The Fundy Energy Research Network: Fostering Tidal Energy Research Collaborations in the Bay of Fundy, Canada

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Extended Abstract

The growing demand for renewable energy is fostering a wave of exploration into the potential of utilizing in-stream tidal energy technology to harness the dynamic, high flow tidal energy resources of the Bay of Fundy, Canada. With this interest comes the need for research to resolve many engineering and environmental monitoring challenges posed by the dynamic, high flow environment, as well as uncertainties regarding the potential ecological and socio-economic effects on the globally significant Fundy ecosystem, and the communities which depend on it.

In 2010, the Fundy Energy Research Network (FERN; http://fern.acadiau.ca), an independent nonprofit organization, was formed by tidal energy researchers from academia, government and industry to coordinate and foster regional and nation-wide interinstitutional research collaborations and information exchange to address environmental, socio-economic and engineering issues and challenges associated with in-stream tidal energy developments in the Bay of Fundy. The main aims of FERN are:

- To identify and provide objective guidance on emerging and priority issues related to tidal energy;
- To facilitate research collaboration and information sharing among government scientists, academia and industry;
- To enable creation of research teams capable of obtaining funding to support collaborative research;
- To enhance communication and cooperation among those involved in tidal energy research and development;

- To develop and maintain productive relationships with regional, national and international groups involved in tidal energy research; and
- To communicate information and research progress through meetings, seminars, conferences, reports, FERN website, and/or other forms of public presentation.

The FERN model is founded on three key principles: inclusivity, partnership, and objectivity. Membership and participation in FERN is free and open to any academic, government or private sector researcher. FERN currently has over 100 individual members spanning academia, government and the private sector, and has developed strong working relationships with all the major regional and national academic institutions, government agencies, nongovernment research and industry associations, and private companies concerned with tidal energy in Fundy. Current project partner associations include Acadia University, the Fundy Ocean Research Centre for Energy (FORCE) (nonprofit facility for testing commercial scale technologies), Offshore Energy Research Association of Nova Scotia (OERA) (research funding agency), Fisheries and Oceans Canada (federal agency), Natural Resources Canada (federal agency) and the Nova Scotia Department of Energy (provincial agency).

One of the key and unique features of FERN is its objectivity. Given the novelty of in-stream tidal energy technology, known risks associated with barrage-style tidal energy (Annapolis Tidal Power Station has been in operation since 1984, and has resulted in some adverse ecological consequences) and the ecological

significance of the Bay of Fundy, there is concern and apprehension, especially by fishers and local communities, regarding the prospects of commercial in-stream tidal energy development in Fundy. As a network of diverse interests, FERN is neither an advocate for nor against tidal energy development in the Bay of Fundy, but strives to build regional capacity and recognition of the importance for high quality research and monitoring to resolve the environmental and socioeconomic uncertainties of in-stream tidal energy in dynamic high flow environments. This focus on supporting 'research' has been key to fostering participation and cooperation among differing interest groups, and to achieving recognition, regionally and nationally, for credible, impartial scientific and multidisciplinary research initiatives.

FERN is governed by an executive committee consisting of academic, government and private sector researchers and run by an independent coordinator. Most of the network activities are conducted by its four technical subcommittees: Biological and Ecological Effects; Hydrodynamics and Geophysics; Engineering; and Socioeconomics. FERN subcommittees bring diverse interests and expertise together to work to identify and resolve priority issues related to tidal energy by:

- Building relationships between academic, government and industry institutions;
- Identifying potential project ideas and research teams; and
- Developing communication and information sharing tools aimed at fostering and facilitating research within and between the four research theme areas.

While the focus is on the Bay of Fundy region, much of the work instigated by members of FERN and its partners has implications for other tidal energy sites of interest, both nationally and internationally, including:

• Development of a multi-instrument, cabled environmental monitoring system for high flow sites;

- Development of autonomous moorings (equipped with environmental monitoring tools) and deployment protocols;
- Hosting of technical workshops and reviews of environmental monitoring technologies;
- Completion of a tidal energy socioeconomic scoping analysis for Nova Scotia;
- Pathways of Effects model development for marine renewable energy in Canada, sponsored by Fisheries and Oceans Canada (federal government);
- Completion of a environmental risk assessment and decision-making framework to support regulatory and policy decisions for tidal energy development, sponsored by Fisheries and Oceans Canada and Nova Scotia Department of Energy (provincial government); and
- Provision of technical support for joint national/provincial efforts to develop a Statement of Best Practice for Environmental Management of Tidal Energy Development policy.

Turbine deployments at the FORCE test site (Minas Passage) and outer Bay of Fundy passages are planned for as early as 2013/14. In anticipation of these activities, FERN's priority is to continue to foster cooperative partnerships among and between researchers, industry and government to build the capacity (e.g. expertise, techniques, instrumentation, infrastructure), baseline data and political/industry support necessary to execute effective environmental and socioeconomic research and monitoring programs in the Bay of Fundy.

Keywords: Bay of Fundy, in-stream tidal energy, environmental effects, research network, socioeconomics