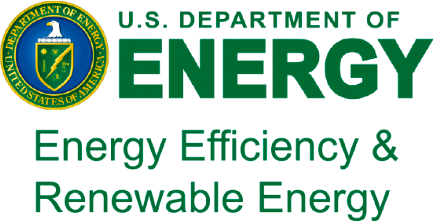
SOLICITING INDUSTRY REQUIREMENTS

FOR A CURRENT ENERGY CONVERTER MOBILE TEST VESSEL

Text

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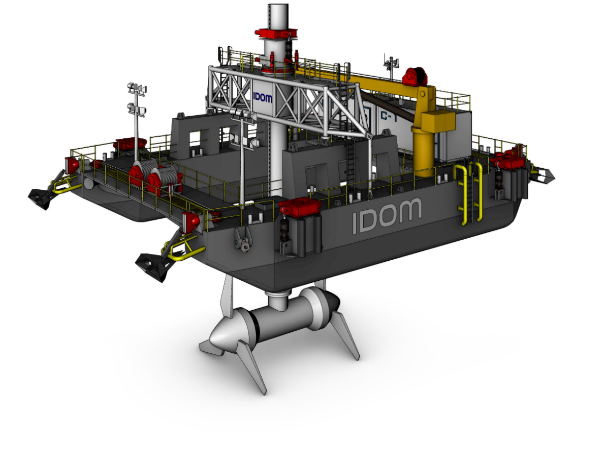
*SUPPORTING ENTITY:*

*AUTHORS:*

# **SOLICITING INDUSTRY REQUIREMENTS FOR A CURRENT ENERGY CONVERTER MOBILE TEST VESSEL**

As the marine energy industry continues to advance technologies towards commercialization, there is an ongoing need for testing at all levels of technological development. The slow pace of design and in-water testing cycles is further exacerbated by the limited availability of testing infrastructure at various scales, complex and time-consuming permitting processes, and expensive environmental monitoring. These challenges have limited the ability of technology developers to assess the performance of devices and components, innovate solutions where necessary, and deploy the next generation of devices. Current energy converter (CEC) prototypes must be tested in real-world environments to fully characterize and validate the performance, reliability, maintainability, and potential environmental impact. Existing testing infrastructure in the U.S. can only accommodate small scale CECs with rotors 2-3 meters in diameter. There is a need for a mobile testing capability that can accommodate CECs with up to 8-meter diameter rotors for testing turbines under different flow conditions in a wide range of test conditions.

The Department of Energy (DOE) in collaboration with IDOM Inc. and Florida Atlantic University’s Southeast National Marine Renewable Energy Center (SNMREC) aims to address this gap within the FOA 2234 by designing and fabricating a Mobile Test Vessel (MTV) that can accommodate a wide range of turbine types and sizes, current speeds, depths, wave conditions, and seabed types. This MTV will support anchoring and mooring for the testing of CECs in rivers, tides and/or open sea. MTV will potentially incorporate an onboard power generation system to support test setup, maintenance, inspection, testing, and services for data acquisition systems.



*Figure 1 Initial MTV concept. This figure is just for illustration purposes. The final configuration and appearance of the MTV may differ significantly from the current concept.*

This request for information (RFI) solicits feedback from CEC technology developers and related stakeholders, like supply chain personnel, test center staff or researchers, on how the MTV can best support the development of CEC technologies and testing. The project team will use responses to this RFI for strategic planning to ensure MTV capabilities are aligned with industry needs. Information received in response to this RFI will be used exclusively in the frame of this FOA in order to help on the definition of the MTV main requirements and its final configuration. None of the information provided within this survey will be published or distributed in any way to any party not involved in the development of this FOA. Therefore, specific attention will be paid to the privacy of the provided device technology related data and the identity of the company providing it.

The RFI is divided into five sections. The first requests general information to be provided by any stakeholder. Three additional sections request information from CEC developers and other knowledgeable parties to better understand technologies which may utilize the MTV, including forecasted testing needs.

The fifth section provides a blank space for the CEC developers and stakeholders to provide any additional comment or suggestion that could complement the answers provided on the survey. The respondents are encouraged to provide any additional comment not covered under the RFI questions that could be considered valuable on the matter.

Please provide feedback to as many questions as possible and as thoroughly as possible. Because results of this RFI will be used to define the MTV’s requirements and scope, it is a unique opportunity for CEC developers and other knowledgeable parties to help ensure that the MTV will suit their future development and technology testing needs. With this in mind, respondents are encouraged to provide any other information which has not been specifically requested, but that may be relevant. A single response per stakeholder organization is appreciated to streamline response review.

Please respond before 02/18/2022.

### **Section 1 - General information\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Q1.1 Company information:**

|  |  |
| --- | --- |
| **Your Name** |  |
| **Position / Title** |  |
| **Contact data (address, phone and email)** |  |
| **Company / Affiliation** |  |
| **Location** |  |
| **Company size** |  |
| **Operating countries** |  |
| **Webpage** |  |
| **Others** |  |

**Q1.2 Please briefly describe your role in the current energy converter (CEC) industry (e.g., technology developer, project developer, community stakeholder, researcher…).**

**Q1.3 Please describe the type(s) of tests an MTV (described on page 1) should support to best impact the development of CECs, the marine energy industry broadly, and/or the blue economy. If possible, please indicate the priority of these tests.**

**Q1.4 In addition to direct testing of CEC technologies, what other R&D activities would be valuable if performed with an MTV to support the development of CEC technologies, the marine energy industry, or the blue economy?**

**Q1.5 Please provide any other suggestions regarding MTV testing capabilities.**

### **Section 2 – CEC Developer´s information\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The following questions are targeted towards individuals, universities, companies and other organizations developing CEC technologies.

**Q2.1 Please provide a high-level description of your system(s) and their intended market(s).**

**Q2.2 Please provide a brief description of your technology’s estimated Technology Readiness Level (TRL).**

Further information about TRL is provided in appendix A at the end of the document.

**Q2.3 Please describe the type of tests or demonstrations already conducted, including the scale of the prototype, the type of tests conducted or any relevant information and lessons learned.**

**Q2.4 Please describe the type of tests or demonstrations that are planned to mature your CEC for commercialization. In your description, please also include potential CEC prototype scales (size), major test outcomes, and test environment for each future test.**

**Q2.5 What type of measurements are needed during the envisaged testing campaigns?**

Examples include power performance, structural and drivetrain loads, power quality, efficiency under crossflow conditions, environmental impact…

**Q2.6 Would you find an onboard DAQ useful or are you planning on providing your own? Please comment on the expected requirements of the DAQ.**

**Q2.7 Would your testing campaign require energy storage capabilities? If so, please provide a capacity estimation.**

**Q2.8 Do your testing needs include specific test durations and/or time of year/weather window constraints (e.g., summer, winter, or year-round testing)? If yes, please explain.**

**Q2.9 Please provide any relevant operational experience that may influence MTV design.**

Clarify if experience is with the device as described. Specify if it is related to the technology, mooring system, foundation, turbine material, electrical equipment, environmental acceptability, etc.

**Q2.10 Please list the relevant standards you would like to follow when testing your CEC device with the MTV.**

**Q2.11 Please provide an outline on the environmental aspects (impact, acceptability...) of your device.**

**Q2.12 Please describe the next planned field testing required for your technology’s development. Please also indicate if this activity is currently planned or scheduled (when, where and for how long).**

Please, clearly identify if the type of environment of the planned testing site , e.g. river, tidal or ocean environment. Additionally, please mention if unique testing conditions are expected, such as the presence of ice, debris, sediments, marine mammals migration, etc..

**Q2.13 Do you envision that an MTV could be useful during your technology development? If yes, please provide additional details and include which research questions will the MTV help you answer.**

**Q2.14 Please list any identified technical or commercial challenges for the continued development of your technology (including planned mitigations, if any) and your expected time to market.**

**Section 3 - CEC Technology details\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Please answer the following questions as they relate to your CEC technology, especially at geometric and/or power scales that could utilize an MTV platform (unless otherwise noted). If information is not yet known or available, please estimate to the best of your ability.

Note: If your company develops more than one CEC please add as many tables as needed.

|  |  |
| --- | --- |
| ***Subject*** | ***Response*** |
| **CEC Device Type**  (Horizontal, vertical, cross-flow, kite, etc.) |  |
| **Geometric scale of prototype to be tested** (vs. full scale system) |  |
| **Major Prototype Dimensions** (Turbine rotor, nacelle, PTO, support structure, etc.) |  |
| **Approximate total in-air weight of prototype** |  |
| **Primary materials used for prototype** |  |
| **No. of rotor blades** |  |
| **Rotor Diameter** |  |
| **Chord to tip ratio** |  |
| **Other main rotor dimensions** (If not-horizontal axis) | ***Please include here any characteristic dimension needed to describe your device*** |
| **Estimated drag/thrust force at maximum speed** |  |
| **Electric Generator Type**  (Input voltage, alternating or direct current, synchronous or asynchronous generator, related power electronic converters, etc.) |  |
| **Power conversion chain**  (Components Breakdown) |  |
| **Device Rated Power** |  |
| **Rated Current Speed** |  |
| **Operating current speed range** (Cut-in and cut-out speeds) |  |
| **Maximum power at max speed** |  |
| **Auxiliary power supply needs for testing** |  |
| **CEC cooling requirement(s), if any** |  |
| **CEC control parameters** (Blade pitch angle, yaw angle, etc.) |  |
| **Does CEC self-align with current direction? How this is achieved?** |  |
| **Ideal deployment depth during MTV testing** |  |
| **Commercial-scale CEC water depth**  (Distance of rotor to sea surface) |  |
| **Planned commercial-scale CEC installed height above the seabed constraints**, if any |  |
| **Prioritized list of commercial-scale CEC resource target(s)** (Please provide specific sites if known) (Ocean, River, etc.) |  |
| **Seasonal restrictions, if any** |  |
| **Seabed type constraints, if any** |  |
| **Description of CEC installation type/structure**  (Floating structure, seabed mounted…) |  |
| **O&M Philosophy**  (Equipment, personnel access methods, replacement and/or repair strategies for main components, diver intervention, planned maintenance intervals and scope, etc.) |  |
| **Environmental compliance and monitoring Philosophy**  (please include here any information related to produced noise, risk of leaking of used lubricants or fluids…) |  |
| \*This table is illustrative based on current research of the technology, but please feel free to add other relevant information not captured. | |

### **Section 4 – Future plans\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Q4.1 Would you consider using the MTV, if available?**

▢ Yes

▢ No

**Q4.2 Will/does your company have CECs available to be tested with the MTV if the platform becomes operational in 2025?**

For example, will/do you have a CEC that was used in a previous test that would benefit from being re-tested or further tested with an MTV? If so, please describe the device and the type of testing you would like to perform.

**Q4.3 Please describe how you anticipate acquiring funding for your testing needs, including prototype fabrication and any expected funding-related considerations to use the MTV.**

### **Section 5 - Further comments / attachment\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

In the following text box, any further comments you think would be helpful are welcome. Thank you for completing this survey.

We will use responses to this RFI for strategic planning to help ensure testing opportunities align with industry needs and that MTV’s capabilities are developed to meet testing support needs. As commented before, none of the information provided within this survey will be published or distributed in any way to any party not involved in the development of this FOA.

Please send a copy of this completed survey to **mtv\_survey@idom.com** by February 18th, 2022 2:00 PM Central Standard Time (CST).

# **END OF SURVEY**

### **APPENDIX A- Technology Readiness Level Definitions\_\_\_\_\_\_**

|  |  |
| --- | --- |
| TRL 1: | Basic principles observed and reported |
| TRL 2: | Technology concept or application formulated |
| TRL 3: | Analytical and experimental critical function or characteristic proof of concept |
| TRL 4: | Component or breadboard validation in a laboratory environment |
| TRL 5: | Component or breadboard validation in a relevant environment |
| TRL 6: | System/subsystem model or prototype demonstration in a relevant environment |
| TRL 7: | System prototype demonstration in an operational environment |
| TRL 8: | Actual system completed and qualified through test and demonstrated |
| TRL 9: | Actual system proven through successful mission operations |