

## **GOT TIDAL ENERGY? AN OPEN SOURCE, WEB-BASED, SPATIAL DECISION SUPPORT TOOL FOR TIDAL POWER SITING**

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**KEYWORDS:** In-stream tidal energy, decision support system, Open Source, GIS

In November 2006, Washington State enacted a Renewable Portfolio Standard (RPS) requiring large utilities to obtain 15 percent of their electricity from new renewable resources by 2020, as well as to undertake all cost-effective energy conservation. A number of public utilities believe that delivering on this vision will require the intensive evaluation of *all* potentially viable renewable energy resources available to the region including tidal energy. The Energy and Power Research Institute (EPRI) has identified the tidally-active Puget Sound area of Washington State as “an exciting and sustainable energy source for meeting some of the Northwest’s future generating needs. Puget Sound’s proximity to large load centers means the electricity generated can be connected directly to the local grid, eliminating the need to construct and maintain expensive transmission lines” (EPRI, 2005 cited in BPA, 2006). Furthermore, the three major coastal inlets on the Southwest Washington coast: Grays Harbor, Willapa Bay, and Mouth of Columbia River are among the largest tidal estuaries in the continental United States, exchanging vast quantities of water with the Pacific Ocean during each tidal cycle.

Public utilities and independent power producers planning and evaluating renewable energy developments involving in-stream tidal power technology and regulatory agencies required to process permit applications for such projects are faced with handling large quantities of information dealing with a complex range of interacting variables and processes (e.g., tidal resource potential, social and cultural issues, land use and regulatory considerations, environmental considerations, infrastructure, and engineering considerations). This paper describes the development of a fully-integrated decision support system (IDSS) to assist with the process of site and device assessments for in-stream tidal power developments in the State of Washington. The R & D effort specifically addresses the challenges in site selection and regulatory process for in-stream tidal developments and will facilitate the evaluation of tidal in-stream energy conversion (TISEC) devices for application in site-specific and regional contexts. The resulting tools are expected to have mutual benefits to regulatory agencies and project proponents and be generally applicable to any potential locations where there is an interest in evaluating in-stream energy systems.

The system is being built around a web-based open source geographical information system (GIS) and will provide essential tidal energy system evaluation tools, methodologies and metrics, such that the products of the research can be readily

communicated and put to use by decision makers. The system will include a large database of tidal resource data derived from high resolution and long term tidal model simulations to provide user access to quantitative estimates of the tidal power potential for areas of interest. Data products will include: time series and mapped estimates of the mean or maximum potential power density available for two-dimensional horizontal areas, for two-dimensional vertical cross-sections, and for specified TISEC devices at points or arrays of points. Estimates of tidal power potential will thus be readily coupled with other geospatial data to assist users with efficiently and effectively identifying, visualizing, and communicating the physical, technical, ecological, and economic relationships needed to advance TISEC projects.

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