New Jersey Academic Alliance for Offshore Wind Energy (A^2OSW) Symposium

Summary Report

On January 12, 2024, an offshore wind energy community engagement event took place at Rutgers – New Brunswick at the Richard Weeks Hall of Engineering in Piscataway, New Jersey. The event was called the New Jersey Academic Alliance for Offshore Wind Energy (A^2OSW) Symposium.

This Symposium was the first event organized by the A^2OSW, a consortium of ten New Jersey academic institutions that serves as a hub to convene, coordinate, and catalyze innovative research and education programs around offshore wind energy. The A^2OSW consortium is comprised of: Atlantic Cape Community College (ACCC), Monmouth University, Montclair State University, New Jersey Institute of Technology (NJIT), Princeton University, Rowan University, Rutgers University, Seton Hall University, Stevens Institute of Technology, and Stockton University.

The Symposium brought together approximately 120 attendees from across academia, industry, non-profit organizations, and governmental agencies. As part of the Symposium, the attendees were divided into small breakout groups in which they participated in facilitated discussions regarding the priorities of the A^2OSW in four topic areas:

1. Environmental Impact and Climate-smart Modeling
2. Design and Operations
3. Electricity Transmission and Storage
4. Community Engagement and Workforce Development

Based on these discussions, this report provides an overview of the priorities for future A^2OSW programming as it pertains to education and research and the vision for community engagement and workforce development.

1. Environmental Impact and Climate-smart Modeling

Educational Priorities

When asked about the educational priorities of the A^2OSW regarding environmental impact and climate-smart modeling, the attendees responded that they would like to see more interdisciplinary coursework in higher education. There were suggestions to include curricula on marketing and social science as well as courses on the atmosphere and wind. Attendees suggested inter-institutional collaboration when it comes to offshore wind energy certificate programs and that these certificates shouldn't be limited to the students' home institutions. There should also be educational programming on offshore wind energy and climate topics for K-12 students.

When asked what courses, internships, fellowships, training programs, or other educational resources are needed, the attendees responded that they would like to see more hands-on education at field stations. Attendees also mentioned that they would like to see more career pipelines for data analysts, marine mammal experts, and field technicians focused on research and monitoring.

They would also like to see a fellowship and/or internship program in which undergraduate and/or graduate students would rotate through different career pathways, like the National Oceanic and Atmospheric Administration (NOAA) Sea Grant Knauss Fellowship Program, or what medical students might encounter as part of their rotations or clerkships. For example, the student would learn about conducting offshore wind energy work as an academic, then as a governmental employee, then as a technician working for a developer, and so on.

As a result of this discussion, the attendees rated the following as their top educational priorities:

- Incorporate field-based learning.
- Teach students how to develop robust monitoring systems and analyze large datasets.
- Development of a fellowship program that rotates through different offshore wind energy careers.

- Provide communication skills training.

Research Priorities

When asked what the research priorities should be of the A^2OSW as it pertains to environmental impact and climate-smart modeling, attendees responded that the research projects need to be interdisciplinary as well as regional. Therefore, research data collected for one project can then be used for another project and to help answer broader questions. For example, web-based data portals provide environmental information at a regional scale and can be used by all. To ensure research data is kept safe and up-to-date, data portals and their associated web-based platforms need ongoing funding to be hosted and maintained.

When asked what facilities or other research resources are needed, the attendees responded that there's a need to improve the marine research vessel fleet and its associated storage, maintenance, and operation. The research vessels need to be improved to meet the time, staff capacity, and distance capability needed for different types of research while also being brought up to code. The new or retrofitted research vessels and their corresponding innovative sensors and equipment will also need to be stored in a secure facility and/or port. To operate and maintain the vessels and their equipment, highly trained professional staff and field technicians will need to be hired.

There's also a need to develop an "ocean test bed." This would be an area where faculty, staff, and students would test sensors in real-life ocean conditions. Although Rutgers is developing an on-land wet tank test facility for offshore wind energy, developing a parallel *in situ* test data bed in the ocean would be integral in collecting historical baseline data and serving as a playground for testing new sensors and tools, like PacWave – an open ocean wave energy testing facility based at Oregon State University.

As a result of this discussion, attendees rated the following as their top research priorities:

- Support strong web-based platforms for interdisciplinary data sharing.
- Accumulate the resources necessary for collecting data, such as sensors and vessels.
- Create an "ocean test bed" for field-based education and research.

2. Design and Operations

Educational Priorities

When asked about the educational priorities of the A^2OSW as it pertains to design and operations, attendees responded that they would like to continue collaboration across academic institutions but would like more input from industry regarding their needs, especially in the emerging field of blue technology. To get more insight on skills training and certification programs, academic institutions should look at unions that offer apprenticeships and certification programs. Also, looking to Europe and other regions where offshore wind energy is operational would be helpful in identifying educational needs.

When asked what courses, internships, fellowships, training programs, or other educational resources are needed regarding design and operations, the attendees responded that they would like training in communications and proposal writing. They also mentioned the need to provide hands-on opportunities for students so they can be engineers who are willing to roll up their sleeves to do technical work.
Attendees mentioned the need for internships that expose students to skills that they learn on the job. Another idea would be to develop "a day in the life of…" program in which students learn about various jobs and their day-to-day duties.

The partners of the A^2OSW institutions mentioned the need to hire students. For start-up companies, the time and costs to attend job fairs are not favorable as they need to move fast, so they usually hire based on networking. They suggested that the A^2OSW can help solve their talent acquisition issues by hosting networking events.

Since students interested in design and operations usually develop innovative technologies, there's a need for access to innovation resources to assist students with securing patents and guiding them through commercialization.

As a result of this discussion, attendees rated the following as their top education priorities:

- Promote collaboration across academic institutions.
- Develop hands-on training, internships, and/or fellowships programs in consultation with industry.
- Provide communication skills and grant writing training.
- Host A^2OSW industry-student networking events.
- Assist students through the innovation pipeline.

Research Priorities

When asked what the research priorities should be of the A^2OSW as it pertains to design and operations, attendees responded that the research projects need to be guided by an advisory board that includes industry, government, academia, and community organizations.

Research areas to be explored include, but are not limited to:

- Floating platforms and turbines
- Materials that can withstand marine conditions for 20+ years
- Design of manufacturing facilities to make parts regionally rather than overseas
- Marine technology
- Blue technology
- Operations and maintenance
- Marine mammal effects

When asked what facilities or other research resources are needed for design and operations, attendees responded that there's a need for a floating offshore wind energy demonstration project.

There's also a need to have cargo vessels that are compliant with the Jones Act to carry materials from the ports to the installation sites. To be compliant with the Jones Act, the vessels need to be built, citizen owned, and registered in the United States. These vessels will also need to be operated by crews from the United States. To demonstrate the need for new vessels, a study can be done to explain the emissions from using older vessels to transport the supplies need for offshore wind energy installation.

As a result of this discussion, attendees rated the following as their top research priorities:

- Develop an advisory board to prioritize research projects.
- Focus research efforts on new technologies, materials, and maintenance.

3. Electricity Transmission and Storage

Educational Priorities

When asked what the educational priorities should be of the A^2OSW as it pertains to electricity transmission and storage, attendees responded that they would like their coursework to be taught or co-taught by professors who have industry experience. Alternatively, industry can be invited as guest lecturers and/or to teach extracurricular training courses. For example, the Institute for Electrical and Electronics Engineers (IEEE) teaches coding languages to students.

When electricity courses are taught, real world examples and case studies should be used. When possible, on-site visits to offshore wind energy storage centers and wind farms should be conducted. Interdisciplinary power system courses should count as core courses rather than as an elective.

Like the Rutgers solar panel test area, students would like to work on a small-scale wind turbine so they can run tests in a laboratory setting and better understand the components, operations, and maintenance.

When asked what courses, internships, fellowships, training programs, or other educational resources are needed, attendees responded that they would like to see more collaboration between institutions. For example, students would like to take courses at other institutions and have them count as college credit at their home institution. Attendees also mentioned using social media or another communication platform in which the A^2OSW faculty, staff, students, industry, nonprofits, governmental agencies, and community organizations can communicate with each other virtually regarding their offshore wind energy work.

Attendees mentioned that they would like to see more university internships and fellowships tailored to high school students, so they are encouraged to pursue engineering and offshore wind energy.

As a result of this discussion, attendees rated the following as their top education priorities:

- Increase the number of fellowships and internship programs.
- Develop hands-on student experiences to prepare them for careers in industry. When possible, visits to energy storage centers and wind farms should be incorporated into courses.
- Create opportunities for students to transition to industry.

Research Priorities

When asked what the research priorities should be of the A^2OSW as it pertains to electricity transmission and storage, attendees responded that they would like to see more coordination amongst the A^2OSW institutions so researchers can work together on achieving similar goals at the same time.

When asked what facilities or other research resources are needed for electricity transmission and storage, the attendees responded that the following research areas to be explored include, but are not limited to:

- Interconnection agreements and net metering
- Microgrids
- Superconductors
- Other renewable energy technologies – bioenergy, geothermal, hydrogen, hydropower, marine, solar, wind
- Energy storage
- Stability of electricity system with variable wind speeds
- Sensors
- Machine learning/Artificial Intelligence

- Stochastic and cost-effective planning of the energy grid
- Electricity transmission upgrades
- Electricity congestion in transmission lines

As a result of this discussion, attendees rated the following as their top research priorities:

- Use actual data from offshore wind energy farms when teaching. This data can be used as a comparison to data collected in the laboratory.
- Conduct long-term planning for offshore wind turbine projects as it pertains to grid modernization.

4. Community Engagement and Workforce Development

Community Engagement Priorities

When asked what the priorities should be of the A^{2}OSW as it pertains to community engagement, attendees responded that a community needs assessment should be conducted. By developing relationships at the local level, meaningful outreach that takes into account the culture, history, and identity of each community can occur while building trust.

When asked what kind of training programs, internships, fellowships, stakeholder involvement in decision making, or other community engagement tools are needed, attendees responded that they would like hands-on training on practical tools that communities can use, like the Mid-Atlantic Ocean Data Portal (MARCO) mapping tool and other tools that can help them understand the impacts of offshore wind energy and how they can participate.

There's also a need to correct misinformation through a series of communication materials from the A^{2}OSW, like fact sheets, brochures, videos, podcasts, etc. When feasible, these materials should be developed in partnership with federal agencies with interest in offshore wind energy, like the Department of the Interior's NOAA and Bureau of Ocean Energy Management (BOEM), along with the Department of Energy's national laboratories.

When asked if there is a particular community and/or geographic region we should focus our efforts on community engagement, attendees responded that there should be organized youth engagement efforts. Youth engagement should be coordinated with local K-12 schools and should include student ambassadors who educate others about offshore wind energy via a social media platform like TikTok.

As a result of this discussion, attendees rated the following as their top community engagement priorities:

- Conduct a needs assessment of communities to take account of their needs and to generate trust.
- Combat misinformation through coordinated A^{2}OSW communication materials.
- Develop and implement youth engagement programming.

Workforce Development Priorities

When asked what the priorities should be of the A^{2}OSW as it pertains to workforce development, attendees responded that they would like to develop offshore wind energy degree(s) and/or certificate program(s) that are accredited by the New Jersey Institutions of Higher Education. To make sure the degree and/or certificate programs are teaching the required skills and provide adequate experiential learning opportunities, an advisory board with industry members would be formed. This advisory board would also be instrumental in ensuring that the timing is aligned so students can transition to relevant offshore wind energy jobs upon graduation or program completion.

Also, the attendees mentioned the need to better understand the processes involved with offshore wind energy development, installation, operation and maintenance, and decommissioning. By better understanding these processes, jobs can be better defined and workforce development programs that meet the needs of the industry can be developed.

When asked what kind of training programs, internships, fellowships, stakeholder involvement in decision making, or other workforce development tools are needed, attendees responded that partnering with national energy workforce organizations like the Center for Energy Workforce Development are helpful in understanding the current workforce development programs at a national level. By participating in national conferences, the A^2OSW institutions can learn from others on how they conduct offshore wind energy workforce development.

When asked if there is a particular industry and/or geographic region we should focus our efforts on workforce development, attendees responded that those conducting workforce development efforts should partner with community-based and nonprofit organizations. Also, reaching K-12 students at a young age will help students and their parents/guardians to have a better understanding of the careers available and the education needed. Since the New Jersey Wind Port is in southern New Jersey, having adequate transportation and possibly satellite offices would be necessary.

As a result of this discussion, attendees rated the following as their top workforce development priorities:

- Gain a better understanding of the offshore wind energy jobs needed and then develop accredited degree(s) and/or certificate program(s) with industry's input.
- Ensure that jobs are ready and waiting upon graduation or program completion.
- Educate K-12 youth on offshore wind energy and the jobs available.