

This webinar is being recorded

U.S. Department of Energy Marine Energy Collegiate Competition



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POWERING
the BLUE ECONOMY

Marine Energy
Collegiate
Competition

U.S. DEPARTMENT OF ENERGY

Welcome

The purpose of this webinar is to share information on the [U.S. Department of Energy Powering the Blue Economy: Marine Energy Collegiate Competition](#)

Agenda

- Department of Energy Water Power Technologies Office Overview
- Powering the Blue Economy Overview
- About the Marine Energy Collegiate Competition (MECC)
- Overview of Events and Deliverables
- Feedback from Similar Collegiate Competitions
- ICOE 2020
- Expectations and Timeline
- Review of Criteria

Question & Answer Period

Type your question in the CHAT BOX in your “Control Bar” at any time during the webinar.

Questions will be addressed during the Q&A period at the end.

Webinar recording and transcripts will be posted on
[https://openei.org/wiki/PRIMRE/STEM/Marine Energy Collegiate Competition \(MECC\)](https://openei.org/wiki/PRIMRE/STEM/Marine_Energy_Collegiate_Competition_(MECC))

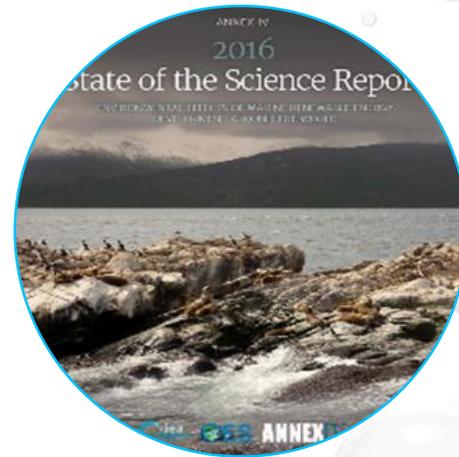
About the U.S. Department of Energy's Water Power Technologies Office (WPTO)



WPTO **invests in early-stage research** to accelerate development of innovative water power technologies while **ensuring that long-term sustainability and environmental issues are addressed.**



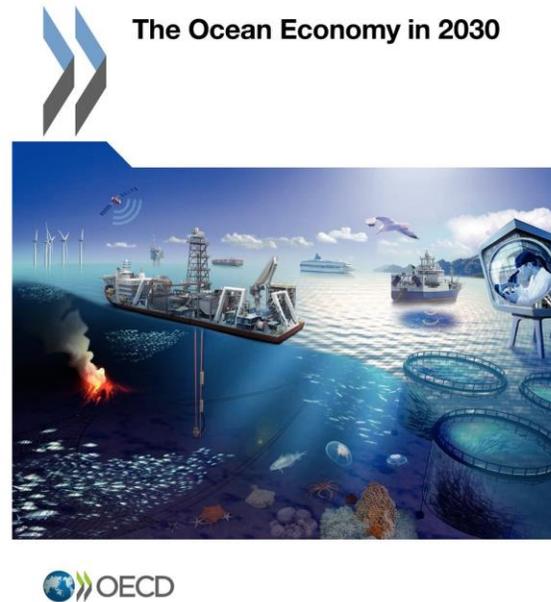
WPTO supports efforts to **validate performance and grid-reliability** for new technologies, develop and increase accessibility to **necessary testing infrastructure**, and evaluate **systems-level opportunities and risks.**



WPTO aggregates, analyzes and disseminates **relevant, objective, technical information** on water power technologies and related issues to stakeholders and decision-makers.

Emerging priorities: In 2018, WPTO initiated an analysis of marine energy technologies' potential to power **the blue economy** (ocean industries & missions).

What is the “Blue Economy”?



- The World Bank defines the Blue Economy as the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.
- The Organisation for Economic Co-Operation and Development predicts the Blue Economy will double from \$1.5 trillion to \$3 trillion in global economic value by 2030.
- The Blue Economy is an administration priority, reflected in National Ocean Policy and the Decadal Vision for Ocean Science.
- “The ocean will become an economic force this century”—The Economist Intelligence Unit (2015)

Water Power Technology Office's Role in the Blue Economy

Marine energy has a dual role in the blue economy

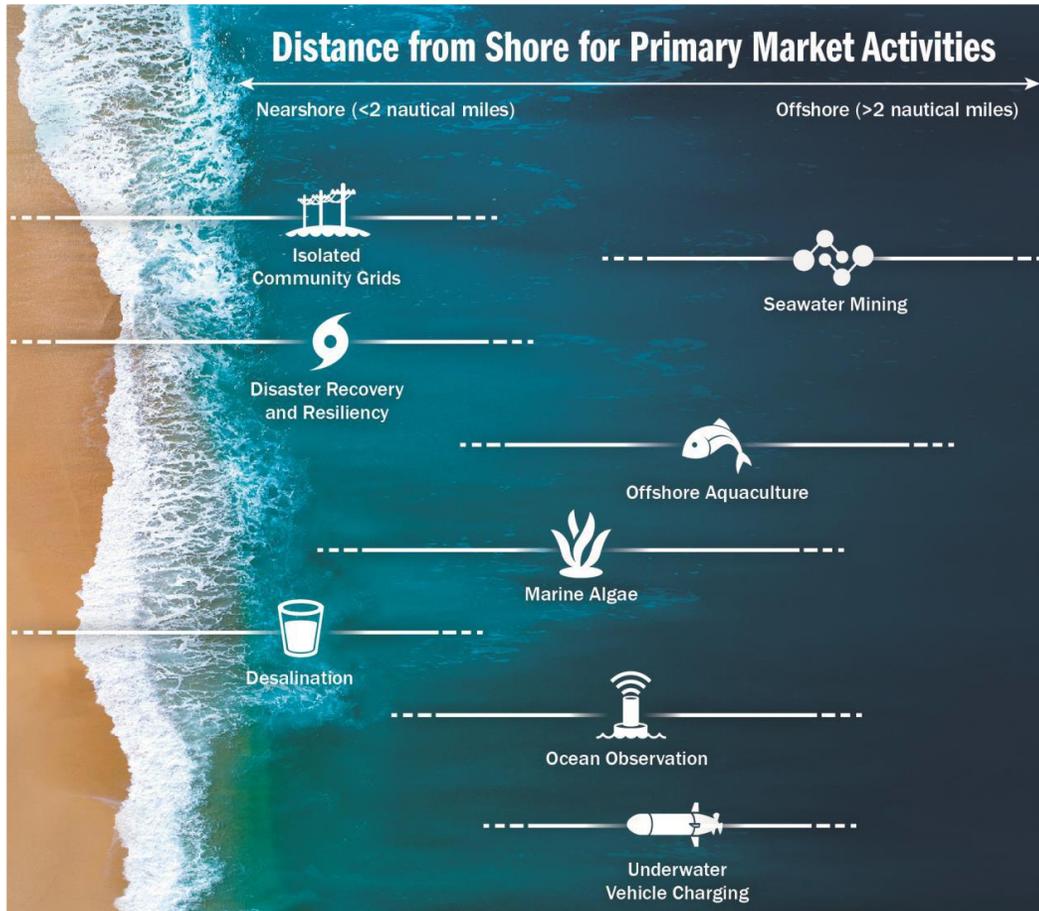
1. Energy generation at sea is a stand-alone sector
2. Removing energy constraints enables development of other sectors

In addition to generating electricity for use on-shore, power generated at sea (from waves, currents, or wind) could be used to serve the needs of other existing or emerging ocean industries (aquaculture, ocean mineral mining, oceanographic research, or military missions).

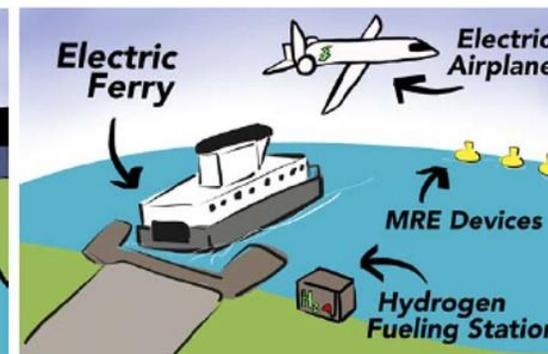
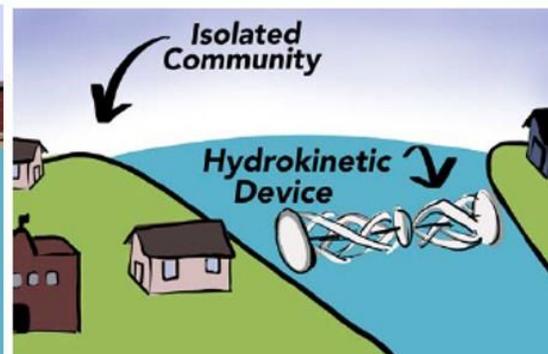
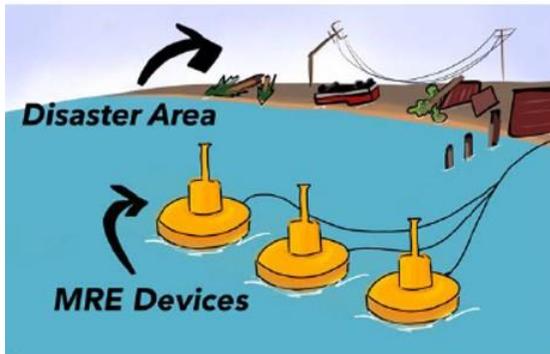
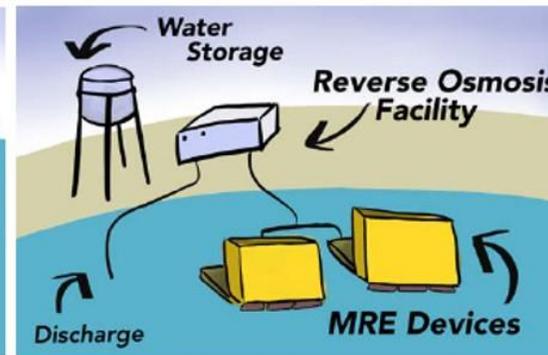
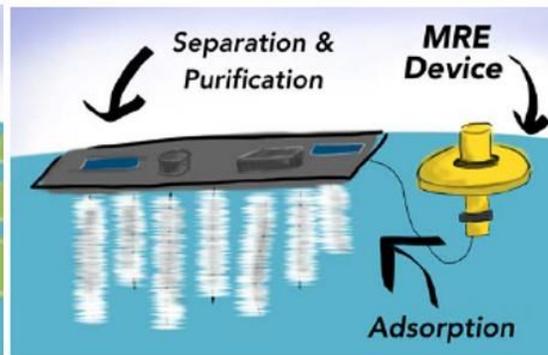
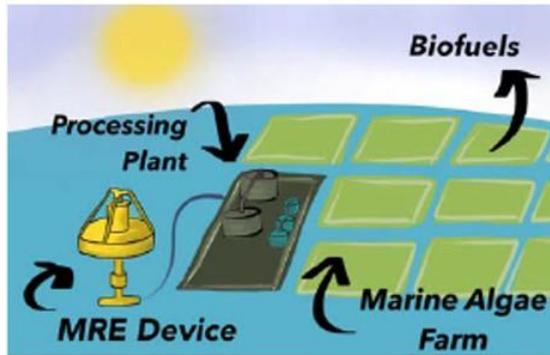
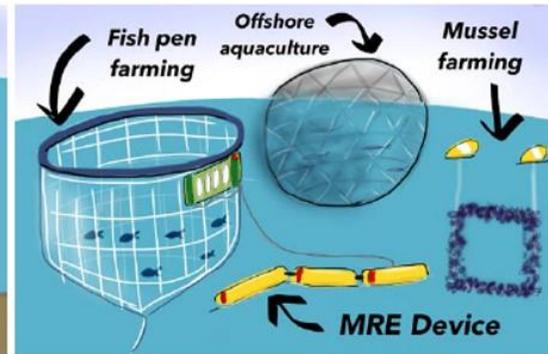
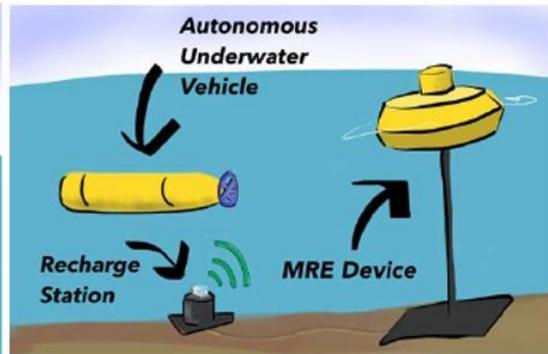
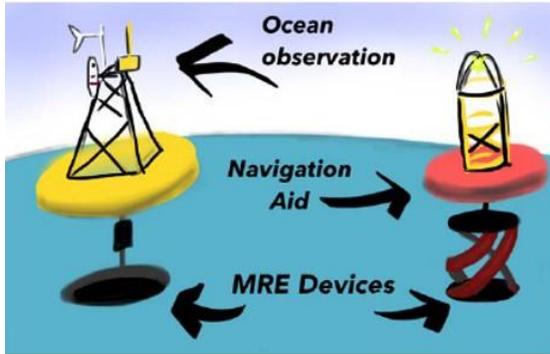
From the Decadal Vision



Exploring Coastal and Offshore Applications



Potential PBE Applications



Marine Energy Workforce Development Opportunities



Array of Skills Required

Planning and Development

- Engineering
- Surveying and scientific monitoring
- Finance
- Permitting
- Legal
- PR and marketing
- Other

Construction

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

Operation & Maintenance

- Site/plant managers
- Project engineers
- Water transportation workers
- O&M technicians
- Safety and inspection workers
- Remote monitoring
- ... And more!



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

About the MECC

- **Interdisciplinary**

- Draw students from diverse disciplines to consider opportunities for marine energy
- Cultivate creative thinking and problem solving to formulate novel solutions. This requires teams comprised of diverse backgrounds.
- Help students see the comprehensive picture, not just one stand alone piece of the puzzle.

- **Intertwines academic coursework with hands-on learning**

- Good platform for STEM education.
- Learning experience that can't be replicated in the classroom alone.

- **Experience with real-world challenges**

- Highly sought after by hiring managers.
- Best preparation for a successful career.

- **Direct interaction with industry experts**

- Introduce next generation workforce to the marine energy and blue economy industries.
- Show students the diverse opportunities in the blue economy.
- Support industry in locating highly qualified candidates.
- Foster information sharing between industry and academia for mutual benefit.

- **Partner with K–12 programs**

- Your own learning deepens when you invest in another's learning.
- Role models to younger students; inspire them to pursue pathways to blue economy careers.

This is the first Marine Energy Collegiate Competition: Powering the Blue Economy!

MECC Components for 2020

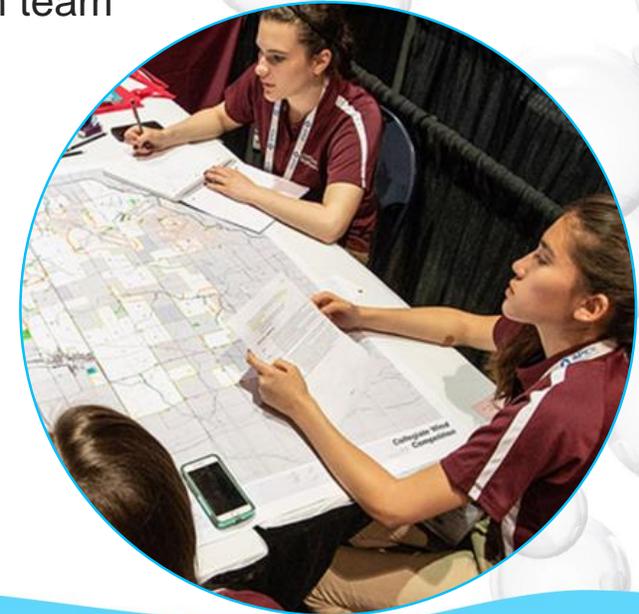
Create a business plan and conceptual-level technical design of a marketable device that powers any sector of the blue economy.

Competition Components:

- Written Report
 - Composed of the business plan and preliminary technical design
- Public Pitch
 - Presentation on business plan and design to a panel of judges
 - Some of the questions that will be asked will be provided in advance to each team
- Poster and Model
 - Poster overviewing the team's entire technical and business plan
 - Non-working table-top scale model of the technology concept

Recommended Opportunities

- Industry engagement
- Community involvement and outreach, e.g.
 - KidWind challenges (some of which include water power), National Ocean Sciences Bowl
 - Marine energy events at your university



Business Plan Composition

- Maximum 25 pages detailing the following:
 - Concept overview
 - Global market opportunity
 - Relevant stakeholders (including end user surveys)
 - Development and operations
 - Financial and benefits analysis
 - Preliminary Technical Analysis (more details on next slide)

Detailed description of all requirements can be found in the Competition Rules and Requirements Document:

https://openei.org/w/images/b/bb/MECC_Rules_and_Requirements_Manual.pdf

Preliminary Technical Design

Detail that is adequate enough for a preliminary review of the baseline and operating properties of the proposed system. At a minimum, the following topics should be included:

- A description of the design objective and how the design components support this objective including the power production component, the load and related power needs and any associated storage.
- A first-order performance analysis that contains the power conversion capture efficiency with an attempt towards optimization across available resource and converter efficiency. An analysis of the expected forcing and power requirement and the profile of the load across time (and associated safety factors within the design where applicable).
- Demonstration that the proposed technology is designed to withstand standard operating forces and moments.
- A description of how the technical design addresses needs identified in the market analysis.
- Engineering diagrams with at least a basic mechanical drawing of all components.

Proposed Scoring Rubric

Competition Contests	Total Scores	Products		
		Written Report (250)	Public Pitch (125)	Poster and Model (125)
Business Plan	275	150	75	50
Preliminary Technical Design	225	100	50	75

Teams will be evaluated based on thoroughness of plans and how they have addressed each category in the scoring rubrics which is fully detailed in the Rules and Requirements document:

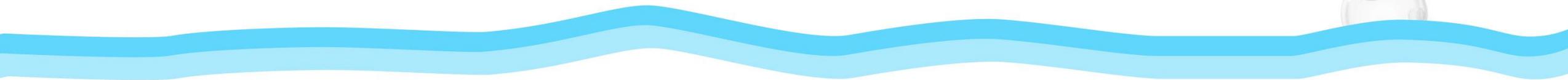
https://openei.org/w/images/b/bb/MECC_Rules_and_Requirements_Manual.pdf

Testimonials from another DOE-sponsored Competition: The Collegiate Wind Competition

- “The event was a great experience for our students. I particularly enjoyed seeing the [school name] students embrace the spirit of the competition—interacting with the KidWind teams, discussing their plans and designs with other CWC teams, and supporting each other as they struggled, and persevered, through many challenges. **The experience they gained over the past year, and particularly this past week, will be invaluable as they continue their education and enter the workforce.**”
- **“Opportunities like CWC have allowed many of us to land our dream jobs.** I am excited to see how the wind industry can be transformed in the coming years and the impact it can have on the energy industry!”
- “...the networking, interactions, and experience of it all is really **not comparable to anything the students can get in a classroom.**”
- “From a WHOLE PROGRAM perspective, my personal measure of success emphasizes the learning experience of our students. From that perspective it was a great success, as the **students from our institution were uniformly engaged and gained an experience that is impossible to replicate in a traditional classroom setting.** From an EVENT perspective my principal measure of success pertains to how well the event was executed and whether it was administered fairly, and in both cases my response is a resounding YES.”
- **“If it wasn't for this competition, our undergraduate programs wouldn't have such meaningful projects to work on related to wind energy.”**
- “This competition...has been my **favorite part of my undergraduate experience and something I will reference for the rest of my career** in developing me as an engineer.”

Video:

<https://www.youtube.com/watch?v=Ic5A6xICdAQ>



Co-Located with ICOE 2020



- The International Conference on Ocean Energy (ICOE) is the **largest marine renewable energy conference** and is held every two years.
- The National Hydropower Association (NHA) will host the next ICOE **May 19-21 in Washington, DC** .
- ICOE has **never before been hosted in the United States** and has only been hosted outside of Europe once since its inception in 2006.
- The event will be a one-time opportunity to showcase world-class U.S. marine energy research and testing capabilities to the rest of the world. This includes:
 - **Highlighting marine energy research and the unique capabilities of U.S. universities and labs**
 - **Announcing results from multiple DOE prizes**
 - **Showcasing DOE's first Marine Energy Collegiate Competition**

Commitment from Organizers

- Host full service collegiate competition at ICOE in 2020
- Ensure fair and unbiased competition environment with expert judging
- \$15K seed funding through a subcontract with NREL (**U.S. institutions only**)
- Marine energy educational opportunities
- Inclusion in an alumni group which will be created after the event
- Opportunities to engage with the marine energy industry professionals
- Opportunities to engage with K–12 STEM education efforts

Expectations from Teams

- Compete in 2020 competition in a professional and collegial atmosphere.
- Bring marine energy education into the classroom.
- Acquire additional funds through fundraising or other means (if needed).
- Spread the MECC message through outreach and local impact.
- Take advantage of educational opportunities provided.



Criteria for Selection



- Educational Objective and Integration (25%)
- Organization and Project Planning (25%)
- Team Configuration + Inclusivity (15%)
- Budget Management + Institutional Support (20%)
- Communication and Outreach (15%)

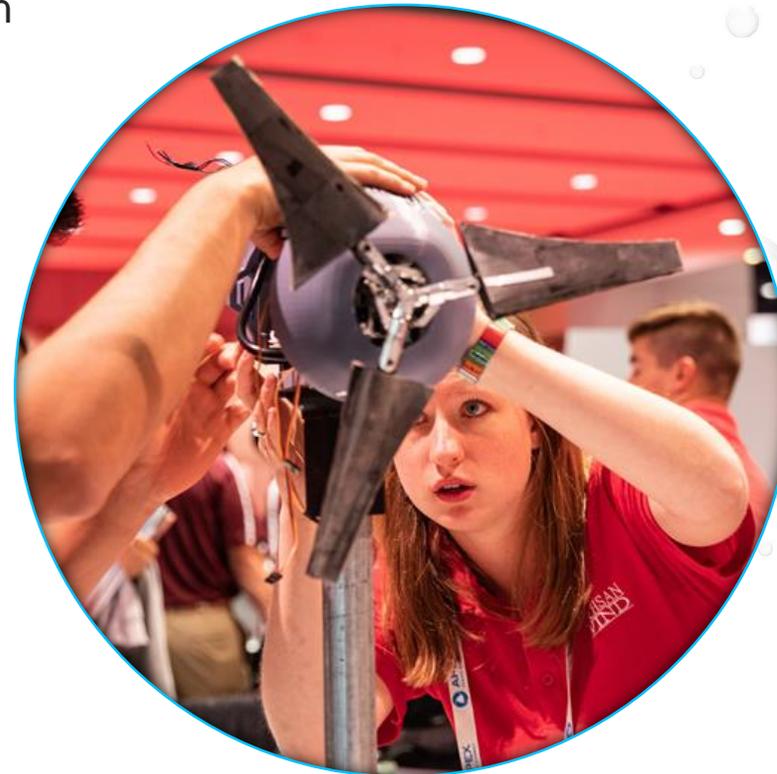
Application template is on the MECC Website:

https://openei.org/w/images/f/f8/MECC_Application_Template.docx

Competition Schedule

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

- Engagement throughout the full academic year
 - Development of contest products and product submission
 - Support student learning on relevant subject matter
 - Local outreach
 - Fundraising
 - All-team calls
- Multi-day event at ICOE in Washington DC
 - Team check in/registration
 - Dry run presentations (optional)
 - Kick-off meeting
 - Presentations
 - Team expo/poster and model displays
 - Onsite activity (TBD)
 - Awards ceremony



Timeline

Month/Year	Competition Activity
August 2019	Release of competition rules and requirements
August 29 and October 3	NREL will host two informational webinars
October 18, 2019	Applications to participate are due
November 1, 2019	Selection notification
November 6, 2019	Informational Webinar: Design Methods
November 2019 – May 2020	Concept development
January 31, 2020	High level concept summary due
May 3, 2020	Written business plans due (2 weeks prior to the event)
May 18, 2020	Dry Run Presentations (optional)
May 19-20, 2020	Competition takes place at ICOE 2020
July 2020	Virtual review meeting held to assess impact

Lessons Learned from Similar Collegiate Competitions

- Create opportunities for cross-disciplinary teams to work together
- Create firm internal deliverables
- Reach out to industry advisors for support
- Start early and get everyone involved
- Decide on your travel team early—logistics, payment, paperwork take time



Lessons Learned from the Collegiate Wind Competition



- Take advantage of the educational webinars and resources offered
- Start collaborating with outside organizations as early as you can
- Share your challenges on the all-team calls to get suggestions from other teams on how to solve them
- Stay engaged even if not selected
- Bring any siloed teams together as early as possible.

How to Apply

- Download application template from [https://openei.org/wiki/PRIMRE/STEM/Marine_Energy_Collegiate_Competition_\(MECC\)](https://openei.org/wiki/PRIMRE/STEM/Marine_Energy_Collegiate_Competition_(MECC))
- Start forming your team and working with your school now to generate support
- Reach out to water.competition@nrel.gov for assistance in forming teams
- Submit completed application to Water.Competition@nrel.gov by October 18, 2019

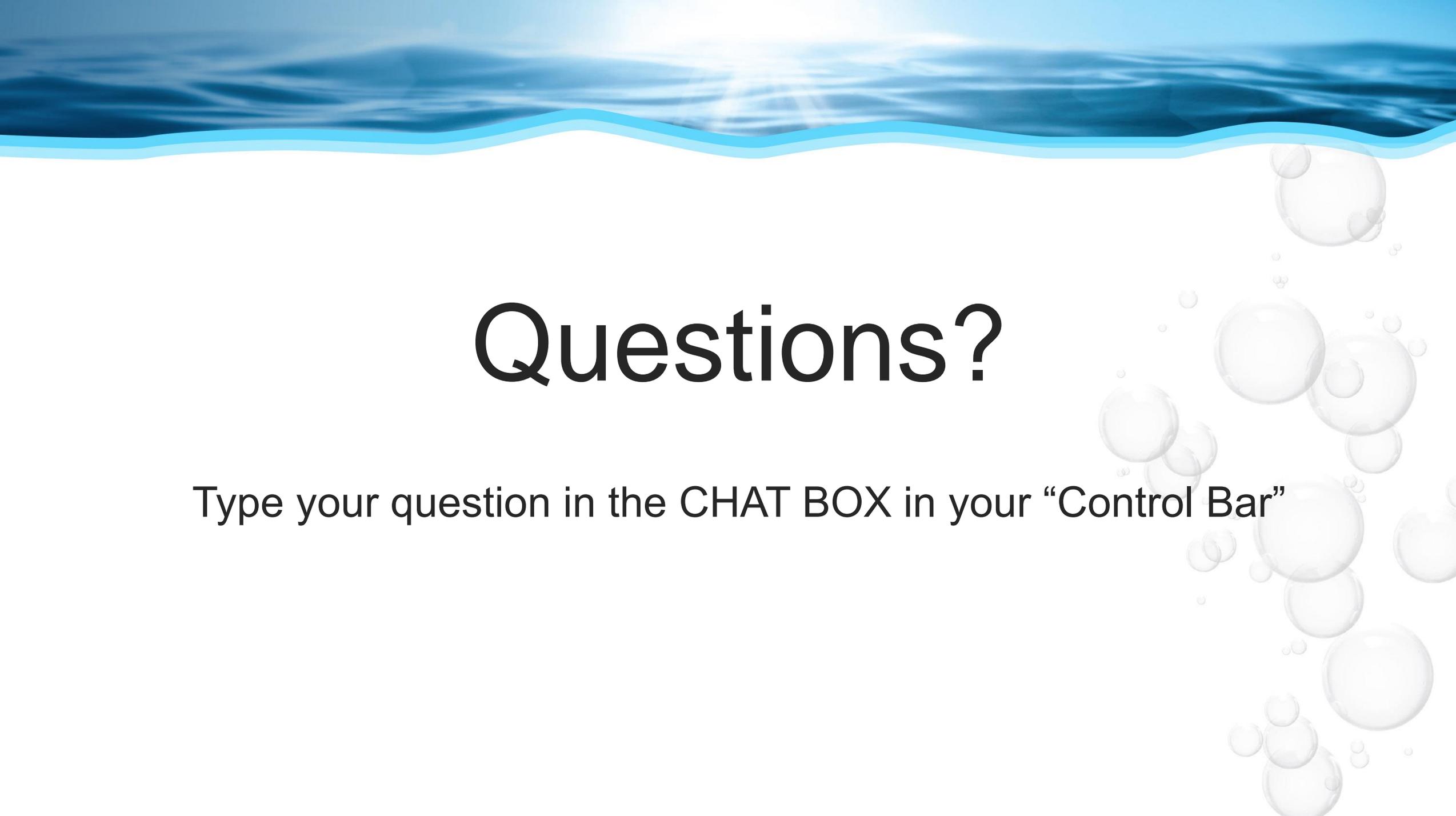
Additional Information

Join the MECC Slack Channel to see competition communications and communicate directly with organizers: <http://marineenergy-n3m8041.slack.com/>

Important Links and Tips

- **2020 Rules and Requirements** are important to reference to get a better understanding of what the competition entails.
- Teams can consist of any combination of undergraduate and graduate students, but some undergraduate participation is required
- International institutions are welcome to participate, but can not receive funding from NREL/DOE
- A list of relevant resources (documents, websites, etc) is available through MECC website
- Previous **reports** submitted by CWC teams can be found by going to **past competitions** and then to the team pages.
- It is never too early to start looking for potential team mentors and sponsors!

[https://openei.org/wiki/PRIMRE/STEM/Marine_Energy_Collegiate_Competition_\(MECC\)](https://openei.org/wiki/PRIMRE/STEM/Marine_Energy_Collegiate_Competition_(MECC))

The background features a blue water surface at the top with a wavy line separating it from a white area below. On the right side, there are several translucent, realistic-looking bubbles of various sizes rising upwards.

Questions?

Type your question in the CHAT BOX in your “Control Bar”



Thank you for joining us today and we look forward to your participation!