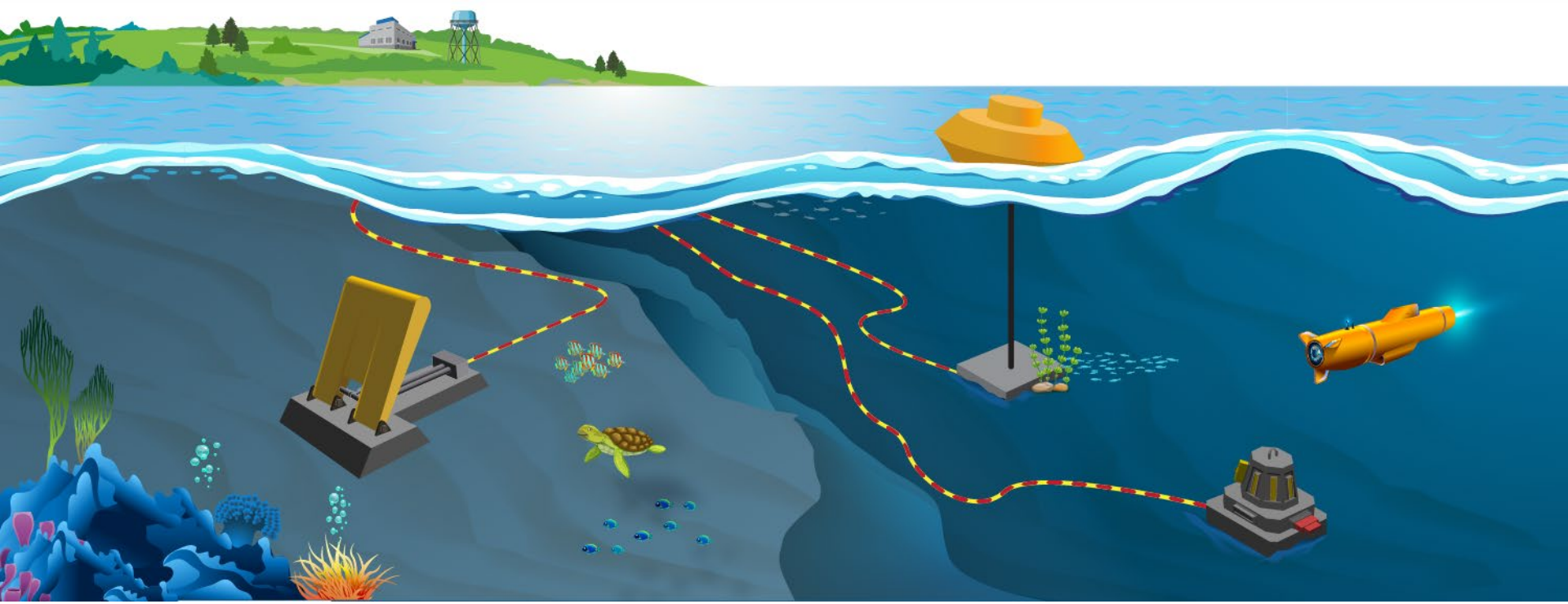


2025 Marine Energy Collegiate Competition

Marine Energy
COLLEGIATE COMPETITION
U.S. DEPARTMENT OF ENERGY

Presentation Topics

1. About the Marine Energy Collegiate Competition
2. Powering the Blue Economy Overview
3. Overview of Events and Deliverables
4. Expectations and Timeline
5. How To Apply and Review of Criteria
6. Marine Energy Collegiate Competition Success Stories
7. Next Steps

What Is the Marine Energy Collegiate Competition?

The Marine Energy Collegiate Competition (MECC) challenges postsecondary, undergraduate, and graduate students from a variety of academic programs to solve ocean energy challenges in the blue economy.

The four required and concurrent challenges are:

- Business Plan Challenge
- Technical Design Challenge
- Build and Test Challenge
- Community Connections Challenge.

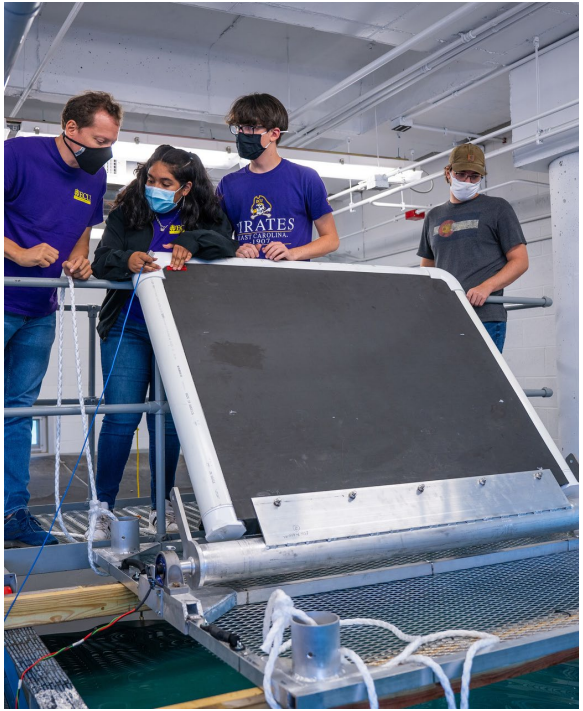
2023 Marine Energy Collegiate Competition and Hydropower Collegiate Competition competitors and organizers pose for a group photo.
Credit: Taylor Mankle, NREL

What Is the Marine Energy Collegiate Competition?

Up to 20 teams will be selected.

Eligible teams who compete in the four challenges and complete all required submissions will receive up to $20,000 in total cash awards and compete for a part of the $20,000 grand prize cash pool.

Reference the 2025 MECC Rules document to learn about competition structure, submission deadlines, etc.: https://www.herox.com/marine-energy-collegiate-competition-2025/resources



Undergraduate students and a professor from East Carolina University (ECU) make last-minute preparations before testing their surge wave energy converter.
Credit: John McCord, Coastal Studies Institute

What Is the Blue Economy?

The World Bank defines the blue economy as "the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems."

The Organization for Economic Co-Operation and Development predicts the blue economy will double from $1.5 trillion to $3 trillion in global economic value by 2030.

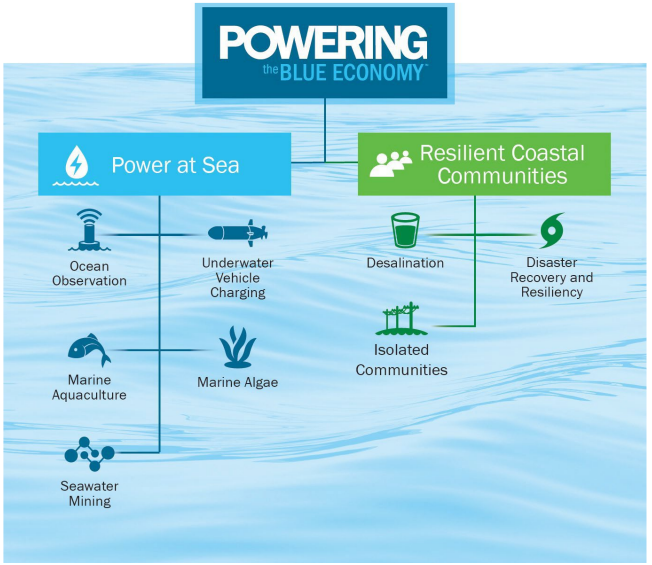
The blue economy is an administration priority, reflected in National Ocean Policy and the Decadal Vision for Ocean Science.

The blue economy was explained by *The Economist* magazine (left) and the Organization for Economic Co-Operation and Development report, titled *The Ocean Economy in 2030* (right). *Images from The Economist and the Organization for Economic Co-Operation and Development, respectively*

Powering the Blue Economy

Launched in 2019, the U.S. Department of Energy Water Power Technologies Office's Powering the Blue Economy initiative has identified markets far out at sea, like ocean observation and mineral extraction, and near-shore applications, like desalination.

The initiative illuminates the compelling need for energy innovation in the blue economy as a potentially critical element underlying the success of multiple sectors across scientific, economic, and security domains.



The Powering the Blue Economy initiative through the U.S. Department of Energy's Water Power Technologies Office includes powering industries at sea and making coastal communities more resilient.
Graphic from U.S. Department of Energy

Diverse Roles in the Marine Energy Workforce

Planning and Development
Engineering
Surveying and scientific monitoring
Finance
Permitting
Legal
Public relations and marketing
Other

Construction
Project engineers
Construction managers
Installation technicians
Port services
Vessels and heavy lift services
Trade workers
Other

Operation & Maintenance
Site/plant managers
Project engineers
Water transportation workers
Technicians
Safety and inspection workers
Remote monitoring
And more!



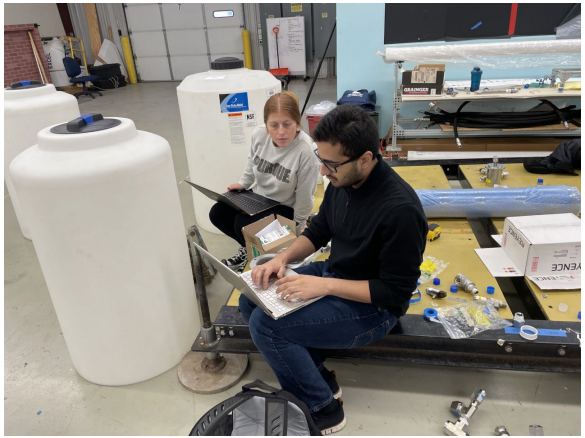



Unlocking marine energy's full potential will require a sustained and coordinated effort from a wide variety of industries, education organizations, and the state and federal government.

Goals of the 2024 MECC

The U.S. Department of Energy Water Power Technologies Office hopes to:

- Inspire students to innovate in and accelerate the emerging marine energy industry.
- Enable students to network with marine energy professionals, learn about marine energy careers, and gain insights in marine energy's potential to contribute to a clean energy future.

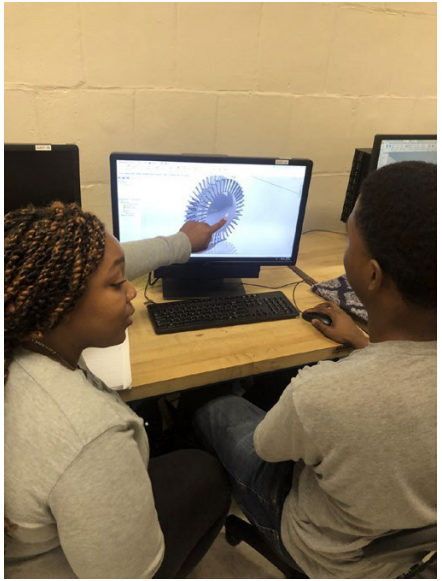


Students work on their MECC design in a lab.
Photo from Purdue University

Components for 2024

The MECC includes a:

- Business Plan Challenge. Teams identify a promising market within the blue economy and determine the best marine energy device to serve the market's needs.
- Technical Design Challenge. Teams complete a detailed design of a marine-energy-powered device to serve those end users.
- Build and Test Challenge. Teams build a scaled prototype of their concept and perform a series of lab tests.
- Community Connections Challenge. Teams create connections among competition participants, the marine energy industry, students, and local communities.



Students work on a computer simulation.
Photo from North Carolina Agricultural and Technical State University

Note: Teams can choose to advance existing technology or develop their own new design.

Team Eligibility

Eligible teams must meet the following criteria:

- Interested teams must submit an initial application to act as a competitor in the competition and be selected to compete.
- Teams may consist of a combination of undergraduate and graduate students but must be at least 50% students who are pursuing their bachelor's and/or associate degree at the beginning of the competition. Only 50% of the team may be pursuing an advanced degree (masters, Ph.D., etc.).
- U.S. academic institutions must be accredited by the U.S. Department of Education to be eligible for cash prizes.
- Non-U.S. institutions are eligible to participate on their own, without a U.S. university partner; however, these teams will not be eligible to receive cash prizes and must provide their own funding to support travel and competition expenses.
- More detailed eligibility criteria can be found in the MECC 2025 Rules document.

Submissions and Cash Prize Distributions

Stage	Cash Prize per Team	Total Cash Prize Pool
Application to Participate	$5,000	$100,000
Midyear Submissions	$10,000	$200,000
Final Event	$5,000	$100,000
Grand Prize*	To Be Determined*	$20,000*
Total	$20,000 (+grand prize awards)	$420,000

**Grand Prize cash prizes will only be distributed to first-, second-, and third-place winners. Specific amounts for winner placements will be announced closer to the final event.*

Final Awards and Grand Prizes

Award	Criteria	Prize
First Place	The team that earns the highest combined score in the four challenges	Trophy and split of a $20,000 grand prize pool. Cash prizes will be paid to each winning team's lead institution.
Second Place	The team that earns the second- highest combined score in the four challenges	Trophy and split of a $20,000 grand prize pool. Cash prizes will be paid to each winning team's lead institution.
Third Place	The team that earns the third- highest combined score in the four challenges	Trophy and split of a $20,000 grand prize pool. Cash prizes will be paid to each winning team's lead institution.
Individual Challenge Awards: Business Plan, Technical Design, Build and Test, Community Connections	The team that earns the highest score in the associated challenge.	Trophy
Rookie of the Year Award	For teams in which the lead institution is competing as the lead for the 1st time, an award will be given to the team from the institution who scores the highest combined score in the four challenges.*	Trophy

** For multi-institution teams to be eligible, the lead institution must be leading for the first time.*

Business Plan Challenge

This challenge accounts for 28% of the total score.

Teams will identify a promising market within the blue economy and determine the best marine energy device to serve the market's needs. Competitors will then evaluate the performance requirements of the marine energy system for end users in the identified market.

Submissions include:

- A midyear submission with a team roster, including partnering institutions.
- A final submission with a report, up to 7,500 words in length, including:
  - A concept overview
  - Relevant stakeholders (including end user surveys)
  - The market opportunity
  - Development and operations
  - A financial and benefits analysis
  - Results incorporated into final presentation and poster.

Students present their wave energy design.
Photo from University of Washington

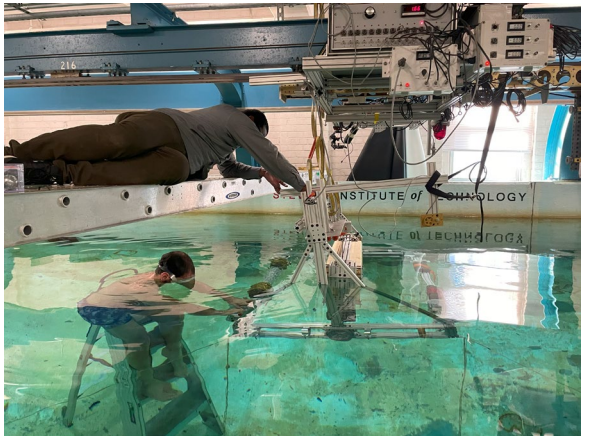
Technical Design Challenge

This challenge accounts for 30% of the total score.

Teams will complete a detailed design of a marine-energy-powered device to serve those end users.

Submissions include:

- A midyear submission with confirmation of selected blue economy market.
- A final submission with a report, up to 7,500 words long, including:
  - A description of the design objective and how the design components support this objective.
  - A performance analysis.
  - An analysis of the device's mechanical loading, power requirement, and load profile (and associated safety factors within the design where applicable).
  - A demonstration that the proposed technology is designed to withstand standard operating mechanical forces and moments.
  - A description of how the technical design addresses the power or operational needs identified in the market analysis.
  - Engineering diagrams of all mechanical components.
  - Results incorporated into final presentation and poster.



Students working on their device test in a wave tank
Photo from Stevens Institute of Technology

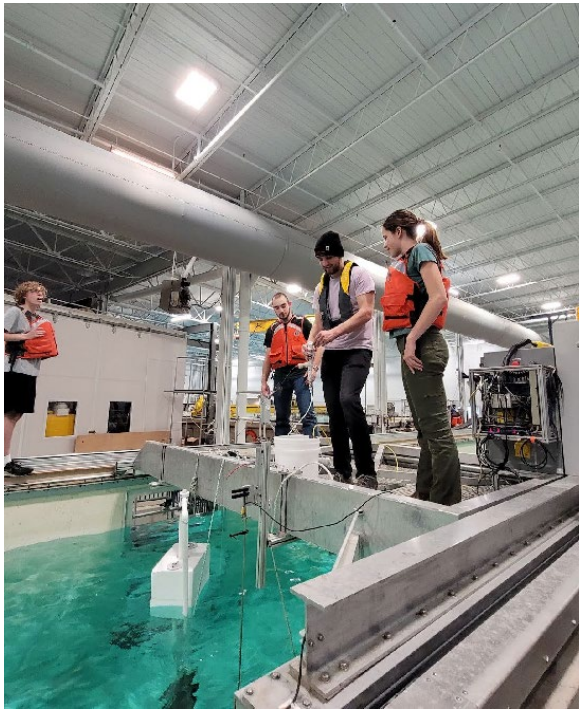
Build and Test Challenge

This challenge will account for 16% of the total score.

Teams will build a scaled prototype of their concept and perform a series of lab tests.

Submissions include:

- A midyear submission with:
  - A description of testing objectives.
  - A signed Safety and Technical Inspection form.
- A final submission with a final report, up to 5,000 words long, including:
  - The design process, potentially including early concepts, requirements, design reviews, and any iterative loops.
  - The fabrication of the prototype.
  - The testing, including a list of instrumentation and methods used and a description of the measurements taken.
  - An analysis of the raw measurements and summary of results.
  - A description of lessons learned from the design, build, and test processes.
  - Results incorporated into final presentation and poster.



Students work on testing their device.
Photo from the University of New Hampshire

Build and Test Challenge – Test Facilities

Testing will occur at a lab facility to be secured by each team with:

- No restrictions on the scale of model
- A safety inspection required by a facility representative.

Teams participating in this challenge can request support from the National Renewable Energy Laboratory to connect them with nearby facilities to test their devices.

Teams can apply to the Testing Expertise and Access for Marine Energy Research (TEAMER) program (https://teamer-us.org/) to gain access to tank, flume, and basin testing facilities.

Start looking into test facility costs and secure funding through sponsorships or fundraising!

Students work on testing their device. *Photo from University of Northern Florida*

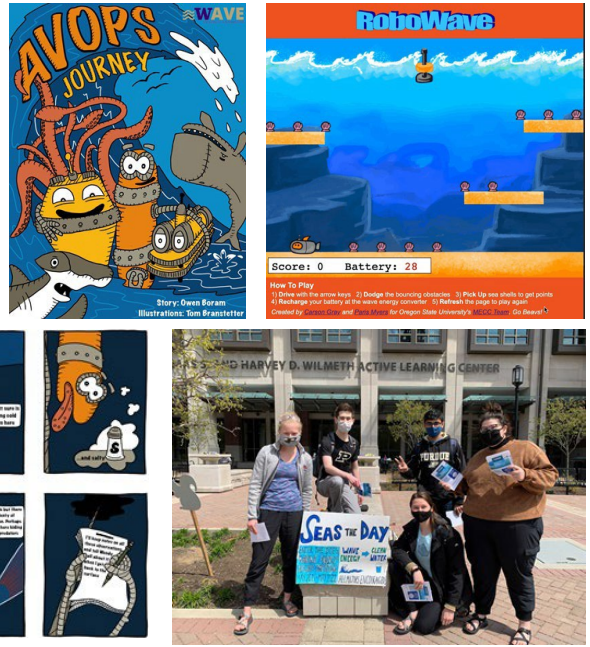
Community Connections Challenge

This challenge will account for 26% of the total score.

Teams will create connections among competition participants, the marine energy industry, students, and local communities.

Submissions include:

- A midyear submissions with:
  - A Team Overview (one to two pages)
  - An Interview Summary and Outreach Strategy.
- A final submission with:
  - A metrics report up to 2,000 words long
  - A 10-minute final presentation at the final event followed by 10 minutes of Q&A.



Examples of community connections from previous competitors.
Photos courtesy of competitors

Possible Points per Submission Element

Description	Maximum Possible Points
Business Plan Challenge (28%) *	275
Midyear Submission: Team Roster	5
Final Report	150
Business Plan Challenge Portion of Final Presentation and Q&A	*100*
Business Plan Challenge Portion of Poster	*20*
Technical Design Challenge (30%) *	290
Midyear Submission: Confirmation of Blue Economy Market	20
Final Report	150
Technical Design Challenge Portion of Final Presentation and Q&A	100
Technical Design Challenge Portion of Poster	20
Build and Test Challenge (16%) *	160
Midyear Submission: Description of Testing Objectives	25
Final Report	100
Build and Test Challenge Portion of Final Presentation and Q&A	25
Build and Test Challenge Portion of Poster	10
Community Connections Challenge (26%) *	250
Midyear Submission: Team Overview, Interview Summary, and Outreach Strategy	50
Metrics Report	50
Community Connections Challenge Portion of Final Presentation and Q&A	150
Total	975

**10 points will be deducted for each day the report is late up to 3 days, at which point the team is no longer eligible to receive points for this challenge. Formatting requirements are in place to ensure an equal amount of space for all teams to tell their stories to the reviewers. Reports not formatted to the listed requirements or that are deemed to be utilizing more than the allotted words will be penalized at the discretion of the reviewers proportional to the infraction. Furthermore, extra words will be ignored.*

How To Apply

To apply, submit an application to participate by **11:59 p.m. MT on May 6, 2024**, in PDF format on the HeroX platform (https://www.herox.com/marine-energy-collegiate-competition-2025), keeping in mind that:

- The document has a 1,500-word maximum.
- The concept description and final team roster are NOT required for the application.
- Faculty advisors may submit applications.
- No engineering or research is required for the application!!!

Your next steps are to:

- Start forming your team and working with your school now to generate support.
- Reach out to water.competition@nrel.gov with questions or if you need support forming teams.

Criteria for Selection

The criteria for selection includes:

- Educational Objectives and Integration (35%)
- Organization and Project Planning (30%)
- Team Diversity and Inclusivity (25%)
- Institutional Support and Fundraising (10%).

Apply at:
https://www.herox.com/marine-energy- collegiate-competition-2025.

A student monitors their device's performance in a wave tank.
Photo from University of New Hampshire

Commitment from Organizers

Organizers promise to:

- Host the final competition at an industry event.
- Ensure a fair and unbiased competition environment with expert reviewing.
- Provide $20,000 seed funding (to U.S. institutions only).
- Offer marine energy educational resources and networking opportunities with marine energy industry professionals.
- Invite teams to the LinkedIn alumni group.
- Create opportunities to engage with community .
- Offer teams the chance to be included in a 2025 MECC team video and other promotional efforts by the U.S. Department of Energy or National Renewable Energy Laboratory.

Expectations from Teams

Participants are expected to:

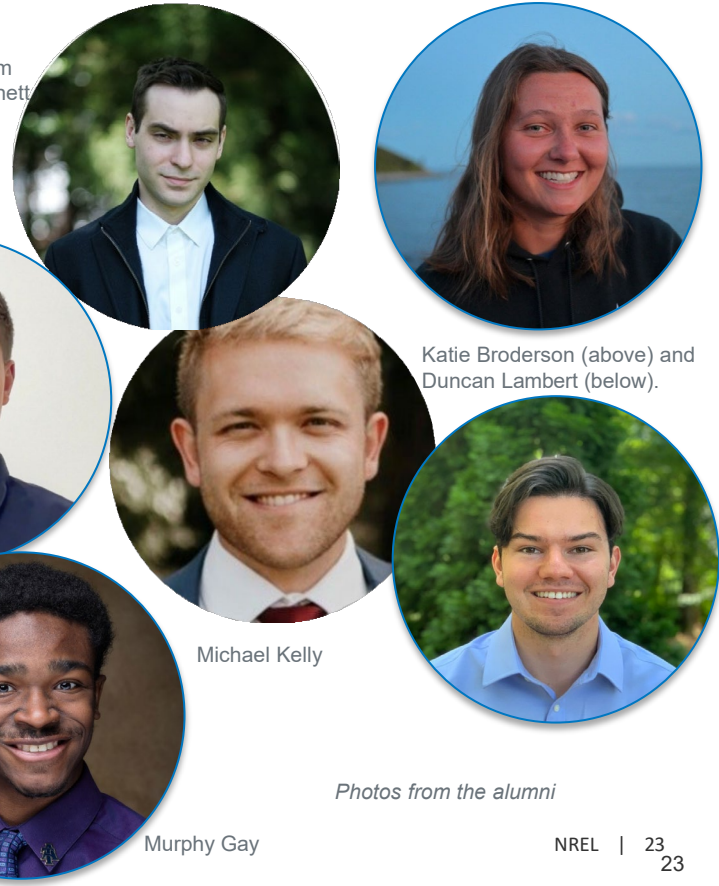
- Compete in the 2025 competition in a professional and collegial atmosphere.
- Bring marine energy education into the classroom.
- Spread the MECC message through outreach and local impact.
- Take advantage of educational opportunities provided.
- Acquire additional funds through fundraising or other means (if needed).
- Submit promotional content to the National Renewable Energy Laboratory, such as videos and photos.

MECC participants provide instruction and activities to event attendees.
Photo Credit: Oakland University

Marine Energy Collegiate Competition Success Stories

Read stories from past alumni:

- Adam Bennett, E-Wave Technologies
- Katie Brodersen, Oneka Technologies
- Murphy Gay, Ocergy
- Michael Kelly, ORISE Fellow
- Nicholas May-Varas, Ocean Motion Technologies
- Duncan Lambert, National Renewable Energy Laboratory Science Undergraduate Laboratory Internship.



Photos from the alumni

Testimonials from Past Participants

“This competition is a great opportunity for college students to have a deeper look into the ocean energy field. It is also a very good chance for engineering and business major students to communicate and work together for a solution.”

“The experience provided an atmosphere that mimics, on a small scale, that which is obtained working in the industry.”

“The MECC inspired us to consider many different perspectives of a business. Being a team primarily of engineers it challenged us to broaden our perspective. This also helped to create a strong interdisciplinary team to complete the task at hand.”

“Our interviews with all the different end-users were seriously fantastic.”

“….even the setbacks and challenges were learning experiences. The most helpful of these positive experiences was getting the business team and engineering team working in tandem. We think it really sets all the team members up to be ready for a work environment like this.

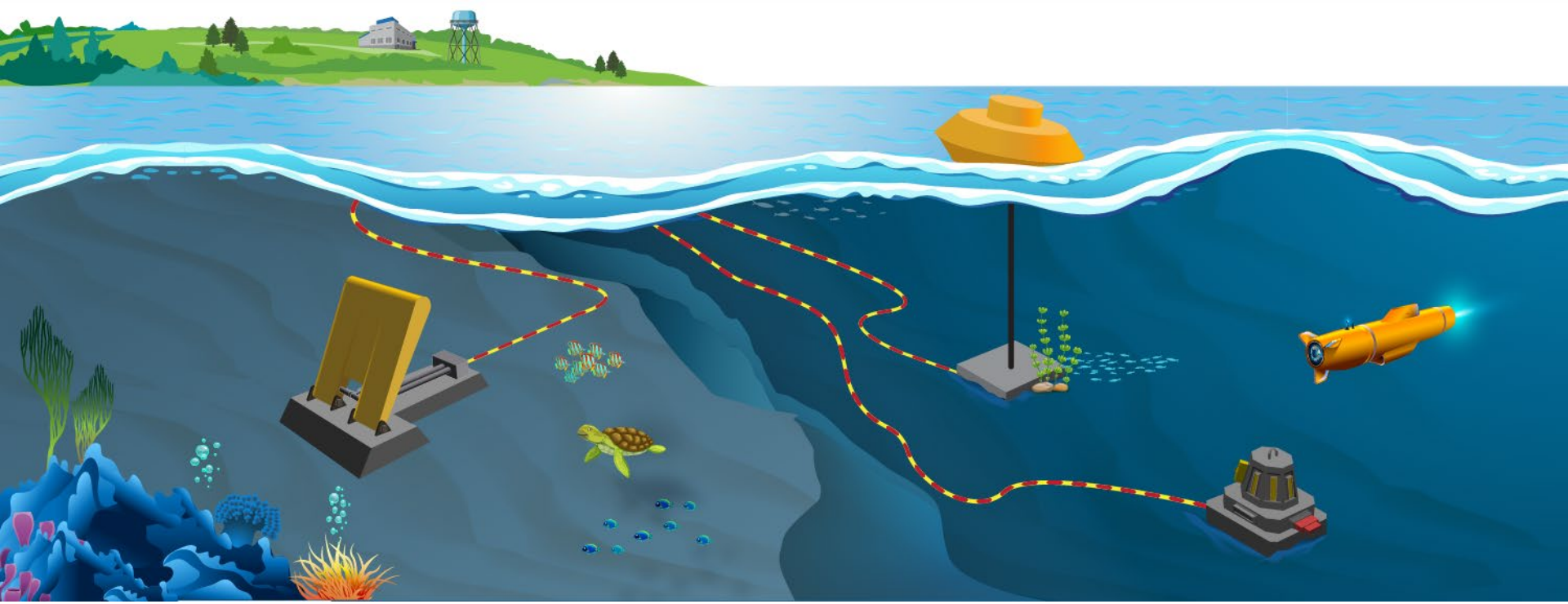
“We were able to learn about what motivations students had between two very different schools on campus, as well as successfully develop two competing ideas that both had merit as final solutions.“

What's Next?

Now, you should:

- Register for free on the MECC HeroX site to join the challenge and submit your application by May 6, 2024: https://www.herox.com/marine-energy-collegiate-competition-2025
- See competition updates, review past submissions, and communicate directly with organizers on the HeroX site.
- Refer to the 2025 MECC Rules document to learn about competition structure, submission deadlines, etc.: https://www.herox.com/marine-energy-collegiate-competition-2025/resources
- And remember that it is never too early to start looking for potential team mentors and sponsors!

A group of undergraduate students from North Carolina Agricultural and Technical State University experience success testing an oscillating water column wave energy device in the test tank at the Coastal Studies Institute on the East Carolina University Outer Banks Campus.
Credit: John McCord, Coastal Studies Institute



Thank You!

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