MHK Performance Measurement & Instrumentation

2.3.2.401 / 21799

Marine and Hydrokinetics Program

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Rick Driscoll

NREL

Project Overview

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Project Summary

This project identified gaps, characterized impacts, and prioritized solution pathways for measurement and data processing for the MRE community.

- A 3rd Marine Hydrokinetic Instrumentation Workshop was held at Florida Atlantic University's Sea Tech Campus in early 2017.
- A comprehensive assessment and literature review was performed for gaps in MRE measurement and testing technology. The focus was marine-grade instrumentation systems for site characterization, structural testing, certification, system verification, commissioning, operational monitoring, and controlled testing in a laboratory environment.

Project Objective & Impact

The project generated 28 findings intended to be informative and used by the MHK community to help advance testing and measurement by focusing research investments and efforts on high-impact projects that fill important gaps and develop technologies and capabilities that can increase test success while lowering costs and decreasing timelines.

- Benefits include understanding the current limitations in testing and measurement, the impact of these gaps, and benefits of closing the gaps.
- Identified gaps can be solved via government or industry, thereby increasing the quality and types of data available to advance technology and establish the viability of MRE technologies.

Project Information

Project Principal Investigator

Rick Driscoll, NREL

WPTO Lead

Erik Mauer

Project Partners/Subs

None

Project Duration

- Project Start Date: 10/1/2017
- Project End Date: 6/30/2018

Alignment with the Program

Marine and Hydrokinetics (MHK) Program Strategic Approaches

Data Sharing and Analysis

Foundational and Crosscutting R&D

Technology-Specific Design and Validation

Reducing Barriers to Testing

Alignment with the MHK Program

Reducing Barriers to Testing

- Enable access to world-class testing facilities that help accelerate the pace of technology development
- Work with agencies and other groups to ensure that existing data is well-utilized and identify potential improvements to regulatory processes and requirements
- Support additional scientific research as needed, focused on retiring or mitigating environmental risks and reducing costs and complexity of environmental monitoring
- Engage in relevant coastal planning processes to ensure that MHK development interests are equitably considered

The MHK Performance Measurement and Instrumentation project contributes by:

1) Identifying and quantifying the impacts of gaps that are preventing the MRE community from obtaining high-quality, comprehensive, and credible measurements and processed data from laboratory and field validation (testing)
2) Providing consensus recommendations for pathways to fill those gaps—yielding enabling technologies, methods, and tools that enhance validation (testing) success and knowledge gained
3) Ultimately reducing test cost, duration, and risk while increasing the quality and relevance of measurements and analysis

Alignment with the MHK Program

Data Sharing and Analysis

- Provide original research to assess and communicate potential MHK market opportunities, including those relevant for other maritime markets
- Aggregate and analyze data on MHK performance and technology advances, and maintain information sharing platforms to enable dissemination
- Support the early incorporation of manufacturing considerations/information into design processes
- Leverage expertise, technology, data, methods, and lessons from the international MHK community and other offshore scientific and industrial sectors

The MHK Performance Measurement and Instrumentation project contributes by capturing the needs, benefits, and some requirements for data sharing and analysis, then providing recommendations for solution pathways.

Alignment with the MHK Program

Technology-Specific Design and Validation

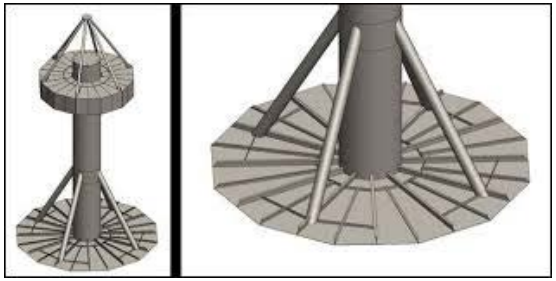
- Validate performance and reliability of systems by conducting in-water tests of industry-designed prototypes at multiple relevant scales
- Improve methods for safe and cost-efficient installation, grid integration, operations, monitoring, maintenance, and decommissioning of MHK technologies
- Support the development and adoption of international standards for device performance and insurance certification
- Evaluate current and potential future needs for MHK-specific IO&M infrastructure (vessels, port facilities, etc.) and possible approaches to bridge gaps

The MHK Performance Measurement and Instrumentation project contributes by providing measurement research and design (R&D) pathways that will increase measurement quality and breadth. This will help accelerate technology design, development, validation, and commercialization, as well as contribute to engineering tool development.

Project Budget

FY17	FY18	FY19 (Q1 & Q2 Only)	Total Project Budget FY17–FY19 Q1 & Q2 (October 2016 – March 2019)	
Costed	Costed	Costed	Total Costed	Total Authorized
$129K	$72K	N/A, project completed in FY18	$195K	$195K

Data are the foundation of understanding and knowledge gained at all stages of validation/testing.



Concept

Laboratory

Field

Management and Technical Approach

Milestones and Events

FY	Q1	Q2	Q3	Q4
FY17	Complete Workshop Plan	Hold Workshop	Literature Review & Analysis	Analysis Complete
FY17	Draft Report	Report Published	Paper at METS	

Technical Approach

- Workshop planning
- Workshop execution
- Findings compilation and analysis
- Findings dissemination

Critical Success Factors

- Participation and collaboration with industry, test centers, and academia
- Accurate assessment of relevant gaps and definition of realistic solution pathways

Challenges

- Ensuring we understand MRE community needs
- Capturing relevant gaps, then defining realistic and achievable pathways

End-User Engagement and Dissemination Strategy

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Pre-Workshop Survey → Workshop → Expert Input & Review → Publication & Presentation

Approach

- Engage MRE community from the very initial planning stages
- Ensure that MRE community is represented at the workshop (wave, tidal, and current developers; test centers; researchers; and national labs)
- Involve technical experts with hands-on experience
- Publish (NREL tech report) and present findings (METS and MEC Webinar)

Technical Accomplishments

Direct Technical Accomplishments

- Held Workshop
- Published Technical Report
- Presented at MET & MEC

Basis for Several Projects

- MHKiT
- Mini-Data
- MODAQ
- Instrument Loan Pool

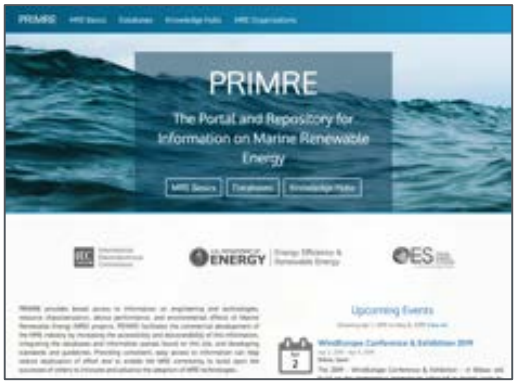
Technical Accomplishments (Cont.)

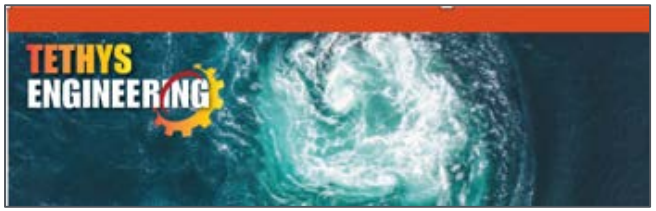
Input to Several Projects

PRIMRE

Tethys Engineering

Enhanced MHKDR





MHKiT Code Hub

MHK
Marine and Hydrokinetic Data Repository
U.S. DEPARTMENT OF ENERGY