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Tidal Energy Development

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The Bay of Fundy features the highest tidal range in the world, averaging 39 feet. According to the Nova Scotia Department of Energy's Web site, the volume of water that empties out of the bay daily–115 billion tons–is more than the combined daily flow from every river on earth (www.gov.ns.ca/energy/renewables/public-education/tidal.asp).

It is no wonder, then, that people have periodically tried to harness the bay's energy potential. In the 1930s and again in the 1970s, people such as President Franklin Roosevelt and Sen. Edmund Muskie supported megaprojects involving construction of dam systems in the Eastport area, on the Maine/Canada border at the Bay of Fundy entrance (where the tidal range averages approximately 20 feet) (Colgan and Barringer 2007). While these visionary projects were never built, a wonderful history of the Roosevelt era Passamaquoddy Bay Tidal Project, featuring a working three-dimensional model, is on display at the Quoddy Tides Museum in Eastport. And in the minds of the local citizens of the Eastport area, the dream of converting the tides into useful energy lives on.

Today, the opportunity to develop tidal energy in the Bay of Fundy/Passamaquoddy Bay region is at hand again, but this time without the negatives of mammoth dams. New technology, called tidal in-stream energy conversion (TISEC) devices, holds the promise of being the most environmentally benign method of generating power. Power generated using TISEC devices is non-polluting, predictable, reliable, and projected to be as cost-effective as any means for producing electricity, including fossil fuel generation.

Maine has the unique opportunity to create a world-class marine tidal energy cluster that encompasses multiple industries and organizations. This cluster would feature research and development (R&D) excellence at both the University of Maine and Maine Maritime Academy, fostering high-tech manufacturing facilities for marine composite structures, a resurgence of marine services activity at working waterfronts, and enhanced understanding of the Gulf of Maine ecosystem.

This collective approach to sensible development of Maine's tidal energy resource will have significant economic, educational, and social impacts. Tidal energy development will be as defining to the Maine coast in the 21st century as forest harvesting, fishing, boat building and tourism have been. It has the potential to provide long-term benefits that could positively affect future generations.

To some, it may seem premature to articulate a bold vision for an industry that has not yet built its first commercial project. But much progress has been made over the last several years, putting the vision within reach. In 2006, in a series of technical publications partially funded by the Maine

Technology Institute (MTI), the Electric Power Research Institute (EPRI) documented the promise of TISEC technology and the existence in Maine of several of North America's most robust tidal energy sites. Unlike dams, which impound the tidal waters and operate similar to conventional hydroelectric plants, TISEC devices are placed in the free-flowing tidal stream to harness power from moving water, to capture part of its kinetic energy. Moving water has a high power density. Because the devices are deployed below the water surface, there are no visibility or navigation issues. Although power output is variable, tidal energy is predictable and therefore can be more easily integrated into the electricity grid for providing reliable power (Bedard et al. 2006).

Following up on the EPRI reports, MTI contin-ued its support for industry development by providing project funding totaling $511,200 to Ocean Renewable Power Company and its local development affiliate, ORPC Maine LLC. The award helped to finance a successful proof of concept of the firm's proprietary TISEC technology in Western Passage, off Eastport. ORPC Maine plans to commercialize its turbine-generator technology by the end of 2009.

While ORPC Maine has been the first company to advance TISEC technology development in local waters, others have been drawn to Maine's potential for tidal development. As of mid-2008 there were nine federal preliminary permits issued and four pending. Across the Bay of Fundy, both Nova Scotia and New Brunswick have embarked on initiatives to develop tidal power, with technology testing scheduled for Nova Scotia waters in late 2009. In addition to the United States and Canada, clusters of technology development and testing are occurring in the United Kingdom, Australia, Norway, and several other countries.

Within this rapidly evolving international marketplace, Maine has the intellectual capacity, experience working "on the water," and tidal energy resources necessary to create excellence in the tidal power industry. Industry development will also create broad-based benefits in the sections of Maine where they are needed most.

The areas of Maine where the robust tidal resources exist are also the most remote. Tidal energy development would provide a job creation and higher income opportunities for Washington County (which has the highest rates in Maine for unemployment and people living in poverty). In addition to management, engineering, and technology positions, the jobs created would include the trades and marine operations positions that have commonly anchored the workforce of coastal communities: metal and fiberglass fabricators, electricians, carpenters, boat operators, and boat crew.

The next generation of TISEC devices will be designed and manufactured using composite materials, representing an extension of the skills and technology that were first applied in Maine's boat-building industry. Tidal energy equipment could become a standard product offering from Maine's composite companies and could lead to further market penetration into other marine energy technologies, such as offshore wind and wave energy.

Multiple opportunities exist for Maine's colleges and universities in this emerging industry. The University of Maine can become a leading source of public information about new tidal technology development, environmental assessments, and the industry's role in the larger energy strategy for the state and the nation. This will lead to expertise regarding underwater turbine designs and materials, anchoring systems, and the relationship between tidal energy development and marine life. Already, the university offers analysis of sub-scale tidal devices and Gulf of Maine modeling. In the process, these projects offer leading-edge opportunities for a new generation of young engineers and scientists (University of Maine 2008). Maine Maritime Academy is currently providing engineering evaluation analysis for tidal device technology. Additionally, the academy holds a federal preliminary

permit with the goal of developing the Tidal Energy Device Evaluation Center (TEDEC), a tidal technology testing site. Furthermore, Husson University, which has recently taken over operation of The Boat School at the Maine Marine Technology Center in Eastport, has the opportunity to increase programs that support ocean energy development, such as marine power electronics, and equipment maintenance.

All of this activity would help Maine become a world leader in tidal energy expertise through the formation of a Maine tidal energy cluster. This cluster would encompass marine composites manufacturing, marine installation, operations and management services, marine technology research and development, environmental research, industry standards development, and the refinement of collaborative processes that allow developers, communities, regulators and other stakeholders to sensibly plan for the industry's evolution and promise. The expertise from Maine's tidal energy cluster could be exported to areas around the world where tidal resources are being developed.

But, the emergence of a tidal power industry in Maine raises several policy-related issues. First, a need exists to inventory and quantify Maine's overall ocean energy cluster, to include the immediate opportunity with tidal energy development and the future opportunities with offshore wind and wave energy development. The quantification effort would include an inventory of all organizations, an assessment of the cluster's current and future status, and identification of additional R&D and public policy issues. This would help to precisely document the industry's cross-sector impact and economic potential. A source of funding for this effort would be the MTI Cluster Enhancement Grant program. It is also an opportunity for leadership by the Environmental & Energy Technology Council of Maine (E2 Tech Council), which has successfully completed MTI-funded cluster projects in the past.

Second, the marine environment must be characterized more fully to increase understanding regarding the relationship between ocean energy extraction and marine life. This effort would be important for improved management of the ocean as a multi-use resource and the need to assure sustainable stewardship of the ocean. Additionally, a public repository of marine environmental information would help to reduce the cost of the permitting process for energy developers by having credible scientific information about the marine resource readily available. This type of effort could be related to the cluster project described above, or funded separately through MTI or direct legislative appropriation. Like the cluster project, the effort would require a collaborative effort by industry, government and the marine science expertise of organizations such as the university system, the Gulf of Maine Research Institute, and others.

Third, state energy officials should engage their counterparts in Canada to determine how to best address tidal development opportunities at the Maine and New Brunswick boundary. Because the marine ecosystem is the same, it seems reasonable that adjacent sites might be developed similarly.

Fourth, Maine's congressional delegation should work to ensure increased federal funding of ocean energy R&D and to ensure that the federal regulatory system, now undergoing modifications, provides predictability for entrepreneurial development of the tidal industry.

Tidal energy development will have a profound positive impact on the economy and citizens of Maine. It is time for all segments of the tidal energy industry cluster to work on a collaborative basis to seize the opportunity.

REFERENCES

Colgan, Charles and Richard Barringer. 2007. “A Brief History of Maine Rural Development Policy.” Health Care and Tourism: A Lead Sector Strategy for Rural Maine, ed. David Vail and Lisa Pohlmann. Maine Center for Economic Policy, Augusta.

Bedard, Roger, Mirko Previsic, Brian Polagye, George Hagerman and Andre Casavant. 2006. North America In-Stream Energy Conversion Technology Feasibility Study. Electric Power Research Institute (EPRI), Palo Alto, CA.

University of Maine. 2008. “Maine Researchers Study the State’s Potential for Tapping Tidal Power.” UMaine Today (May/June).

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