

# Understanding the Grid Value Proposition of Marine Renewable Energy



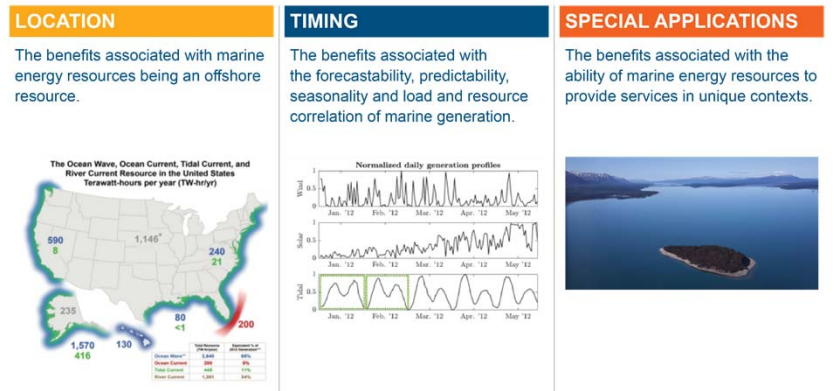
## Challenge

- Marine energy cannot *currently* compete with other generating resources on an energy/cost basis
- There are unique aspects of marine energy that may provide competitive or unique benefits
- These benefits may or may not be *currently* compensated, quantified, or even established

## Project Goal

The primary goals of this project are to provide data and supporting analysis that will:

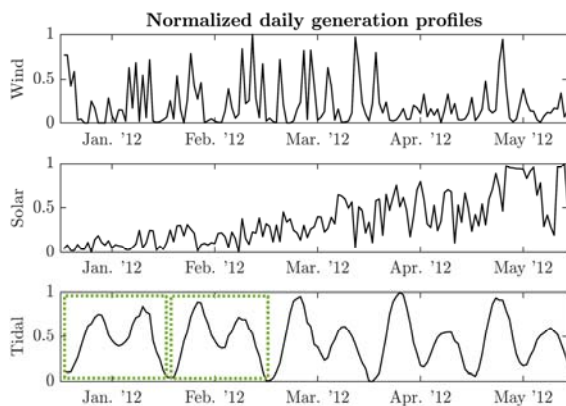
- Enable the marine energy industry to articulate additional *quantified* value to potential investors and customers
- Allow system planners, utilities and decision makers to have information to evaluate marine energy when considering a suite of available generating resources
- Guide the technology investments made at the US Department of Energy toward improving marine energy performance where it is likely to have competitive or unique quantified value



*We organize the benefits of marine energy resources by their different attributes and then identify all the potential value streams of these resources (beyond energy value), categorized by each attribute. We then quantify these values in different grid situations to highlight marine renewables energy's value proposition.*

## Evaluating Predictability

- Using various methods to quantify predictability of the marine resource permits comparison of resources over various time-horizons and an estimation of grid value in capacity, reduced reserves, and resource selection

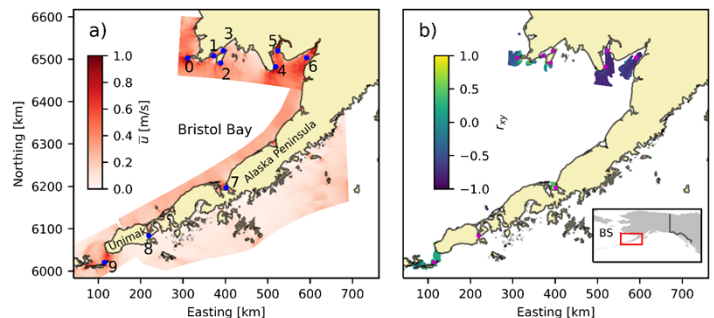


For more information, visit: <https://www.pnnl.gov/projects/marine-energy-grid-value>



## Tidal Phase Diversity

- Uniformity in output, resulting from clustering tidal resources, especially in concert with predictability, can increase grid value

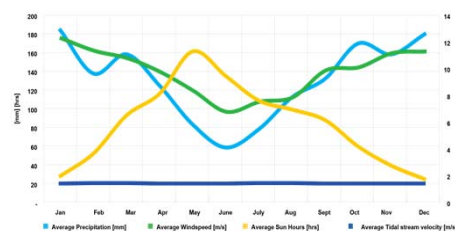


(a) Mean tidal current speed; (b) cross-correlation at points with mean velocity above 50 cm/s and deeper than 10 m with respect to anchor point (0)

## Islands and Remote Grids

For islands and remote grids, marine energy can:

- Provide resource diversity
- Deliver a predictable and sustained resource to support the grid
- Provide a mechanism to avoid land constraints and deliver energy security and sustainability



*Resource complementarity between different renewable technologies*