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National Offshore Wind Research and Development Consortium

California Energy Commission | October 3 2019

NATIONAL OFFSHORE WIND
RESEARCH & DEVELOPMENT CONSORTIUM

National Offshore Wind R&D Consortium – U.S. DOE & NYSERDA

DOE's 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

Administrator: (competitively awarded by DOE in 2018): New York State Energy Research and Development Administration (NYSERDA)

Project Value: $41 M ($20.5 DOE funds, matched by NYSERDA) – plus member contributions

Duration: 4 years under current funding (+ 3 years to complete all projects); goal is to become self sustaining indefinitely through research partner funding

Consortium Advisory Groups

Research & Development Advisory Group (RDAG)

Eligibility

- Academic Institutions
- National Laboratories
- Research Organization

Responsibility

- Technical R&D input

Strategic Advisory Network (SAN)

Eligibility

- Academic Institutions
- Utilities
- State and Federal Authorities
- NGOs

Responsibility

- Strategic, technical, commercial, regional and national input

Manufacturing, Supply Chain and Service Council (MSSC)

Eligibility

- Manufacturers
- Technical Consultancies
- Service Providers
- Supply Chain members

Responsibility

- Technical R&D and commercial input

Tech To Market Group (TTM)

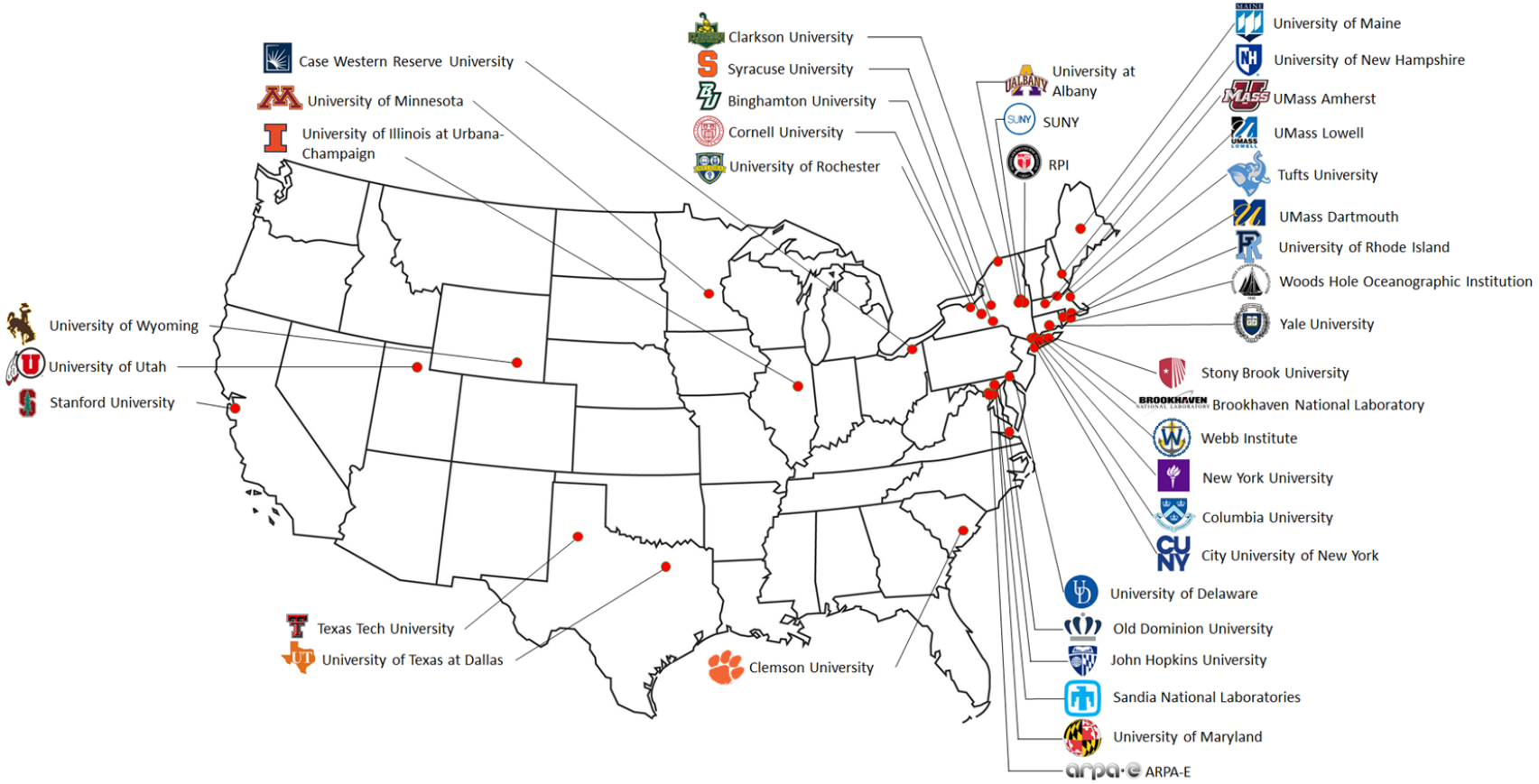
Eligibility

- Venture capital firms
- Entrepreneurs
- Philanthropic organizations
- Technology incubators

Responsibility

- Invest in innovative technologies/startups

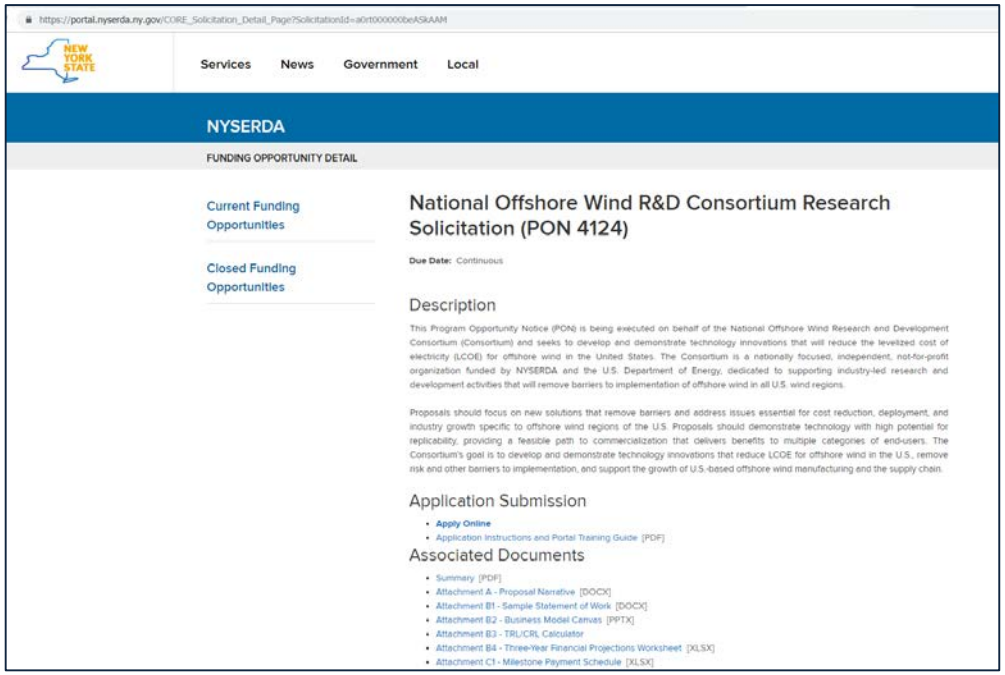
RDAG Membership: Broad National Representation



R&D Roadmap and Solicitation

- Prioritized **Research and Development Roadmap** published in November 2018
- Roadmap topics support three **Research Pillars:**
  1. **Offshore Wind Plant Technology Advancement**
  2. **Offshore Wind Power Resource and Physical Site Characterization**
  3. **Installation, O&M and Supply Chain Solutions**

Consortium Accepting R&D Proposals!



- Proposals are reviewed on a continuous basis, as received.
- Technical Challenge Areas will be updated regularly.
- Proposals welcomed for work supporting all U.S. wind areas.
- Go to: www.NYSERDA.ny.gov/Funding-Opportunities for complete details, and to submit your proposal!

Pillar 1 Technical Challenge Areas

Array Performance and Control Optimization

- modeling array effects
- wind plant controls
- increasing energy density

Cost-Reducing Turbine Support Structures for the U.S. Market

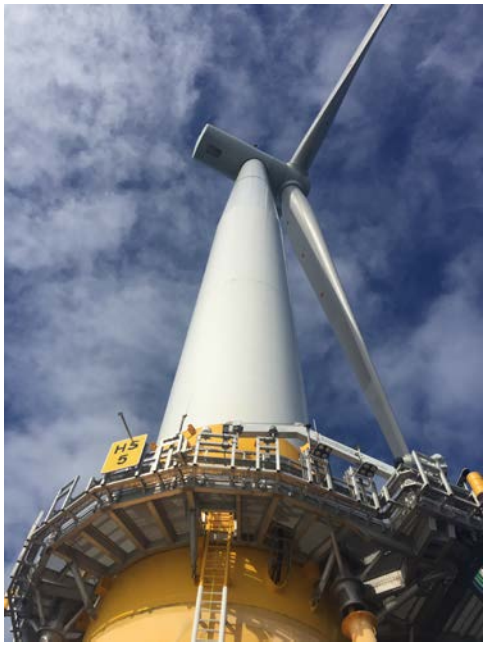
- Innovative substructure designs, and methods
- Reduce the dependency on foreign flagged or heavy lift vessels
- Life extension of the substructure

Floating Structure Mooring Concepts for Shallow and Deep Waters

- Addressing complexity of Atlantic siting in 50 m - 90 m depths
- Addressing issues with Pacific siting >500 m depths

Power System Design and Innovation

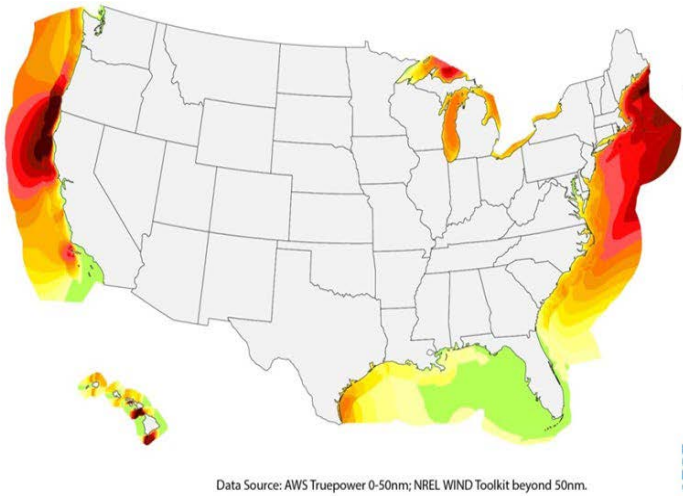
- Assessment of power system infrastructure barriers
- Innovative OSW power system technologies
- New cable technology or array power system technology



Pillar 2 Technical Challenge Areas

Comprehensive Wind Resource Assessment – Addressing the uncertainties and inaccuracies of the current resource data bases for wind, extreme wave

Development of a Metocean Reference Site – Providing an ocean-based reference site to calibrate and verify instrumentation for wind energy areas



Pillar 3 Technical Challenge Areas

Heavy Lift Vessel Alternatives – Alternative, innovative vessel solutions realized through new ship designs or the repurposing of existing U.S.-flagged vessels. Vessel alternatives enabling quayside assembly and installation of 12 MW+ wind turbines. Includes vessels involved in offshore wind construction, cable laying, crew transfer, and service operation vessels.

Offshore Wind Digitization through Advanced Analytics - Reduce labor at sea through SCADA data analytics, machine learning, condition monitoring technologies, advanced sensors, artificial intelligence, turbine-based robotics, drones, autonomous vessels, and self-healing materials.

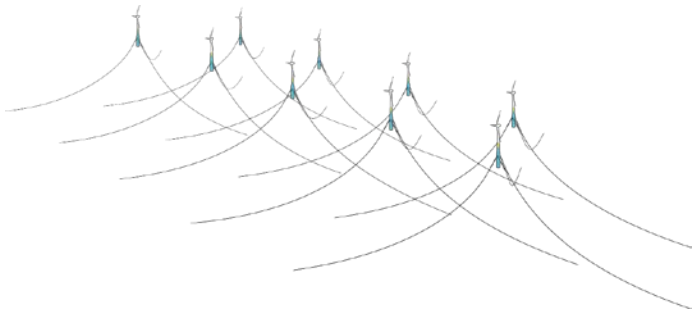
Technology Solutions to Accelerate U.S. Supply Chain - New technologies that accelerate the maturation of the U.S. supply chain and concepts that result in increased utilization of existing U.S. manufacturing, new manufacturing, and new system designs that favor local content.

First Project Selected for Contract Negotiation

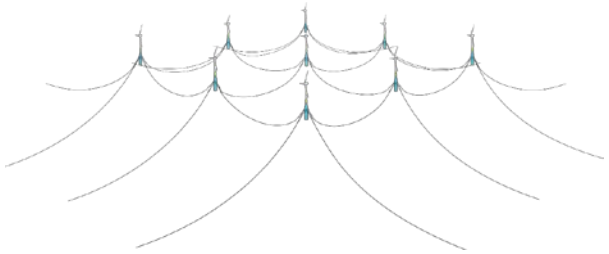
NREL
NATIONAL RENEWABLE ENERGY LABORATORY

"Shared Mooring Systems for Deep Floating Wind Farms"

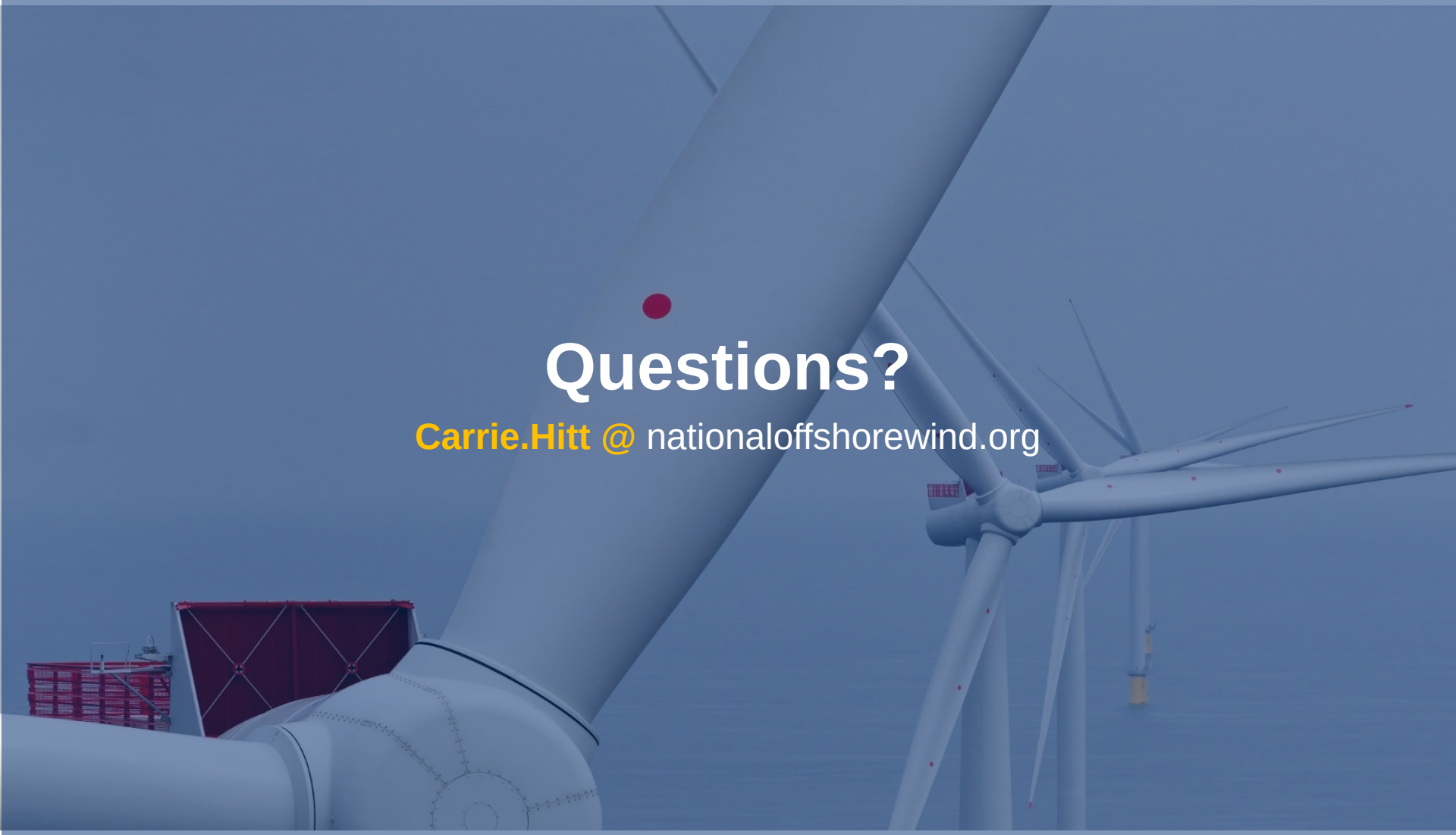
- Project will assess the potential of shared mooring lines to reduce floating wind farm costs by connecting adjacent turbine platforms and distributing load throughout the wind farm.
- Reducing the number of anchors and mooring lines has potential to lower costs for deep water floating systems
- NREL will design and update their modeling tools to support floating wind farms with shared mooring systems.
- Feasibility study will help inform future work of consortium partners and developers as they consider best practices for advancing offshore wind energy in an environmentally and economically responsible way.



Conventional individual catenary mooring system for a nine-turbine farm in deep water



A nine-turbine farm using a shared mooring system



Questions?

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