



Offshore Energy
Environmental
Research
Association

Contents

Who We Are.....1

Mandate.....1

OEER Research Focus Areas.....2

Funded Research:
Tidal Marine Energy.....3

Funded Research:
Georges Bank.....6

Funded Research:
Seismic-Invertebrate.....8

Nova Scotia Energy Research
& Development Forum.....9

Contact Information.....Back Cover

Who We Are



The OEER Association (OEER) is a not-for-profit corporation dedicated to fostering offshore energy and environmental research and

development, including the examination of renewable energy resources and their interaction with the marine environment.

OEER’s members include Acadia University, St. Francis Xavier University, Cape Breton University and the Nova Scotia Department of Energy.

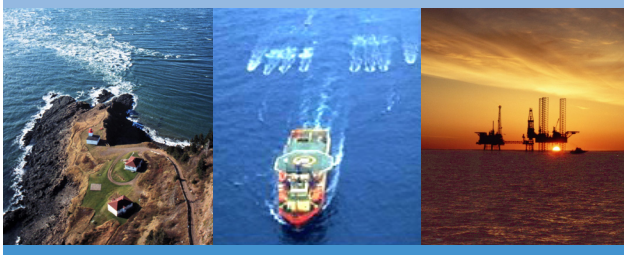


Mandate

The mandate of OEER is to foster research and development, to build research capacity in Nova Scotia, and to encourage the diffusion of research related to offshore petroleum and renewable energy resources and their interaction with the marine environment. This includes research that assesses the potential impacts on the marine environment, of (i) petroleum exploration, development and production, and (ii) renewable energy technologies, including utilizing ocean currents, wind, tides and waves.



OEER Research Focus Areas



Tidal Marine Energy

OEER and OETR have approved eight joint research projects in the area of tidal marine energy development in the Bay of Fundy. Projects will address environmental and technical knowledge gaps, and assist in collecting information relating to the potential environmental effects of tidal energy extraction and tidal technologies on the surrounding environment.

Georges Bank Research

In July 2009, OEER released two Invitations for Commercial Proposals (ICPs) for a 30-day scientific and technical review period by stakeholders. The ICPs studies, relating to Georges Bank, are titled "A Preliminary Review of Environmental and Socio-Economic Issues - Georges Bank" and "A Preliminary Review of Existing Technology and Their Mitigative Potential in Offshore Petroleum Development". Stakeholder feedback was incorporated and the Commercial Proposals were released for bidding in October 2009. OEER selected Stantec Consulting Limited of Halifax, Nova Scotia as the successful consultant to complete the two studies. The purpose of these studies was to gather a body of information on issues relating to Georges Bank that have emerged since the 1999 Georges Bank Review Panel Report, and to assess the current state of knowledge.

Seismic-Invertebrate Research

Seismic exploration on marine invertebrates has been identified by stakeholders and experts as an important issue, and has been the focus of several research projects and workshops globally over the last several years. OEER has worked with stakeholders to identify key priorities, and has now funded three projects in this research area, led by: Dr. Lee-Dadswell, Cape Breton University, Dr. Mikio Moriyasu, Fisheries and Oceans Canada, and Dr. Chris Purcell, Defense Research and Development Canada.

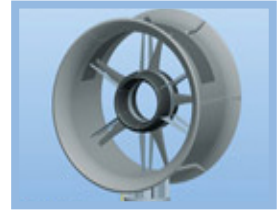
Funded Research

Tidal Marine Energy

With a broad range of experienced researchers from industry, government and academia to draw on, Nova Scotia has the opportunity to develop a strategic tidal energy research agenda.

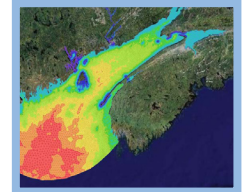
In May 2009, OEER and OETR issued an Invitation for Expressions of Interest (EOI) for research on Hydrodynamic Modeling of the Bay of Fundy and other key research areas.

In November 2009, eight projects ranging in duration from two to three years, were approved and are currently underway. Combined, these projects create the most comprehensive research program ever undertaken on hydrodynamic modeling in the Bay of Fundy region.



Areas of research include:

- tidal resource assessment;
- sediment dynamics;
- animal behaviour;
- near- and far-field effects;
- potential effects of ice and debris; and
- potential effects of tidal lagoons.



The eight funded projects are described as follows:

Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin

Dr. Richard Karsten, Acadia University; Dr. David Greenberg, Fisheries and Oceans Canada; and Michael Tarbotton, Triton Consulting

Dr. Karsten has teamed up with Dr. Greenberg and Mr. Tarbotton to use ocean coastal modeling to assess the power potential of the tides and tidal currents in the Minas Basin and Minas Channel regions of the Bay of Fundy. Power estimates will be based on current turbine technology and will take into account the impact on the tidal range and currents.

Effects of Energy Extraction on Sediment Dynamics in Intertidal Ecosystems of the Minas Basin

Dr. Danika van Proosdij, Saint Mary's University

Dr. van Proosdij and her team are assessing how the

Funded Research

Tidal Marine Energy (cont'd)

dynamics of sedimentation change when energy is extracted from a macrotidal system. The differences in tidal prism and energy between neap and spring tidal cycles will be used as a proxy for energy extraction due to in-stream tidal power devices.

Investigation of the Vertical Distribution, Movement and Abundance of Fish in the Vicinity of Proposed Tidal Power Energy Conversion Devices

Dr. Norman Cochrane and Dr. Gary Melvin, Fisheries and Oceans Canada

Dr. Cochrane and Dr. Melvin are working with other researchers at Fisheries and Oceans Canada, Coda Octopus and ROMOR Atlantic to study Minas Passage turbine active fish avoidance using Coda Octopus Echoscope II 3-D multibeam sonar mounted on a bottom platform in close proximity to a turbine. The objective is to observe and quantify the distribution and abundance of fish in the water column and their ability to detect and avoid turbines.

Near-Field Effects of Tidal Power Extraction on Extreme Events and Coastline Integrity in the Bay of Fundy

Dr. James Warner, Martec Limited

Dr. Warner and Martec Limited, in collaboration with Dalhousie University, are quantifying the near-field effects of power extraction on the resulting effects of extreme storm events and coastline integrity by implementing a spectral wave model to numerically simulate wave transformation for tidal current conditions with and without turbines. The objective is to assess the changes in wave conditions caused by the extraction of energy from tidal currents, as well as the effects of turbines on shoreline erosion and coastline integrity.

Impacts of Tidal Energy Extraction on Sediment Dynamics in Minas Basin, Bay of Fundy, NS

Dr. Peter Smith, Fisheries and Oceans Canada; Dr. Ryan Mulligan, East Carolina University

Dr. Smith and Dr. Mulligan, together with researchers from Fisheries and Oceans Canada and Dalhousie University, are developing a numerical hydrodynamic and sediment transport model for Minas Basin in the Bay of Fundy, focusing on the sediment dynamics of the tidal inlets and flats. The model will be used to predict the impacts of tidal power devices on the dynamics of coastal flows, sediment transport and seabed morphology.

Assessing the Far Field Effects of Tidal Power Extraction on the Bay of Fundy, Gulf of Maine and Scotian Shelf

Dr. Jinyu Sheng, Dr. Keith Thompson, and Dr. Paul Hill, Dalhousie University; Dr. David Greenberg, Fisheries and Oceans Canada

Dr. Sheng, Dr. Thompson, Dr. Hill and Dr. Greenberg are working to quantify the far field effects of tidal power extraction, with a particular focus on tides, frequency of coastal flooding, tidal current patterns, the vertical and horizontal distribution of temperature and salinity, and large-scale sediment distributions.

3-D Acoustic Tracking of Fish, Sediment-Laden Ice and Large Wood Debris in the Minas Channel of the Bay of Fundy

Dr. Michael Stokesbury and Dr. Anna Redden, Acadia University

Dr. Stokesbury and Dr. Redden, in collaboration with the Ocean Tracking Network and a broad team of researchers and consultants, are using VEMCO animal tracking technology to complete in-situ testing of the path, depth and velocity of fish and objects passing through the Minas Passage. Using hydrodynamic models, they will determine the potential for interaction of fish and objects with turbines installed in the water column, and provide advice on risk and mitigation to regulators and developers.

Assessment of Hydrodynamic Impacts Throughout the Bay of Fundy and Gulf of Maine Due to Tidal Energy Extraction by Tidal Lagoons

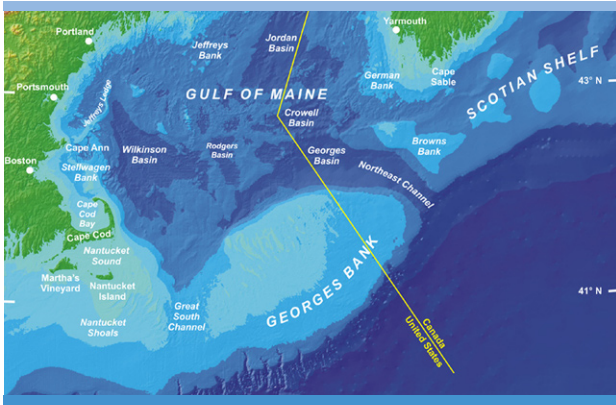
Dr. Andrew Cornett, Canadian Hydraulics Centre (CHC)

Dr. Cornett and his colleagues from the CHC are extending existing hydrodynamic models of tidal flows in the Bay of Fundy to simulate the presence and operation of a tidal lagoon project located in the Minas Basin. They will attempt to predict and identify changes in water levels, potential impacts on the flow of sediments, tide range and circulation throughout the Bay of Fundy.

In partnership with the Fundy Ocean Research Centre for Energy (FORCE), OEER hosted a workshop in October 2010 for the eight funded research projects to present year 1 results. There was facilitated discussion on future priority research areas including environmental effects monitoring, potential near- and far-field effects, and resource assessment and extraction. OEER and OETR will use priorities generated from this workshop to define future areas of research.

Funded Research

Georges Bank



Georges Bank is a large submarine bank (250 km by 150 km – 40,000 km²) at the edge of the Atlantic continental shelf between Cape Cod and Nova Scotia within the Bay of Fundy and Gulf of Maine tidal system, located approximately 100 km offshore.

In 1988, the Canadian federal government and the Nova Scotia provincial government declared a moratorium on drilling on the Canadian area of Georges Bank until the year 2000. The moratorium was enacted to enable the socio-economic and environmental impacts of petroleum exploration on Georges Bank to be better understood before proceeding with this activity.

With the understanding that Georges Bank represents an important ocean area to Canada from a broad social, economic and environmental perspective, on December 22, 1999, the Minister of the Nova Scotia Petroleum Directorate and the Minister of Natural Resources Canada announced that the Georges Bank moratorium would be extended until December 31, 2012. This decision was based on the recommendation of a three-member Public Review Panel.

In March 2008, the Nova Scotia Department of Energy provided OEER with funding to support scientific research on matters specific to Georges Bank. The purpose of this research was to assist the provincial and federal governments in their decision on whether or not to initiate a Public Review of the moratorium on petroleum activities on Georges Bank, and if they should so order, to provide a preliminary body of information for use in the Public Review.

Funded Research

Georges Bank (cont'd)

OEER released two Invitations for Commercial Proposals (ICPs) titled “A Preliminary Review of Environmental and Socio-Economic Issues” and “An Assessment of Existing and Emerging Technologies and Mitigative Measures”. In October 2009, OEER released the ICPs for response. After evaluation of the submissions, Stantec Consulting Limited, in partnership with Gardner-Pinfold, emerged as the successful consultant for both studies.

A Preliminary Review of Environmental and Socio-economic Issues

The purpose of this study was to conduct an independent third-party preliminary review to outline the current state of knowledge on the science and issues that led to the 1999 Panel recommendation to extend the moratorium. In addition, Stantec Consulting Limited, in partnership with Gardner-Pinfold, undertook a preliminary review of issues related to potential environmental and socio-economic impacts pertaining to offshore petroleum activities on Georges Bank if such activities were to be permitted.

An Assessment of Existing and Emerging Technologies and Mitigative Measures - Focusing on Georges Bank

The purpose of this study was to conduct an assessment of technologies and practices in offshore exploration, drilling and production that have been developed or emerging since the 1999 Georges Bank review. Specifically, the study assesses the reliability of the technologies and practices, and their effectiveness in assuring that predicted environmental risks are adequately addressed and mitigated.

Funded Research

Seismic-Invertebrate Research



In July 2009, OEER released a Request for Proposals (RFP) to assess the impacts of seismic exploration on marine invertebrates. The RFP focused on supporting research which builds on previous

experience and contributes to the development of a body of knowledge which draws conclusions on whether there are any potential negative impacts of seismic exploration on invertebrates under expected and actual seismic field conditions. A formal funding recommendation was made to the OEER Research Advisory Committee and Board in February 2010. OEER selected the following three projects which are aimed at increasing scientific knowledge on the potential effects of seismic exploration on marine invertebrates.

Establishment of Baseline Biological Data on Snow Crab (Chionoecetes opilio) Offshore Cape Breton for Future Assessment of Potential Impacts of Seismic Noise on Snow Crab. Dr. Mikio Moriyasu, et al., Fisheries and Oceans Canada

This study aims to improve understanding of the fundamental biological characteristics of snow crabs in their natural habitat and the physiological effects of handling. This is a multi-phased research project.

Feasibility of a Marine Vibroseis System to Minimize Potential Impacts of Seismic Surveying on Commercial Marine Invertebrates. Dr. Chris Purcell, Defence Research and Development Canada (DRDC)

This study will focus on forming a hypothesis and designing experiments to determine if the impact of seismic energy is reduced by using a marine vibroseis system with a lower peak intensity and longer pulse duration. The team will develop a system that could replace conventional air guns. This project is scheduled to be complete in May 2011.

Physics of the Interaction Between a Crab and a Seismic Test Pulse – Stage 3: Continued Development of Mathematical Model and Testing of Model via Simulation.

Dr. Geoffrey Lee-Dadswell, Cape Breton University

This research, scheduled to be complete in Sept. 2011, is in its third phase and seeks to improve the mathematical model developed in previous work, and produce a modeling software package for use by other researchers.

Nova Scotia Energy Research & Development Forum

Every two years, OEER partners with OETR, the Nova Scotia Department of Energy and others, to hold the Nova Scotia Energy Research & Development Forum.



The forum began in 2004 with the theme of **Energy • Innovation • Opportunity**. The forum was held again in 2006 and 2008 with themes of **Partnership • Inspiration • Sustainability and Securing Nova Scotia's Energy Future: Research • Resources • Results** respectively. These forums, held at St. FX University, brought together delegates representing

research, industry and government to discuss ongoing research, and how it will shape Nova Scotia's energy future.

The most recent forum was held May 26 and 27, 2010 at the World Trade & Convention Centre in Halifax, Nova Scotia. This theme was **Inspiring Energy Research Opportunities and Capabilities** which focused on ground-breaking energy research that began since the 2008 forum. Over 50 speakers made presentations in the areas of Marine Energy and the Environment, Renewable and Sustainable Energy, Play Fairway Analysis and Geoscience Data Package Program, and Petroleum Geoscience: Offshore and Onshore Nova Scotia. These session topics provided a unique opportunity for open discussion about R&D activity and opportunities, energy issues, industry needs and the challenges facing Nova Scotia's energy sector. An overwhelming response was received from student researchers. As a result, 34 posters were displayed during the Forum and presented to judges. 2010's forum also surpassed previous registration, bringing in 263 delegates.



Your feedback is always important to us. We invite you and anyone you think would be interested to join our OEER contact list. You can do so by visiting our website at offshoreenergyresearch.ca and clicking on “Register” or by emailing the address below. Please include your contact information, email address, and area of interest.

As a member of the OEER contact list you will be kept up-to-date on OEER news and events.



Offshore Energy
Environmental
Research
Association

5151 George Street, Suite 400
PO Box 2664
Halifax, Nova Scotia B3J 3P7
Phone: (902) 424-8479
Toll Free: 1-888-257-8688
Fax: (902) 428-2200
Email: oetr@offshoreenergyresearch.ca

www.offshoreenergyresearch.ca