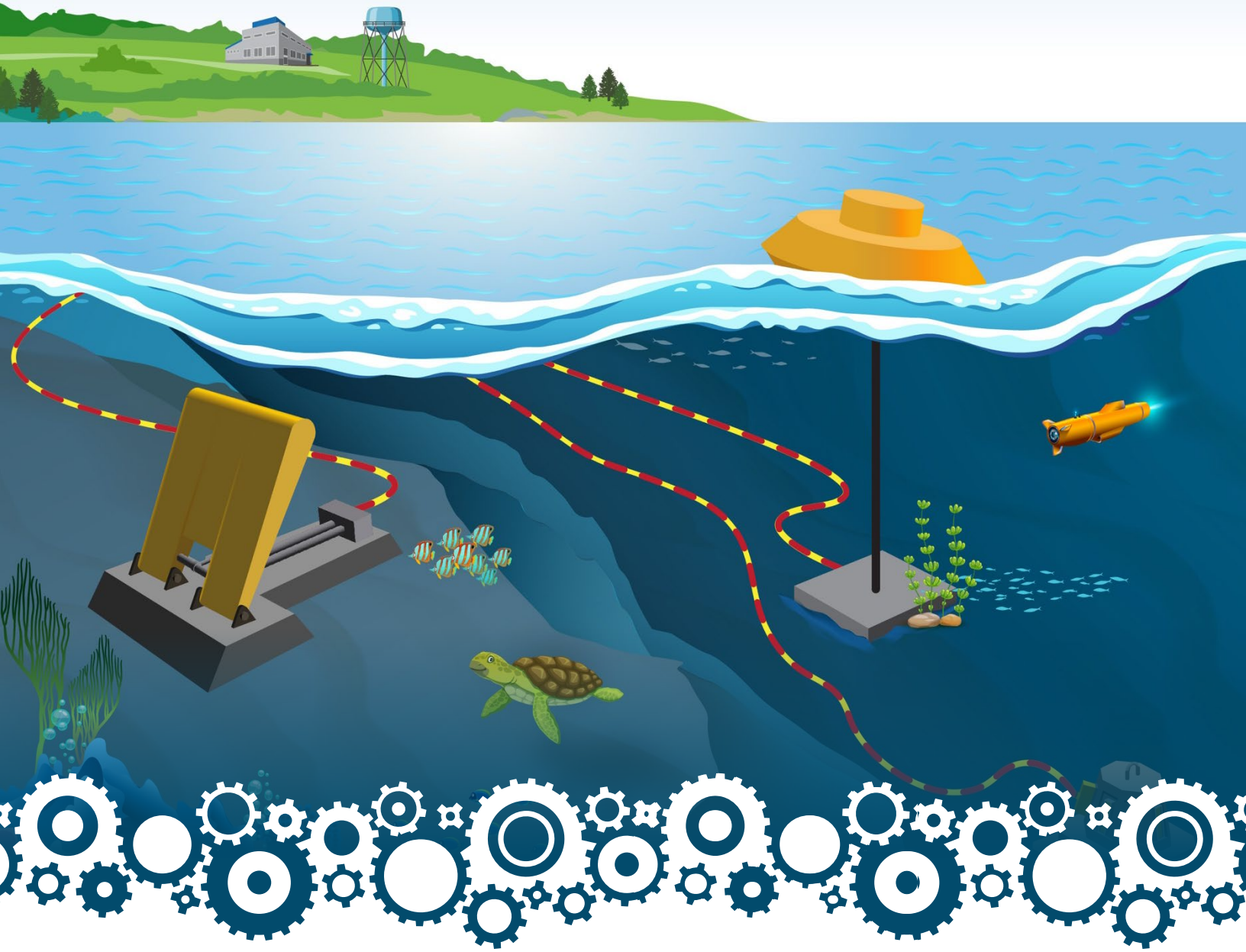
AMERICAN MADE
U.S. DEPARTMENT OF ENERGY

Marine Energy Collegiate Competition (MECC)



OFFICIAL RULES

MARCH 2024

Preface

The U.S. Department of Energy's Marine Energy Collegiate Competition will be governed by 15 U.S.C. §3719 and this Official Rules document. This is not a procurement under the Federal Acquisitions Regulations and will not result in a grant or cooperative agreement under 2 CFR 200. The Prize Administrator reserves the right to modify this Official Rules document if necessary and will publicly post any such notifications as well as notify registered prize participants.

Date	Modification

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1 Introduction

The U.S. Department of Energy (DOE) Water Power Technologies Office's (WPTO) Marine Energy Collegiate Competition (MECC, also referred to as the "Competition" in this rules document) invites diverse interdisciplinary teams of postsecondary, undergraduate, and graduate students from a variety of academic programs to solve ocean energy challenges in the blue economy. Through the competition, WPTO hopes to inspire students to innovate in and accelerate the emerging marine energy industry. The competition will 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. MECC will consist of four required and concurrent challenges: a Business Plan Challenge, a Technical Design Challenge, a Build and Test Challenge, and a Community Connections Challenge, and will culminate in a final in-person event.[1]

1.1 Prizes

Up to 20 teams will be selected to compete for a cash prize pool of $420,000.

All competing teams that submit all required submission materials will be eligible for up to $20,000 in total cash awards and will compete for a part of the $20,000 grand prize cash pool.

Specific requirements for each stage of the competition are included in the following sections.

Table 1. Cash Prize Distributions

All amounts are up to the total noted and are not guaranteed.

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*	TBD*	$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.*

As a part of the MECC, competitors may have the opportunity to engage in networking events with marine energy industry experts during the final event, to be held at an industry event. This engagement is intended to encourage connections between competitors and industry professionals and help prepare students for the job market in this industry.

[1] See Appendix H for the alternative competition structure in the event of a final virtual event.

1.2 Background

The term "blue economy" refers to various aspects of the economic, social, and ecological sustainability of the ocean.2 Through the Powering the Blue Economy™ initiative, WPTO supports the advancement of technologies to integrate marine renewable energy to power applications in coastal and maritime markets to enable sustainable growth of the blue economy. Specific applications include autonomous vehicles to further ocean exploration, deep-water offshore aquaculture, battery and fuel cell technology for marine transportation, desalination and water treatment to serve coastal and island communities, and alternative fuels like biofuels derived from marine algae and hydrogen from seawater. These and other blue economy applications for marine energy are intended to be the basis of MECC projects.

1.3 The 2025 Competition

In the 2025 MECC, the competing student teams will have approximately 10–12 months to develop and present their concepts at the final event held in Spring 2025. During the competition, the teams will submit written documents demonstrating their progress on a schedule described in this document, attend monthly all-team calls, receive an assigned industry mentor, and have access to educational webinars and networking opportunities with marine energy experts.

This competition will consist of four challenges, described below, that will run concurrently. Each selected team will participate in all four challenges. Each challenge includes distinct submissions that selected teams must complete to be awarded cash prizes for that challenge. The teams' activities and ensuing results from the four challenges are intended to be incorporated into three separate final reports and two presentations at the final event.

The four challenges of the MECC are:

- **Business Plan Challenge**: Teams will identify a promising market within the blue economy (either a market identified in the WPTO Powering the Blue Economy report or another potential 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.[3]
- **Technical Design Challenge**: Teams will evaluate the performance requirements in their chosen blue economy market by identifying and interviewing at least three potential end users. Teams will complete a detailed design of a marine-energy-powered device to serve those end users.
- **Build and Test Challenge**: Teams will build a scaled prototype of their concept and perform a series of lab tests.
- **Community Connections Challenge**: Teams will engage with the marine energy industry and their communities to achieve three goals: make connections with professionals to discuss a challenge in the industry that they are passionate about, create unique solutions to address these challenges, and take action toward one of these solutions.

[2] For more information, please see The Economist Intelligence Unit's *The Blue Economy: Growth, Opportunity and a Sustainable Ocean Economy* 2015 report: https://impact.economist.com/perspectives/sustainability/blue-economy

[3] Potential future customers within the selected blue economy market.

At the end of the competition, all competing teams are expected to attend the final event in Spring 2025 to present results from all four challenges. The written submissions as well as presentations will be reviewed by experts selected by DOE. Specific details on submission requirements and scoring criteria are included in the following sections.

1.3.1 Key Dates

- MECC Application Opens: March 22, 2024
- MECC Application Closes: May 6, 2024
- Midyear Submissions Deadline: January 27, 2025
- Signed Safety and Technical Inspection Form Deadline: March 24, 2025
- Final Report Deadline: 2 weeks prior to final event, exact date TBA
- Metrics Report Deadline: 1 week prior to final event, exact date TBA
- Final Event: Exact date(s) TBA

1.4 Prize Goals

DOE and the National Renewable Energy Laboratory (NREL) launched the first year of MECC in 2020. The competition's goals are to:

- Bring together diverse groups of students from multiple disciplines.
- Encourage teams to explore opportunities for marine energy technologies that can benefit other existing maritime industries via real-world concept development experiences.
- Inspire future innovators as an entryway into the marine energy and blue economy sectors.
- Teams will be evaluated on how effectively their projects meet these goals when determining winners for the grand prize.

This competition aims to provide experience with a wide range of blue economy and marine energy opportunities and provide a foundation for future opportunities in these sectors. Throughout the competition, teams will have the opportunity to gain insights into various marine energy and clean energy careers and access workforce development resources and career opportunities in these sectors. All teams will be invited to attend regular educational webinars and industry presentations intended to enhance their educational experience. The MECC has helped students in the past by connecting them with job opportunities and instilling an interest in and understanding of renewable energy careers.

Ultimately, this collegiate competition is designed to foster educational programs and would benefit from classroom curriculum as well as the creation of remote learning, industry partnerships, informal independent-study projects, industry mentorships, and clubs.

1.5 Eligibility and Competitors

The competition seeks to bring together interdisciplinary undergraduate and graduate student teams and is only open to academic institutions, subject to the following requirements:

- 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.
- Multiple institutions are eligible to form a singular team; however, multi-institutional teams must designate the lead institution and partner institution(s). For teams comprising U.S. and non-U.S. institutions, the lead institution must be an eligible U.S. institution to receive cash prizes.
- Each institution may only sponsor one team. Multiple teams applying from an institution will be asked to partner internally. Institutions appearing on multiple teams, either acting as the lead or partner institution, will be required to choose only one team to participate in.
- DOE employees, employees of sponsoring organizations, members of their immediate families (e.g., spouses, children, siblings, or parents), and persons living in the same household as such persons, whether or not related, are not eligible to participate in the prize.
- For the family members of lab employees participating in the competition, the lab employee's scope of their employment cannot overlap with any aspect of the prize competition.
- Individuals who worked at DOE (federal employees or support service contractors) within six months prior to the submission deadline of any contest are not eligible to participate in any prize contests in this program.
- Federal entities and federal employees are not eligible to participate in any portion of the prize.
- Students who are employed at labs can participate, including interns, however, they cannot use their Federal lab facilities as part of the competition since these facilities are not open to all competitors.
- Entities and individuals publicly banned from doing business with the U.S. government such as entities and individuals debarred, suspended, or otherwise excluded from or ineligible for participating in Federal programs are not eligible to compete.
- Individuals participating in a foreign government talent recruitment program[4] sponsored by a country of risk and teams that include such individuals are not eligible to compete.

[4] Foreign Government-Sponsored Talent Recruitment Program is defined as an effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding,

- Entities owned by, controlled by, or subject to the jurisdiction or direction of a government of a country of risk are not eligible to compete.
- To be eligible, an individual authorized to represent the competitor must agree to and sign the following statement upon registration with HeroX:

  > I am providing this submission package as part of my participation in this prize. I understand that the information contained in this submission will be relied on by the federal government to determine whether to issue a prize to the named competitor. I certify under penalty of perjury that the named competitor meets the eligibility requirements for this prize competition and complies with all other rules contained in the Official Rules document. I further represent that the information contained in the submission is true and contains no misrepresentations. I understand false statements or misrepresentations to the federal government may result in civil and/or criminal penalties under 18 U.S.C. § 1001 and § 287, and 31 U.S.C. §§ 3729-3733 and 3801-3812.

In keeping with the goal of growing a community of innovators, competitors are encouraged to form multidisciplinary teams while developing their concept. The HeroX platform provides a space where parties interested in collaboration can post information about themselves and learn about others who are also interested in competing in this contest.

All cash prizes will be paid to the lead academic institutions.

Based on prior experience with collegiate competitions, MECC Prize Administrators recommend a team size of six to eight participants, but there is no official limit to the number of participants per team. However, for each team, the number of students participating in the final event may be limited based on timing and/or space restrictions. Interdisciplinary teams including students with backgrounds in the following areas are highly encouraged: engineering, marine science, environmental science, business, marketing, communications, policy, and social sciences.

Specific application requirements and evaluation criteria are included in this document. The Prize Administrator has the right to refuse any submission for incompleteness or unresponsiveness to the prize goals.

1.6 Assigned Mentors

Eligible teams selected to participate will be assigned a mentor for support throughout the competition. These hand-selected industry mentors will play a critical role throughout the competition, providing teams with real-world experience, technical insight, and other important support. **Mentors will be assigned to teams by July 1, 2024.**

2 Application Requirements

Interested teams must submit an application in PDF format to participate on the HeroX platform **by 11:59 p.m. Mountain Time on May 6, 2024**. Teams will not be eligible to compete if an application is not submitted by the deadline. Submissions will be reviewed and scored by national laboratory

complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

researchers and U.S. Department of Energy (DOE) staff using the evaluation criteria listed in the application scoring rubric in Table 2.

2.1 What to Submit

Teams should submit a written application that includes the following elements. Each application should be a maximum of 1,500 words.

2.1.1 Team Contact Information

The team contact information will include the:

- Lead institution
- Partner institutions (if applicable)
- Team Faculty Advisor(s) name and department (faculty member or primary representative)
- Faculty Advisor(s) email
- Faculty Advisor(s) phone number
- Collegiate Team Student Leader(s) name and declared/intended major (if known)
- Collegiate Team Student Leader(s) email.

2.1.2 Introduction

Teams should provide a brief introduction of their team, why they are interested in participating in this competition, and their commitment to engage in the MECC educational opportunities. This includes, but may not be limited to, subject matter expert speakers, tools overviews, and other educational webinars.

2.1.3 Educational Objectives and Integration (35%)

Teams should answer the following questions:

- How do they see the competition being integrated into their academic experiences (e.g., courses integrating competition elements or other programs that otherwise support competition-related work, scholarships, independent-study projects, or research assistantships designed to support successful student participation in the competition)?
- Alternatively, is there a plan to cultivate knowledge through other means (e.g., remote learning, industry partnerships, informal independent-study projects, industry mentorships, clubs, and so on)?

2.1.4 Organization and Project Planning (30%)

Teams should provide:

- A description of how the team will execute elements of the competition, including how unique obstacles, such as academic calendars or virtual collaboration challenges, will be overcome (if applicable, noting previous participation in similar competitions) and how the team will be supported by faculty and staff to ensure that students can be successful in achieving the competition objectives (e.g., list faculty, staff, and other mentors and how they will advise students throughout the competition).

- An explanation of which departments across the institution will participate to meet competition requirements.

- Resumes of students from international institutions, which includes university affiliation(s) and the physical location of where they will perform the work for this prize. Non-domestic participation may be subject to DOE review, see Appendix A "General Conditions."

2.1.5 Team Diversity and Inclusivity (25%)

Teams should describe efforts to ensure that the team makeup will be consistent with DOE's and NREL's efforts to cultivate a water power workforce comprising diverse backgrounds, skill sets, and educational training. For example, the team should describe how:

- The team has created ambitious yet achievable diversity, equity, and inclusion objectives that will be incorporated in the competition that are applicable across multiple academic disciplines. These objectives must be specific, measurable, assignable, realistic, and time-related (often called SMART).
- The team has a clear plan to measure the success of the proposed diversity, equity, and inclusivity objectives to cultivate a water power workforce comprising diverse backgrounds, skill sets, and educational training. The team is likely to be successful in achieving the objectives they have defined, engaging team members of diverse or unique backgrounds.

2.1.6 Institutional Support and Fundraising (10%)

Teams should clearly describe how they expect to spend the $20,000 cash prize funds to achieve their project goals. Note that these funds may not cover the full expenses of this project or participation for all students, in which case teams should describe how they will seek funding or in-kind contributions for additional resources (e.g., software, educational materials, project planning tools, and so on) they anticipate needing as part of the competition.

2.1.7 Application Scoring and Notification

All applications will be scored and reviewed. Teams selected to compete in the competition will be notified of their acceptance.

Table 2. Application Component Scoring Rubric

Application Component and Scoring Criteria	Maximum Possible Points (100)
Educational Objectives and Integration	**35**
The application provides an achievable and detailed description of how the competition would be integrated into their academic experiences and describes a plan to cultivate student knowledge.	
Organization and Project Planning	**30**
The application provides an achievable and detailed description of: • How the team will execute elements of the competition, including how unique obstacles, such as academic calendars or virtual collaboration challenges, will be overcome.	

• How the team will be supported by faculty and staff, and external partners, where applicable, to ensure that students can be successful in achieving the competition objectives (e.g., list faculty, staff, and other mentors and how they will advise students throughout the competition). • Which departments across the institution will participate and actively support the team to meet competition requirements including a description of what this support will look like across each of these departments.	
Team Diversity and Inclusivity	**25**
The application includes: • Ambitious yet achievable diversity, equity, and inclusion objectives that will be incorporated in the competition that are applicable across multiple academic disciplines. These objectives must be specific, measurable, assignable, realistic, and time-related (often called SMART). • A clear plan to measure the success of the proposed diversity, equity, and inclusivity objectives. • Justification for why the team will be successful in achieving the objectives they have defined and engaging team members of diverse or unique backgrounds.	
Institutional Support and Fundraising	**10**
The application includes a detailed and achievable description of how they will seek additional resources (e.g., software, educational materials, project planning tools, and so on) they anticipate needing as part of the competition.	

3 Competition, Challenges, Submissions, and Awards

The MECC consists of all the activities carried out as part of the four challenges leading up to and through the final event.[5] Teams will compete for a cash prize pool of up to $420,000.

Teams who complete all competition elements in all four challenges are eligible to receive up to $20,000 in cash prizes each, a participation plaque, and recognition through DOE and NREL channels. First-, second-, and third-place winners will also be awarded cash prizes from an additional grand prize pool.

Since the primary theme of the competition is Powering the Blue Economy,[6] teams will frame each of their challenge submissions around applications within the blue economy. Teams are allowed to either advance existing technology through this competition or develop new technologies.

[5] If external circumstances do not allow for an in-person event, the event will move to a virtual format.
[6] https://www.energy.gov/sites/prod/files/2019/09/f66/73355-v2.pdf

3.1 Required Submission Materials Overview and Deadlines

During the full period of the MECC, participants will need to submit and/or present a number of required submissions as outlined in Table 3 by the submission deadlines outlined in Table 4.

Table 3. Challenge Submissions Overview

Required Submissions	Business Plan Challenge	Technical Design Challenge	Community Connections Challenge	Build and Test Challenge
Midyear Submissions	X	X	X	X
Final Report	X	X		X
Presentation and Q&A (single submission)	X	X	X	X
Poster (single submission)	X	X		X
Metrics Report			X	

Teams selected to compete will be eligible to receive cash prizes on the schedule outlined in Table 4 following submission of the required materials. Prize Administrators encourage teams to use the first two cash awards (for initial selection and midyear submissions) to support travel and participation in the final event, purchase materials for the Build and Test Challenge, and/or foster sustained marine energy programs and curricula at their home institutions. Teams that attend and actively participate in the MECC final event in Spring 2025 will be eligible to receive an additional cash prize per team as a third award and will compete for the grand prize cash pool.

Table 4. Submission Deadlines

Submission	Submission Deadline	Funds Awarded
Application to participate (open March 22 2024). All selected teams will be invited to compete in the rest of the competition.	May 6, 2024, 11:59 p.m. MT	Selected teams will be eligible to receive $5,000, distributed to the selected and eligible lead team's institution.
Business Plan Midyear Submission: Team roster, including partner institutions* Detailed Technical Design Midyear Submission: Confirmation of selected blue economy market Build and Test Midyear Submission: Description of testing objectives Community Connections Midyear Submission: (1) Team overview* and (2) interview summary and outreach strategy	Jan. 27, 2025, 11:59 p.m. MT	Each lead team's institution can receive a $10,000 cash prize.
Submission of signed Safety and Technical Inspection Form	March 24, 2025, 11:59 p.m. MT	

Team photos and video (optional)	March 24, 2025, 11:59 p.m. MT	
Submission of final reports	2 weeks prior to final event	
Submission of metrics report	1 week prior to the final event	
During the final event		Each team that meets the submission requirements will be eligible to receive an additional $5,000 cash prize and to compete for a portion of the $20,000 grand prize cash pool (amount subject to change).
Display of poster summarizing Business Plan, Technical Design, and Build and Test*	Bring to final event	
Presentation of (1) Community Connections Challenge presentation (10 minutes) and (2) presentation for Business Plan, Technical Design, and Build and Test Challenges (25 minutes)	Bring to final event	

*Template provided.

All of the required submissions will be scored as described in Table 5. Details on what to include in these submissions and the scoring criteria used to evaluate them are described in the following sections for each of the challenges.

Table 5. Scoring Summary for All Competition Submissions (975 Points)

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 Porton 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 Porton 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 Porton 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.*

3.2 Business Plan Challenge (28%)

In the 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[7] in the identified market and develop a business plan.

While developing their business plan, competing teams must evaluate the near-term market potential for their concept and/or system, ideally in the next 5–10 years. Business plans will be reviewed based on whether teams completed a robust market analysis and considered any potential shortfalls.

In the Business Plan Challenge, teams must submit a midyear submission and final report. Additionally, each team will present one final live presentation on their Business Plan, Technical Design, and Build and Test Challenges results to a panel of reviewers during the final event.

3.2.1 Business Plan Challenge Midyear Submission: Team Roster

Teams will submit a team roster on the HeroX platform in PDF format that includes names, email addresses, and declared majors of each team member. The roster should also include contact names and email addresses for students from partnering institutions. **This submission is due Jan. 27, 2025, 11:59 p.m. MT.**

A template is available on HeroX.

The Business Plan Challenge Midyear Submission will be scored against the following criteria:

Table 6. Business Plan, Technical Design and Build and Test Challenge Midyear Submissions

Description	Maximum Possible Points
Business Plan Challenge Midyear Submissions	**5**

[7] Potential future customers within the selected blue economy market.

Team roster is complete and in compliance with the template provided by Prize Administrators	5

3.2.2 Business Plan Challenge Final Report

Each team must submit a final report summarizing the results of the Business Plan Challenge in PDF format on the HeroX platform. **This report is due two weeks prior to the final event.**

The final report should follow these formatting requirements:

- Pages should be 8.5 inches by 11 inches, paginated, single-sided, and with 1-inch margins at a minimum.
- Content should be at a minimum single-spaced.
- The body of the report must use at a minimum an 11-point font.
- Captions for figures and tables must be numbered for easy navigation.
- The final reports must be packaged into a single, bookmarked PDF file (see Appendix D).

The final report describing the Business Plan Challenge should serve as primary means for a team to provide detailed information about their project to the reviewers. Teams are encouraged to describe the technology design and how the business plan supported by market research shaped the design. The final report should include the following:

- **Cover sheet** including all involved team members, mentors, faculty, and others (e.g., sponsors and advisors), contact information, and a clear indication of their role. The total word count must be included on the cover page.
- **Executive summary** briefly describing the project. This must not exceed 1,000 words (including figure captions). The Prize Administrators recommend that teams write this section after completion of their reports to summarize the key aspects of their project.
- **Report narrative** of up to 7,500 words describing the Business Plan Challenge. A detailed guide for what to include in the report narrative can be found on HeroX.
- **List of references.**

At the conclusion of the competition, all team reports will be posted to the competition website.

The Business Plan Challenge Final Report is worth 150 points. Expert reviewers will evaluate the report against the following criteria:

Table 7. Scoring Rubric for the Final Business Plan Challenge Report (150 Points)

Description	Maximum Possible Points
Extent to which the team demonstrates market feasibility (marketability, buildability, public/market acceptance, identification of stakeholders and end users, cost competitiveness in comparison to other energy sources)	50
The team thoroughly evaluates risk and proposes mitigation strategies (e.g., recognition of failure maintenance, operational expenses)	35
Extent to which the business plan demonstrates innovation, creativity, and originality	15
The team conducted at least three end-user interviews/surveys and inputs received are of high quality	20

Accuracy of financial analysis and inclusion of supporting documentation	20
Clear demonstration of student learning and contributions toward the business plan	10
Total	**150**

3.3 Technical Design Challenge (30%)

In the Technical Design Challenge, competitors will evaluate the performance requirements in their chosen blue economy market by identifying and interviewing at least three potential end users.

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

As a note, marine energy as defined in the Powering the Blue Economy report does not include offshore wind energy or solar power, and MECC requires that at least 51% of the total energy system be powered by marine energy. Therefore, offshore wind energy and solar power can be included in a hybrid design with marine energy but cannot be the sole power-producing unit.

In the Technical Design Challenge, teams must submit a midyear submission and final report. Additionally, each team will present one final live presentation on their Business Plan, Technical Design, and Build and Test Challenges results to a panel of reviewers during the final event.

3.3.1 Technical Design Challenge Midyear Submission: Confirmation of Blue Economy Market

Teams will submit the Technical Design Challenge Midyear Submission on the HeroX platform in PDF format. The submission should be no more than 500 words and is expected to describe the selected blue economy market the team will address, the reason for choosing that market, and an overview of issues to be explored and analyzed. The specifics of the design are not required at this time. **This midyear submission is due Jan. 27, 2025, 11:59 p.m. MT.**

The Technical Design Challenge Midyear Submission will be scored against the following criteria:

Table 8. Technical Design Challenge Midyear Submissions

Description	Maximum Possible Points
Technical Design Challenge Midyear Submissions	**20**
The team identifies a blue economy market they have decided to address	10
Extent to which the team provides justification for choosing the market and identifies issues to be explored	10

3.3.2 Technical Design Challenge Final Report

Each team must submit a final report summarizing the results of the Technical Design Challenge in PDF format on the HeroX platform. **This report is due two weeks prior to the final event.**

The final report should follow these formatting requirements:

- Pages should be 8.5 inches by 11 inches, paginated, single-sided, and with 1-inch margins at a minimum.
- Content should be at a minimum single-spaced.
- The body of the report must use at a minimum an 11-point font.
- Captions for figures and tables must be numbered for easy navigation.
- The final document must be packaged into a single, bookmarked PDF file (see Appendix D).

The final report describing the Technical Design Challenge should serve as primary means for a team to provide detailed information about their project to the reviewers. Teams are encouraged to describe the technology design and how the business plan supported by market research shaped the design. The final report should include the following:

- **Cover sheet** including all involved team members, mentors, faculty, and others (e.g., sponsors and advisors), contact information, and a clear indication of their role. The total word count must be included on the cover page.
- **Executive summary** briefly describing the project. This must not exceed 1,000 words (including figure captions). The Prize Administrators recommend that teams write this section after completion of their reports to summarize the key aspects of their project.
- **Report narrative** of up to 7,500 words describing the Technical Design Challenge. A detailed guide for what to include in the report narrative can be found on HeroX.
- **List of references.**

At the conclusion of the competition, all team reports will be posted to the competition website.

The Technical Design Challenge Final Report is worth 150 points. Expert reviewers will evaluate the report against the following criteria:

Table 9. Scoring Rubric for the Final Technical Design Challenge Report (150 Points)*

Description	Maximum Possible Points
Clear design objective description	25
Accuracy of the power performance analysis	20
Accuracy of the mechanical and electrical loads analysis and associated safety factors	20
Clear description of system optimization efforts (e.g., power/storage capacity to overcome resource intermittency issues)	15
Quality of engineering diagrams, including mechanical and electrical drawings	25
Incorporation of environmental and sustainability factors	15
Incorporation of user needs as part of the design system	20
Clear demonstration of student learning and contributions toward the technical design	10
Total	**150**

**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.

3.1 Build and Test Challenge (16%)

In the Build and Test Challenge, teams will build an effective prototype that will be tested in a lab or tank for performance and will deliver measured results. Teams have the discretion to decide what to test and where to perform tests. Open-water testing is outside the scope of this competition. At a minimum, teams will need to build and test a scaled model of the system component that is extracting energy from a marine energy resource.

Competition Prize Administrators will provide educational webinars and be available to answer questions; answers to technical questions will be made available to all teams.

In the Build and Test Challenge, teams must submit a midyear submission, a signed Safety Specification form, and final report. Additionally, each team will present one final live presentation on their Business Plan, Technical Design, and Build and Test Challenges results to a panel of reviewers during the final event.

3.1.1 Build and Test Challenge Midyear Submission: Description of Testing Objectives

Teams will submit, in PDF format on the HeroX platform, a description of testing objectives. This submission should be no more than 500 words long and is expected to describe the team's testing objectives. The specifics of the test plan are not required at this time; however, reviewers will review the lab/tank tests the team plans to perform, objectives from performing these tests, the identification of risks and the teams' approach to risk minimization. **This midyear submission is due Jan. 27, 2025, 11:59 p.m. MT.**

The Build and Test Challenge Midyear Submission will be scored against the following criteria:

Table 10. Build and Test Challenge Midyear Submissions

Description	Maximum Possible Points
Build and Test Challenge Midyear Submissions	**25**
Safety and technical inspection form has been signed and submitted	5
The team provides a summary of proposed tests and describes the reasons for pursuing each test	10
Extent to which the team summarizes potential technical, budget, schedule, and safety risks and identifies mitigation strategies	10

3.1.2 Build and Test Challenge Safety Specification Form

Teams must also submit a signed Safety Specification form (see Appendix C) by **March 24, 2025, 11:59 p.m. MT.**

The form is not scored, but the safety and inspection form must be submitted to the MECC Prize Administrators prior to initiating any experimental testing, and failure to submit the safety and inspection form will disqualify the team from the Build and Test Challenge.

A template is available on HeroX.

Teams can reference the Business Plan and Technical Design reports for device description and operation, and they can focus the Build and Test Challenge report to include, at a minimum, information on:

- 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.

3.1.3 Build and Test Challenge Final Report

Each team must submit a final report summarizing the results of the Build and Test Challenge in PDF format on the HeroX platform. **This report is due two weeks prior to the final event.**

The final report should follow these formatting requirements:

- Pages should be 8.5 inches by 11 inches, paginated, single-sided, and with 1-inch margins at a minimum.
- Content should be at a minimum single-spaced.
- The body of the report must use at a minimum an 11-point font.
- Captions for figures and tables must be numbered for easy navigation.
- The final document must be packaged into a single, bookmarked PDF file (see Appendix D).

The final report describing the Build and Test Challenge should serve as primary means for a team to provide detailed information about their project to the reviewers. Teams are encouraged to describe the technology design and how the business plan supported by market research shaped the design. The final report should include the following:

- **Cover sheet** including all involved team members, mentors, faculty, and others (e.g., sponsors and advisors), contact information, and a clear indication of their role. The total word count must be included on the cover page.
- **Executive summary** briefly describing the project. This must not exceed 1,000 words (including figure captions). The Prize Administrators recommend that teams write this section after completion of their reports to summarize the key aspects of their project.
- **Report narrative** of up to 5,000 words describing the Build and Test Challenge. A detailed guide for what to include in the report narrative can be found on HeroX.
- **List of references.**

At the conclusion of the competition, all team reports will be posted to the competition website.

The Build and Test Challenge final report is worth 100 points. Expert reviewers will evaluate the report against the following criteria:

Table 11. Scoring Rubric for the Final Build and Test Challenge Report (100 Points)*

Description	Maximum Possible Points
Clear description of the scaling factors considered in designing and fabricating the model-scale device	20
Clear description of the development of an experimental test plan and how the test plan would allow for the collection of data to prove the team's stated objective	20
Demonstration that the test plan was executed successfully and description of how the instrumentation and measurement design was completed	20
Clear description of how the raw measurements, recorded during model testing, were postprocessed to generate useful data that characterizes the device performance	20
Quality summary of lessons learned during execution of the Build and Test Challenge showing what device modifications, new tests, or changes in recorded measurements the team would consider if their concept were to go through a second round of experimental testing	20
Total	**100**

**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.*

3.1.4 Build and Test Challenge Testing Facilities

Teams can request support from NREL to connect them with nearby facilities to test their devices if the team does not have adequate on-site testing facilities at their institution. Teams are encouraged to research the TEAMER program, which provides various forms of support for testing and research needs. **It is recommended that teams investigate the TEAMER schedule and requirements immediately upon notice of selection to participate in the MECC.**

Teams who receive support from the TEAMER program or other outside entities are required to describe the work that was done outside of the student team and how the team incorporated any outside work.

Physical Design Constraints Within Testing Facility

Given the wide variety of concepts expected in this competition, there are no firm restrictions on the scale of the model that a team can test in an appropriate experimental facility. Therefore, the Prize Administrators expect the model scale will be dependent on two factors: (1) the dimensions of the testing facility chosen and (2) the available budget. Teams are allowed to seek supplemental funding from additional sources outside of MECC to build a larger model or complete a greater number of experimental tests if desired; however, the Build and Test Challenge scoring rubric will focus on the quality of the model design, test plan development, instrumentation and measurement techniques, and postprocessing of measured data rather than on the size and breadth of the experiment.

Safety Specifications

The competition staff requires that a safety inspection of the test article and load system by the test facility be passed before the test article can be installed and tested at the chosen experimental facility. draft version of the safety and inspection form used to evaluate the test article and accompanying instrumentation is available on HeroX. The draft safety and inspection form is an example and should be edited to suit the needs of each team and their design. Although the test facility will make the final and official determination about whether a test article may be tested in the experimental facility, competition Prize Administrators can exclude teams from participating in this challenge if teams do not submit the safety and inspection form of sufficient detail. The safety and inspection form must be submitted to the MECC Prize Administrators prior to initiating any experimental testing, and failure to submit the safety and inspection form will disqualify the team from the Build and Test Challenge.

Marine Energy Device Challenge Testing

The marine energy device testing portion of the Build and Test Challenge consists of three distinct tasks: the performance task, durability task, and safety task. This section describes the requirement of the individual tasks in which the turbine is expected to perform and the parameters of the testing conditions.

Through testing, teams can demonstrate their marine energy device's performance through objective tasks, and the testing outcomes help determine if teams have succeeded in developing a durable, safe, high-performing machine. Performance is a strong indicator of a marine energy device's ability to compete successfully in the marketplace.

Each marine energy device, and potentially its corresponding load system, will be tested in the experimental facility chosen by each team. The challenge will include the following aspects: marine energy device performance, marine energy device durability, and marine energy device safety. While the prescribed order will be the same for each team, the exact amount of time spent on each task could vary between teams. Teams are not required to complete all tasks; however, addressing each task would demonstrate a holistic approach to the design of a complete system. Given that each team may have different levels of access and time at testing facilities, each team is required to complete at least one task, with suggested priority given in the order of the tasks listed.

A. Marine Energy Device Performance Task

The objective of this task is to test the marine energy device over a range of environmental conditions to develop a performance curve or matrix. Each marine energy device should be tested in various environmental conditions across the operational envelope for the given device. Each team is expected to test their device in at least six operational environmental conditions, which will be left to the team's discretion; teams should provide a description of their decision-making process for the conditions they chose in the final report.

The measured performance for each device can vary and will be decided upon by each team. For example, the team can choose to measure electrical power output, pumped water, compressed air, or simply device response (e.g., amplitude of oscillatory motion, rotations per minute), as this is generally associated with improved power extraction. Each team will be responsible for selecting the sampling rate of their data acquisition systems and will need to include details on any additional filters applied between the measuring instrument and the data acquisition system to reduce noise in the final report. Teams are strongly encouraged to understand the mechanical or electrical loads at model scale in order to select appropriate

instrumentation such that the expected measured values do not fall within the noise range of the instrumentation.

B. Marine Energy Device Durability Task

Marine energy devices are expected to perform over the long term and will be subjected to a wide variety of weather conditions. Producing power effectively and over the course of the device's lifetime are desirable design qualities. These devices must be designed to withstand extreme environmental conditions without damage to their mechanical and electrical components. To control high mechanical and electrical loads, marine energy devices must be able to limit their response and output power in these particularly high-energy sea states.

In this task, the marine energy device should be subjected to an environmental condition that corresponds to an extreme or survival situation. Teams will be responsible for describing how and justifying why these sea states were chosen in the test report. The mechanical loads and/or device response should be compared to normal operating conditions to evaluate the survivability of the marine energy device. If the marine energy device changes shape, orientation, submergence, etc., depending on the environmental conditions, the team must describe how this change is implemented but will not be required to have a model with real-time capability during testing.

C. Marine Energy Device Safety Task

Safety is of utmost importance to device designers and manufacturers. To be certified, marine energy devices must be able to safely shut down rapidly and with a fail-safe shutdown capability.

Marine energy devices must shut down when disconnected from the grid as well as manually upon command. Each team may choose to address these shutdown scenarios with one or two systems or mechanisms.

In this task, the marine energy device will be required to safely shut down at one time during the testing period in any environmental condition. For each marine energy device, the shutdown process will be initiated once upon command. It is important that when initiating the command, the data acquisition system remains active and can continue to monitor the shutdown response of the system.

3.2 Community Connections Challenge (26%)

Marine energy workforce development requires a multidisciplinary approach, and marine energy is closely tied to communities and places where marine energy exists. In recognition of the multidisciplinary approach and the multiple areas of interest that impact marine energy and communities, this required challenge is designed to forge stronger connections between competition participants, the marine energy industry, and the local community to address the challenges they are facing. This challenge will also provide students opportunities to engage beyond engineering and site design, and allow for teams to take creative, scalable approaches to engaging between an emerging workforce, communities, and the marine energy industry.

The purpose of this challenge is to:

- Engage students to get exposure to the marine energy industry.
- Enable these students to have a framework to be exposed (competitors in this prize) to the current problems that will need to be solved in the coming years.
- Encourage students to not only focus on technology development but also work on issues/challenges extending beyond technology challenge work to better understand and appreciate those issues.
- Come up a repeatable framework to expose more students to opportunities in the marine energy space.

3.2.1 Topics for Community Connection Challenge

The following is a list of topic areas in the industry, as identified by Prize Administrators that are critical to the marine energy industry. Students are encouraged to conduct their own research into their selected topic. Resources are listed in Appendix F.

- K–12 curriculum and awareness
- Marine energy perception
- Workforce pipeline
- Diversity, equity, inclusion, and accessibility
- Energy equity and environmental justice
- Permitting and reducing regulatory barriers
- Technology demonstrations
- Opportunities for marine energy to be paired with other generation or storage technologies
- Manufacturing and supply chain
- Funding and financing pathways.

As part of this challenge, competitors will submit a midyear submission, a final report, and a presentation at the final event.

In the midyear submission, teams will select a topic area from the list above and will conduct a minimum of four interviews with marine energy professionals to learn more about the state of this topic in the industry and the various problems and challenges that exist. Based on the information gathered from the interviews, the teams will propose in the midyear submission, three to five solutions and take action toward one of those solutions, engaging the broader marine energy community. The final report will include an after-action report on the event or activity undertaken to solve the challenges identified.

The team will be required to present and summarize the process and impact of their work. Specific requirements are defined in the following challenge segments, and deadlines are included in Table 4.

The Prize Administrator has outlined best practices and suggested approaches in a resource available on HeroX.

3.2.2 Community Connections Challenge Midyear Submission: Team Overview, Interview Summary, and Outreach Strategy

The Community Connections Challenges midyear submission will include two separate documents: (1) a team overview and (2) an interview summary and outreach strategy which competitors will upload on the HeroX platform. **This midyear submission is due Jan. 27, 2025, 11:59 p.m. MT.**

The team overview should be no more than 350 words, and the interview summary and outreach strategy should be no more than 1,500 words and formatted according to the following requirements.

- Pages should be 8.5 inches by 11 inches, paginated, single-sided, and with 1-inch margins at a minimum.
- Content should be at a minimum single-spaced.
- The body of the report must use at a minimum an 11-point font.
- Captions for figures and tables must be numbered for easy navigation.
- The final document must be packaged into a single Microsoft Word file (see Appendix F).

The midyear submission should include the following:

Team Overview

The team overview will use storytelling to introduce team members and their vision for the competition and the clean energy community. The Prize Administrator will post excerpts from these reports as the team overview on the MECC website and may edit the text for consistency between teams and to meet necessary web standards on energy.gov. Teams should promote the components of the team overview through their social media channels and media connections once they are live on the MECC website. Students should include a strategy of how they will continue promotion.

This team overview may include topics such as:

- Team name, institution name, city, and state.
- Faculty advisor and student lead names and email addresses.
- An introduction to each team member, their current studies, and their professional goals.
- Why the team is participating in the MECC and what the team is most excited for in this competition.
- The team's vision for a clean energy future.
- Team structure, including if it is a club team, capstone, or other; and student leadership roles.
- The team's history and lessons learned from previous years, or how new teams got involved in the MECC.
- Brief overview of technology concept.
- A team photo, including the names of the team members in the order in which they appear. This photo must be submitted as a separate .jpg or .png file in addition to being included in the report.

Interview Summary and Outreach Strategy

An interview summary will detail the progress made to date in engaging marine energy professionals to explore the topic areas that the team has identified, and the insights gained from those interviews. The outreach strategy is an industry best practice to help keep announcements on track and serve as an activity road map. The report should address the following and describe the team's proposed activities throughout the year:

- An overview of the interviews completed, including who was interviewed, the sector and state/region they represent, their job title and organization, and a summary of the topic area.
- Key takeaways and insights the team has gained from these interviews.

- A statement of the topic area they'd like to address and high-level goals the team aims to achieve with their outreach activities.
- Three to five proposed solutions to the topic area and how the team has identified these solutions.
- An overview of the actions the team plans to take by the end of the competition to address one of the proposed solutions.
- Any industry connections or partnerships the team has, and how the team will leverage these connections to achieve their outreach goals.
- The team's social media and communications strategy that highlights progress and milestones, including team social media accounts with hyperlinks, and relationships developed with the team's school newspaper or local media outlets.
- A timeline of events presented in chart form (see the engagement toolkit in Resources on HeroX for an example), including:
    - Timeline for proposed events.
    - Timeline for event development and promotion of event.
- Planned outreach announcements and social media posts.
- Up to 10 photos or social media images that have been developed for outreach purposes.

Submissions will be evaluated on quality of the content using the following scoring criteria and not the length of the submission.

Table 12. Scoring Rubric for the Community Connections Challenge Midyear Submission*

Description	Maximum Possible Points
Midyear Submission	**50**
Quality and informativeness of team overview with engaging and creative storytelling	15
Quality, depth, and specificity of the industry interviews, insights gained from interviews, and three to five proposed solutions	15
Quality and creativity of outreach activities as represented in the Outreach Strategy Report	20

**5 points will be deducted for each day a submission is late, up to 3 days, at which point the team is no longer eligible to receive points for this challenge.*

3.2.3 Community Connections Challenge Metrics Report

Teams will submit a final metrics report on the HeroX platform detailing the metrics of their Community Connections Challenge activities throughout the year. **The report is due one week prior to the final event.**

The final metrics report should be no more than 2,000 words and follow these formatting requirements:

- Pages should be 8.5 inches by 11 inches, paginated, single-sided, and with 1-inch margins at a minimum.
- Content should be at a minimum single-spaced.

- The body of the report must use at a minimum an 11-point font.
- Captions for figures and tables must be numbered for easy navigation.
- The final document must be packaged into a single PDF file (see Appendix D).

The final metrics report should serve as primary means for a team to provide detailed information about their activities undertaken during the challenge to the reviewers. The final report should include the following:

- **After-action report** including: an overview of actions taken to address the challenge topic since the midyear submission, discussion of challenges the team faced and how these challenges were mitigated and lessons learned, a description of how these actions met the team's high-level outreach goals and impact to the marine energy community, and a reflection on the community connections challenge as a whole. This section of the report can include up to 10 photos or social media images that depict outreach activities.
- **Industry interview outcomes** including quantifiable numbers, such as:
    - Number of industry interviews.
    - Metrics on team and participant attendance at interviews.
    - Contact information for each interviewee, including; name, company, email address, origin of relationship (i.e., professional or alumni), sector in marine energy industry, and response regarding if this person would be open to continued participation in future MECC events.
- **Action outcomes for activities or events** including quantifiable numbers, such as:
    - Number and types of activities or events.
    - Number of attendees, if applicable.
    - Types of attendees (industry, academia, community members, etc.).
    - Geographic regions represented.
    - Metrics on team and participant attendance at events.
- **Action outcomes for communications materials** with quantifiable numbers, such as:
    - Number of page clicks.
    - Number of downloads.
    - Locations of viewers.
    - Locations where materials were distributed.
- **Outreach strategy outcomes** with quantifiable numbers, such as:
    - Number of persons engaged through outreach.
    - Types of outreach.
    - Reflection on outreach strategy, best practices, and lessons learned.
- **Social media strategy outcomes** including quantifiable numbers, such as:
    - Metrics on social media account growth.
    - List of each platform with number of followers, number of posts and likes, and how this grew throughout the year.
    - Reflection on the team's original social media plan versus results attained, lessons learned, and best practices.
- **List of references (if applicable).**

At the conclusion of the competition, all team reports will be posted to the competition website; as such, when collecting data or feedback from stakeholders, attendees, or program participants, teams should communicate how their information will be used.

The Community Connections Challenge Final Metrics Report is worth 50 points. Expert reviewers will evaluate the report against the following criteria:

Table 13. Scoring Rubric for the Community Connections Challenge Final Metrics Report

Description	Maximum Possible Points
Final Metrics Report*	**50**
After-action report: concise, readable, and descriptive with logical flow; communicates information clearly	30
Quality of industry interview metrics reporting	5
Quality of action metrics reporting	5
Quality of outreach strategy metrics reporting	5
Quality of social media metrics reporting	5

**5 points will be deducted for each day a submission is late, up to 3 days, at which point the team is no longer eligible to receive points for this challenge.*

3.3 Final Event

The culmination of the MECC will occur with an in-person event (see Appendix E for event contingencies) to be held in the spring of 2025. The exact location and dates will be published during the 2025 competition.

During the final event, teams will present two presentations, one on their Business Plan, Technical Design, and Build and Test Challenges results and one on their Community Connections Challenge results. Teams will also submit a poster summarizing their activities in the Business Plan, Technical Design, and Build and Test activities.

3.3.1 Final Event Presentation and Q&A Session

3.3.1.1 Business Plan, Technical Design, and Build and Test Challenge Portion of Presentation and Q&A Session

Teams will present one presentation on their Business Plan, Technical Design, and Build and Test Challenges results to a panel of reviewers. This public presentation is intended to enable teams to communicate the technical underpinnings, business case, and feasibility of commercialization of their system. The presentation should include specifics on the business plan and the design parameters of the team's device. Teams should be prepared to discuss the extent of their market analysis and design validation in their presentation.

The public presentation is limited to 25 minutes, which will be followed by up to 15 minutes of questions from the panel of reviewers in a private setting. It is at each team's discretion to determine how much time they allocate to each challenge during the 25-minute presentation. When pitching their marine energy project, teams should use their presentation to showcase maximum creativity and dynamism, highlighting the team strengths and unique approach in a professional manner.

Presenters should highlight their concept prototype and may use high-quality photos, maps, charts, or other visual aids or props to enhance their presentation using slides in the 16:9 widescreen format.

The public presentation submission should be a single file (see Appendix D), which should be brought to the final event.

The Business Plan, Technical Design, and Build and Test Challenge presentation and Q&A are worth 225 points, and are weighted as indicated in the following table.

Table 14. Possible Points per Business Plan, Technical Design and Build and Test Challenge Portions of Presentation and Q&A

Points allocated below contribute to the total Competition award.

Submission Element	Possible Points
Business Plan Portion of Presentation and Q&A	100
Technical Design Portion of Presentation and Q&A	100
Build and Test Portion of Presentation and Q&A	25

The expert reviewers will using the following criteria in determining these scores.

Table 15. Scoring Rubric for the Business Plan, Technical Design, and Build and Test Presentation* (225 Points)

Description	Maximum Possible Points	Maximum Points - Business Plan	Maximum Points - Technical Design	Maximum Points - Build and Test
The presentation is compelling and includes a narrative of inspiration and purpose behind the business plan	**30**	15	15	
Demonstrates thorough market analysis and triple-bottom-line risk assessment	**40**	40		
Demonstrates consideration of risks, issues, and challenges along with design assumptions	**40**		40	
The team describes lessons learned during execution of the Build and Test Challenge and what device modifications, new tests, or changes in recorded measurements the team would consider if their concept were to go through a second round of experimental testing	**25**			25
The presentation is practiced and polished, the team has a professional appearance and manner, and the team clearly communicates technical topics	**30**	15	15	
The team incorporates high-quality graphics, media, and props to support presentation	**20**	10	10	
Accurate and thorough ability to answer reviewers' questions	**30**	15	15	
Demonstration of learning through the competition requirements by the students	**10**	5	5	
Total	**225**	**100**	**100**	**25**

**The final presentation must be submitted online to the Prize Administrators in advance of a team's presentation during the final event, and teams should bring a USB with the presentation as backup. 5 points will be deducted for each day a submission is late, up to 3 days, at which point the team is no longer eligible to receive points for this challenge.*

3.3.1.2 Community Connections Challenge Portion of the Presentation and Q&A Session

For the Community Connections Challenge presentation teams will develop a final PowerPoint presentation to share their results on the challenge during the final event. This presentation must include:

- Details on the team, each team member's current studies, and future professional goals.
- A statement of the topic area the team has addressed, an overview of insights gained from industry interviews, a brief discussion of the three to five solutions identified to address this topic area, planning and execution of the action, and an assessment of action impact.

Teams should emphasize the quality and visual appeal of each slide and the accompanying presentation by the speaker. Slides should include high-resolution photos to represent each challenge element. Teams may use videos, but this is not required. There will be no template for these slides so teams can choose how to best convey their Community Connections Challenge experience.

Each team will have 10 minutes to present to a panel of reviewers and to the public during the final MECC event. This will be followed by 10 minutes of questions from the reviewers. Teams will be scored on the professional and clear structure of the presentation, use of effective storytelling techniques and visual elements, and their completion of each of the required submissions, as described in the following table.

Table 16. Scoring Rubric for the Community Connections Challenge*

Description	Maximum Possible Points
Final Presentation**	**150**
PowerPoint is concise and visually engaging, and presentation to reviewers is professional and clear, uses effective storytelling techniques	30
Demonstrated execution and measurements of outreach to a diverse group of stakeholders	30
Execution and demonstrated impact of chosen action	30
Demonstrated development of best practices and lessons learned through insights gained	30
Successful completion and integration of contest elements	30

**5 points will be deducted for each day a submission is late, up to 3 days, at which point the team is no longer eligible to receive points for this challenge. In addition, 5 points will be deducted from the final submission score for each submission that doesn't meet formatting guidelines.*

***The final presentation must be submitted online to the Prize Administrators in advance of a team's presentation during the final event, and teams should bring a USB with the presentation as a backup.*

3.3.2 Final Event Poster

One poster summarizing the team's efforts in the Business Plan Challenge, Technical Design Challenge, and Build and Test Challenge is required for each team. The poster does not need to include a summary of the Community Connections Challenge. Teams will bring their poster to the final event.

Poster dimensions should be 36 inches by 48 inches, and a template is available in the HeroX Resources page.

Teams are encouraged to showcase their creativity to tell a story of their efforts over the year. Examples of previous MECC posters can be found on the MECC website.[8]

The poster is worth 50 points, with the weighting described in the following table.

Table 17. Possible Points per Submission Element of the Business Plan, Technical Design, and Build and Test Challenges Poster

Points allocated below contribute to the total Competition award.

Submission Element	Possible Points
Business Plan Portion of Poster	20
Technical Design Portion of Poster	20
Build and Test Portion of Poster	10

Table 18. Scoring Rubric for the Poster (50 Points)

Description	Maximum Possible Points
Poster is visually appealing	15
Concept is clearly understood	20
Important elements of Business Plan, Technical Design, and Build and Test Challenges are represented on poster	15
Total	**50**

3.3.3 Final Awards and Grand Prizes

In addition to the awards and prizes, as determined according to Table 19, all teams will receive a participant plaque.

8 https://openei.org/wiki/PRIMRE/Prizes_and_Competitions/Marine_Energy_Collegiate_Competition_(MECC)/MECC_Teams.

Table 19. Final Awards and Grand Prizes

Award	Criteria	Prize
First Place	The team that earns the highest combined score in the four challenges	Trophy 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 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 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 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

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

3.3.4 How We Determine and Award Winners

The Prize Administrator screens all completed submissions and, in consultation with DOE, assigns reviewers to independently score the applicable content of each submission. The reviewers will be composed of federal and nonfederal subject matter experts with expertise in relevant areas.

Reviewers will review submissions throughout the competition according to the described evaluation criteria. The Prize Administrator will tally the scores based on the scoring criteria described.

3.3.5 Final Determination

The director of WPTO is the Judge of the competition and will make the final determination. Final determination of winners by the Judge will take the reviewers' scores and program policy factors in Appendix A into account.

4 Key Terms

Term	Definition
Commercialization Plan	Process of bringing your product or service to the market. Typically involves production, distribution, marketing, sales, customer support and other key functions critical to achieving commercial success.
Competition	The competition is all aspects and activities leading up to and through the final event. It is collectively referred to for a given year as the U.S. Department of Energy Marine Energy Collegiate Competition: Powering the Blue Economy™.
End-users	The individuals or organization who will ultimately be using your product or service. These are the people your products or services are designed for.
Final Event	The final event is when and where the teams compete in the challenges.
Stakeholder	A person, group, or organization with a vested interest, or stake, in the decision-making and activities of a business, organization or project. This can include customers, employees, suppliers, regulators, competitors, communities, and the environment.
Submissions	Submissions are what the team builds, writes, submits, and brings to compete in the final event. These include midyear submissions, final reports, public-facing presentations, and a poster.
Team Booth	Each team is provided an assigned area during the final event, known as a team booth, to use as a central location to practice their presentation, regroup, and showcase their hard work throughout the year to the public. There will be electrical outlets available in the team booth area to allow students to access computers and other equipment that the teams deem necessary.

5 Appendix A: Additional Terms and Conditions

Your submission for the Marine Energy Collegiate Competition is subject to the following terms and conditions:

- You must post the final content of your submission or upload the submission form online by the deadlines outlined in this rules document and listed on the HeroX website. Late submissions or any other form of submission may be rejected.
- All submissions that you wish to protect from public disclosure must be marked according to the instructions in Section 8 of Appendix A (Section A.8). Unmarked or improperly marked

submissions will be deemed to have been provided with unlimited rights and may be used in any manner and for any purpose whatsoever.

- You must include all the required elements in your submission. The Prize Administrator may disqualify your submission after an initial screening if you fail to provide all required submission elements. Competitors may be given an opportunity to rectify submission errors due to technical challenges.
- Your submission must be in English and in a format readable by Microsoft Word or Adobe PDF. Scanned hand-written submissions will be disqualified.
- Submissions will be disqualified if they contain any matter that, in the sole discretion of the U.S. Department of Energy or the National Renewable Energy Laboratory (NREL), is indecent, obscene, defamatory, libelous, and/or lacking in professionalism, or demonstrates a lack of respect for people or life on this planet.
- If you click "Accept" on the HeroX platform and proceed to register for any of the prizes described in this document, these rules will form a valid and binding agreement between you and DOE and are in addition to the existing HeroX Terms of Use for all purposes relating to these contests. You should print and keep a copy of these rules. These provisions only apply to the prize described here and no other prize on the HeroX platform or anywhere else.
- The Prize Administrator, when feasible, may give competitors an opportunity to fix nonsubstantive mistakes or errors in their submission packages.
- As part of your submission to this prize, the applicant will be required to sign the following statement:

> I am providing this submission package as part of my participation in this prize. I understand that the information contained in this submission will be relied on by the federal government to determine whether to issue a prize to the named competitor. I certify under penalty of perjury that the named competitor meets the eligibility requirements for this prize competition and complies with all other rules contained in the Official Rules document. I further represent that the information contained in the submission is true and contains no misrepresentations. I understand false statements or misrepresentations to the federal government may result in civil and/or criminal penalties under 18 U.S.C. § 1001 and § 287, and 31 U.S.C. §§ 3729-3733 and 3801-3812.

Verification for Payments

The Prize Administrator will verify the identity and role of all competitors before distributing any prizes. Receiving a prize payment is contingent upon fulfilling all requirements contained herein. The Prize Administrator will notify winning competitors using provided email contact information for the individual or entity that was responsible for the submission. Each competitor will be required to sign and return to the Prize Administrator, within 30 days of the date on the notice, a completed NREL Request for ACH Banking Information form and a completed W9 form (https://www.irs.gov/pub/irs-pdf/fw9.pdf). In the sole discretion of the Prize Administrator, a winning competitor will be disqualified from the competition and receive no prize funds if: (i) the person/entity does not respond to notifications; (ii) the person/entity fails to sign and return the required documentation within the required time period; (iii) the notification is returned as undeliverable; (iv) the submission or person/entity is disqualified for any other reason.

In the event of a dispute as to any registration, the authorized account holder of the email address used to register will be deemed to be the competitor. The "authorized account holder" is the natural person or legal entity assigned an email address by an Internet access provider, online service provider, or other organization responsible for assigning email addresses for the domain associated with the submitted address. All competitors may be required to show proof of being the authorized account holder.

The Prize Administrator will award a single U.S. dollar amount to the designated primary submitter, whether consisting of a single or multiple entities. The primary submitter is solely responsible for allocating any prize funds among its member competitors or teammates as they deem appropriate. The Prize Administrator will not arbitrate, intervene, advise on, or resolve any matters or disputes between team members or competitors.

Submission Rights

By making a submission and consenting to the rules of the contest, a competitor is granting to DOE, the Prize Administrator, and any other third parties supporting DOE in the contest, a license to display publicly and use the parts of the submission that are designated as “public” for government purposes. This license includes posting or linking to the public portions of the submission on the Prize Administrator or HeroX applications, including the contest website, DOE websites, and partner websites, and the inclusion of the submission in any other media worldwide. The submission may be viewed by DOE, Prize Administrator, and judges and reviewers for purposes of the contests, including but not limited to screening and evaluation purposes. The Prize Administrator and any third parties acting on their behalf will also have the right to publicize competitors’ names and, as applicable, the names of competitors’ team members and organization, which participated in the submission on the contest website indefinitely.

By entering, the competitor represents and warrants that:

1. The competitor’s entire submission is an original work by the competitor and the competitor has not included third-party content (such as writing, text, graphics, artwork, logos, photographs, likeness of any third party, musical recordings, clips of videos, television programs or motion pictures) in or in connection with the submission, unless (i) otherwise requested by the Prize Administrator and/or disclosed by the competitor in the submission, and (ii) competitor has either obtained the rights to use such third-party content or the content of the submission is considered in the public domain without any limitations on use.
2. Unless otherwise disclosed in the submission, the use thereof by Prize Administrator, or the exercise by Prize Administrator of any of the rights granted by competitor under these rules, does not and will not infringe or violate any rights of any third party or entity, including, without limitation, patent, copyright, trademark, trade secret, defamation, privacy, publicity, false light, misappropriation, intentional or negligent infliction of emotional distress, confidentiality, or any contractual or other rights.
3. All persons who were engaged by the competitor to work on the submission or who appear in the submission in any manner have:
    a. Given the competitor their express written consent to submit the submission for exhibition and other exploitation in any manner and in any and all media, whether now existing or hereafter discovered, throughout the world;

b. Provided written permission to include their name, image, or pictures in or with the submission (or, if a minor who is not competitor's child, competitor must have the permission of the minor's parent or legal guardian) and the competitor may be asked by the Prize Administrator to provide permission in writing; and
c. Not been and are not currently under any union or guild agreement that results in any ongoing obligations resulting from the use, exhibition, or other exploitation of the submission.

Copyright

Each competitor represents and warrants that the competitor is the sole author and copyright owner of the submission; that the submission is an original work of the competitor or that the competitor has acquired sufficient rights to use and to authorize others, including DOE, to use the submission, as specified throughout the rules; that the submission does not infringe upon any copyright or any other third-party rights of which the competitor is aware; and that the submission is free of malware.

Challenge Subject to Applicable Law

All challenge are subject to all applicable federal laws and regulations. Participation constitutes each participant's full and unconditional agreement to these Official Challenge Rules and administrative decisions, which are final and binding in all matters related to the challenge. This notice is not an obligation of funds; the final award is contingent upon the availability of appropriations.

Resolution of Disputes

The U.S. Department of Energy is solely responsible for administrative decisions, which are final and binding in all matters related to the challenge.

Neither the U.S. Department of Energy nor the Prize Administrator will arbitrate, intervene, advise on, or resolve any matters between team members or among competitors.

Publicity

The winners of these prizes (collectively, "winners") will be featured on the DOE and NREL websites.

Except where prohibited, participation in the challenge constitutes each winner's consent to DOE's and its agents' use of each winner's name, likeness, photograph, voice, opinions, and/or hometown and state information for promotional purposes through any form of media worldwide, without further permission, payment, or consideration.

Liability

Upon registration, all participants agree to assume any and all risks of injury or loss in connection with or in any way arising from participation in this contest. Upon registration, except in the case of willful misconduct, all participants agree to and, thereby, do waive and release any and all claims or causes of action against the federal government and its officers, employees, and agents for any and all injury and damage of any nature whatsoever (whether existing or thereafter arising, whether

direct, indirect, or consequential, and whether foreseeable or not), arising from their participation in the contest, whether the claim or cause of action arises under contract or tort.

In accordance with the delegation of authority to run this contest delegated to the judge responsible for this prize, the judge has determined that no liability insurance naming DOE as an insured will be required of competitors to compete in this competition per 15 U.S.C. § 3719(i)(2). Competitors should assess the risks associated with their proposed activities and adequately insure themselves against possible losses.

Records Retention and Freedom of Information Act

All materials submitted to DOE as part of a submission become DOE records and are subject to the Freedom of Information Act. The following applies only to portions of the submission not designated as public information in the instructions for submission. If a submission includes trade secrets or information that is commercial or financial, or information that is confidential or privileged, it is furnished to the Government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, DOE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for review of the application or as otherwise authorized by law. This restriction does not limit the Government's right to use the information if it is obtained from another source.

Submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

The submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information: "Notice of Restriction on Disclosure and Use of Data: Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. [End of Notice]"

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Trade Secrets, Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure." In addition, each line or paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets.

Competitors will be notified of any Freedom of Information Act requests for their submissions in accordance with 29 C.F.R. § 70.26. Competitors may then have the opportunity to review materials and work with a Freedom of Information Act representative prior to the release of materials. DOE does intend to keep all submission materials private except for those materials designated as "will be made public."

Privacy

If you choose to provide HeroX with personal information by registering or completing the submission package through the contest website, you understand that such information will be transmitted to

DOE and may be kept in a system of records. Such information will be used only to respond to you in matters regarding your submission and/or the contest unless you choose to receive updates or notifications about other contests or programs from DOE on an opt-in basis. DOE and NREL are not collecting any information for commercial marketing.

General Conditions

DOE reserves the right to cancel, suspend, and/or modify the contest, or any part of it, at any time. If any fraud, technical failure, or any other factor beyond DOE's reasonable control impairs the integrity or proper functioning of the contests, as determined by DOE in its sole discretion, DOE may cancel the contest. Any performance toward contest goals is conducted entirely at the risk of the competitor, and DOE shall not compensate any competitors for any activities performed in furtherance of this prize.

Although DOE may indicate that it will select up to several winners for each contest, DOE reserves the right to only select competitors that are likely to achieve the goals of the program. If, in DOE's determination, no competitors are likely to achieve the goals of the program, DOE will select no competitors to be winners and will award no prize money.

DOE may conduct a risk review, using Government resources, of the competitor and project personnel for potential risks of foreign interference. The outcomes of the risk review may result in the submission being eliminated from the prize competition. This risk review, and potential elimination, can occur at any time during the prize competition. An elimination based on a risk review is not appealable.

Program Policy Factors

While the scores of the expert reviewers will be carefully considered, it is the role of the prize judge to maximize the impact of challenge funds. Some factors outside the control of competitors and beyond the independent expert reviewer scope of review may need to be considered to accomplish this goal. The following is a list of such factors. In addition to the reviewers' scores, the below program policy factors may be considered in determining winners:

- Geographic diversity and potential economic impact of projects.
- Whether the use of additional DOE funds and provided resources are non-duplicative and compatible with the stated goals of this program and the DOE mission generally.
- The degree to which the submission exhibits technological or programmatic diversity when compared to the existing DOE project portfolio and other competitors.
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers.
- The degree to which the submission is likely to lead to increased employment and manufacturing in the United States or provide other economic benefit to U.S. taxpayers.
- The degree to which the submission will accelerate transformational technological, financial, or workforce advances in areas that industry by itself is not likely to undertake because of technical or financial uncertainty.
- The degree to which the submission supports complementary DOE funded efforts or projects, which, when taken together, will best achieve the goals and objectives of DOE.
- The degree to which the submission expands DOE's funding to new competitors and recipients who have not been supported by DOE in the past.

- The degree to which the submission enables new and expanding market segments.
- Whether the project promotes increased coordination with nongovernmental entities for the demonstration of technologies and research applications to facilitate technology transfer.
- National Environmental Policy Act (NEPA) Compliance
- This prize is subject to the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321, et seq.). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website at http://nepa.energy.gov/.
- While NEPA compliance is a federal agency responsibility and the ultimate decisions remain with the federal agency, all participants in the Marine Energy Collegiate Competition will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their participation in the prize competition. Participants may be asked to provide DOE with information on fabrication and testing of their device such that DOE can conduct a meaningful evaluation of the potential environmental impacts.
- Definitions
- Prize Administrator means both the Alliance for Sustainable Energy operating in its capacity under the Management and Operating Contract for NREL and DOE EERE Water Power Technologies Office. When the Prize Administrator is referenced in this document, it refers to staff from both the Alliance for Sustainable Energy and Water Power Technologies Office staff. Ultimate decision-making authority regarding prize matters rests with the Director of Water Power Technologies Office.
- Return of Funds
- As a condition of receiving a prize, competitors agree that if the prize was made based on fraudulent or inaccurate information provided by the competitor to DOE, DOE has the right to demand that any prize funds or the value of other non-cash prizes be returned to the government.

  ALL DECISIONS BY DOE ARE FINAL AND BINDING IN ALL MATTERS RELATED TO THE CHALLENGE.

6 Appendix B. Roles and Responsibilities

Table B-1 shows the competition roles, who is performing in each role, and what the role entails.

Table B-1. Roles and Responsibilities

Role	Individual(s) Assigned	Responsibilities
Collegiate Team	Multiple	Team carries out work on the project within the rules and requirements of the competition, based on direction and advice from their fellow team members, Student Leader(s), and Faculty Advisor(s).

Collegiate Team Student Leader(s)	Minimum of one and maximum of two per team	The student leader(s) attends informational sessions with the Faculty Advisor, represents the team when communicating with competition Prize Administrators and other teams, and disseminates information received from the competition Prize Administrators over the course of the entire project, including monitoring communications. A minimum of one and maximum of two student leaders per team is allowed, but at least one must be an undergraduate. These names shall be reported to the Prize Administrators prior to the Team Student Leader kickoff meeting expected to occur in August 2023.
Collegiate Team Faculty Advisor(s)	Minimum of one per team	The Faculty Advisor serves as the lead faculty member and primary representative of a participating institution in the competition. This person also engages with competition Prize Administrators and provides guidance to the team throughout the project and ensures that the Student Leader(s) disseminates information received from the competition Prize Administrators. The Faculty Advisor advises, provides input to, and coaches the students on the skills necessary to compete in the various aspects of the competition. Some teams may specify multiple Faculty Advisors who contribute to the team. The name(s) shall be reported to the Prize Administrators prior to the Faculty Advisor kickoff meeting expected to occur in August 2023.
Collegiate Team Co-Advisors(s) or Supporting Faculty	Multiple	Supports the Faculty Advisor and Student Leader(s) in the above duties but typically does not directly engage with U.S. Department of Energy/National Renewable Energy Laboratory Prize Administrators.
Prize Administrator		The Prize Administrator leads correspondence with the collegiate teams regarding contracts, challenge questions, and team expectations. During the competition, the Prize Administrator is the primary point of contact for questions related to engagement with the reviewers, logistics, and protocol. Tasks include developing team schedules, coordinating/collating scores and team feedback from the challenges in time for the awards ceremony, and supporting the collegiate teams, reviewers.
Challenge Reviewers	To be announced prior to the competition	The Challenge Reviewers conduct and evaluate each individual challenge.
Competition Judge	Director, WPTO	The director of WPTO is the judge of the competition and will make all final determinations.

Industry Mentor	One mentor will be assigned to each team	These hand-selected industry mentors will play a critical role throughout the competition, providing teams with real-world experience, technical insight, and other important support.

7 Appendix C. Safety and Conduct

Safety

The competition is a forum for students with an interest in marine energy to showcase innovative ideas and further develop their knowledge. The event is designed to be safe, fair, and competitive as well as a fun learning experience and a professional growth opportunity. Each team is responsible for the safety of its operations in accordance with the subcontract agreement. Participants are expected to conduct themselves in the spirit of the competition by being team players both within their own teams and among competitor teams.

Conduct

As part of the culture of the U.S. Department of Energy and the National Renewable Energy Laboratory, renewable energy and sustainability go hand in hand—a common public perception as well. As a result, though the competition is about renewable energy, we expect that participants will embrace and showcase sustainability where possible during all aspects of the event (e.g., reducing waste in packaging for shipping, reusing packaging materials used in transporting items to the final event, and eliminating the use of nonrecyclable materials, such as foam packing peanuts). In addition, we encourage team members to engage in common sustainable activities, such as recycling paper and beverage containers. Team creativity to support this mission is encouraged but not scored.

While teams work on their submissions, faculty advisors, faculty co-advisors, graduate student advisors, and members of industry secured by each team for support can provide feedback about the team's design so the students can identify fatal flaws, prove technical rigor, or demonstrate feasibility of their concept. Only student team members may take an active role in any competition event. It is the role of the non-student team members to provide a supportive environment and the educational background necessary for the students to achieve success in the competition.

In addition, teams are encouraged to bring to the Prize Administrators' attention rules that are unclear, misguided, or in need of improvement. The Prize Administrators will seriously consider suggestions that are feasible, within their constraints, and are intended to improve the competition, its rules, fairness, measurable outcomes, or precision.

8 Appendix D. Communications and Challenge Details

External Communications

The MECC website will showcase the various elements of the competition, ongoing collegiate team engagement, and information about how to participate in future competitions. The website will also feature important documents, such as this manual and the MECC application template.

Internal Communications

It is each team's responsibility to stay abreast of the latest competition communications from the Prize Administrators. Communication between the teams and the Prize Administrators occurs via one or more of the following:

- HeroX Forum: Official communications suitable for viewing by all team members and Prize Administrators will be posted on the competition's HeroX Forum.
- HeroX Resources: All MECC resources, templates, and meeting recordings will be uploaded to the HeroX Resources page.
- Virtual meetings: Teams are strongly encouraged to participate in scheduled virtual meetings with the Prize Administrators. Invitations and instructions for participation in these meetings are provided by the Competition Operations Manager(s) via email and the HeroX Forum.
- Meetings during the final event: An opening ceremony will be held during the final event week.
- Email: The official email address for the competition is Water.Competition@nrel.gov questions should be sent directly to this email address, and answers that may be of interest to all teams will be posted on the competition's HeroX Forum. For expediency and to protect confidentiality, the Prize Administrators may choose to communicate with teams via team members' email addresses as listed in the HeroX database; however, most official communications occur via the HeroX Forum.

Branding

Teams are encouraged to develop an online presence and branding platform for their team to showcase their work throughout the year, and this platform should be shared as part of the Community Connections Challenge portion of the competition.

This platform may include web pages, social media, outreach material, and team T-shirts. Regular updates and engagement with the team's school and external media are recommended, and efforts will be shared by NREL and the U.S. Department of Energy (DOE) channels as allowed. In addition, teams will be asked to report on these efforts through the scored Community Connections Challenge component. Teams must receive permission to use the competition logo or name as part of individual school/team branding and platform; requests should be sent to Water.Competition@nrel.gov.

Teams are expected to set up a professional space in their team booths to highlight the team's branding. This can include the concept design, posters, team logo, and school information. The team booths are the teams' chance to showcase all the work they have put into their project over the course of the year and are the best way to communicate their efforts to the industry.

Reviewing and Scoring

A panel of reviewers is responsible for scoring team performance in each challenge and for each submission. The reviewers will have expertise related to the content they are responsible for evaluating. The panel will include diverse backgrounds that allow the reviewers to evaluate performance from a variety of angles.

Prize Administrators will ensure that, to the extent possible, Reviewers will not:

- Have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in the competition.
- Have a familial or financial relationship with an individual who is a registered participant.
- Provide advice to teams, although they can provide clarification on the reviewing process.
- Discuss team performance with other teams or their advisors.

Names of the selected reviewers will be announced prior to the final in-person event. Reviewers for midyear submissions may be different than those providing reviews at the final event. The director of WPTO is the Judge of the competition and will make the final determination.

Team Feedback

In an effort to provide as much feedback as possible, teams will receive their scores following completion of the competition. Teams will also receive a short narrative derived from the reviewers' deliberations after each team's presentation.

Submissions and Submission Locations

Go to HeroX and follow the instructions for registering and submitting all required materials before the deadline in Table 4 and as displayed on the HeroX website.

The HeroX platform provides a space where parties interested in collaboration can post information about themselves and learn about others who are also interested in competing. Teams can submit early copies and updated revisions until the deadline. If a team wants to submit after a deadline, you must contact the Prize Administrator and points will be deducted according to what is identified in the evaluation criteria.

Submission Requirements

PDF Requirements

Submitted PDFs must meet the following criteria:

- Have embedded fonts.
- Have all images be a minimum resolution of 300 dpi.
- Creating a PDF:
    - From scans or by outputting the content into a raster image format (e.g., .jpg, .tiff, .png, or .gif) is not acceptable.

- That is an all-raster PDF should be avoided because, despite being large files at 300 dpi, they are of unacceptable quality at lower resolutions and are not scalable without degradation.

Audiovisual Presentation Requirements

Audiovisual presentation format requires that:

- Videos, if used, are in a .MOV or H.264 compressed .MP4 (MPEG-4) file type with a resolution of 720 × 480.
- Presentations should be in a 16:9 aspect ratio.
- No background music that violates U.S. copyright laws is included; all incorporated music must be an original or royalty-free composition and proof of licensing must be submitted with the final file and transcript.

Electronic File-Naming Instructions

The required file-naming convention for all electronic files is:

[TEAM ABBREVIATION] _[SUBMISSION]_[SUBMISSION DATE (YYYY-MM-DD)].[EXTENSION]

For example, a report submitted by California Maritime Academy on April 24, 2024, would have the following file name: MARITIME_Report_202-04-23.PDF

9 Appendix E. Alternative Competition Structure

In the event of a cancellation of an industry event or alternative reason for cancellation of the in-person event, this document will be updated to reflect changes resulting in the cancellation. All of the required submissions will remain unchanged, but the event and submissions schedule may be updated. Should there be extenuating circumstances for some but not all teams, a hybrid solution between a standard in-person event and virtual will be developed and further communicated to the teams with as much advanced notice as feasible.

The primary goal of the competition is to maximize learning, and the Prize Administrators will work with each team to determine what is possible.

The following best practices are highly recommended for remote participation in any event.

Prior to the Final Event

Prior to the final event, a team should:

- **Know the competition schedule**. Teams are responsible for keeping track of the final event schedule and confirming their meeting point of contact.
- **Test their technology**. Teams should explore the virtual meeting platform and test their audio and video capabilities. The Prize Administrators have built in transition time, but it is limited.
- **Check their Internet connection**. Teams are encouraged to use a hard-wired internet connection (i.e., ethernet cord). Wi-Fi connections can be used but are not ideal because they are prone to more connection issues.

Day of the Final Event

On the day of the final event, a team should:

- **Note their audio settings**. Teams are responsible for muting their audio connection (phone or computer) when they are not intending to speak. The Prize Administrators will mute participants with excessive background noise. Ensure team members are only using one audio connection, connecting to audio via their phone or computer but not both. Connecting with two audio connections results in electrical feedback that is very uncomfortable for all involved.
- **Verify their video preferences**. Teams are encouraged (but not required) to use their webcam when presenting. Audio narration of slides is also acceptable. Ensure team members have a clean background while streaming their video (e.g., no inappropriate or offensive images in the background or people walking around) and avoid window backdrops because of lighting.
- **Be prepared**. Teams should look professional in their dress and speak professionally during their presentation. Refrain from distracting behavior while sharing their video and/or audio, such as drinking or eating.

10 Appendix F. Marine Energy Resource Library

Students can refer to some of the following resources to better understand marine energy, desalination technologies, and additional information about the Marine Energy Collegiate Competition or U.S. Department of Energy (DOE) Water Power Technologies Office (WPTO) within the Office of Energy Efficiency and Renewable Energy (EERE).

High-Level Overviews and Supporting Materials

For general informational and educational materials on renewable and marine energy, explore:

- DOE's Energy 101: Marine and Hydrokinetic Energy video for a broad introduction to marine energy.
- DOE's Tidal power 101 video for an introduction to tidal power.
- DOE's Powering the Blue Economy™ Appendix, developed as part of the recently published Powering the Blue Economy Report, this appendix provides an overview of marine energy technology types, resource potential, energy costs, laboratories, testing facilities, industry standards, and more.
- DOE's Marine and hydrokinetic energy device types glossary of the some of the known device types for wave, current, tidal, and ocean thermal energy converters.
- National Renewable Energy Laboratory (NREL) publication on Marine Hydrokinetic Energy Site Identification and Ranking Methodology Part I: Wave Energy.
- NREL publication on Marine Hydrokinetic Energy Site Identification and Ranking Methodology Part 2: Tidal Energy.
- NREL tool Marine Energy Atlas.
- NREL publication on Marine Hydrokinetic Resource Assessment for Domestic Army, Air Force, and Coast Guard Facilities.
- The European Marine Energy Center Ltd's List of Worldwide Wave Developers.
- The European Marine Energy Center Ltd's List of Worldwide Tidal Developers.

- Bureau of Ocean Energy Management webpage on Renewable Energy on the Outer Continental Shelf.
- Ocean Energy Systems Annual Report 2018.
- NPS Physics video on Fundamentals of Wave Energy Lecture 1.
- NPS Physics video on Fundamentals of Wave Energy Lecture 2.

Desalination

For informational and educational materials on desalination, explore:

- Powering the Blue Economy—Chapter 7: Desalination.
- Numerical Modeling and Dynamic Analysis of a Wave-Powered Reverse-Osmosis System.
- The cost of water from an autonomous wave-powered desalination plant.

Technical Deep Dives

For technical materials, explore:

- DOE publication on marine and hydrokinetic online resources, including quick links for information on marine and hydrokinetic energy, a central data repository, interactive mapping tools, and an environmental data site.
- DOE documentation on levelized cost of electricity guidance and supporting information.
- Ocean Energy Systems news article on "International Levelized Cost of Energy for Ocean Energy Technologies" from May 29, 2015.
- Sandia National Laboratories Reference Model Project funded by DOE, a partnered effort to develop open-source marine and hydrokinetic energy point designs as reference models to benchmark technology performance and costs and an open-source methodology for design and analysis of technologies, including models for estimating capital costs, operational costs, and levelized cost of energy. This project (read the NREL published project summary) contains detailed reports for six types of marine energy devices including a: Tidal Current Turbine; River Current Turbine; Wave Point Absorber; Ocean Current Turbine; Oscillating Surge Flap; and an Oscillating Water Column.
- A publication on the capture-width ratio of wave energy converters.
- A publication on a selection of wave energy converters.

Literature for Further Reading

For more extensive education, participants can read the following books:

- *Fundamentals of Ocean Renewable Energy*, which presents the basic concepts of mechanics and introduces the various technical aspects of marine energy.
- *Handbook of Ocean Wave Energy*, which offers state-of-art research and applications in the two related and interdependent areas of ocean engineering and oceanography.
- *Ocean Wave Energy*, which gives a comprehensive description of marine energy conversion devices.
- *Ocean Waves and Oscillating Systems*, which examines the interaction between ocean waves and oscillating systems.

- *Market Study on Ocean Energy*, which estimates the financial needs of the ocean energy sector in the European Union, identifies and analyzes potential financing gaps and possible financing solutions and analyzes recommendations of the ocean energy roadmap in that context.

Additional Links

The following are additional resources that may prove useful:

- DOE WPTO website.
- DOE WPTO Project Map, which lists all projects funded by WPTO and high-level descriptions.
- Collegiate Wind Competition Archives, which includes reports from past Collegiate Wind Competitions.
- Funding opportunities and where you can get DOE news:
    - EERE Funding Opportunity Exchange
    - Small Business Innovation Research/Small Business Technology Transfer solicitations
    - Advanced Research Projects Agency–Energy funding opportunity announcements.
- WPTO's newsletters, which provide updates and notices for funding opportunities, program activities, events, and publications.
- WPTO Semiannual Stakeholder Webinar, which details WPTO's hydropower and marine energy programs along with ways to partner and get involved in new initiatives.
- PacWave Test Site, which describes the first grid-connected, full-scale test facility for wave energy conversion technologies.
- WPTO's standards site.

Build and Test Challenge Resources

Resources documenting past marine energy testing projects may be helpful for teams to review when designing their experimental testing campaign:

- DOE's Wave Energy Prize rules document
- DOE's Waves to Water Prize rules document
- The North Carolina Renewable Energy Challenge website
- Telesto Marine Energy Development Pathway.

Community Connections Challenge Resources

Students should research the current state of these topics in the industry before meeting with industry professionals. Resources include but are not limited to:

- Marine Energy Science, Technology, Engineering, and Mathematics Portal
- National Renewable Energy Laboratory Marine Energy Program News
- U.S. Department of Energy Water Power Technologies Office Hydropower Program
- Marine Energy Collegiate Competition meetings and webinars.

AMERICAN MADE
U.S. DEPARTMENT OF ENERGY

Marine Energy Collegiate Competition (MECC)

OFFICIAL RULES

MARCH 2024