



Marine Renewables Canada

Annual Report 2014



marine
renewables
canada

The power to think bigger.

marinerenewables.ca



BOARD OF DIRECTORS

Graham Curren, Irving
Transportation Services, *Chair*

Melanie Nadeau, Emera, *Vice
Chair*

Clayton Bear, New Energy
Corporation, *Treasurer*

Marcel Boridy, Marine
Renewables Development
Consultant

Don Bryan, MacArtney

Shelley MacDougall, Acadia
University

Jessica McIlroy, BC Women in
Energy Network

Scot Merriam, SRM Projects

Russell Stothers, Clean Current
Power Systems

TEAM

Chris Campbell, Executive
Director

Elisa Obermann, Atlantic Director

Amanda White, Operations
Director

Marine Renewables Canada is the country's lead wave, tidal, and hydrokinetic energy association representing technology and project developers, utilities, researchers, and the energy and marine supply chain.

Since 2004, Marine Renewables Canada has worked to advance the development of the marine renewable energy industry by identifying and fostering collaborative opportunities, providing information and outreach, and representing the best interests of the sector. Canada has the resources, the skills, and the leadership to ensure our marine renewable energy industry is globally competitive and part of the world's sustainable energy solution. We have the power to think bigger.

Our Vision

A Canadian sustainable marine renewable energy sector, serving domestic and export power needs and providing projects, technologies and expertise in a global market.

Our Mission & Objectives

Marine Renewables Canada aligns industry, academia and government to ensure that Canada is a leader in providing marine renewable energy solutions to a world market. To accomplish this mission, our association works to:

- Promote development of Canadian marine renewable energy industry that will benefit generations of Canadians.
- Foster communication and collaboration between members, industry, academia, government, and the public.
- Create a focus on innovation opportunities that can result in technology, techniques and services for world markets.
- Develop competitive intelligence and appropriate strategic relationships.
- Provide education, outreach, engagement and an understanding of marine renewable energy activities and the economic, environmental, and social benefits they present.
- Support members and industry by increasing exposure for Canadian companies in the world market and identifying business development opportunities.



Leadership Message

2014 has been another big year for marine renewable energy in Canada, with more to come. In terms of industry activity, some of the key ingredients are now in place that will move us from aspiration to action. Nova Scotia's FIT established in late 2013 has attracted some of the world leaders in tidal energy development, with some having plans for deployment as early as 2015. Fundy Tidal Inc. has established partnerships with a new project developer and technology developers to realize the potential of the COMFIT projects. We are also seeing growing activity in river energy as the Canadian Hydrokinetic Turbine Test Centre has been working with technology developers to test and prove hydrokinetic devices.

Now that the industry is taking shape, there is a real opportunity developers, suppliers, and experts to come together to share risks, costs, and ultimately innovate to accelerate development. If there is a focus we have pushed hard this year, it is collaboration. Not for its own sake, but clearly as a way to minimize costs and risks and as a way to potentially engage the Canadian supply chain in developing and offering solutions essential to the wider marine renewables industry. Some of our member companies such as Rockland Scientific and Axys Technologies are finding ways to collaborate with international partners, while others like the developers working in the Bay of Fundy have begun to work together to try and solve critical challenges and needs of their projects.

The International Conference on Ocean Energy

2014 has had a theme throughout it as we welcome the world leadership to Halifax this November. The coincidence of the launch into tidal project development and hosting the event in the same year was a hoped-for aspiration, that has come together. Interest is high and the more than 300 abstracts submitted actually meant many could not be fitted. With 250 presenters and a trade show of 75 booths and more than 100 companies, this is the most ambitious ICOE yet. The association, with foundational help from the Government of Nova Scotia, the Offshore Energy Research Association (OERA), and the Atlantic Canada Opportunities Agency (ACOA) has delivered a project that is more than four times its base budget. And, we have secured the host for ICOE 2016.

The future for the Marine Renewables Canada Association

The association continues to evolve and tries to stay ahead of what the sector development needs. Our international leadership shifted inwardly this year with a focus on bringing the world to us. We have honed our approach to consortium building and pursuit of the Canadian value we targeted in the 2011 roadmap. We have continued efforts to develop activity in the parts of the country that are lagging.

It is clear in all of this that Marine Renewables Canada is solidly established as an organization that provides leadership, supports and advises its members, pursues market opportunities for Canada, creates profile for the economic and energy opportunity and searches out leadership from utilities, governments and other industry sectors. The needs for its services are increasing and the association must continue its efforts to resource those activities.



Board members and members are already playing a more central role in western Canada (and making up most of the TC114 initiative) and perhaps we need to see more of this as the industry becomes more "real".

We were particularly keen to welcome Jessica McIlroy back in 2014, as a board member. Jessica was there at the origins and development of OREG and represents a significant "corporate memory". This is especially important as Marine Renewables Canada makes another departure, with completion of a transition to its second ever executive director in January 2015. Elisa Obermann is hugely qualified to take on this challenge and her leadership will be supported by Chris Campbell in a reduced role and by a totally committed board of Directors.

*Graham Curren
Chair*

*Chris Campbell
Executive Director*

Industry Progress & Updates



A Stronger Enabling Environment

In 2014, many of the enabling activities by government have been led and implemented by Nova Scotia. Further steps have been taken to ensure that tidal energy projects in the Bay of Fundy advance to (maybe) the world's first multi-device, array projects.

Market pathway: In late 2013, Nova Scotia's Utility and Review Board (UARB) set a feed-in tariff (FIT) for the first array-scale projects – the developmental FIT. A rate range of \$0.375 to \$0.575 per kWh was set. The rate granted to a developer is dependent on the number of devices and term of development plans. The setting of the FIT rate was a key milestone in attracting new developers to FORCE and triggering creation of long-term development plans by the berth holders.

Results of Strategic Environmental Assessments (SEA) released: The Offshore Energy Research Association released the Update to the Bay of Fundy SEA (previously conducted in 2007-2008) and the SEA Community Response Report for the Cape Breton Region in May 2014.

Development of Statement of Best Practices for In-Stream Tidal Energy: Nova Scotia Department of Energy (NS DOE) partnered with Marine Renewables Canada to develop guidance for the development and operations of in-stream tidal energy. The Statement of Best Practices (SOBP) will be a tool that can be used by industry, government, and other key stakeholders to harmonize development with environmental interests and ensure that the industry grows in an environmentally

and socially responsible manner. Marine Renewables Canada and NS DOE worked to develop a best practice draft and consulted the industry's lead developers, regulators, and the research community to finalize what will be a living document, designed to adapt as the industry evolves. The SOBP is expected to be released in late 2014.

Tidal Energy Continues to Progress

Some of the major activity in 2014 has been around tidal energy development in the Bay of Fundy. Fundy Tidal Inc. has secured Tribute Resources of Ontario as a development partner and established partnerships with technology developers, Clean Current Power Systems, Tocardo, and Nautricity.

In March 2014, the Government of Nova Scotia announced the new berth holders at FORCE. OpenHydro/DCNS are now back after being one of the original berth holders in 2009. Black Rock Tidal, with parent company, SCHOTTEL also secured a berth. As part of their new plans, Minas Energy and partner MCT have added Bluewater Energy Services as partner and they have jointly agreed to develop a 2 MW floating tidal current turbine. The four developers at FORCE have been working with the Nova Scotia government on development plans and the first deployments may come next year. To support these deployments and the first 20 MW of development, the Government of Nova Scotia committed \$4 million in funding to increase the electrical capacity at FORCE.



FORCE itself has been working to have the cable infrastructure in place for the berth holders. With experience from deploying the data cable for the Fundy Advanced Sensor Technology (FAST) platform successfully last December, FORCE has been preparing for the subsea cable deployment/installation this fall.

The continued strengthening of a BC Working Group of Marine Renewables Canada is based on continuing work by a number of members engaged in site assessment. The group developed an integrated, multiparty proposal to Western Economic Diversification to further these efforts and pursue technical approaches that may support development of industry standards.

With work underway at the Canoe Pass site, New Energy expects to have its 250kW devices under test in late winter 2014.

Advances in river and wave energy

The Canadian Hydrokinetic Turbine Test Centre (CHTTC) in Manitoba has really become “live” this year with its dedicated infrastructure on the Winnipeg River being used by three, if not four, technology developers. CHTTC will work towards deploying systems in rivers, developing the required expertise from water-to-wire, and contributing to harness a portion of the hydrokinetic river resource in Canada that will also engage and serve rural communities. In its first real season of operation, at least three device developers will have used the facility.

The river current energy focus has also been pursued by introducing research and

standards developments through our Canadian sub-committee to the IEC TC114. Some of our members have also been pursuing international development opportunities - Idenergie visited francophone west Africa and New Energy, in partnership with World Wildlife Fund (WWF), provided the first ever power to a remote Nepali village.

Interest in wave energy in British Columbia continues to focus West Coast Wave Initiative (WCWI) out of University of Victoria’s Institute for Integrated Energy Systems (IESVic). The WCWI has completed tank testing with a generic converter model and is working with device specific inputs from developers to numerical modeling. With a suite of data buoys gathering new wave data, a new target is to develop the ability to generate forecasts energy output from wave farms, an essential input to system operators.

International Collaboration

To further activity under the *Canada-United Kingdom Joint Declaration*, a memorandum of understanding between Nova Scotia, the Offshore Energy Research Association (OERA), and the United Kingdom’s Technology Strategy Board (TSB) was signed in March to encourage joint research to develop new and innovative technology for high-flow tidal environments.

As a first action in support of this MOU, the OERA and TSB launched a call for collaborative R&D projects focused on advancing environmental monitoring, sensing, and instrumentation. The OERA and TSB are jointly investing \$1.4 million in the successful project(s).

Our Work: Advancing the Canadian Marine Renewable Energy Sector



Building the Sector – Fostering collaboration & innovation

Bay of Fundy Developer Collaboration:

The projects being developed in the Bay of Fundy by the FORCE berth holders and Fundy Tidal Inc. pose a unique opportunity presented by the close proximity and development timelines through the FITS to collaborate and share risks, costs, and engage Canadian service providers, suppliers, and researchers.

To realize this opportunity, Marine Renewables Canada has been leading a developer working group with FORCE that is focusing on common challenges and critical priority projects that could be the basis of joint project. This initiative has made great progress since it started in May and is at a point where a number of collaborative areas have been identified and work to launch an action plan on the first is moving ahead. The reality of trying to reduce costs and risks through sharing efforts and results makes sense to the developers and increases our ability to introduce Canadian solutions and capture long-term value using the first projects to qualify for a world market. We will be working with the developers through the next year.

Standards Development: Marine Renewables Canada has been administering the TC114 International Electrotechnical Commission (IEC) Canadian sub-committee, with support from ecoEII. The sub-committee has been examining existing standards and developed new work packages necessary to support technology advancement in

Canada. This has led to two calls for research projects to inform standards development, with the successful projects being:

- *River Current Resource Assessment and Characterization Considering Ice Conditions*
- *Impact of channel blockage, free surface proximity and foundations on the performance of Tidal/River Energy Converters*
- *Impact of channel blockage and free surface proximity on the performance of cross-flow hydrokinetic turbines*
- *Evaluation of Performance Assessment Procedures for a Floating River Energy Converter*
- *West Coast Wave Initiative (WCWI) Extended Research Program*

In the spring, Marine Renewables Canada supported the hosting of the international Plenary TC114 meeting in Vancouver. This included 40 participants from 13 countries.

Engagement & Outreach

Regional Supply Chain Engagement and Inter-Industry Collaboration:

Marine Renewables Canada continues its efforts to identify and engage business with capabilities and expertise that is required by the growing marine renewable energy sector. To accomplish this, the association has continued to build and grow relationships with key offshore, marine, and energy organization to strengthen cross-sector collaboration.



The other aspect of this work has also been to directly reach out to potential supply chain members. Some of activities to achieve this goal over 2014 include:

- Outreach session/presentation in St. John's, Newfoundland in partnership with Newfoundland Environmental Industries Association (NEIA) and OceansAdvance.
- Canadian-UK business and research panel hosted by the British Embassy in Halifax.
- Presentation to renewable energy service providers at All-Energy Canada in Toronto.
- Exhibit stand at the Renewable Energy Conference in Halifax.
- Engagement at the West Coast Shipbuilding and Ship Repair Forum
- Presentation at the Canadian Institute of Marine Engineering NewWave conference

Pacific Coast Engagement: Last year Marine Renewables Canada members developed an action paper identifying potential pathways, partners, and key priorities to ensure that the potential opportunity and benefits of marine renewable energy in British Columbia are realized. Actions to follow through on the strategy have continued amongst west coast members, now named the **Pacific Working Group** of Marine Renewables Canada. This group will continue to work with the association to advocate for more support and activity on the west coast.

A Canadian Energy Strategy: Marine Renewables Canada has joined other

national renewable energy associations – CanWEA, CanSIA, and the Canadian Hydropower Association – to establish a unified approach towards supporting renewable electricity development in Canada. This group has been working to formalize its mandate and activities and is expected to formally launch in 2015.

This group is being facilitated by Clean Energy Canada, an advocacy initiative pursuing clean energy and climate action initiatives. Through this initiative Marine Renewables Canada can inform this broader discussion.

Strengthening a foundation of academic research: Marine renewables Canada is an advisor to the recently commissioned University of Manitoba/Manitoba Hydro launched Canadian Hydrokinetic Turbine Test Centre. We continue to promote the strategic funded research initiatives at Acadia and University of Victoria. An emerging concern is that all three of these have funding horizons of March 31 2016, however this is offset by the potential foundations established upon which a national initiative could be launched.

International Business Development: Marine Renewables Canada has continued to focus on identifying market opportunities for members, growing relationships with international organizations, and profiling Canada's strengths to the world market.

One of our priorities this year has been promotion and development of the 5th International Conference on Ocean Energy (ICOE) which will bring the world of marine renewable energy to Halifax, Nova Scotia in November. In support of all



these activities, Marine Renewables Canada has participated in the following conferences by providing presentations, hosting mini-trade missions, and promoting the Canadian sector and ICOE 2014 through partners:

- Norway Marine Renewable Energy Roundtable, February 2014, Oslo
- Marine Renewable Industry Association Ireland Forum, February 2014, Dublin
- RenewableUK Wave & Tidal, February 2014, Belfast, NI
- Oceanology, March 2014, London, UK
- Globe, March 2014, Vancouver, BC
- Thetis, April 2014, Cherbourg, France
- GMREC, April 2014, Seattle, WA
- Pacific Economic Cooperation Council Forum, June 2014, Santiago, Chile
- ADEMAR Roundtable, June 2014, Santiago, Chile
- Oceans Week, June 2014, Halifax, NS
- Energy Ocean, June 2014, Atlantic City, NJ
- Oceans 2014, September 2014, St. John's NL

Marine Renewables Canada also spent time in Norway, Ireland, and Chile working with Canadian trade commissioners to identify potential business and research partnerships and holding roundtables to provide updates on progress and opportunities in Canada's marine renewable energy sector.

With support DFATD's GOA program, Marine Renewables Canada was able to lead mini-mission or assist member companies in attending:

- RenewableUk Wave & Tidal – February 2014
- Oceanology 2014 – March 2014

- Mission to India for Rockland Scientific – March 2014
- Mission to Africa for Idénergie – January 2014

Members undertook market exploration missions to Africa and India and New Energy's iconic deployment of a generator in a Nepal's mountain stream was recognized by the Globe and Mail.

Outreach to the Asian Development Bank and World Bank has opened a demand for discussion of river current energy solutions for remote community electrification, in Asia in particular. Working toward a Canadian market solution is likely a priority for Marine Renewables Canada in coming years.

Events

Marine Renewables Canada Annual Conference: The 2014 conference was held in Ottawa, Ontario on November 20-21. This year's theme was "From Prototyping Technology to Prototyping an Industry" with sessions focused on how Canada will move to the next stage of development—from single devices to array-scale projects.

The conference was the best attended to date with over 160 participants. It also attracted delegations from Ireland and Scotland as well as several politicians including the Minister Younger of Nova Scotia who had just taken on his role of minister of energy a few weeks before.

International Conference on Ocean Energy (ICOE): The development and organization of ICOE 2014 has truly been one of the association's major activities this year with "all hands on deck" to ensure



that it is a major success. This will be the first time ICOE is held outside of Europe, a major accomplishment for Canada – and a major opportunity.

As host of ICOE 2014, Marine Renewables Canada has led all aspects of abstract submission/review and program development, promotions and marketing, development of technical tours, coordination of side events, sponsorship, exhibition and tradeshow organization, and budget management. As part of the effort to showcase Canada's strengths, Marine Renewables Canada is also working with ACOA, Nova Scotia Department of Energy, Government of New Brunswick, and DFATD to organize a Canadian Pavilion which will host 30+ companies.

The association has received tremendous support from partner organizations, notably ACOA, Government of Nova Scotia, OERA, Emera, and J.D. Irving, Ltd. DFATD and trade commissioners and Canadian Embassies have also played an integral role in attracting international participants and organizing delegations.

ICOE 2014 is expected to attract participants from over 30 countries. As of October, the tradeshow is over 90% sold and the program includes over 200 speakers/presenters. While the official program is from November 4-6, the side events result in almost two weeks of side events, workshops, and meetings.

Financial Summary



Audited financial statements for the year ending Dec 31 2013 are available elsewhere.

The impact of hosting ICOE 2014 is that the budget forecast for 2014 operations is approximately \$1.5m –almost five times a typical year. Early underwriting of some of the ICOE delivery expenditures came from the Nova Scotia government (OERA) and Atlantic Canada Opportunities agency. Additional event support from members and other industry players underwrote production of the event. The event is expected to operate with a surplus, but the final net contribution to operations will depend on final numbers of attendees.

Marine Renewables Canada continued to administer the EcoEnergy Innovation Initiative funding supporting the work of the IEC TC114 standards development. A part of the funding for this initiative supports the association's associated activities.

International business development, and some national initiatives, provide some financial support for travel of the team.

Membership levels have remained steady for the last 3 years, although there has been some change in its makeup. With the focus created by ICOE 2014, a new structure and a drive for additional and higher-level memberships is anticipated.

Overall, the financial results for 2014 are expected to make a net contribution to the necessary operational reserve.

Our Members



Acadia Tidal Institute

www.tidalenergy.acadiau.ca

Andritz Hydro Canada Inc.

www.andritz.com/hydro

AOE Accumulated Ocean Energy Inc.

www.aoecanada.ca

ASL Environmental www.aslenv.com

AXYS Technologies

www.axystechnologies.com

BC Hydro www.bchydro.com

Bluewater Energy Services

www.bluewater.com

Broad Spectrum Consulting Ltd.

www.broadspectrum.ca

Campbell River Economic Development Corporation www.rivercorp.ca

Canadian Copper and Brass Development

www.coppercanada.ca

Cascadia Coast Research Ltd.

www.cascadiacoast.com

Charles Wood, Seawood Designs Inc.

City of Campbell River

www.campbellriver.ca

Clean Current Power Systems

www.cleancurrent.com

College of the North Atlantic – Burin

Campus www.cna.nl.ca/Campus/BU

Dalhousie University www.dal.ca

Deborah BooneDNV GL – Energy

www.dnvgl.com/renewables

DP Marine Energy Limited

www.dpenergy.com

Dynamic Systems Analysis, Ltd. www.dsa-ltd.ca

Emera www.emera.com

Enbridge www.enbridge.com

Focus Environmental Inc.

Fundy Ocean Research Center for Energy (FORCE) www.fundyforce.ca

Fundy Tidal Inc. www.fundytidal.ca

GL-Garrad Hassan www.gr-garradhassan.com

Grey Island Energy

www.greyislandenergy.com

Halcyon Tidal Power LLC

www.halcyontidalpower.com

Hatch www.hatch.ca

Hemmera www.hemmera.com

Idenergie www.idenergie.ca

Igloo Innovations Inc. www.digitaligloo.net

Irving Transportation Ltd.

www.jdirving.com

Jessica McIlroy

Juergen Puetter

Jupiter Hydro Inc. www.jupiterhydro.com

Knight Piesold www.knightpiesold.com

Lengkeek Vessel Engineering Inc.

www.lengkeek.ca



MacArtney Inc www.macartney.com

Maine Composites Alliance
www.maine-composites-alliance.org

Manitoba Hydro www.hydro.mb.ca

Marine Institute of Memorial University
www.mi.mun.ca/mi_international

Maritime Tidal Energy Corp.
www.maritimetidal.com

Maine Maritime Academy
www.mainemaritime.edu

Martin Leguizamon

Martin Tampier

Mavi Innovations www.mavi-innovations.ca

McKeil Marine www.mckeil.com

Meridian Marine Industries Inc.
www.meridianmarine-inc.com

Mersen www.ep-ca.mersen.com

Minas Basin Pulp and Power
www.minas.ns.ca

M.K. Ince and Associates Ltd.
www.mkince.ca

National Research Council www.nrc-cnrc.gc.ca

New Energy Corp www.newenergycorp.ca

NortekUSA www.nortekusa.com

Northwest Hydraulic Consultants, Ltd.
www.nhcweb.com

Nova Scotia Department of Energy
www.gov.ns.ca/energy

Ocean Renewable Power Company (ORPC) www.orpc.co

Offshore Energy Research Association (OERA) www.oera.ca

OpenHydro www.openhydro.com

Resolute Marine Energy Inc
www.resolutemarine.com

Rockland Scientific International
www.rocklandscientific.com

SCHOTTEL www.schottel.de

Sea Breeze Power Corp
www.seabreezepower.com

Sea Mammal Research Unit (SMRU)
www.smru.st-and.ac.uk

Shark Marine Technologies Inc.
www.sharkmarine.com

Sheldon Fernandes

Siemens Canada www.siemens.ca

SRM Projects www.srmprojects.ca

Stantec www.stantec.com

Thordon Bearings Inc. www.Thomson-Gordon.com

Tony Tung

UVic IESVic www.iesvic.uvic.ca

Voith Hydro www.voith.com

Western Tidal www.westerntidal.com

Yves Savoie