



Marine Energy Data Access, Analytics, and Workforce Development

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and Outreach Lead

Outline

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2. Data Access and Analytics
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 - Implementation and Progress
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 - Sub-activity Area Overview and Strategy
 - Implementation and Progress
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Data Access, Analytics, and Workforce Development Overview



Data Access

Aggregating and providing access to marine energy data and informational resources created through WPTO's funded projects.

Improving the connectivity of WPTO's databases to other U.S. and international data portals.



Data Analytics

Leveraging data to produce lessons learned and useful analysis across a range of topics.

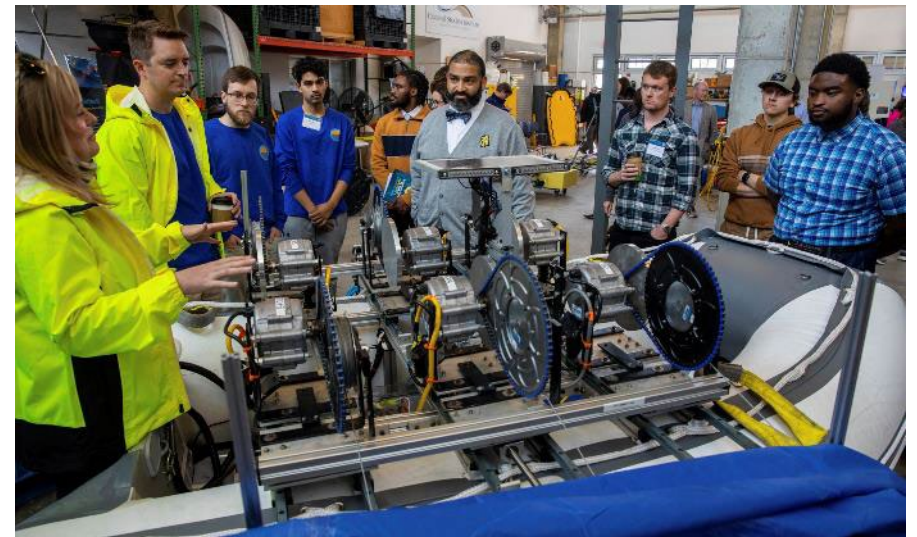


Workforce Development

Increasing opportunities for students to develop skills needed to enter the marine energy workforce.

Limited Availability of Technology/Market Information

- Unclear value opportunities for utilizing marine energy technologies due to the limited availability of information and analysis on the potential of marine energy technologies.
- Lack of validated, publicly available data on the performance, costs, and reliability of new marine energy systems.
- Lack of STEM-relevant and educational information and opportunities to attract students and early career professionals to marine energy careers.



Data Access, Analytics, & Workforce Dev. – Goals and Objectives

Key Results and Performance Goals (2021–2025)

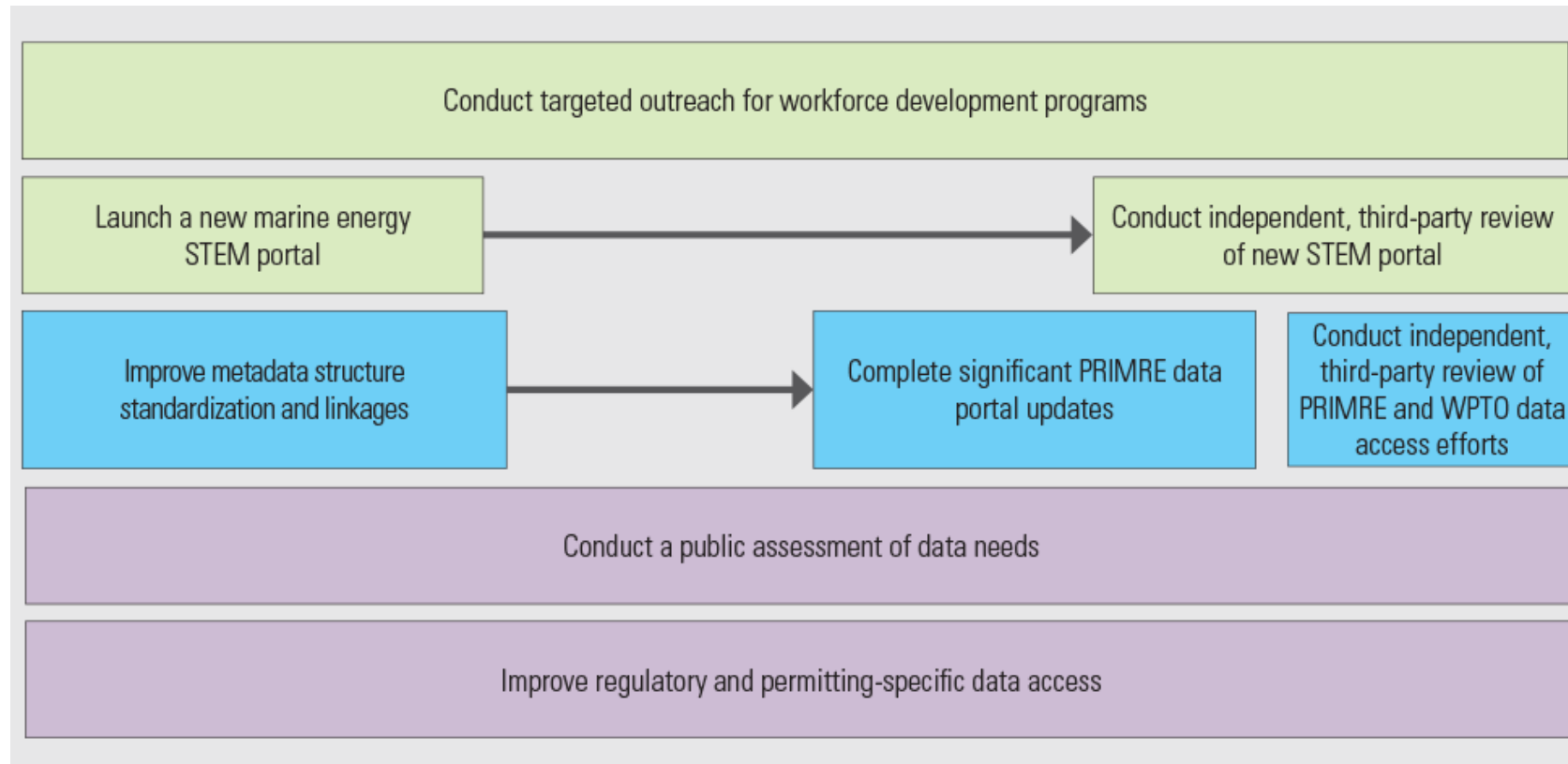
- Publish an assessment of marine energy industry and researcher data needs.
- Collect, analyze, and publish data from the existing in-water testing projects to generate new foundational understanding of marine energy devices and identify promising areas for additional research.
- Complete integration of publicly available, WPTO-funded marine energy databases with interconnected search functionality.
- Launch a new marine energy permitting toolkit to improve regulators' access to and understanding of information about marine energy resources, devices, and potential environmental effects.
- Release a new marine energy STEM portal consisting of educator and student resources and curricula.
- Improve targeted outreach with the intention of diversifying the pool of students participating in WPTO workforce development programs such as the graduate student research fellowship and Marine Energy Collegiate Competition.

Follow-On Objectives (2026–2030)

- Increased usage of WPTO-developed data, along with supported marine energy databases and toolkits (including the Marine Energy Environmental Toolkit, Marine Energy Permitting Handbook, and State of the Science Report) by a diverse set of stakeholders (along with positive value and ease-of-use metrics collected from users).
- Dramatic improvement in regulators' access to useful marine energy data, helping to reduce uncertainty, improve their ability to assess risk, and achieve efficiency gains when permitting projects.
- Measurable and significant increases in use of marine energy STEM portal by educators and individuals.
- Measured improvement in the diversity of students and student teams participating in WPTO's fellowship programs and Marine Energy Collegiate Competition, including minority students as well as students from minority-serving institutions, such as historically Black colleges and universities, Hispanic-serving institutions, and tribal colleges.



Data Access and Workforce Development – FY21-25 Priorities

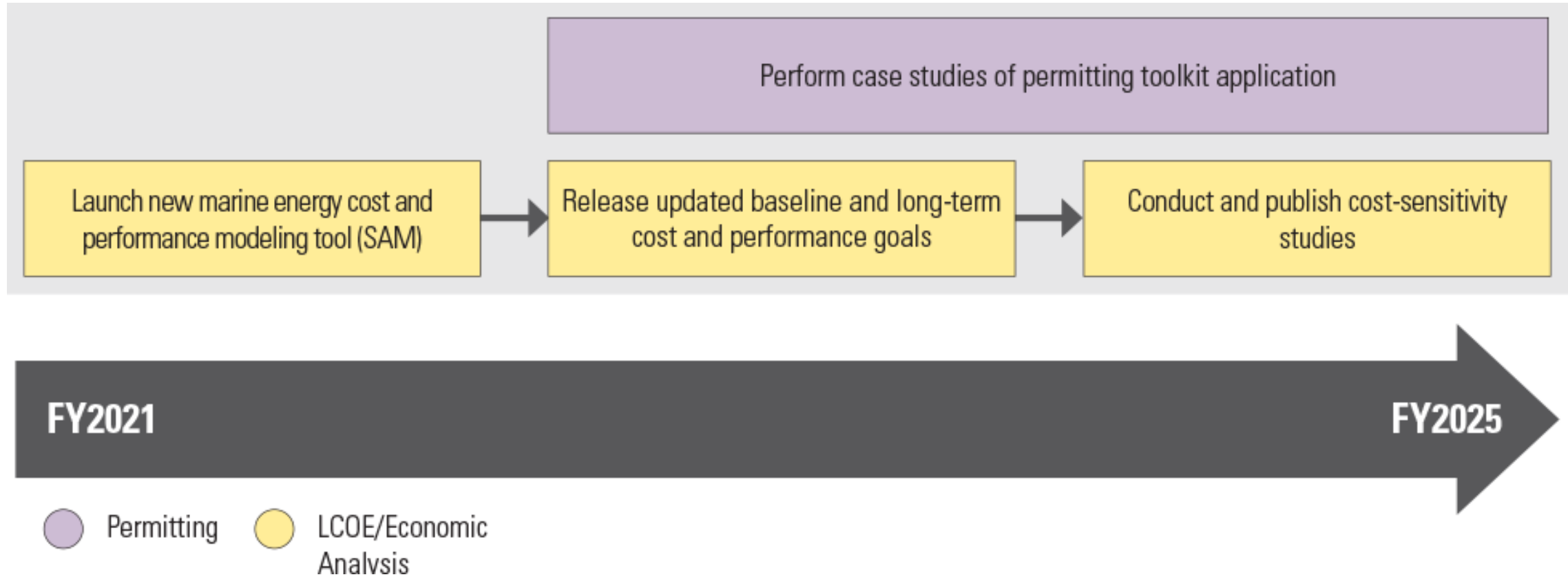


FY2021

FY2025

- Data Software/ Platform
- Permitting
- STEM/Workforce

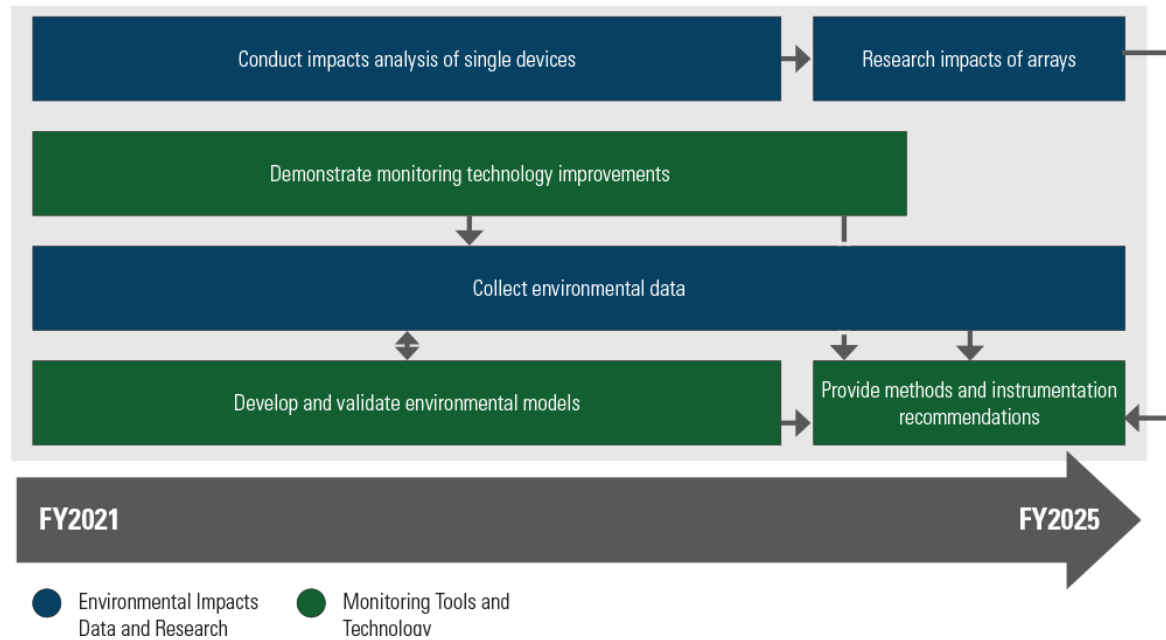
Data Analytics – FY21-25 Priorities



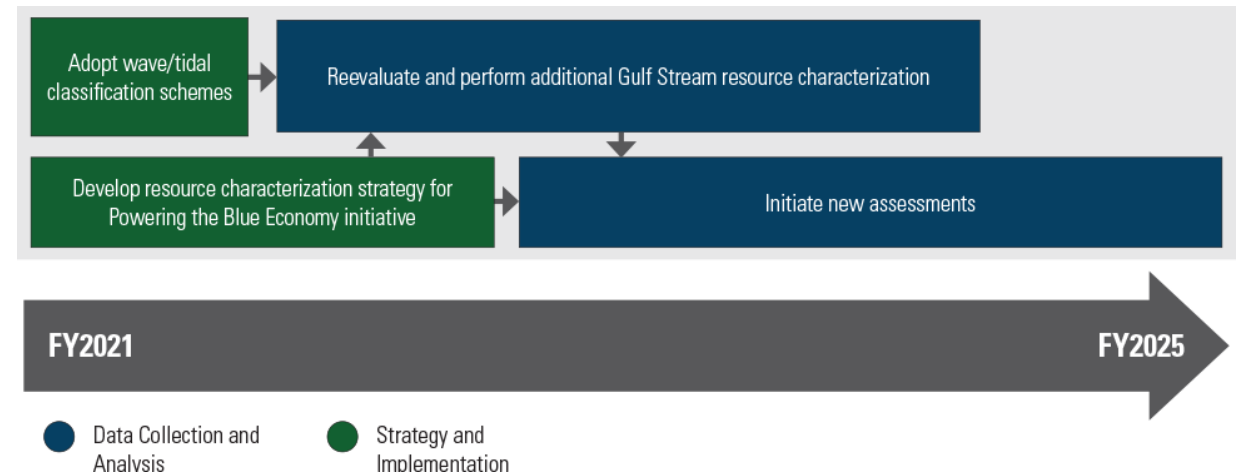
Our Data Access Projects Support Dissemination Across the Marine Energy Program

For example, both PRIMRE and the marine energy permitting toolkit support dissemination efforts for projects across the Marine Energy Program. For example, both projects aggregate and connect users to environmental and resource characterization data produced by projects under other activity areas.

Environmental Research and Instrumentation Development Research Priorities



Resource Characterization Research Priorities



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Examples of How Stakeholder Engagement Informed the Data Strategy

From 2017-2018, on behalf of WPTO, a team with representation from three national labs consulted with a broad range of the marine energy community to understand data needs. The outreach included:

- Several workshops, including EWTEC, METS/Waterpower Week
- A stakeholder advisory/steering committee
- Surveys and active engagement with industry, test centers, and researchers

Additionally, the sub activity area has been informed by reviewer feedback from the last two peer reviews, including the need to address gaps in publicly available, easy to use **resources on the marine energy permitting process** and **lessons learned** from U.S. marine energy research and development, especially in-water tests.



In response to stakeholder feedback, the PRIMRE project was designed to address a few major themes necessary to facilitate data discoverability, accessibility, and sharing.

Data Access and Analytics – Key Accomplishments

Fiscal Year (FY) 2019

Launched [Tethys Engineering](#) and the [Portal and Repository for Information on Marine Renewable Energy \(PRIMRE\)](#).

Selected and awarded a large team of public and private partners led by Kearns & West to develop a [marine energy permitting toolkit](#). The toolkit builds on work funded under the Tethys and PRIMRE projects.

FY2020

Sandia closed out and published results from the [Marine Environmental Compliance Cost Assessment](#). This study directly informed the permitting toolkit project.

Established consistent [data standards, metadata](#), and an aggregated [search function](#) across PRIMRE.

Launched an online [marine energy](#) STEM and workforce development portal.

FY2021

Launched the new [Marine Energy Environmental Toolkit for Permitting and Licensing](#) for marine energy to accelerate and reduce the cost of marine energy permitting.

Multi-lab team published a comprehensive report summarizing best available [data on U.S. marine energy resource potential](#).

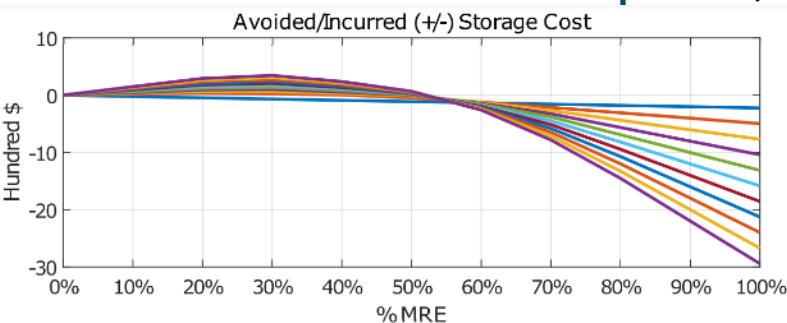
FY2022*

Linked the [Marine Energy Atlas](#) to PRIMRE.

PRIMRE team led interviews with marine energy stakeholders and analyzed results for upcoming lessons learned dissemination.

PNNL published analysis of [value propositions for marine energy](#), illustrating and quantifying opportunities for the deployment of marine energy.

**Outside of review period for WPTO's 2022 Peer Review*



Future Work – Data Access and Analytics



Data Access

- Close the Kearns & West award and integrate new permitting toolkit with PRIMRE
- Create a new repository of Biological Evaluations for WPTO awardees
- With support from WPTO and OES, the PRIMRE team will build out the [OES GIS map](#)



Data Analytics

- PRIMRE team to publish results of their lessons learned interviews and start integrating this process into WPTO financial assistance
- NREL to publish summary of wave energy experts' recommendations on which factors may best drive LCOE reductions
- NREL to publish new performance metrics guidance



Outreach

- Several planned workshops and conference presentations, including at the Ocean Renewable Energy Conference (OREC) and the International Conference on Ocean Energy (ICOE)
- Design a marine energy data needs survey to inform future efforts to support the industry's data needs



New Ideas?

- Are you aware of any critical data gaps impacting the U.S. marine energy industry?
- Do you think the sector would benefit from analysis, lessons learned documentation, and/or best practices guides on a particular topic?

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Workforce Development

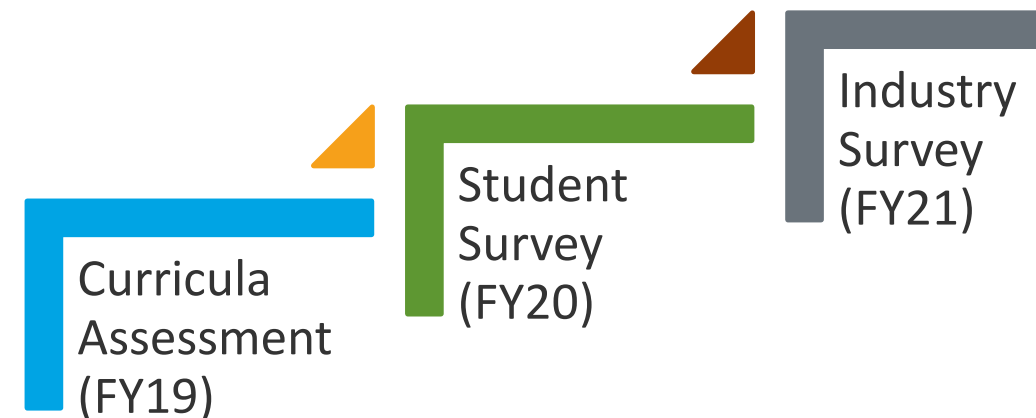
Increasing opportunities for students to develop skills needed to enter the marine energy workforce.

Examples of How Stakeholder Engagement Informed the Workforce Development Strategy

Feedback received from the marine energy industry, academia, and students have informed all aspects of WPTO's STEM and workforce development portfolio.

WPTO and NREL have collected feedback through:

- Surveys with industry, academia, and students
- A marine energy [curricula](#) assessment
- Several stakeholder workshops, such as a half day workshop at 2019 Waterpower Week, a workshop with educators and staff from the NEED Project, and several webinars on specific aspects of the water power STEM and workforce portfolio



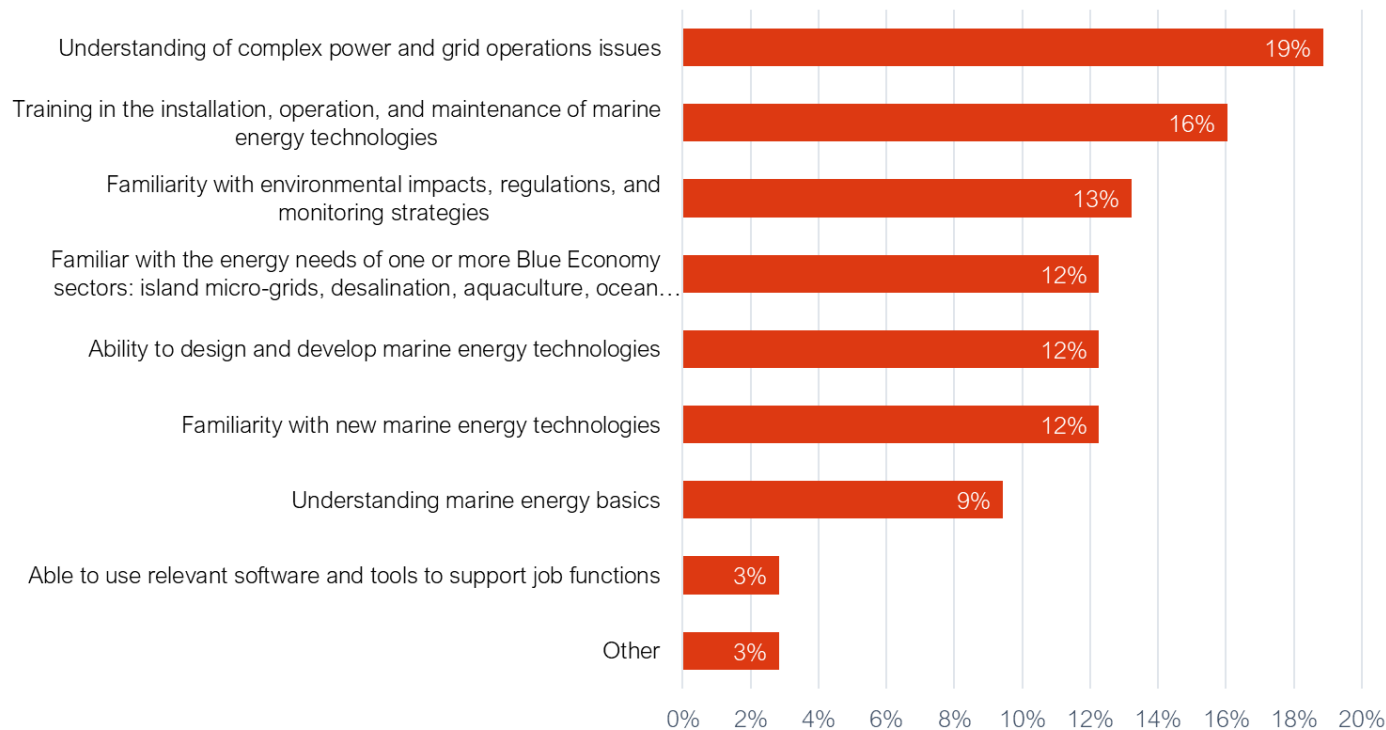
Feedback from Stakeholders and Challenges the Workforce

Sub Activity Area Addresses

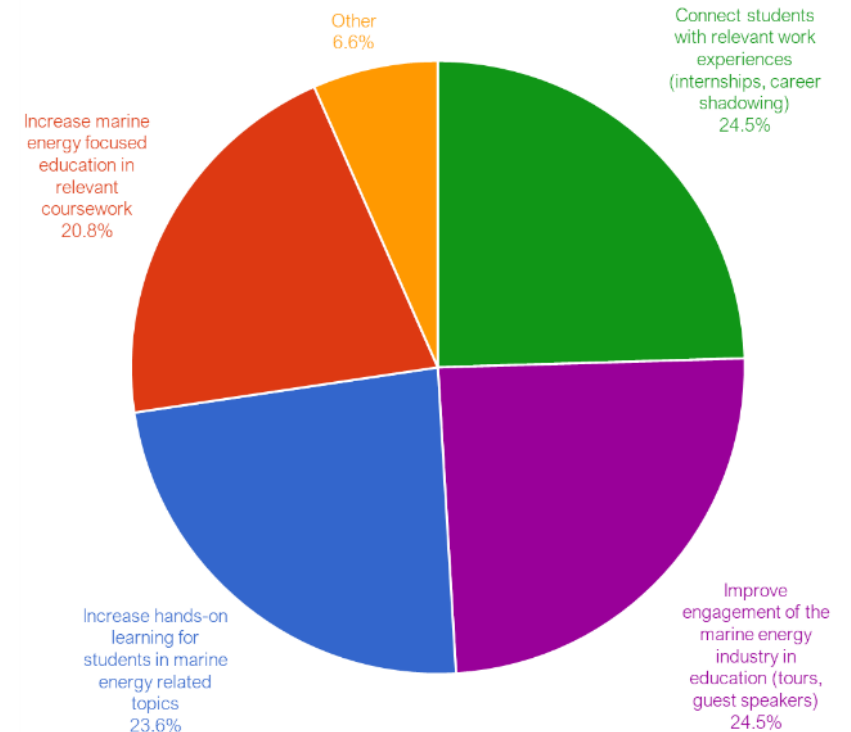
According to marine energy organizations we surveyed:

- 83% say recent graduate hires have limited to no knowledge of marine energy
- 63% say recent graduate hires have limited to no hands-on experience,
- Skills gaps of recent graduate hires varies, but key issues include grid operations, IO&M, and environmental issues

Q13. What are the gaps in the knowledge, skills, and abilities of your recent student hires?
35 responses



Q21. What suggestions do you have for educators to strengthen the pipeline of qualified students to support the U.S. marine energy industry?
35 responses



Implementation and Progress – Workforce Development



MECC stats: After completion of the 2023 [Marine Energy Collegiate Competition \(MECC\)](#), we estimate the competition will have engaged 650-700 students from 54 educational institutions, including 16 Minority Serving Institutions (MSIs).



Mechanism	Target audiences	Reach/impact
MHK Grad Research Fellowship	<ul style="list-style-type: none"> Graduate students pursuing marine energy research 	A few but deeply
Clean Energy Innovators Fellowship	<ul style="list-style-type: none"> Recent graduates (Bachelor's, Master's, and Doctoral graduates) Early career energy professionals 	A few but deeply
Hydropower and Marine Energy Collegiate Competitions	<ul style="list-style-type: none"> Undergrad students Community college students Trade school students Graduate students Professors and faculty 	100+ students and professors across many disciplines annually
Online STEM Portals for Marine Energy and Hydropower	<ul style="list-style-type: none"> K-12 students K-12 educators Post-secondary students Post-secondary educators 	Many

Workforce Development – Key Accomplishments

Fiscal Year (FY) 2019

Began initial project scoping for the NREL-led water power workforce project and launched an outreach campaign to gather stakeholder input that informed project priorities and direction.

Selected teams for the inaugural MECC. 15 teams represented 16 schools.

FY2020

Solidified a 5-year roadmap for the NREL workforce project.

Launched a new Science, Technology, Engineering, and Math (STEM) and workforce development [portal for marine energy](#).

Selected the second MECC cohort made up of 16 teams representing 21 schools.

Launched the [Marine and Hydrokinetic Graduate Student Research Program](#).

FY2021

Selected the third MECC cohort made up of 17 teams representing 26 schools.

A [marine energy exhibit](#) designed with support from WPTO/NREL was unveiled at Mystic Aquarium in Connecticut.

WPTO hired a Diversity, Equity, and Inclusion Lead to spearhead DEI and workforce programming.

FY2022*

Selected the third MECC cohort made up of 19 teams representing 23 schools.

Launched the [Clean Energy Innovator Fellowship](#) (with EERE partners). **13% of candidates selected water power as one of their top two sectors of interest.**



**Outside of review period for WPTO's 2022 Peer Review*

Future Work – Workforce Development



Programs

- Release the 2023 application for the annual Marine and Hydrokinetic Graduate Student Research Program (ORISE Fellowship); expand eligibility to master's students
- Manage the 2023 MECC



Products

- Develop K-12 marine energy curricula with the [National Energy Education Development \(NEED\) Project](#) and a marine energy career map showing the skills needed in the sector
- Release a new [educational app](#) exploring an island powered by different water power technologies



Analysis & Outreach

- Formalize metrics tracking program with BW Research
- Workshops alongside several upcoming conferences, such as the Ocean Renewable Energy Conference (OREC) and the International Conference on Ocean Energy (ICOE)



Scoping New Ideas

- Starting in FY23, WPTO will fund six national labs programs to carry out “DEI in STEM” projects
- Scoping a new collegiate competition supporting entrepreneurship in communities underrepresented in clean energy

Agenda Overview

10:00 AM	10:25 AM	Marine Energy Data Access, Analytics, and Workforce Development Overview	WPTO	Allison Johson
10:25 AM	10:50 AM	MHK Data Products and User Community Development (PRIMRE)	PNNL, NREL, SNL	Andrea Copping
10:50 AM	11:15 AM	International Environmental Data Sharing Initiative (Annex IV Project & Tethys Database)	PNNL	Andrea Copping
11:15 AM	11:25 AM	BREAK		
11:25 AM	11:50 AM	Improving The Efficiency and Effectiveness for MHK Permitting: A Toolkit and Engagement for Success	Kearns & West, Inc.	Zach Barr
11:50 AM	12:15 PM	Grid Value Proposition of MHK	PNNL, NREL	Dhruv Bhatnagar, Levi Kilcher