Triton Initiative

(formerly known as the Marine Energy Environmental Technologies Initiative)

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

Title: **Triton Initiative**

(formerly the Marine Energy Environmental Technologies Initiative)

The Challenge: To develop the tools to effectively monitor the environment around marine and hydrokinetic (MHK) energy devices to address regulatory needs, and thus reduce the levelized cost of energy for MHK generation.

Who Benefits: In the short term, device developers and regulators. In the long term, coastal and remote communities receiving clean, cheap electricity.

Partners: No formal partners, but collaboration with University of Washington, University of Maine, Scientific Solutions, Inc., Ocean Renewable Power Company to date, and others in the future.

Program Strategic Priorities
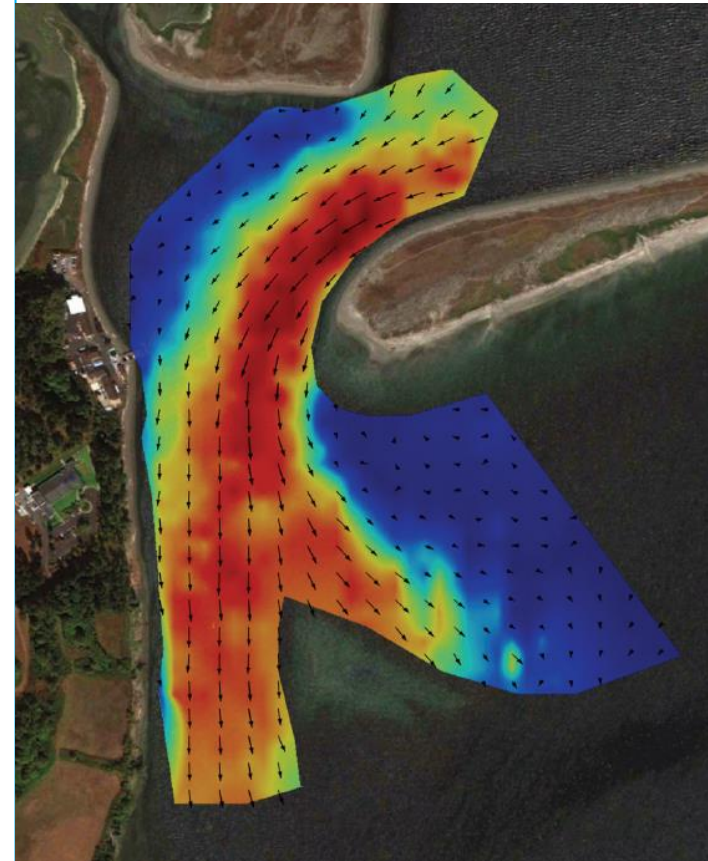
Technology Maturity

- 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

Program Strategic Priorities

Deployment Barriers

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The Impact

- Triton enables the development of technologies to reduce the cost, and potentially the time, for permitting and environmental monitoring activities.

- This will improve the understanding of environmental effects and how to identify the key issues for a location or device type.

- The aim is to retire risks that are not relevant for specific developments so studies concentrate on the meaningful questions.

- This may also feed into improving the regulatory process to focus on needs in specific locations.

- By reducing costs and increasing understanding, more developments should be able to be installed in a shorter timescale.

- Ultimately, permitting and environmental monitoring costs will be reduced.

Program Strategic Priorities

Crosscutting Approaches

- **Enable access to testing facilities that help accelerate the pace of technology development**

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- Exchange of data information and expertise

The Impact

- Triton provides access and infrastructure for testing environmental monitoring technologies in the water.

- Vessels, divers, and permits are in place to provide a location where instruments and software analysis can be tested.

- The acceleration of environmental monitoring techniques and interpretation will enable MHK devices to be deployed faster and at lower cost.

Research Activities	Project Areas				
	SB1	SB2	SBa	MSL	GSa
Sea bed installations	✓	✓	none	✓	none
Surface platforms and buoys	✓	✓	none	✓	none
MSL dock installations	none	none	none	✓	none
Autonomous underwater vehicle operations	✓	✓	✓	✓	✓
Surveys and sediment sampling	✓	✓	none	✓	none
Vessel use	✓	✓	✓	✓	✓
Acoustic device operation	✓	✓	✓	✓	✓
Electromagnetic field operation	none	none	none	✓	none

Key topics:

Acoustic measurement and analysis

Electromagnetic field measurement

Animal-device interaction

Sensor integration

Tasks:

Permitting procedures

Operational logistics

Project tracking

Project needs identification and planning

Resource allocation

Most appropriate locations for different conditions

Simulated conditions (e.g., sound signals, targets)

Identify key regulatory needs

Set up capabilities to support external projects

Successfully complete fieldwork studies into integrating sensors, sonar processing, and noise measurements to improve data collection methods and analysis

Develop automated analysis for video to identify the presence of fish to reduce manual processing time

Identify methods for fieldwork to study fish collision around a working turbine

Project Plan & Schedule

Project logistics

- To date, Triton has set up systems to manage multiple projects being supported; this includes project management tracking systems and external data access
- Additional equipment has been acquired to support individual projects as necessary, and will continue to be bought or hired as project needs develop
- Specialist training has been undertaken where necessary
- Data collection has been completed to provide information on conditions at site
- Permitting and logistics support is likely to continue until late 2019

Fieldwork

- From September 2015 onwards, fieldwork has been undertaken to support external projects
- Support for external projects at Sequim is planned to continue until late 2018
- Fieldwork for fish collision work is likely to continue until 2019

Software Development

- Algorithm development for acoustic measurements has been ongoing since 2015, and is likely to continue through 2019
- Automated analysis for video has been ongoing since March 2016 and is likely to continue through 2019

Project Budget

Budget History					
FY2014		FY2015		FY2016	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
		$2,000k			

- Funds for FY16 were issued at the end of FY15
- Approximately 70% of the funds were used to the end of FY16

Research Integration & Collaboration

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Partners, Subcontractors, and Collaborators:

Subcontractors: Applied Physics Laboratory, University of Washington (UW) is subcontracted to provide vessels if needed

Collaborators: University of Washington, University of Maine, Scientific Solutions Inc., Ocean Renewable Power Company, Fish4Knowledge researchers to date. In the next three years, additional collaborators will include Florida Atlantic University, Integral Consulting Inc., BioSonics Inc., Woods Hole Oceanographic Institute.

Communications and Technology Transfer:

There is already interest in the automated fish analysis, from academia and industry, as this will significantly cut down the personnel time (and cost) to process video.

The aim of most of the Triton-supported projects is to develop the technologies to a commercially ready state, so the collaborators can then take these to market.

Awareness of Triton is growing through the FY16 environmental monitoring technology advancement FOA projects. The usefulness of this type of support, and the results from targeted studies looking at key environmental issues that apply to a range of projects, such as fish collision, are of interest both in the United States and abroad, opening up further collaboration opportunities.

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Next Steps and Future Research

FY17/Current research:

- The UW iAMP and fish algorithm projects will be completed in FY17, as will the Igiugig fish video analysis and algorithm development
- Seven FY16 FOA projects will be supported for field testing
- Initial studies to identify suitable fish for collision studies will be undertaken, and refinement of sensor combinations for monitoring fish around a turbine

Proposed future research:

- Fieldwork is planned to support the seven FY16 FOA projects in FY18, with potential technical input where appropriate. Strengths include deployment methods and software automation for environmental monitoring.
- In FY19, these projects will continue to be supported through the development of test plans and fieldwork organization at a more energetic MHK site around a deployed device where possible
- Fieldwork investigating fish collision around a turbine is also planned for FY18 and FY19, as well as further development of the automated video analysis algorithms