



# MHK Regulator Training

MHK Stakeholder Engagement and Outreach

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**MHK Regulator Training:** To address the current lack of information and regulatory consensus around marine and hydrokinetic (MHK) technologies, DOE initiated an effort to educate state and federal regulatory personnel on the current science around important environmental effects of MHK systems, conducted detailed discussions around the level of appropriate impact risk mitigation and remaining key information gaps. A referenced technical report was developed that regulators can use as a guide for regulating near term MHK deployment.

**Project Challenge:** Given the nascent state of the MHK technology, the industry faces challenges in technology deployment. Although efforts are underway to gather and share information on MHK experience, many regulatory agency staff with permitting responsibilities and other stakeholders may not yet be familiar with all aspects of the technology and their potential environmental effects. Furthermore, the scientific information is still evolving without documented understanding of the potential effects for small scale, largely testing focused technology deployments. Without a base of documentation, regulators find it hard to approve even small-scale projects, which limits the ability to better document the impact of larger projects, a real catch-22.

## *Facilitators, Subject Matter Experts, Report Authors\**

*Anna West\**, Kearns & West: subject-matter expert (SME) on regulatory and permitting.

*Sharon Kramer\**, H.T. Harvey & Associates: SME on environmental issues and processes.

Chris Bassett, formerly of Woods Hole Oceanographic Institute: SME on acoustic output from MHK devices

Brian Polagye, University of Washington: SME on acoustic output from MHK devices.

Andrew Gill, Cranfield University: SME on the effects of Electromagnetic Force from Tidal and Wave Systems

Craig Jones, Integral Consulting: SME on the effects of MHK on the physical environment.

Jesse Roberts, Sandia National Laboratories (SNL): SME on the effects of MHK on the physical environment.

Participants and Speakers	Interviewees and other workshop contributors
Verdant Power	48 North Solutions
Maine Department of Environmental Protection	Resolute Marine Energy
Federal Energy Regulatory Commission (FERC)	Oregon Wave Energy Trust (OWET)
National Oceanic and Atmospheric Administration (NOAA)	Pacific Northwest National Laboratory (PNNL)
Ocean Renewable Power Company (ORPC)	Pacific Energy Ventures
NOAA	Oscilla Power
Bureau of Ocean Energy Management (BOEM)	M3 Wave
Verdant Power	Stoel Rives
U.S. DOE	Van Ness Feldman
	U.S. Navy

## Technology Maturity

- Test and demonstrate prototypes
- Develop cost effective approaches for installation, grid integration, operations and maintenance
- Conduct R&D for Innovative MHK systems & components
- Develop tools to optimize device and array performance and reliability
- Develop and apply quantitative metrics to advance MHK technologies

## Deployment Barriers

- **Identify potential improvements to regulatory processes and requirements**
- **Support research focused on retiring or mitigating environmental risks and reducing costs**
- **Build awareness of MHK technologies**
- Ensure MHK interests are considered in coastal and marine planning processes
- Evaluate deployment infrastructure needs and possible approaches to bridge gaps

## Market Development

- Support project demonstrations to reduce risk and build investor confidence
- Assess and communicate potential MHK market opportunities, including off-grid and non-electric
- Inform incentives and policy measures
- Develop, maintain and communicate our national strategy
- Support development of standards
- Expand MHK technical and research community

## Crosscutting Approaches

- Enable access to testing facilities that help accelerate the pace of technology development
- Improve resource characterization to optimize technologies, reduce deployment risks and identify promising markets
- Exchange of data information and expertise

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## The Impact

A better understanding of MHK technologies and their effects will allow regulatory organizations to better prepare for, evaluate, and support the implementation of ocean-based energy technologies.

- Worked with researchers and subject matter experts to define and present the current state of technology and associated research.
- Increased permitting agencies' understanding of the technology and potential environmental effects.
- Identified knowledge and experience gaps.
- Discussed thresholds or acceptable ranges of potential impacts that could drive specific requirements for device deployment.
- Published the workshop summary and findings technical report as a regulatory focused information resource that documents discussions and knowledge gained from the workshop series.

**Unique aspects:** A unique challenge to this project was the limited understanding of MHK technology and its potential deployment impacts. Deployed systems are needed in order to further understand the actual potential operating impacts. However, with limited deployment examples, and without a broad understanding of the technology impact, regulators are hesitant to approve permits for small and prototype test projects, reducing opportunities for data gathering and expanded understanding of actual vs. perceived technology impact.

## Approach:

- 1) Develop initial workshop and issues outline based on series of Offshore Renewable Energy workshops conducted by NREL for the Bureau of Ocean Energy Management on the West Coast in FY13.
- 2) Conduct interviews with federal and state regulatory officials, industry representatives, and engaged parties to focus workshop content and identify appropriate participants.
- 3) Develop content, building from a strong base of current work.
- 4) Conduct first workshop:
  - Workshop took place in Portland, Oregon.
  - Gathered feedback from speakers, attendees, and stakeholders.
- 5) Refine framework and conduct second workshop:
  - Workshop took place in Washington, D.C., and focused on agency leadership.
- 6) Publish materials:
  - Workshop discussions and knowledge gained were published in July 2016, “A Review of the Environmental Impacts for Marine Hydrokinetic Projects to Inform Regulatory Permitting: Summary Findings from the 2015 Workshop on Marine and Hydrokinetic Technologies, Washington, D.C.”
  - Place all workshop materials on Tethys for future use.

## Key Issues

### *Bring together regulatory organizations and permitting agencies*

- Increase technical understanding for regulatory organizations and permitting agencies
- Identify regulating agencies and responsibilities.

### *Consensus on knowledge and experience gaps*

- Conducted interviews with multiple agencies to identify key topics and areas of concern.
  - Without additional understanding or data, regulators and permitting agencies are hesitant to approve permits.
  - Hesitancy to approve permits results in significant impacts to project schedules and budget, and reduces the number of deployments and opportunities for data gathering.

### *Workshop framework and focus*

- Following the implementation of the first workshop, it was determined that the second workshop needed to approach the information and discussions from a different framework, involving agency leadership rather than focus on permitting staff.
- Topics covered during the second workshop presented information along a spectrum of what is known and unknown. Approaching topics from this framework allowed for:
  - Better understanding of the actual vs. perceived potential effects of deploying MHK technology.
  - Discussion of appropriate circumstances for monitoring by industry vs. topics that should be addressed by the broader research community.

## Accomplishments

- Worked with partner laboratories and multiple agencies to identify key topics and appropriate attendees.
- Through workshops in Portland, Oregon and Washington, D.C., implemented a technology and application focused training symposium.
  - Focused second workshop on attendees representing agency leadership.
  - Adjusted the framework of the workshop to identify elements of each topic across the spectrum of what is known and unknown.
- Published a summary of workshop discussions and findings, resulting in an important resource to regulators, agencies, and stakeholders that can be used as a guide in regulating near-term MHK deployment.
  - Workshop participants and experts came to the general agreement that many environmental concerns are not likely to be significant at individual pilot projects and monitoring could be adjusted accordingly.
  - The workshop summary supports the Annex IV 2016 State of the Science Report, and continues the discussion of monitoring appropriate to smaller-scale projects and identification of issues that are better addressed by general research instead of the developers.



**Project Initiation and Completion Dates:** The MHK Regulator Training project was initiated in FY14 and completed in FY16.

## **Milestones/Schedule:**

- The project scope in FY14 originally included two workshops that would be implemented in FY14. One workshop was hosted in FY14, while the second workshop was postponed to FY15 following a redefinition of the workshop goals.
- The project scope in FY15 included a memo report summarizing the workshop. The scope of the memo report was expanded to result in a full technical report that was completed in FY16.

**Go/No-Go decision points:** A Go/No-Go decision in FY15 determined that the project should include hosting one additional workshop instead of two.

Budget History					
FY2014		FY2015		FY2016	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
\$0	\$0	\$40k	\$0	\$0	\$0

## Budget variance and modification:

- Original project funding was provided late in FY13 (\$200k).
- A mod to the project was awarded in FY15 to support the expanded effort to publish a summary report.

## Project Budget Cost Status:

- The project is complete and fully spent.
- The project expended \$239,949 during FY14–FY16.

## Partners, Subcontractors, and Collaborators:

- Partnered directly with PNNL and SNL
- Collaborated with industry and other federal partners
- Used partner and federal facilities to conduct the workshops, reducing project costs
- Engaged SMEs through honoraria and subcontracts
- Facilitated the development of presentations, panel sessions, and content framework with Kearns & West, H.T. Harvey, Brian Polagye, Chris Bassett, and Andrew Gill

**Communications and Technology Transfer:** Two, 2-day workshops including attendance by government regulators, resource managers, regulatory decision makers, and other stakeholders at the first workshop. Attendance of regulating and permitting agency leadership at the second workshop. Publication of the workshop findings and knowledge gained.

- **Paper:** “A Review of the Environmental Impacts for Marine Hydrokinetic Projects to Inform Regulatory Permitting: Summary Findings from the 2015 Workshop on Marine and Hydrokinetic Technologies, Washington, D.C.”, <http://www.nrel.gov/docs/fy16osti/66688.pdf>
- **Presentation Materials:** Available on Tethys: [www.tethys.pnnl.gov](http://www.tethys.pnnl.gov)

## FY17/Current research:

No current follow-on work being undertaken.

## Proposed future research:

- More regionally focused workshops would likely be helpful to the regulatory community.
- Identify areas to apply current modeling or simulation technology to help understand uncertainty.