



marine
renewables
canada

2020 ANNUAL REPORT

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WHO WE ARE

Marine Renewable Canada is the national association for wave, tidal, offshore wind and river current energy, representing technology and project developers, utilities, researchers, and the energy and marine supply chain. Since 2004, the association has worked to identify and foster collaborative opportunities, provide information and education, and represent the best interests of the sector to advance the development of a marine renewable energy industry in Canada that can be globally competitive.

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Elisa Obermann *Executive Director*

Amanda White *Operations Director*

LEADERSHIP MESSAGE

2020 began with plenty of activity – Marine Renewables Canada hosted an information session in New Brunswick, led a mission to the inaugural Pan-American Marine Energy Conference (PAMEC), presented at information sessions, and hosted a business development offshore wind workshop in Halifax. Little did we know that the day after that workshop, borders would be closing, travel restrictions would be implemented, and the engagement and face-to-face connections we were used to, would essentially come to a halt.

It has been a year that none of us could have anticipated. In the early months of the pandemic, businesses including our members were greatly impacted by the closure of borders, supply chain and logistics challenges, and delays in projects. Marine Renewables Canada was also faced with challenges in how to deliver its activities in this new virtual world. The association, our members, businesses, and government began to find new or alternative ways of doing things and although this year has been difficult, it has also demonstrated the resiliency of Canadian businesses and organizations, and the marine renewable energy sector in particular.

With the challenges, we've also seen perseverance by industry, new opportunities coming to light, and an increased focus and importance on climate change where marine renewable energy could make important contributions. We believe that Canada's marine renewable energy sector will emerge from this stronger than before – ready to take on some of the biggest challenges ahead in tackling climate change.

Despite the closures and the restrictions, this was not a quiet year where nothing happened. Our association, our members and our sector know how to adapt. We know how to pivot. We know how to tackle challenges. Tidal energy activity continued to move forward around the Bay of Fundy, with new projects announced, activity to prepare for upcoming deployments, and ongoing research and R&D to support project development. The sector also continued to focus on realizing opportunities for using marine renewable energy (cont'd)



The Honourable Michel P. Samson
Chair



Elisa Obermann
Executive Director

to power remote and coastal communities that are reliant on diesel for electricity generation – a major market in Canada and also globally. The association created new activities and supports that could be offered virtually, partnered and collaborated on numerous projects of value to our members, and was even successful in delivering hybrid and in-person events.

As 2020 comes to a close and we enter 2021, the marine renewable energy sector will continue to tackle obstacles, find solutions, and make progress. In this new era of “building back better” marine renewable energy is a prime example of a sector that can support the dual objectives of stimulating the economy and acting on climate change. We truly look forward to working with our membership, partners, and collaborators in 2021 to show the world what Canada’s marine renewable energy sector can contribute to a net zero future.



SECTOR HIGHLIGHTS

PROJECT AND TECHNOLOGY DEVELOPMENT

Despite the challenges of the global pandemic, Canada's marine renewable energy sector continues to persevere with new R&D activities, new entrants to the market, and ongoing progress of existing initiatives and projects.

Marine Renewable Energy Projects & Activity Across Canada (various stages of planning and development)

WAVE ENERGY

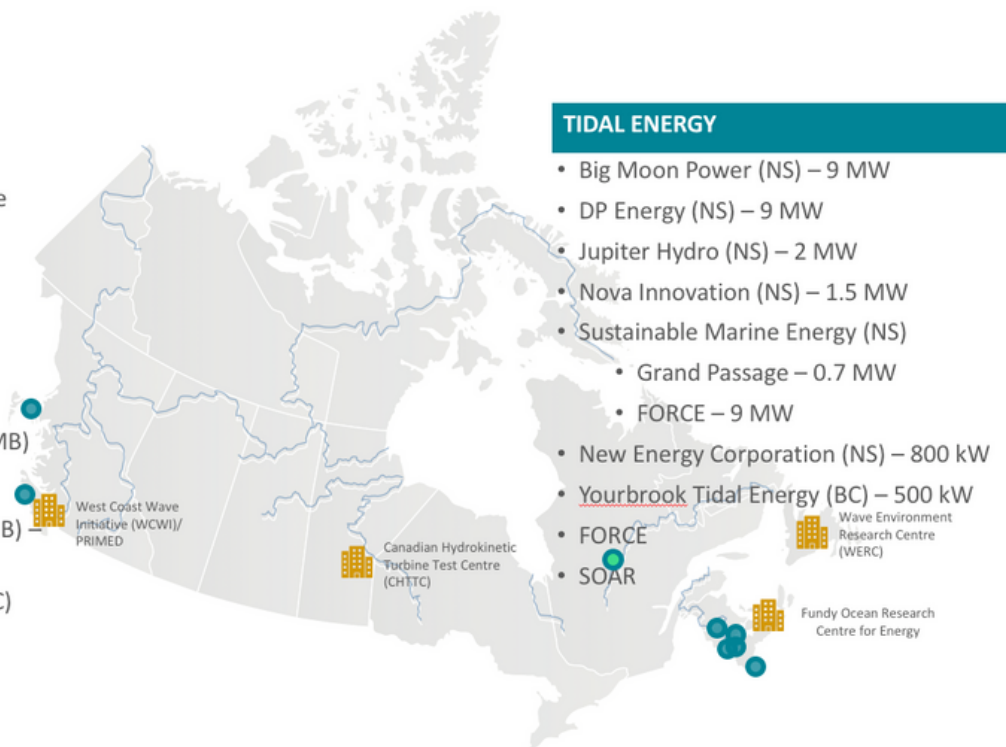
- University of Victoria (West Cove Wave Initiative & Pacific Regional Institute of Marine Energy Discovery (PRIMED))
- AOE + [Cermaq](#) (BC)
- Wave Environment Research Centre

RIVER CURRENT ENERGY

- ORPC Canada (QC)
- Canadian Hydrokinetic Turbine Test Centre (MB)

OFFSHORE WIND ENERGY

- Sea Breeze Floating Offshore Wind Demo (NB) – proposed
- Oceanic Wind Energy (Northland Power) (BC)



TIDAL ENERGY

- Big Moon Power (NS) – 9 MW
- DP Energy (NS) – 9 MW
- Jupiter Hydro (NS) – 2 MW
- Nova Innovation (NS) – 1.5 MW
- Sustainable Marine Energy (NS)
 - Grand Passage – 0.7 MW
 - FORCE – 9 MW
- New Energy Corporation (NS) – 800 kW
- [Yourbrook Tidal Energy](#) (BC) – 500 kW
- FORCE
- SOAR

Tidal Energy

Big Moon Power (Nova Scotia)

Big Moon Power was the successful proponent for the vacant berth at Fundy Ocean Research Center for Energy (FORCE), acquiring 4 MW at the site. As part of the conditions for occupying the berth, Big Moon is required to remove the Cape Sharp Tidal turbine that was deployed at the location in 2018.

DP Energy (Uisce Tapa Project) (Nova Scotia)

DP Energy continued to develop its 9 MW project, Uisce Tapa, at FORCE test site through 2020, finalizing site specific engineering, site characterization activities and the final planning activities. Project-specific marine operations planning work continues to progress. Subsea cable installation is targeted for fall 2022 with subsea structures and turbine installation targeted for 2023.

Jupiter Hydro (Nova Scotia)

Jupiter Hydro has continued planning for the development of its project in the Bay of Fundy which is in two phases: the testing of a non-grid connected 1 MW prototype and the other for 2MW demonstration.

NewEast Energy (Nova Scotia)

NewEast Energy, a subsidiary of New Energy Corporation was awarded a permit through Nova Scotia's tidal energy demonstration permit program for an 800 kW project in the Minas Passage, as well as a fifteen-year power purchase agreement (PPA). The project will be at a location next to FORCE and will consist of an array of floating grid connected New Energy EnviroGen™ Power Generation systems. Four generators will be installed as part of the array. NewEast Energy is in the initial stages of project development and has a three year project development window.

Nova Innovation (Nova Scotia)

Nova Innovation has continued the development of its tidal energy project in Petit Passage, Nova Scotia. With the first turbine scheduled for deployment in 2021, Nova Innovation has ramped up engagement with regulators, communities, supply chain and First Nation communities and organizations. In September 2020, Nova Innovation was awarded \$4 million from the Government of Canada to support Phase 1 of the project.

ORPC Canada (Quebec)

ORPC Canada engaged in extensive outreach in 2020 to potential community, government and supply chain partners across Canada, focusing on supporting remote communities to transition to a sustainable energy future. In addition, ORPC Canada conducted in-depth market analysis and mapping for river hydrokinetic and tidal energy. ORPC Canada's activities have been buoyed by parent company ORPC's success in neighboring Alaska, where the company's RivGen. Power System has been operating continuously for the Igiugig community since October 2019. It is now the longest operating current energy converter device in the Americas and the first one to be successfully produce electricity throughout the Alaskan winter, operating during frazil and ice breakup events.

Sustainable Marine (Nova Scotia)

Sustainable Marine has been operating its PLAT-I 4.63 (280kW) floating tidal energy platform in Grand Passage since 2018. The demonstration has provided the opportunity to collect useful data, test operations and maintenance methods, and support important environmental and technical R&D. In late 2020, Sustainable Marine was awarded \$28.5 million by the Government of Canada for the development of its 9MW Pempa'q project at FORCE. The first phase of the Pempa'q In-stream Tidal Energy Project will begin with the installation of a 420kW PLAT-I platform that will be launched in early 2021. It will be installed at the Grand Passage site for commissioning and testing throughout the winter and spring. Construction work will then start at FORCE where this platform will be installed, alongside two others, to provide a combined capacity of 1.26MW.



Image: Construction of Sustainable Marine's 420kW PLAT-I platform.

Yourbrook Tidal Energy (British Columbia)

Yourbrook Energy Systems, a British Columbia based tidal energy technology developer, is continuing development of its 500 kW Kamdis Tidal Power Demonstration Project. Yourbrook's technology is targeting rural and remote communities with a combination of innovative tidal power extraction paired with energy storage capability. The company has recently patented a new highly efficient paddle wheel system to extract more energy from the swept area of the tidal stream.



Offshore Wind

Brezo Energy (New Brunswick)

Brezo Energy, Inc. is a Canadian Engineering, Procurement, Construction & Installation (EPCI) company formed to commercialize a new floater design for offshore wind farms. Its proposed Sea-Breeze Tech demonstration project entails the development of a novel, floating platform that can significantly reduce the costs of energy generation and spur job creation across Canada and in Atlantic Canada where the project is proposed.

Northland Power (British Columbia)

Oceanic Wind sold Northland Power a 100% interest in its wholly owned subsidiary, NaiKun Wind Development Inc. in British Columbia. As a result Northland acquired the rights to develop, build and operate the offshore wind project in Hectate Strait.

Clean Marine (cleantech in marine and offshore industries)

Marine Renewables Canada has a number of members that are engaged in the broader clean marine energy space – providing services or technologies that can help to decarbonize marine and offshore industries. This is a space that continues to grow and presents many complementarities with marine renewable energy and their collective contributions and impact to the blue economy.

Glas Ocean Electric (Nova Scotia)

Glas Ocean Electric (GOE) is an award winning company building electric boats. Focused on working boats such as Fishing, Aquaculture, Tourism, Passenger and R&D vessels, GOE plans to convert using a scalable kit that can be used in both new build and retrofits. Through emissions testing and power measurement GOE can show the impact of the electrification of marine assets. GOE is committed to scaling this opportunity and developing collaborations that will allow boat batteries to be used as dynamic energy storage through vessel-to-grid applications. In 2020, GOE converted the Alutasi from diesel to a hybrid electric, wrapped it in art from Mi'kmaq artist Alan Syliboy and obtained the first ever Transport Canada marine technical review board decision that allows a lithium-ion battery to be used on a passenger vessel.

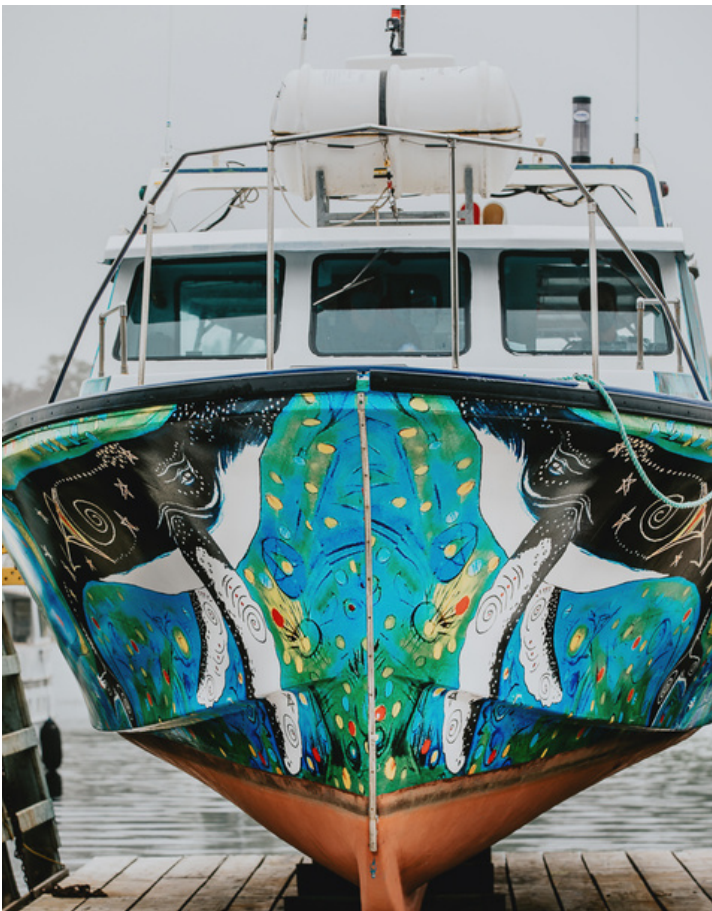


Image: The Alutasi - a vessel now converted from diesel to hybrid electric using a lithium-ion battery.

Oneka Technologies (Quebec/national & international demonstrations)

Oneka leveraged the 2020's situation which limited travels and international operations to focus on improving further the technology and collaborate with Canadian fellow companies in the marine sector. Oneka's newly developed system, P1, was deployed and successfully tested near Halifax at Eastern Passage.

The project was to validate the deployment process as well as the performance specification of the newly developed wave-powered desalination system. The company worked with RMI Marine, Eagle-Beach Contractors, Leeway Marine and Mersey Consulting Ltd for the realization of the project. Oneka and its collaborators demonstrated that the system could be installed in under one hour with no divers needed. On the performance side, the output exceeded the forecast and the system was able to generate near its nominal power with the same wave conditions as the installation's conditions.

The system was taken out as the temperature went below freezing temperatures and the unit was cumulating ice, which isn't such a problem for its functioning, but certainly for its servicing. The testing and demonstration of Oneka's P1 will be pursued in 2021 in a warmer climate better adapted for its intentions, which is to provide sustainable fresh water using wave energy.



Image: Demonstration of Oneka's newly developed system, P1, Nova Scotia.

RESEARCH, INNOVATION, AND DEMONSTRATION

Canadian Hydrokinetic Turbine Test Centre (CHTTC) (Manitoba)

In partnership with SOAR, the Canadian Hydrokinetic Turbine Test Centre (CHTTC) has been working on several work packages to address the realization of community-scale marine renewable energy projects in Canada. R&D activities led by CHTTC have included:

- Demonstration of winter survival by modifying a Smart Hydro turbine mono-float to avoid icing issues.
- Conducting a low cost resource assessment using a satellite-based approach to identify open waters in rivers during the winter.
- Development of a low cost instrumented buoy that can be deployed in energetic river areas identified by the satellite method and that can survive multiple years.
- Testing of turbine interactions using New Energy turbines and H-ADCP and ADV instruments to characterize the flow around the turbines.
- Testing of a 5 kW Waterrotor turbine, a low flow turbine that can tap into additional global market opportunities.
- Demonstration of micro-grid solutions using New Energy turbines, solar panels, a repurposed Nissan Leaf battery pack, and inverters controlled by a state a state-of-the-art controller developed and manufactured by BMT Canada.



Image: R&D underway by CHTTC.



Image: FORCE installed a new radar at the visitor centre in 2020 as part of the Risk Assessment Program (RAP) for tidal stream energy, replacing the previous model which had been in operation since 2015. The new radar, along with another unit at the Cape Sharp Lighthouse, will build a high-resolution radar network to create the first spatiotemporal flow atlas of the Minas Passage and deliver real-time hydrographic mapping of currents, eddies, and waves—important determinants of marine animal distribution.

Fundy Ocean Research Centre for Energy (FORCE) (Nova Scotia)

Fundy Ocean Research Center for Energy (FORCE) is Canada's primary centre for the demonstration of in-stream tidal energy technologies and continues to lead various research and initiatives to gather knowledge about tidal energy and support technology and project demonstration.

In 2020, FORCE was awarded \$2 million from the Government of Canada for a new project - the Risk Assessment Program (RAP) for Tidal Stream Energy. RAP is designed to create a detailed, credible assessment tool to gauge the probability that fish will encounter a tidal device. This project will help to support greater regulatory clarity around tidal project development. Key partners in the RAP project include Acadia University, Marine Renewables Canada (MRC), Mi'kmaw Conservation Group (MCG), Confederacy of Mainland Mi'kmaq, Ocean Tracking Network (OTN), and Dalhousie University.

Other key highlights for FORCE in 2020 included:

- The announcement of Big Moon Canada Corporation (BigMoon) as the successful applicant to fill FORCE's berth D and remove the Cape Sharp turbine presently occupying the berth.
- Collaborative work with the Offshore Energy Research Association (OERA) to advance 'The Pathway Program' to identify effective and regulator approved monitoring solutions for the tidal energy industry in Nova Scotia.
- Continued environmental monitoring baseline studies, analysis of past results, and the development of an updated monitoring plan for 2021 and beyond.
- The development of new methodologies for high resolution eddy mapping.
- Further advancement of the Vectron: the world's first stand-alone instrument to remotely measure turbulence in the mid-water column in high resolution.

National Research Council (NRC)(Ontario/National)

National Research Council Canada (NRC) is currently developing a Marine Energy Resource Atlas for Canada (the 'Atlas'), based on a pilot web application completed in 2019. The goal of the Atlas program is to support technical assessment of marine energy resources (waves, tidal currents, river flows) and allow various stakeholders to estimate and map energy resources by resource type, by region, and by province.

The Atlas will allow stakeholders to apply a wide range of practical constraints and assumptions so that energy resource investigations can be tailored to address specific needs. The Atlas is currently being developed using Amazon Web Services (AWS) to store, view, query, and host large marine energy datasets (> 25 Terabytes). NRC is collaborating with University of Victoria, University of Ottawa, University of Dalhousie, University of Laval, Polar Knowledge Canada, and NRCan to incorporate new datasets and tool functionalities.

The development encompasses several stages:

1. Developing a methodology and code to upload and download marine resource datasets efficiently through AWS S3 (Spring 2020).
2. Developing an Application Programming Interface (API) to download specific spatial and temporal datasets (Fall 2020).
3. Developing graphical user interface functionalities in the application to extract, view or download marine resource datasets (2021).
4. Creating a user's manual guide for the API and application (2022).

The Atlas will help disseminate detailed information on Canada's most attractive resource opportunities, help accelerate the growth of marine renewable energy technologies, reduce the cost of pilot projects within Canada, and help establish Canadian companies as key players in this emerging industry.

Natural Resources Canada - CanmetENERGY (Ontario/National)

CanmetENERGY-Ottawa is developing methods for identifying areas of high river hydrokinetic potential in river reaches across Canada through remote sensing techniques. In partnership with the Canadian Center for Remote Sensing (CCRS), CHTTC, University of Ottawa, and NRC, CanmetENERGY analyzes Synthetic Aperture Radar (SAR) and Optical Satellite data to locate areas of open water within river ice. These areas are indicative of high kinetic energy in the form of turbulence or velocity and may be suitable for energy extraction. The ultimate goal of this project is to create a publicly available database of high potential sites to be leveraged by project developers and remote communities for potential renewable energy projects. Initial SAR datasets from the Radar Constellation Mission (RCM) have been analyzed and field validations of the findings are ongoing.



Image: Jetyak in Petit Passage for an OERA funded project - a collaboration between Luna Sea Solutions, Dalhousie Ocean Acoustics Laboratory, and Memorial University to develop and validate software for detecting fish using Acoustic Doppler Current Profilers (ADCP).

Sustainable Oceans Applied Research (SOAR) (Nova Scotia)

SOAR worked closely with OERA and other partners to deliver aspects of the Pathway Program by evaluating the effectiveness of the multibeam imaging sonars for monitoring near-field interactions between marine animals and tidal turbines.

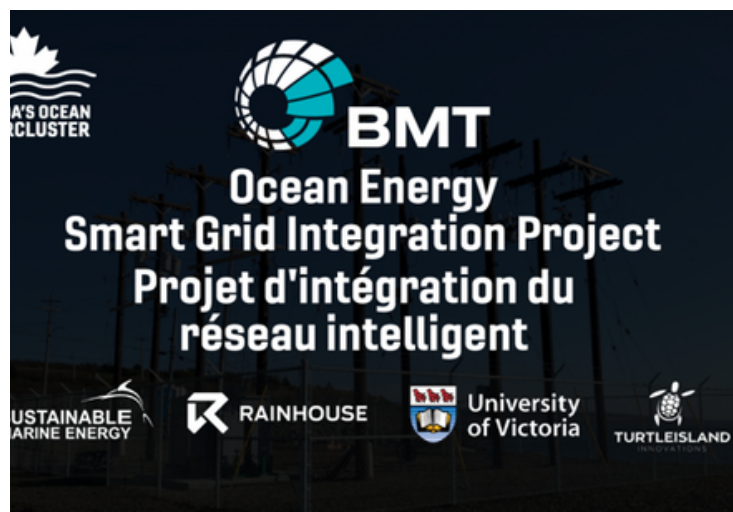
SOAR is also partnered with the University of Manitoba/ CHTTC on a project supported by the Government of Canada to advance research on river hydrokinetic and in-stream tidal energy technologies in the Canadian context. As part of this project, SOAR conducted marine animal observations in the Grand Passage area of the Bay of Fundy and worked closely with Dalhousie Ocean Acoustics Laboratory to conduct extensive flow field mapping using vessel mounted and drifting ADCPs to characterize Sustainable Marine's PLAT-I's wake.

Additional work led by SOAR focused on advancing case studies for site assessment at remote indigenous communities in Northern Labrador and British Columbia planned for 2021 in collaboration with Queens University, University of Victoria, and indigenous organizations.

Ocean Supercluster Projects

Canada's Ocean Supercluster is an industry-led transformative cluster model that is driving cross-sectoral collaboration, accelerating innovation, and growing Canada's ocean economy. By matching industry investment, and facilitating collaboration and close alignment with the ecosystem, academia, science, indigenous communities, and government, the Supercluster supports game-changing projects. In 2020, the Supercluster awarded funding to a number of projects focused on marine renewable energy. These include:

- **Vitality** – A project aimed at capitalizing on Canada's ocean data to deliver definitive commercial outcomes to the businesses involved by advancing ocean data analysis, management and visualization capabilities, and products. This project will see the development of new, applicable low-cost data streams, and the development of tools to manage those streams, as well as software that lowers the barrier to entry for the application of this data. The project will also build tools and linkages between the Canadian Integrated Ocean Observing System (CIOOS) and three emerging environmental technology and data-heavy ocean sectors: aquaculture, tidal power, and offshore wind. Vitality is led by Pisces Research Project Management Inc. together with project partners from across Canada including: Dalhousie University, Perennia Food and Agriculture Inc., FORCE, University of Victoria, St. Lawrence Global Observatory, Tula Foundation and The Hakai Institute, Marine Renewables Canada, and COINAtlantic.



- **Ocean Energy Smart Grid Integration Project** – A project that will develop a single controller that has algorithms for different communities, whereas currently there is a bespoke design for each community. With this solution, algorithms are selected and parameterized based on ratings of the equipment. The project will commercialize the integration of ocean energy solutions to help reduce the dependence of diesel power generation in rural and remote communities and increase the opportunity for use of renewable sources of energy. The project is led by BMT partnered with Sustainable Marine, University of Victoria, Rainhouse, and Turtle Island Innovation.

Offshore Energy Research Association (OERA) (Nova Scotia)

OERA's marine renewable energy research agenda has evolved over the last decade as the tidal energy sector advances through progressive stages of development. Since 2006, OERA has funded or co-funded over 100 research projects that – combined with partner leverage – have achieved a total research investment of \$23.8M.

In 2020, OERA supported the following marine renewable energy research:

- Field assessment of multi-beam sonar performance in surface and bottom-mount deployments.
- Pathway Program – Development of platform and cabling solution.
- Testing of 360-degree imaging technologies for improved animal detection around tidal energy installations.
- How sounds travel in high energy environments – effectiveness of acoustic monitoring systems and turbine audibility assessment.
- Reducing costs of tidal energy through a comprehensive characterization of turbulence in Minas Passage.

A major marine renewable energy project led by OERA in 2020 is the Pathway Program. Currently, there is no suite of environmental monitoring tools accepted by regulators as 'field-proven' for the conditions in the Bay of Fundy. To address this, OERA developed the Pathway Program – a \$2 million collaborative environmental effects monitoring research program aimed at reducing regulatory uncertainty and compliance costs. This project is supported by the Government of Canada and the Province of Nova Scotia.

University of Victoria (IESVic)(British Columbia)

The University of Victoria (UVic) has been leading work in wave energy and clean energy for remote community development working with local suppliers, industry, researchers, and Indigenous communities. UVic continues to lead this work through its established Pacific Regional Institute for Marine Energy Discovery (PRIMED), which is aimed at eliminating the uncertainty and risk for “first-of-a-kind” community based marine renewable energy projects.

Key projects and activities over 2020 included:

- Research methods for extreme wave assessment in coastal waters.
- Wave measurement and instrument development - preparing to deploy the first LiDAR based wind profiling offshore buoy in 2021 along with a land-based LiDAR station for buoy calibration near Victoria, British Columbia.
- PRIMED collaborative project with BMT to develop hardware in the loop simulation facility for energy system management technology (energy system dispatch hardware) for hybrid energy systems.
- Collaboration with AOE on the development of air pumping wave energy converter concept.
- Muchalaht First Nation project including wave energy FEED study.
- Work with Canadian wave energy technology company to develop a control system for point absorber type wave devices.

CANADIAN INDUSTRY EXCELLING IN THE INTERNATIONAL MARKET

Marine renewable energy is a growing market worldwide with increasing opportunities for Canadian participation. Many of Marine Renewables Canada's members, particularly those in the supply chain, have been pursuing international business successfully. Member companies active in international industry projects and development include: Atlantic Towing, AXYS Technologies, BMT, Castaloo, DSA Ocean, Dominion Diving, Growler Energy, Horizon Maritime, London Offshore Consultants, MacArtney, Northland Power, Ocean Sonics, Pangeo Subsea, Scanmudring, Seaforth Geosurveys, and Stantec among others.

The booming offshore wind market is creating new opportunities for Canadian businesses and supply chain despite the fact that Canada has yet to develop its domestic offshore wind resource. Northland Power is developing three offshore wind farms internationally – 1) Deutsche Bucht, a 252 MW project in the North Sea, Germany 2) Gemini, a 600 MW project in the North Sea, Netherlands and 3) Nordsee One, a 332 MW project in the North Sea, Germany.

Canadian suppliers are also supporting international offshore wind development and in addition to this, some international work has been completed in Canada. For example, in Spring 2020, Dominion Energy and Ørsted delivered turbine components and monopiles to Woodside (Port of Halifax) in Dartmouth, Nova Scotia before they were loaded on the installation vessel, Vole au Vent, for the 12 MW Coastal Virginia Offshore Wind (CVOW) pilot project. This work arose from limitations due to the US Jones Act which requires that any transport of goods between US ports to be done on US built, crewed and flagged ships. Currently, there are no US offshore wind installation vessels, which creates an opportunity for Canadian ports in close proximity.



Image: Roll Group's Bigroll Beaufort vessel, Jan De Nul's Vole au Vent Installation vessel, and Atlantic Towing's harbour tugs involved in the delivery of offshore wind components to Woodside/Port of Halifax, Nova Scotia for the Coastal Virginia Offshore Wind project.

POLICY, LEGISLATION AND ENABLING ACTIVITIES

Federal Government

The primary focus of government throughout 2020 was the pandemic and supporting Canadians and businesses. However, a number of initiatives and strategies were launched by the Government of Canada, particularly towards the end of 2020 when economic recovery became a growing priority. Key actions of relevance and importance to the marine renewable energy sector included:

- *Offshore Renewable Energy Regulations (ORER) Initiative*: Natural Resources Canada began consulting on future offshore renewable energy regulations through the Offshore Renewable Energy Regulations (ORER) Initiative. The ORER initiative aims to develop safety and environmental protection regulations that will apply to exploration, construction, operation and decommissioning activities related to renewable energy projects and power lines in Canada's offshore areas. The ORER will be developed under the Canadian Energy Regulator Act which came into force in August 2019.

This legislation enables the Canada Energy Regulator to review and authorize activities related to offshore renewable energy in Canada's offshore areas. These activities could include:

- Site characterization activities, such as, resource surveys, geoscience and geotechnical studies, and environmental surveys; and,
 - Construction, certification, operation, maintenance and decommissioning of offshore renewable energy facilities and offshore power lines.
- *Bill C-12, Canadian Net-Zero Emissions Accountability Act*: Bill C-12 was introduced to Parliament. The legislation would legally bind the government to a process to achieve net-zero emissions by 2050, and require the Minister of Finance to report annually on key measures that the federal government, including Crown Corporations, has taken to manage climate-related financial risks and opportunities.
 - *Fall Economic Statement*: The Fall Economic Statement set the stage for what was to come for a "build back better" plan for economic recovery. The statement included a number of actions to address climate change and increase renewable energy production:
 - \$2.5 billion (via Canada Infrastructure Bank (CIB) \$10B program) to connect Canadians to clean electricity across Canada through the Atlantic Loop and other regional electricity transmission infrastructure projects.
 - \$25 million in 2021-22 to facilitate these new infrastructure project by helping some proponents complete engineering assessments, community engagement, and environmental and regulatory studies.
 - \$7.3 million over three years for the Department of Finance Canada and Environment and Climate Change Canada to create a public-private Sustainable Finance Action Council aimed at developing a well-functioning sustainable finance market in Canada.

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- *High Level Panel for a Sustainable Ocean Economy (Ocean Panel)*: In fall 2020, Canada joined the Ocean Panel which commits to an action plan, “Transformations for a Sustainable Ocean Economy: A Vision for Protection, Production and Prosperity.” The plan prioritizes marine renewable energy as one of the areas of focus. As part of this commitment, the Government of Canada indicated that they will lead public consultation on Canada’s blue economy strategy in 2021.
 - *A Healthy Environment and a Healthy Economy*: This plan is essentially the federal government’s “build back better” initiative encompassing policy and funding measures to implement commitments from the 2020 Speech from the Throne to create over one million jobs and restore employment to pre-pandemic levels. The plan includes 64 new measures and \$15 billion in investments in addition to the Canada Infrastructure Bank’s \$6 billion for clean infrastructure already announced in the fall. Highlights of the plan that are most relevant to the marine renewable energy sector include:
 - \$964 million over four years to advance smart renewable energy and grid modernization projects.
 - \$300 million over five years to advance the government’s commitment to ensure rural, remote and Indigenous communities that currently rely on diesel have the opportunity to be powered by clean, reliable energy by 2030.
 - Work with provinces and territories to connect parts of Canada that have abundant clean hydroelectricity with parts that are currently more dependent on fossil fuels for electricity generation—including by advancing strategic intertie projects, such as the Atlantic Loop and other regional initiatives. The Canada Infrastructure Bank has earmarked \$2.5 billion as part of its \$10 billion Growth Plan. The government will invest an additional \$25 million to support predevelopment work.
 - Work with provinces, utilities and other partners to ensure that Canada’s electricity generation achieves net-zero emissions before 2050.
 - Continue to support Sustainable Development Technology Canada with an additional \$750 million over five years. This would support startups and scale-up companies to enable pre-commercial clean technologies to successfully demonstrate feasibility as well as support early commercialization efforts.

Nova Scotia

Nova Scotia continues to be the most active region for marine renewable energy development in Canada, now with seven permitted projects at different stages of planning and development. Numerous permits have been issued for unconnected tests/demonstrations and the Province of Nova Scotia continues to fund and support research dedicated to enabling and advancing tidal development. Nova Scotia also remains the only jurisdiction in Canada that has established a regulatory framework exclusively dedicated to marine renewable energy providing a management and governance structure to support responsible development of the marine environment (ie. environmental, social and economic interests). In 2020, several actions by Nova Scotia resulted in new entrants and project activity:

- *Marine renewable energy demonstration permit program*: The Government of Nova Scotia issued additional permits under its demonstration permit program that was launched in 2018. Under the program, marine renewable-energy permits let project developers test or demonstrate new ways of
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generating marine renewable energy. Applicants may apply for unconnected permits to test non-grid connected devices or demonstration permits to deploy and connect devices to the electrical grid in the Province. Each demonstration project may be permitted no more than five (5) megawatts of new generating capacity, with a total of no more than ten (10) megawatts available under the program. In August, Neweast Energy was granted a permit for an 800 kW project. Another 7 MW was previously allocated to Big Moon Power (5 MW), Jupiter Hydro (2 MW), and Nova Innovation (1.5 MW).

- *Procurement process for vacant berth*: The call for proposals for the vacant berth at FORCE initiated in 2019 resulted in an award of the berth to BigMoon Power. This process was led by a third party administrator who conducted the process on behalf of the government. Award of the berth requires that BigMoon also remove the Cape Sharp Tidal turbine that remains in the berth after its 2018 deployment.



OUR WORK: ADVANCING THE SECTOR

Marine Renewables Canada's core focus is building a marine renewable energy industry in Canada. To do this, the association leads advocacy with government and stakeholders, international business development activities, knowledge-building workshops, and continues to support the needs of members as they pursue opportunities. As 2020 was a very different year, traditional activities and events were not always possible, but the association worked to pivot activities and was able to innovate and adapt to continue supporting sector growth.

ENGAGEMENT & ADVOCACY

With the pandemic top of mind and major impacts to the economy worldwide, the focus on “building back better” became a key theme. Marine Renewables Canada worked continuously to ensure that marine renewable energy was recognized as a solution to both economic recovery and action on climate change. Over the course of 2020, the association provided input and engaged in a number of federal and provincial government initiatives:

- Submission to the Government of Canada Regarding Economic Recovery Measures (May 2020)
- Submission to the BC Government Regarding Economic Recovery (July 2020)
- Written Submission for the Pre-Budget Consultations in Advance of the Upcoming Federal Budget (August 2020)
- Joint submission via Canadian Council on Renewable Electricity (CanCORE) to Government of Canada on Considerations for Renewable Electricity in upcoming Throne Speech (September 2020)
- Joint submission via Canadian Council on Renewable Electricity (CanCORE) on the Federal Hydrogen Strategy Engagement Sessions (September 2020)

Marine Renewables Canada also worked to address both near- and long-term challenges and opportunities for the sector. The association continued to meet with government and other stakeholders to discuss the opportunity for offshore wind in Canada, which increasingly poses potential as more studies identify benefits to developing the resource and the need for industrial and supply chain activity is a necessity to post-pandemic economic recovery. Marine Renewables Canada was also highly active in engaging with the federal government on how to create a more predictable regulatory pathway for tidal energy projects. This work will continue into 2021.

Alliances and Strategic Partners

In working to support the development of a new industry, collaboration and partnerships have always played a key role in Marine Renewables Canada's efforts. In a year with so much uncertainty, it was even more important to come together with partners and collaborators to address challenges and provide support for members and the broader clean energy sector as a whole. In addition to existing partners, Marine Renewables Canada established some new partnerships:

- *Business Network for Offshore Wind*: Marine Renewables Canada has been working to facilitate an offshore wind sector domestically as well as support members engaging in international offshore wind markets, particularly in the United States. In mid 2020, the association entered into an affiliation agreement with US based, the Business Network for Offshore Wind, an organization focused solely on the development of the US offshore wind industry and advancement of its supply chain. Both organizations are committed to ensuring Canada and US industry and suppliers receive increased support to engage in offshore wind development and since the agreement, both organizations have been sharing information, participating in each other's events, and working together regularly.
- *Women in Renewable Energy (WiRE)*: In early 2020, Marine Renewables Canada entered into a partnership with WiRE, an organization focused on advancing the role and recognition of women working in the energy sector. This collaboration creates new opportunities for the association to support and foster engagement amongst women working in the marine renewable energy sector.
- *National electricity associations*: Soon after the pandemic led to shutdowns, travel bans, and a general inability to meet and work the way most people are accustomed, the national electricity associations, including Marine Renewables Canada, came together to share insight on the challenges to the electricity sector presented by the pandemic, ideas on how to support members, and how to work together to address impacts to the sector. After a year the group is still meeting weekly and has also spearheaded a number of joint initiatives including joint op-eds, virtual sessions, and meetings with government officials focused on the need for increased electrification in Canada.
- *Canadian Council on Renewable Electricity (CanCORE)*: The association continues to work closely with its partners – Waterpower Canada and Canadian Renewable Energy Association (CanREA) through CanCORE to provide advice and education on how renewable electricity can play a significant role in meeting GHG reduction targets and overall climate change goals.

PIVOTING DURING THE PANDEMIC – HELPING MEMBERS SUCCEED

The COVID-19 pandemic presented new challenges for Marine Renewables Canada and its members – a situation most of us had not anticipated that disrupted our lives and the way we do business. Early in the pandemic, Marine Renewables Canada worked to track business supports established by government and provided information to members on an ongoing basis. It also led a number of targeted activities to support industry growth and member needs. In working towards some continuity with hybrid and in-person event delivery, staff also developed health and safety guidelines for events and tailored these as needed for each event.

- *Supporting Economic Recovery*: With the very visible need for economic recovery measures, the association also viewed this time as an opportunity to emphasize the dual role marine renewable energy could play in economic development and acting on climate change. The association hosted and organized a two-part webinar series “Big Green Ideas for Atlantic Canada’s Economic Recovery” and developed economic recovery submissions for the federal government and government of British Columbia.
- *MRC Connect*: One of the key aspects of business and everyday life that was impacted by the pandemic has been the people factor – face-to-face meetings, networking at conferences, having casual conversations over coffee. Understanding that the ability to continue making new connections, foster relationships and engage in networking opportunities is of vital importance to association members, Marine Renewables Canada developed a new tool to support members’ business development needs during these times of distancing – the MRC Connect app. MRC Connect is exclusive to members and was designed to be used daily as a tool to connect directly and informally, keep informed of opportunities, and provide additional support for events and international trade missions.



SUPPORTING TC-114 STANDARDS DEVELOPMENT

Marine Renewables Canada has continued to administer the TC-114 International Electrotechnical Commission (IEC) Canadian sub-committee. Canada has been actively engaged in the standards development process for marine renewable energy since the inception of the international committee. The Canadian TC-114 Subcommittee currently has 39 active members from government, utilities, industry, and academia.

In 2020, the Canadian sub-committee actively participated in the development of new first edition standards and the continued improvement of existing standards. After collecting feedback over the last few years, the TC-114 team is now developing the second edition of many standards. These will include significant enhancements for mooring design, general design, and power production verification for marine renewable energy technologies.

Despite the inability to meet in person over the course of 2020, the Canadian sub-committee continued to hold regular meetings virtually, including the yearly plenary which includes bringing together subject matter experts from around the globe.

ENGAGING IN THE GLOBAL MARKET: INTERNATIONAL BUSINESS DEVELOPMENT

Trade Missions & International Engagement

Although 2020 was a difficult year for engaging in international business development, Marine Renewables Canada was still very active in delivering activities. The association pivoted to virtual platforms where necessary and managed to support members' international business objectives and continue highlighting the strengths Canada has in marine renewable energy.

Mission to the Pan-American Marine Energy Conference (PAMEC)

San Jose, Costa Rica (January 2020)

Marine Renewables Canada hosted and organized a mission to the inaugural Pan American Marine Energy Conference (PAMEC), a conference established to bring researchers, industry and government together from all of the Americas with an aim to collaborate and encourage marine renewable energy development.

This was the only in-person mission of the year and had broad representation including, service providers, consultants, technology developers, project developers, ocean technology manufacturers, research associations, and government. It was very successful in fostering a Pan-American network of companies (i.e. Canada, Costa Rica, Mexico, Chile, USA) that can collaboratively work towards commercial solutions for some of the unique clean electricity market opportunities the regions present.

Highlights of the PAMEC Mission included:

- Participation of 11 companies/organizations
- Organization and realization of 100+ strategic meetings for mission delegates
- Canadian booth in the PAMEC exhibition
- A Canada hosted conference session and luncheon highlighting experience & expertise in marine renewable energy
- Canadian delegates from Marine Renewables Canada, Envigour, FORCE, Dalhousie University, Glas Ocean, Mersey Consulting and CEF Consultants participated in the conference sessions as speakers
- Participation in pre-conference workshops by delegates, including an international test centre workshop hosted by FORCE



Workshop: Business Readiness for the US Offshore Wind Energy Market

Halifax, Nova Scotia (March 2020)

Marine Renewables Canada has been leading the development of an Offshore Wind Energy Strategy which includes both near- and long-term actions. As part of this strategy, the association planned to lead a mission to the International Partnering Forum for (IPF) for Offshore Wind taking place in Rhode Island April 21-24, 2020, which was eventually cancelled and rescheduled to be held virtually in August 2020.

In advance of this IPF mission, Marine Renewables Canada, in partnership with ACOA and the Nova Scotia Department of Energy & Mines, hosted a workshop to assist mission delegates as well as members and Canadian businesses with interests in pursuing opportunities in the US offshore wind market. Workshop speakers provided a deep dive into the US market as well as guidance on strategies and tactics for Canadian companies to build their business case for the market.

Participation in the 2020 International Partnering Forum (IPF) on Offshore Wind

Virtual (April-August 2020)

Due to the onset of COVID-19 mid-March, IPF conference organizers decided to postpone the event until August 2020. As COVID progressed, it was clear that an in-person conference and mission was not going to be possible. IPF pivoted to a virtual platform that included sessions and B2B sessions April through August. Many of the Marine Renewables Canada members and Canadian businesses that had originally expressed interest in participating in the mission to IPF 2020 attended virtually and were able to take advantage of plenary sessions, poster sessions, B2B services, and the virtual exhibition.

Additional international events participation and speaking engagements

Marine Renewables Canada participated in a number of other international conferences providing presentations on the state of the marine renewable energy sector and the strengths of the Canadian industry:

- International Forum on Environment and Blue Economy – Brazil (September 2020)
- WavEC Annual Seminar 2020 – Portugal (November 2020)

ASSOCIATION-LED EVENTS & OUTREACH

Information Session: Opportunities in Offshore Wind & Tidal Energy Saint John, New Brunswick (January 2020)

In partnership with Port Saint John, Marine Renewables Canada hosted an information session to provide information on growth, progress, and opportunities in the international offshore wind industry (particularly in the US) and Canadian tidal energy development. The info session provided insights into the opportunities for Canadian supply chain engagement in US offshore wind energy developments and an overview of the context for potential offshore wind energy projects in Canada. Attendees also received updates on tidal energy activity in the Bay of Fundy including current project plans and timelines.

Summer Nautical Networking Event on the Tall Ship Silva Halifax, Nova Scotia (August 2020)

Every summer, Marine Renewables Canada holds an event to bring its members and the broader ocean and energy industries together for an evening of networking and catching up on progress and opportunities in the sector. Although the COVID-19 pandemic was ongoing, Marine Renewables Canada was able to move ahead with its annual summer event on a smaller-scale – and – with absolute adherence to all public health directives.

Moving forward with the summer event was important to the association for many reasons: Marine Renewables Canada wanted to create an opportunity for members to connect with colleagues again and get updates on industry opportunities and progress – and – the association also believes that engaging local businesses to help deliver events like this is integral to ensuring that small businesses can overcome the losses they have faced. The association also felt strongly that although virtual meetings and events are effective for many business needs, they still do not have the same impact as face-to-face interactions.

The 2020 Nautical Networking Event on the Tall Ship Silva sold out quickly having a capped capacity of 50 people. It included sit-down food and beverage service and live music during the two hour cruise through Halifax Harbour. This event could not have been possible without the support of its sponsors and partners: Halifax Offshore Consulting (HOC), Bourque Industrial, Spar Marine, and Atlantic Towing.



Marine Renewables Canada Inaugural Golf Tournament

Halifax, Nova Scotia (September 2020)

Marine Renewables Canada hosted its first ever Golf Tournament in the fall at the Grandview Golf & Country Club, creating an opportunity to make connections and build relationships with professionals across marine, offshore, and energy industries. With Nova Scotia and Atlantic Canada as a whole easing COVID-19 restrictions in July, the association was able to move ahead with this inaugural event creating new health and safety protocols and working closely with the venue. The golf tournament was a great success, selling out at a capped capacity of 72 people. Attendees enjoyed a safe and fun-filled day of golf, followed by a post-tournament BBQ.

This first golf event could not have been possible without the support of its sponsors and partners: McKeil Marine as well as event sponsors Halifax Offshore Consulting (HOC), Bourque Industrial, Atlantic Towing, Canadian Maritime Engineering, Oneka Technologies, Logistec, Cox & Palmer, Cherubini, Sustainable Marine Energy, Mersey Consulting, and The Westin Nova Scotian.



Marine Renewables Canada 2020 Fall Forum

Halifax, Nova Scotia (November 2020)

Marine Renewables Canada typically hosts a 2-3 day annual conference each year, but given the limitations created by the pandemic this was obviously not possible in 2020. The association still felt that there was a need and importance to host an event that could bring the industry together and were committed to figuring out how to do that in-person where possible. As a solution to operating during the pandemic while still creating a venue for in-person connection, Marine Renewables Canada created a one day Fall Forum, comprising of a pre-forum virtual session with international industry and a full day of hybrid sessions.

As this was Marine Renewables Canada's first hybrid event, staff worked closely with the venue to implement health and safety protocols and coordinated closely with audio-visual suppliers to ensure seamless delivery of the program that included both in-person and virtual speakers participating in the same sessions.



The event was at capacity for attendees with social distancing practices in place and featured 17 in-person and 10 virtual speakers. Achieving a hybrid event under the circumstances presented by COVID was quite a highlight of the year for the association, but this was further accentuated with Seamus O'Regan, Minister of Natural Resources for Canada joining in person for a keynote address which included the announcement of \$28.5 million to Sustainable Marine for the development of its tidal array project at FORCE.

The hybrid Fall Forum was an important achievement for Marine Renewables Canada and it could not have been possible without the support of its sponsors and partners: Nova Scotia Department of Energy & Mines, Sustainable Marine Energy, Atlantic Towing, Global Affairs Canada, DP Energy, Bourque Industrial, Cox & Palmer, Halifax Offshore Consulting, Taut Solutions, Hydroquest, COVE, and Cherubini.



Additional international events participation and speaking engagements

Marine Renewables Canada participated in a number of other conferences, workshops, and events delivering presentations that provided education on the opportunities of Canada's marine renewable energy sector, industry progress, and strengths of members and the supply chain:

- Association of Professional Engineers and Geoscientists of New Brunswick (APEGNB) Marine Renewables Session – Moncton, New Brunswick (March 2020)
- Government of Canada Funding Announcement at FORCE – Parrsboro, Nova Scotia (September 2020)
- Canadian Club of Ottawa “Building Back Better Through Electrification” – Virtual (October 2020)
- National Research Council Science and Technology Scan: Marine Energy – Virtual (October 2020)



We are proud to have members from across the country and internationally who represent different aspects of the marine renewable energy sector -- suppliers, utilities, project and technology developers, government, communities, and academia.

Marine Renewables Canada is pleased to welcome the following new members who joined the association in 2020:

BMT Canada, Brezo Energy, Business Network for Offshore Wind, Castaloo, Canadian Maritime Engineering (CME), DASCO Equipment Inc., Halifax Offshore Consulting (HOC), Huntley's Sub-Aqua Construction, HydroQuest, I.H. Mathers, KMS Industries, Inc., Logistec, MacArtney Canada, Manitoba Hydro, Pennecon Energy Hydraulic Systems, Port of Stephenville, Taut Solutions, Scanmudring, Sustainable Oceans Applied Research (SOAR), Welsh Government in Canada, and Weyl Power.





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