

U.S. Department of Energy Marine Energy Collegiate Competition

POWERING
the BLUE ECONOMY™

Marine Energy
Collegiate
Competition

U.S. DEPARTMENT OF ENERGY



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](#).

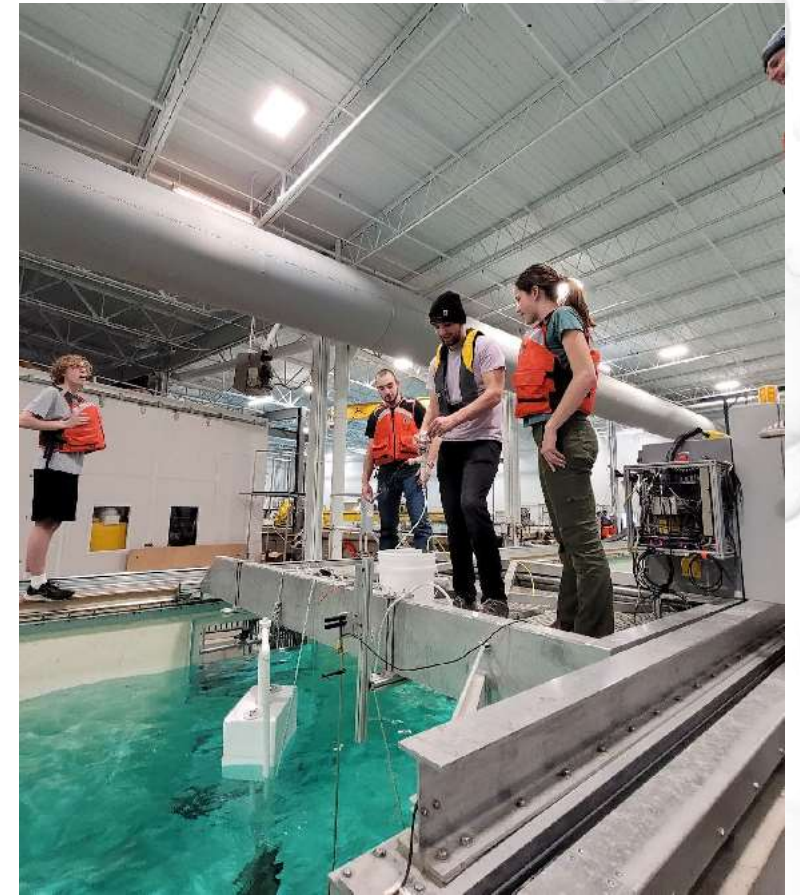
The four required and concurrent challenges are:

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

Approx. 20 teams per year are selected to compete

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 2024 MECC Rules document to learn about competition structure, submission deadlines, etc.: <https://www.herox.com/marine-energy-collegiate-competition/resource/1257>.



Students participating in MECC test their marine energy device in a water tank

State of the Renewable Energy Workforce

- The United States has a goal to reach net-zero greenhouse gas emissions by 2050 and some estimates show this will require the creation of 10.5 million jobs by 2030
- 68% of wind industry employers already report difficulty finding qualified applicants
- Offshore Wind Workforce Development is seeing an increasing need for Trade, Engineering, Professional/Support, Science, and Maritime roles.
- Between 2014 and 2019, solar jobs grew five times faster than the overall economy.
- Jobs in renewable energy are found in all 50 states

The Electric Power Generation sector employed **857,579** people in 2021, an increase of **24,006 jobs (+2.9%)**.

Nearly all subtechnologies added jobs from 2020 through 2021. Wind energy was one of the few industries that did not lose jobs in 2020.

An increase of
24,006 JOBS,
UP 2.9%,
from 2020 to 2021.



Solar

+17,212 jobs
(+5.4%)



Wind

+3,347 jobs
(+2.9%)



Coal

-572 jobs
(-0.8%)



Nuclear

-2,440 jobs
(-4.2%)



Hydropower

+1,383 jobs
(+2.2%)



**Combined Heat
and Power**

+996 jobs
(+3.5%)



Bioenergy

+349 jobs
(+2.9%)



Geothermal

+220 jobs
(+2.8%)

Diverse Roles in Marine Energy Workforce

Planning and Development

- Engineering
- Surveying and scientific monitoring
- Finance
- Permitting
- Legal
- PR 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
- O&M 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.

Why Collegiate Competitions

- Surveys show that there is a gap in curricula (Kindergarten-University) for renewable energy technologies at varying levels across different technologies.
- Provides opportunities for students to immerse themselves in industry issues while obtaining academic credits (example: senior capstone projects) and/or resume building opportunities.
- The Collegiate Wind, Marine Energy, and Solar Decathlon Competitions have seen students obtain jobs through connections provided during the competition.
- Competitions provide opportunities to develop skills needed in the real world such as: presentation, marketing, finance, risk assessment, project management, design and teamwork skills.



Addressing ME Workforce Needs

STEM for PRIMRE
This information diving portal is designed to help your innovation and growth in the marine energy technology industry and support workforce development.

Science, Technology, Engineering, and Math for Marine Energy

Select a topic to get started...

- Workforce Data & Analysis
- Education
- Industry & Career Building

Energy Engineers
Whether you're an energy engineer or just getting started, you'll need to know about renewable energy — including energy from the sun, wind, and water. Explore what you can do to save energy and protect the environment. Doing the right thing with your energy is also good for your planet. Energy and engineers can help you learn about these issues on the Energy Resource Guide below.

MYSTIC AQUARIUM



Marine Education Program Locations

Map showing the locations of marine education programs across the United States. The map includes a legend with categories like 'Marine Energy', 'Renewable Energy', and 'Marine Education'. A search bar is visible at the top.

Locations

Map showing the locations of marine education programs across the United States. The map includes a legend with categories like 'Marine Energy', 'Renewable Energy', and 'Marine Education'. A search bar is visible at the top.

RENEWABLE OCEAN ENERGY
These devices turn the energy from moving water and wind into electricity. Underwater power cables carry the electricity to shore, where our homes, schools, and businesses can use it.

Mystic Aquarium Story Telling Videos

A grid of video thumbnails showing various scenes related to marine energy and ocean resources, including underwater views, wind turbines, and coastal infrastructure.



Day in the Life: Miguel Quintero

professional profile video

RENEWABLE OCEAN ENERGY

A museum exhibit featuring a large screen displaying ocean energy technology, with interactive displays and informational panels.



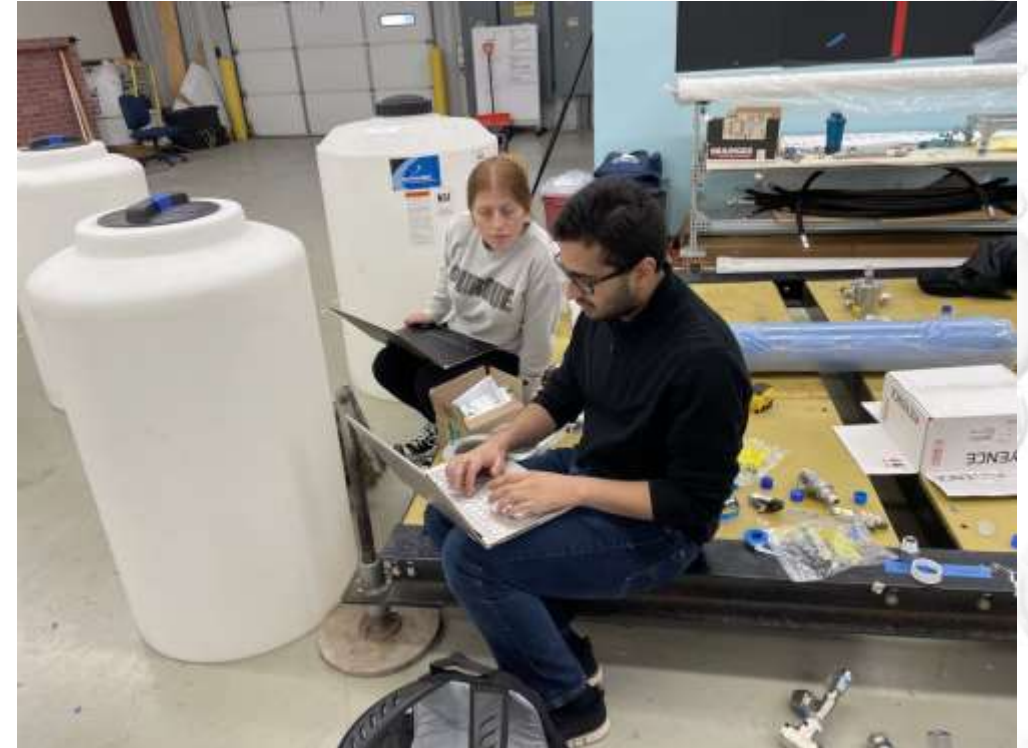
Goals of the MECC

We want to share that:

- Marine energy can play a critical role in reaching 100% clean energy and decarbonization by 2035
- We have challenges, and we will meet them
- Marine energy is exciting and pioneering
- The future of U.S. renewable energy technologies can only be realized with a strong workforce.

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 laptops in a lab

Who Runs MECC



Allison Johnson and
Ashley Brooks:

DOE Competition
Managers



Betsy Stratton:

Communications &
Outreach Lead



Arielle Cardinal:
Competition Manager



Elise DeGeorge:
Head Rules Judge



Ben Maurer,
Amanda Morton
and Natham Tom:

NREL Competition
Technical Staff



Components for 2024

- 1. Business Plan Challenge:** 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.
- 2. Technical Design Challenge:** Teams will complete a detailed design of a marine-energy-powered device to serve those end users.
- 3. Build and Test Challenge:** Teams will build a scaled prototype of their concept and perform a series of lab tests.
- 4. Community Connections Challenge:** Teams will create connections among competition participants, the marine energy industry, students, and local communities.

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



Students work on a computer simulation (right) and in-water test of their marine energy device (below).



Teams

Up to 20 teams will be selected to participate in the competition. Teams must meet the following criteria to be eligible:

- Teams may consist of a combination of undergraduate and graduate students but at least 50% must be students pursuing their bachelor's and/or associate's degree at the beginning of the competition. Only 50% of the team may be pursuing an advanced (e.g., master's, doctoral) degree.
- Both U.S. and non-U.S. institutions are welcome to apply and participate.
- Non-U.S. institutions are not eligible to receive cash prize funding.
- In a team with students from both U.S. and non-U.S. institutions, the lead institution must be a U.S. academic institution [accredited by the U.S. Department of Education](#) to enable the team to be eligible for cash prize funding.



Final Awards and Grand Prizes

Award	Criteria	Prize
First Place	The team that earns the highest combined score in the four challenges.	<ul style="list-style-type: none"> • Trophy • Split of a \$20,000 grand prize pool with cash prizes paid to each winning team's lead institution.
Second Place	The team that earns the second-highest combined score in the four challenges.	
Third Place	The team that earns the third-highest combined score in the four challenges.	
Individual Challenge Awards <ul style="list-style-type: none"> • Business Plan Challenge • Technical Design Challenge • Build and Test Challenge • Community Connections Challenge 	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 first time, an award will be given to the team from the institution who scores the highest combined score in the four challenges.	Trophy

Commitment from Organizers

- Organizers are expected 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 through required outreach and education activities
 - Offer teams the chance to be included in a 2024 MECC team video and other promotional efforts by the U.S. Department of Energy or National Renewable Energy Laboratory.



Expectations from Teams

- Compete in 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 NREL (videos, photos, etc.)



Competition Schedule

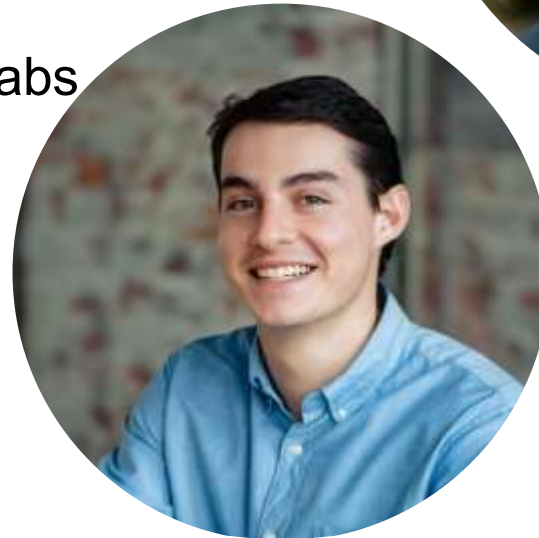
This schedule is ***subject to change***, but provides a high-level overview of what to expect:

- Engagement throughout the full academic year
 - Development of contest products and product submission
 - Support student learning on relevant subject matter
 - Local outreach
 - Fundraising
 - All-team calls
- Multi-day event
 - Dry run presentations (optional)
 - Kick-off meeting
 - Team Presentations
 - Team expo/poster displays
 - Networking with industry
 - Awards ceremony



MECC Success Stories

- Adam Bennett – E-Wave Technologies
- Andrew Witt - Glosten
- Katie Brodersen – Oneka Technologies
- Murphy Gay - Ocergy
- Michael Kelly – ORISE Fellow
- Nicholas May-Varas – Ocean Motion Technologies
- Duncan Lambert – NREL SULI program
- At least 7 additional interns across the national labs



Participation in 1st Four Years

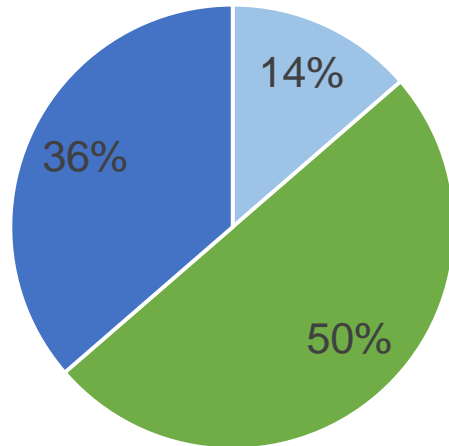
- 58 Unique Schools from different states and 9 countries
- 12 MSIs including
 - 1 Historically Black College and University (HBCU)
 - 1 Alaska Native and Native Hawaiian-Serving Institution (ANNH)
 - 9 Hispanic-Serving Institutions
 - 4 Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs)
- 13 International schools
- 1 community college



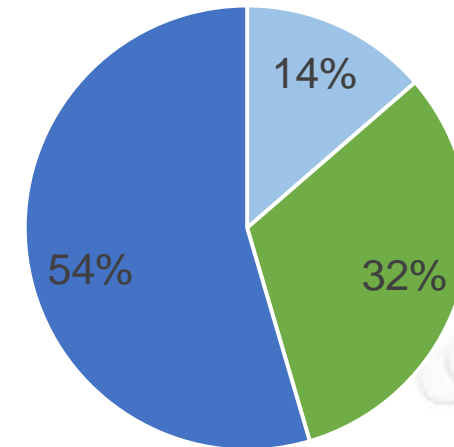
While we don't have exact numbers, we've estimated that roughly 500 students have participated in MECC in the first 4 years of the competition

Some early survey results

How important do you perceive your experience during the 2023 Marine Energy Collegiate Competition (MECC) to be in attaining a related job post-graduation?



The Marine Energy Collegiate Competition (MECC) increased my interest in pursuing a career in renewables or Marine Energy.



■ Not at all important ■ Somewhat important ■ Very important ■ Neither agree nor disagree ■ Somewhat agree ■ Strongly agree

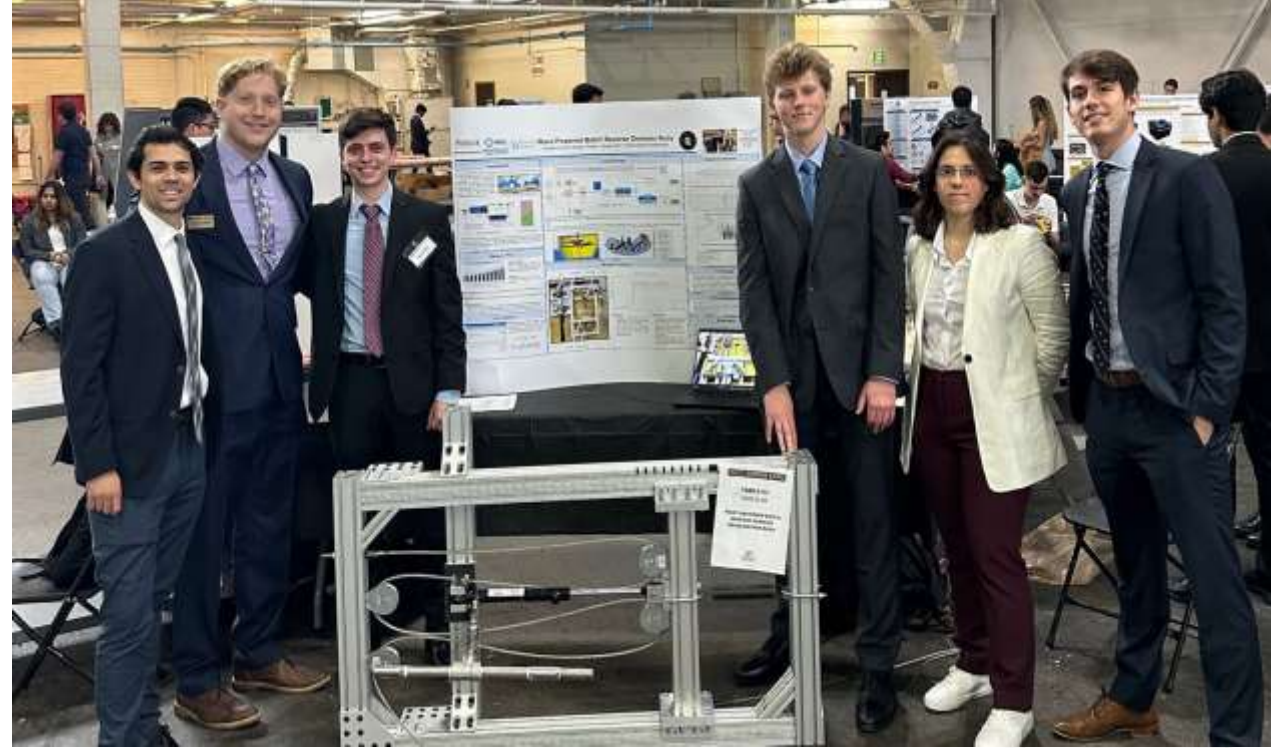
Testimonials from MECC Participants:

- “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.** It confirmed that we had a valid idea and really gave us confidence to move forward with the idea.”
- “....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.



Ways to Get Involved

- Serve as a Judge
- Present as a Guest Speaker during our monthly calls
- Mentor/Sponsor a team
- Send us job opportunities for distribution to teams
- Participate in Networking events





Thank you! Please send any questions to:
arielle.cardinal@nrel.gov