, business administration)
- The chance to work on cutting-edge topics of real industrial relevance
- Annual competition and award for the best SPP thesis
- Around 20% of students in the SPP gain employment at Ørsted after graduation

https://orsted.com/en/Careers/Students-and-graduates/Student-jobs-and-projects

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Write your student project with us

Do you want to collaborate on a real-world problem with one of Europe's leading energy companies and a world leader in offshore wind power?

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PhD Students

- Ørsted engages with both university and industrial PhD students
- PhD students hired at a university and working on a project defined by Ørsted can be supported with additional supervision from Ørsted staff, data and/or sponsorship
- Industrial PhD students are hired, in collaboration with a university, to work at Ørsted on an R&D project
- In all cases, PhD student projects must be defined by Ørsted and must fit within the R&D Programme strategy

Collaborative R&D Projects

- Ørsted operates many collaborative R&D projects under each of the 6 R&D roadmaps
- The majority of these are defined by Ørsted and universities are contacted directly to discuss collaboration
- Other R&D projects are initiated from proposals sent to Ørsted by universities:
  - Proposals should be sent to info@orsted.com with the subject "Request for Research Project in Ørsted Offshore"
  - All proposals will be assessed by an R&D Roadmap manager and a reply will be issued
  - Ørsted prefers to be involved as early in the proposal process as possible to allow sufficient scope to steer and contribute
  - Please allow *at least* 15 working days for response
- Proposals for public co-funding are welcome

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Q&A