Energy and Mines Office of the Minister



Énergie and Mines Bureau du ministre

Joseph Howe Building, 1690 Hollis Street PO Box 2664, Halifax, Nova Scotia, Canada B3J 3P7

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August 20, 2020

Mr. Clayton Bear President & CEO Neweast Energy Corporation 7112 78 St. NW Calgary, AB Canada T3B 4J1

Re: Marine Renewable-energy Demonstration Permit - No. 2020-70-0004 issued to Neweast Energy Corporation Registry of Joint Stock Companies ID No. 3329875.

Dear Mr. Bear:

This is to advise that I have approved Neweast Energy Corporation's application for a permit in accordance with Sections 35(5) and 36(1) (c) of the *Marine Renewable-energy Act*. I am pleased to present you with a **Demonstration Permit** for an 800 kilowatt in-stream tidal energy project to be deployed in Cumberland County, Nova Scotia (Permit Number 2020-70-0004).

Please note that failure to meet, or otherwise breach, requirements of this Permit, the Act or its associated regulations can result in legal remedies being taken by the Province including being subject to an order, a suspension, or a revocation of this Permit. Pursuant to Section 23 of the *Marine Renewable-energy General Regulations*, annual rents and fees are due 60 days from the issuance of this Permit.

Be aware that pursuant to Section 46 of the Act, any proposal for a modification, relocation, or other change in the project and permit requires prior review and approval by the Minister.

If you have any questions regarding the approval, or if we can be of further assistance to you, please contact the Program Administrator at (902) 717-0906 or via email at marinerenewables@novascotia.ca.

Sincerely,

Derek Mombourquette Minister



MARINE RENEWABLE-ENERGY DEMONSTRATION PERMIT

Province of Nova Scotia Marine Renewable-energy Act

| PERMIT HOLDER: | Neweast Energy Corporation Inc. |
|-------------------|---------------------------------|
| PERMIT NUMBER: | <u>2020-70-0004</u> |
| EFFECTIVE DATE: | <u>August 21, 2020</u> |
| EXPIRY DATE: | <u>August 20, 2025</u> |
| LAST AMMENDED ON: | |

Pursuant to Section 36 of the *Marine Renewable-energy Act*, as amended from time to time, this Demonstration Permit granted to the Permit Holder is subject to the Terms and Conditions attached to and forming part of this Permit, for the following activities:

Construction, installation, operation, and decommissioning of four (4) in-stream tidal energy generators on a short-term demonstration basis with an aggregate nameplate capacity of eight hundred (800) kilowatts at Neweast Energy Corporation Inc. Permit Area located adjacent to the FORCE MREA.

For greater certainty, the activity authorized under this Demonstration Permit and its terms and conditions is subject to the *Marine Renewable-energy Act* and its regulations.

Jour floges

August 20, 2020

Derek Mombourquette Minister Date Signed

MARINE RENEWABLE-ENERGY DEMONSTRATION PERMIT TERMS AND CONDITIONS

Province of Nova Scotia Marine Renewable-energy Act

| PERMIT HOLDER: | Neweast Energy Corporation Inc. |
|-------------------|--|
| PERMIT TYPE | Demonstration Permit (Connected Generator) |
| PERMIT NUMBER: | <u>2020-70-0004</u> |
| EFFECTIVE DATE: | <u>August 21, 2020</u> |
| EXPIRY DATE: | <u>August 20, 2025</u> |
| LAST AMMENDED ON: | |

Terms and Conditions of License Approval

This approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations and by-laws before constructing, installing, operating and decommissioning any device in the Neweast Energy Corporation Inc. Permit Area.

Permit

The following schedules are attached to and form part of this Permit:

- Schedule A Neweast Energy Corporation Inc. Technical Description;
- Schedule B Survey of Neweast Energy Corporation Inc. Permit Area;
- Schedule C Project Plan; and
- Schedule D Insurance Requirements.

The terms and conditions of this Permit document shall prevail over the Schedules.

Definitions:

Terms which are defined in either the *Marine Renewable-energy Act* or its regulations have the same meaning in these terms and conditions, unless otherwise provided.

In this Permit:

"Aggregate Name Plate Capacity" means the maximum installed capacity permitted under the demonstration permit of the units forming the Generation Facility;

"Application Document" means the marine renewable-energy permit application submitted by the Permit Holder to the Nova Scotia Department of Energy and Mines and deemed complete on March 22, 2020;

"Commercial Operation" means the completion of the design, construction and commissioning of at least one (1) device of the Generating Facility, and the Permit Holder has provided written notice to NSPI that they are ready for Commercial Operation. Commercial Operation must be reached on or before the Final In-Service Date;

"Commercial Operation Date" means the first day of the calendar month following Commercial Operation;

"Decommissioning, Abandonment and Rehabilitation Plan" means the decommissioning, abandonment and rehabilitation plan required by subsection 44(2) of the *Marine Renewable-energy Act* and provided to the Minister in accordance with sections 19 and 20 of the *Marine Renewable-energy General Regulations*;

"Deployment" means the placement of a device or associated equipment in position ready for use;

"Effective Date" means the date that this Permit is effective, as noted at the head of this document;

"Fee Regulations" means the Marine Renewable-energy Fees Regulations;

"Final In-Service Date" shall be three (3) years from the Effective Date;

"Generation Facility" means one or more device(s) described in the Project Plan and Schedule A, together with all protective and other associated equipment and improvements as may be modified from time to time pursuant to the terms of this Permit;

"Generator(s)" as defined in the Marine Renewable-energy Act,

"Incremental Energy Rate" means the rate in \$/MWh which is equal to NSPI's cost of generating or purchasing one more MWh of energy from sources other than the Generating Facility as calculated by NSPI averaged over the twelve (12) month period immediately preceding the relevant time and set out in the Power Purchase Agreement (PPA);

"Minister" means the Minister of Energy and Mines for the Province of Nova Scotia;

"MRE-Act" means the Marine Renewable-energy Act;

"Neweast Energy Permit Area" or "Permit Area" means the area of submerged land for which the specific location has been determined by survey by the Permit Holder as described in the Application document and as contained in Schedule B of this Permit;

"NSPI" means Nova Scotia Power Incorporated;

"Permit Holder" means Neweast Energy Corporation Inc.;

"Program Administrator" means a representative of the Nova Scotia Department of Energy and Mines who has been assigned to receive information on the Department's behalf with respect to this Permit;

"Project Plan" means the project plan attached as Schedule C;

"Regulations" means the Marine Renewable-energy General Regulations;

"Socio-economic Matters" include, but are not limited to, issues relating to employment, job-creation, and community relations;

"Technical Description" means the description of the technology contained in Schedule A of this Permit;

1.0 Scope of Approval

- 1.1 *Project Details*. This Permit is limited to the project as described in the Schedules attached to and forming part of this Permit.
- 1.2 *Project Technology*. The Permit for the project is limited to the technology as described in the Schedules attached to and forming part of this Permit and limited to the aggregate nameplate capacity first stated above.
- Permit Area. The Permit Area is (25.25 hectares) as set out in Schedule
 B. Generator(s) authorized under this Permit shall be constructed, installed and operated within the Permit Area.
- 1.4 *Development and Operation.* The Permit Holder shall develop and operate the project as described in the Project Plan attached to and forming part of this Permit as Schedule C.
- 1.5 *Precedence of legislation*. In the event of a conflict between the *MRE-Act* and its regulations and the terms and conditions of this Permit, the *MREAct* and its regulations shall prevail.

2.0 General Terms and Conditions

- 2.1 This Permit is valid for a term of five (5) years form the Effective Date.
- 2.2 *Site Development.* All work related to construction of shoreline and onshore infrastructure related to this Permit take place between October and March, each year work is required, to minimize impacts to birds during the migration season.
- 2.3 *Renewal eligibility.* This Permit expires on August 20, 2025. To be eligible to renew the term of the Permit, the Permit Holder must have fulfilled its obligations under this Permit, *MRE-Act* and its regulations and shall submit and receive written approval of a new project plan for the coming renewed term in accordance with the requirements and within the timelines of the *MRE Act* and its associated Regulations.
- 2.4 *Other Approvals, Permits and Authorizations.* This Permit is subject to the terms and conditions herein, as well as the Permit Holder obtaining and

maintaining all other necessary approvals, permits or authorizations under municipal, provincial and federal acts, regulations and by-laws.

2.5 In accordance with Section 42(1C) of the *MRE Act*, the maximum aggregate of terms for this permit is 18 years.

3.0 **Project Plan/Term of Permit**

- 3.1 The Permit Holder shall, within three (3) years of the Effective Date, reach Commercial Operation on the project.
- 3.2 The full Generation Facility as described in the Technical Description (Schedule A) and Project Plan (Schedule C) shall be constructed and operational within three (3) years of the Effective Date of this Permit. This is also the Final In-Service Date. The Final In-Service date shall not be extended by the Minister.
- 3.3 Any proposal by the Permit Holder for changes to any aspect of the project from that described in an approved Project Plan shall be submitted to the Minister for review and approval.
- 3.4 This Permit is valid from the date of issuance, expiring on August 20, 2025.

4.0 **Power Purchase Agreement**

- 4.1 Energy produced by the Permit Holder will be paid in accordance with the Power Purchase Agreement (PPA) between the Permit Holder and NSPI.
- 4.2 The term of the PPA shall end on the earlier of:
 - a) the date on which the Demonstration Permit expires, or is revoked;
 - b) or 15 years after the Commercial Operation Date.
- 4.3 The Permit Holder shall be paid an energy rate of \$500 per megawatt hour (MWh) of energy generated up to an annual cap of MWh, then the Incremental Energy Rate above this cap, in accordance with the PPA.

5.0 Rent Payments

- 5.1 The Permit Holder shall pay the first annual rent payment of \$185.02 no later than sixty (60) days after the Effective Date, and \$511.60 on or before January 31 of each subsequent year during the term of the Permit. The rent payment is calculated on the basis of a calendar year and is equal to the greater of two thousand five hundred dollars (\$2,500) per megawatt (MW) of installed capacity under the Permit or twenty dollars (\$20.00) per hectare in the Permit Area.
- 5.2 Rent payments shall be made payable to the "Minister of Finance" and are non-refundable.
- 5.3 If rent is not paid on or before the deadline for payment, the Permit Holder shall pay an additional late fee in an amount equivalent to 10% of the full owed.

If rent remains in arrears for more than 120 days after the deadline the Minister may suspend the Permit until rent owing is paid in full.

5.4 The Permit Holder shall notify the Minister in writing no later than sixty (60) calendar days before the next rent payment is due if the megawatts of installed capacity authorized under the Permit or the hectares of the Permit Area change such that it may impact annual rental fees.

6.0 Environmental Monitoring Plan

- 6.1 The Permit Holder shall not construct or install a generator, cable or other equipment or structure in the Permit Area until the Permit holder has submitted, and the Minister has approved, an Environmental Monitoring Plan. The Permit Holder shall implement and adhere to the Environmental Monitoring Plan following approval.
- 6.2 Unless otherwise approved, the Permit Holder shall submit an Environmental Monitoring Plan to the Program Administrator for review and approval at least thirty (30) days prior to constructing or installing a generator, cable or other equipment or structure in the Permit Area.
- 6.3 The Environmental Monitoring Plan (EMP) must be developed using relevant baseline data and identify appropriate environmental effects

indicators. The plan shall consider project effects on, but not limited to, the following:

- fish and lobster;
- marine birds;
- marine mammals;
- acoustics;
- physical oceanography; currents and waves; and benthic environment.

The EMP shall include contingencies to be implemented as alternative courses of action in the event mitigation and/or monitoring activities cannot be implemented, are not functioning as designed, or do not provide expected results.

- 6.4 The Permit Holder shall update and revise the EMP to reflect best available and economic practices, methods, and technologies respecting environmental monitoring; changes in the Project Plan and circumstances of the project; and changes in the knowledge of, or actual changes in the physical, ecological, and environmental circumstances and impacts of the project.
- 6.5 The Permit Holder shall submit an initial status report on environmental monitoring equipment functionality to the Program Administrator prior to turbine operation and shall notify the Program Administrator of any malfunction or non-functioning of the equipment within twenty-four (24) hours.
- 6.6 Environmental effects monitoring reports shall be submitted in writing to the Minister at a schedule to be determined by the Nova Scotia Department of Energy and Mines.
- 6.7 Upon knowledge of serious harm to marine mammals, fish, marine invertebrates, and marine birds, the Permit Holder shall, without unreasonable delay, notify the Program Administrator and the Department of Fisheries and Oceans Canada.

7.0 Engagement Requirements

- 7.1 *Mi'kmaq Engagement Plan.* The Permit Holder shall not construct or install a generator, cable or other equipment or structure in the Permit Area until the Permit Holder has submitted, and the Minister has approved, a Mi'kmaq Engagement Plan. The plan shall outline ongoing and proposed engagement activities with the Mi'kmaq of Nova Scotia and shall include, as a minimum, a description and general schedule of activities under the authority of the Permit. The Permit Holder shall send a draft of this engagement plan to the KMKNO and allow adequate time for feedback to be incorporated prior to submitting to the Department for approval. The Permit Holder shall implement the plan following approval. The plan shall be updated and resubmitted annually to the Minister for approval on or before January 31st throughout the term of this Permit.
- 7.2 The Permit Holder shall support the Province of Nova Scotia in its future and ongoing consultation processes with the Mi'kmaq of Nova Scotia related to this project, share information the Minister considers necessary or advisable, with the Mi'kmaq of Nova Scotia, and consider implementing mitigation and accommodation measures to address any issues raised through consultation.
- 7.3 Stakeholder Communication and Engagement Plan. The Permit Holder shall not construct or install a generator, cable or other equipment or structure in the Permit Area before submitting a stakeholder communication and engagement plan to the Minister for approval. The plan shall outline ongoing and proposed engagement activities with stakeholders and shall include, as a minimum, a description and general schedule of activities under the authority of the Permit. The Permit Holder shall implement the plan following approval. The plan shall be updated and resubmitted annually to the Minister for approval on or before January 31, throughout the term of this Permit.

8.0 Reporting Requirements

- 8.1 *Deployment Notice*. The Permit Holder shall notify the Program Administrator at a minimum, thirty (30) days prior to the Deployment or the testing of generator(s) or equipment under the authority of the Permit.
- 8.2 *Deadlines for Activity Reports.* The Permit Holder, throughout the term of the Permit, shall submit quarterly written reports ("Activity Reports") to the Minister detailing the activities carried on under the authority of the Permit:

- a. by January 31, for activities between October 1 and December 31;
- b. by April 30, for activities between January 1 and March 30;
- c. by July 31, for activities between April 1 and June 30; and
- d. by October 31, for activities between July 1 and September 31.
- 8.3 *Content of Activity Reports.* At a minimum, the Activity Reports shall include:
 - a. Detailed and up-to-date project schedule;
 - b. Status update on operational aspects of the project;
 - c. Operational capacity factor for each generator and calculation methodology;
 - d. Progress updates on the activities outlined in the project schedule;
 - e. Detailed and up-to-date procurement schedule;
 - f. Amended procurement deadlines;
 - g. Summary of any entities procured for goods/services;
 - h. Financial statements related to procurement, construction, operations, and monitoring activities, with audited financial statements included at least once per calendar year;
 - i. Data relating to socio-economic matters;
 - j. Lessons learned deemed beneficial to the sector; and
 - k. Any changes to the corporate structure of the Permit Holder or its major shareholders, including but not limited to changes of domicile, management, and corporate governance.
- 8.4 *Event notification*. The Permit Holder shall notify the Program Administrator within ten (10) business days upon reaching the following milestone(s):
 - a. Receipt of any federal, provincial, or municipal regulatory approvals;
 - b. Approval of additional funding or grants;
 - c. Completion of any NSPI grid interconnection activities;
 - d. Connection to the transmission or distribution grid;
 - e. Issuance of any manufacturing or fabrication contracts;
 - f. Installation of a generator and any cable or other equipment or structure used or intended to be used with a generator;
 - g. Reaching commercial operation under the power purchase agreement;
 - h. Achieving % capacity factor;
 - i. Achieving % capacity factor;
 - j. Exceeding % capacity factor;

- k. Commencement of decommissioning activities; and
- I. Completion of decommissioning and rehabilitation activities.
- 8.5 *Press release notification.* The Permit Holder shall notify the Program Administrator at least one (1) business day prior to any press release, social media post, or other public facing release, related to the activities authorized under the Permit.
- 8.6 *Officer's and Director's Certificates*. The Permit Holder, upon request from the Minister, shall provide an officer's or director's certificate attesting to the truth, accuracy and completeness of any report and submission required under this Permit, or attesting to matters of compliance with this Permit.

9.0 Incident Reporting

- 9.1 The Permit Holder shall provide the Program Administrator, within seventytwo (72) hours, a report of any significant adverse environmental effects, accident or near miss, generator malfunction or impact to human health or safety together with a description of the response.
- 9.2 The Permit Holder shall notify the Program Administrator at least one (1) business day in advance of any public release or press-conference related to an incident or near-miss.
- 9.3 The Permit Holder shall ensure that:
 - a. Any incident or near-miss is investigated, its root cause and causal factors identified where possible and corrective action taken where applicable; and
 - b. Any incident or near-miss is investigated, its root cause, causal factors and corrective action taken must be submitted in writing to the Program Administrator no later than thirty (30) days after the day on which the incident or near-miss occurred.

10.0 Risk Management Plan

10.1 The Permit Holder shall not construct or install a generator, cable or other equipment or structure in the Permit Area, until the Permit holder has submitted, and the Minister has approved a Risk Management Plan. The

Permit Holder shall implement and adhere to the Risk Management Plan following approval.

- 10.2 Unless otherwise approved, the Permit Holder shall submit a Risk Management Plan to the Program Administrator for review and approval prior to taking any action authorized by this Permit.
- 10.3 The Risk Management Plan must be developed using relevant project information and shall contain all the information listed in Section 18 of the Regulations.
- 10.4 The Risk Management Plan shall be updated and resubmitted annually by the Permit Holder to the Minister on or before January 31, throughout the term of the Permit.

11.0 Decommissioning, Abandonment and Rehabilitation Plan

- 11.1 Unless otherwise approved, in accordance with Section 19 of the Regulations, the Permit Holder shall not construct or install a generator, cable or other equipment or structure authorized by this Permit until the Permit Holder has submitted and the Minister has approved a Decommissioning, Abandonment and Rehabilitation Plan.
- 11.2 Unless otherwise approved, the Permit Holder shall submit a Decommissioning, Abandonment and Rehabilitation Plan to the Program Administrator for review and approval prior to constructing or installing a generator, cable or other equipment or structure authorized by this Permit.
- 11.3 The Decommissioning, Abandonment and Rehabilitation Plan shall be developed using relevant project information and shall contain all decommissioning activities and all of the information listed in Section 20 of the Regulations.
- 11.4 The Permit Holder shall update and revise the Decommissioning, Abandonment and Rehabilitation Plan to reflect best available and economic practices, methods, and technology of decommissioning, abandonment and rehabilitation; changes in the Project Plan and circumstances of the project; and changes in the, or knowledge of the, physical, ecological, and environmental circumstances and impacts of the project.

11.5 Any proposal by the Permit Holder that proposes changes to any aspect described in an approved Decommissioning, Abandonment and Rehabilitation Plan(s) shall be submitted to the Minister for review and approval.

12.0 Financial Security and Insurance

- 12.1 *Insurance.* The Permit Holder shall provide proof of liability insurance to the satisfaction of the Minister prior to taking any action authorized by this Permit.
- 12.2 *Coverage*. The Permit Holder shall maintain its insurance coverage in full force and effect for the term of the Permit and shall meet or exceed the terms and conditions as set out in Schedule D.
- 12.3 The Permit Holder shall provide financial security on terms and conditions acceptable to the Minister within sixty (60) days of notice of an approved Decommissioning, Abandonment, and Rehabilitation Plan and prior to the construction or installation of a generator or cable, or other equipment or structure authorized by this Permit. The Minister will provide written notice of the amount required, and any terms or conditions, prior to receiving financial security from the Permit Holder.
- 12.4 The Permit Holder shall ensure that any security provided is kept in effect throughout the Permit term. Unless otherwise required, the Permit Holder shall renew security on an annual basis and provide proof of financial security annually on or before January 31, throughout the term of the Permit.
- 12.5 The Minister may determine the form, and for greater certainty the terms and conditions, in which financial security is provided, including any of the following forms:
 - a. Electronic transfer, cash deposit, or cheques made payable to the Minister of Finance, which the Province in its absolute discretion may cash at any time;
 - b. Government guaranteed bonds, debentures, term deposits, certificates of deposit, trust certificates or investment certificates assigned to the Minister of Finance; or
 - c. Irrevocable letters of credit, irrevocable letters of guarantee, performance bonds or surety bonds in a form acceptable to the Minister.

The Minister may impose additional terms and conditions for this financial security upon review and approval of the Decommissioning, Abandonment and Rehabilitation Plan.

13.0 Performance Requirements

- 13.1 The Permit Holder shall provide final as-constructed drawings of the Generation Facility and all associated infrastructure to the Program Administrator no later than ninety (90) days upon reaching Commercial Operation.
- 13.2 The Permit Holder is subject to the following performance targets:
 - a. Capability of deployed generators(s) to be operated and controlled with consistency following installation;
 - b. Deployed generators operating and being controlled consistently;
 - c. Capability of turbines, blades, and other spinning or moving components representing a risk to human or wildlife health of being stopped, halted and braked when and if required; and
 - d. Maintenance of an annual average capacity factor of at least % for each generator under the authority of the Permit.
- 13.3 The Permit Holder shall provide performance reports to the Program Administrator no later than January 31 of each year through the term of this Permit. At a minimum, the report must include the following for each generator installed:
 - a. Amount of energy generated;
 - b. Date(s) energy was generated;
 - c. Peak generation;
 - d. Capacity factor achieved and calculation methodology;
 - e. Number and date(s) of days deployed;
 - f. Number and date(s) of operating days;
 - g. Number and date(s) of maintenance days (planned and unscheduled);
 - h. The type of maintenance required; and,
 - i. A summary of operational issues impacting energy production or safe operation of the Generation Facility.

13.4 In the event any generator fails to meet the annual performance standard detailed in 13.2, the Permit Holder must submit a report to the Minister outlining a reasonable time-line and plan for restoration of the generator(s) to either render it fully functional or provide details for removing the generator(s) from the Permit Area. The Permit Holder must implement the restoration as submitted; any change is subject to prior approval of the Minister. Unless otherwise approved, the Permit Holder cannot invoke this provision within three years of it being previously invoked, and not more than twice overall during the maximum term of this Permit.

14.0 Notice to Minister and Program Administrator

14.1 Notice, documents and other information required to be sent to the Minister of the Nova Scotia Department of Energy and Mines, shall be in writing and may be served by personal service, fax or electronically, addressed as follows:

Attention: Minister of Energy and Mines

Nova Scotia Department of Energy and Mines Joseph Howe Building 1690 Hollis Street PO Box 2664 Halifax, NS B3J 3J9 Phone: (902) 424-4575 Fax: (902) 424-0528 Email: <u>energyminister@novascotia.ca</u>

14.2 Notice and/or information required to be sent to the Program Administrator shall be in writing and sent via email to: <u>marinerenewables@novascotia.ca</u>

15.0 Notice to NSPI

15.1 In the event this Permit expires, is suspended or revoked, the Minister will provide written notice of this to Nova Scotia Power Inc.

16.0 Standards

16.1 The Permit Holder must comply with industry standards for marine renewable energy conversion systems as they exist at the time of the issuance of this Permit and as amended, which may include, but may not

be limited to, the International Electrotechnical Commission (IEC) Technical Committee (TC) 114.

16.2 At a minimum, the Permit Holder shall conduct itself with prudence and due diligence and with appropriate regard for matters of health, safety, and environment.

Schedule A – Technical Description

Schedule B – Survey of Permit Area



Schedule C – Project Plan



NewEast Energy Corporation Marine Renewable Energy Application Public Circulation Document

NewEast Energy Corporation, a wholly owned subsidiary of New Energy Corporation Inc., has applied to the Nova Scotia Department of Energy for a permit to deploy up to 800kW of tidal power generation equipment in the Minas Passage at a location next to the existing Fundy Ocean Research Center for Energy (FORCE) Crown Lease Area. The installation will consist of an array of floating grid connected New Energy EnviroGen[™] Power Generation systems based on the Darrieus vertical axis cross flow turbine. Energy produced with these turbines will be conditioned and supplied to the Nova Scotia Power grid system through the existing FORCE substation located near the tidal generation site.¹



Fig.1 Map of Bay of Fundy showing Minas Passage

The project timeline consists of a 3-year development window and up to a 15-year demonstration phase.

The Technology

The EnviroGen Power Generation systems are based on a vertical axis cross flow turbine. This is a slow turning turbine oriented across the moving water column. These systems are typically floated to keep the electrical equipment out of the water and position the rotor in the highest water velocity regime.



Fig.2 Rendering of a 25kW EnviroGen system with bi-directional mooring

¹ Subject to the review and approval of the FORCE Board and Nova Scotia government agencies connected to the permitting process

The platform and turbine genset are held in place by anchors on the sea bed – the only contact with the sea floor other than an electric cable back to shore.

New Energy has extensively monitored its turbines for impact on aquatic life. An independent study initiated by the Electric Power Research Institute (EPRI) and supported by Natural Resources Canada was conducted by the S.O.Conte Anadromous Fish Research Center located in Turner Falls, MA, on juvenile Atlantic Salmon and adult American Shad to determine the impact of a 5kW New Energy turbine on fish having to traverse a restricted channel. The fish were instrumented with transmitters, released into the channel, and behavior monitored. Even though this was an extreme situation with the fish having to pass very close or through the turbine, no mortality or injuries were observed.



Fig.3 EnviroGen turbine installed and operating in the test flume where fish were released and monitored.

Staged Approach to Project Development

While New Energy has completed fresh water applications in rivers, canals, and industrial outflows, and is currently working on several more along with an initial tidal energy demonstration project, the Bay of Fundy project will represent the first salt water (tidal) commercial demonstration of the EnviroGen Power Generation systems. Logistic and other issues not present in fresh water applications, will be addressed as part of the project plan.

To minimize risk and complete the project with the highest level of certainty, the project will be executed following a staged approach that includes an initial pilot installation using New Energy's existing and proven 25kW (rerated to 50kW) power generation hardware. This initial pilot phase involves the installation of two 25/50kW EnviroGen Power Generation systems, that once proven, will set the stage for the scale up and full build out phases, consisting of the installation of three 250kW units, by proving out all steps required to assemble, deploy, interconnect, and operate the power plant without incurring the potential high costs of having to rework the processes and procedures with the larger systems.



Fig. 4 Preparing for installation of a 25kW low flow unit on the Yukon River, Alaska



Fig. 5 Two 25kW units operating on the Chilla Canal in Northern India

Phase 1 – Pilot Installation

Phase 1 includes two main objectives:

- To demonstrate the installation and operation of New Energy's EnviroGen Power Generation Systems through a limited deployment of 100kW of generating capacity to shake out logistical or technical issues in deploying and operating the power generation systems prior to the main deployment. This experience will then be used to fine tune the process used to deploy the larger systems and incorporate any modifications required to ensure successful operation of the full plant.
- 2. To engage with stakeholders who have varying interests including: environmental concerns, impact on livelihoods, local and regional economic benefits including opportunities for employment, and even benefits to the provincial electrical system. The floating systems offer the opportunity for stakeholders to physically see the equipment in operation allowing them to gain a better understanding of how they work and giving them an opportunity to provide any feedback as to operational improvements. This engagement process will be used to better develop the long-term project plan for the full plant build-out taking into consideration the broader implications of the project.

The units are assembled on shore using a loader or small crane. Deadweight anchors will be floated into position along with mooring lines and buoys (or simply carried from shore if a large enough vessel is used) and lowered to rest on the bottom at the appropriate positions. As the flow is bi-directional two anchors will be used for each unit approximately lined up with the direction of flow. One mooring line from the closest platform will also include the electrical cable back to shore. With the two 25/50kW units in transport mode, the platforms and units will then be moved into position with a small tug or other boat and connected to the mooring lines and electrical cable. The cable will then be connected to the pre-installed electrical line running back to the FORCE substation.

The two 25/50kW systems will be supported by floating barges that provide buoyancy for the equipment but also serve as a convenient platform for mounting electronic equipment, taking measurements, and monitoring and servicing the system. Each boat will include power conditioning componentry, plus any supporting instrumentation. The boats will be placed close to one another (may be connected) such that overhead cabling can be used from one to the other. The system closest to shore will also be used as a summing station and will house the cable connection to shore.

The entire installation is designed to minimize cost and complexity of deployment, making it very easy to remove equipment for repair or other reasons, and to easily re-deploy when repairs are complete or other issues must be addressed. With the equipment in place, a detailed commissioning procedure will be undertaken to confirm all systems are operating as intended. An extensive 6-month test and data acquisition phase will be used to gather as much data as possible on all aspects of the installation to be used as inputs to the scale up and full build out phases which will include interconnection to the Nova Scotia Power grid.

During this phase NewEast will strive to make opportunities to physically view the equipment in operation in a safe manner. Barring that, video will be made available demonstrating how the equipment operates under various flow conditions.



Fig. 6 Proposed lease deployment area showing one possible array configuration, and cable corridor showing approximate cable route to shore.

Phase 2 - 250kW Scale Up

Phase 2 will scale the systems from 50kW to 250kW. The scale up will accomplish two basic objectives:

- 1. Scale-up the design from the proven 25/50kW system size to a full 250kW size including input from Phase 1 of the project.
- 2. Prepare for the full roll-out of the array of 250kW systems.

Once the 25/50kW systems have been installed and operational for a defined time (approximately 6 months) without any systemic issues, a scaled-up version of the 25/50kW systems will be built and deployed incorporating any learning from the test program. The scaled-up version will ultimately have an output capacity of 250kW.

Manufacture of the 250kW units will be coordinated locally with the support of local industry, taking advantage of local marine expertise, providing local employment, and minimizing shipping costs. As with the 25/50kW units, the 250kW units will be assembled at a staging area near the deployment location or at a local mobilization base. Once assembled the system will be moved to a location at low tide using a specially fitted trailer to be floated out during high tide.

Anchoring and mooring of the 250kW units will also essentially be scaled up based on the 25/50kW concept and procedures. Dead-weight anchors will be assembled on shore during low tide, floated into position during high tide, and sunk in a similar fashion to the 25kW units or with the use of a barge. Details of this process will be further developed through the deployment of the 25kW anchors.

While most power conditioning equipment is expected to be situated on the individual unit boats, a separate floating platform may be deployed for use as a summing station for the entire array, including the final above water connection to the cable to shore. This boat can also be used to house power conditioning equipment, instrumentation, data collection equipment, etc, as required.

Due to the unique characteristics of a vertical axis cross flow turbine, spacing of turbines in a multi-unit (array) configuration can be much tighter than horizontal propeller type turbines according to recent studies. To validate and quantify this conclusion, a separate effort will be undertaken with the Canadian Hydrokinetic Turbine Test Centre in Manitoba to establish spacing of the turbine array. Multiple systems will be installed at the CHTTC and tested in a variety of configurations to establish array spacing and arrangements. The results of this study will be used to influence spacing of the 250kW units.

Phase 3 – Full Build-Out

Once the initial 250kW system has been deployed and operated without any systemic issues for approximately 6 months, the final phase of the project will deploy the remaining two 250kW units in an array configuration with the initial unit following the procedures established in the previous phases. With all equipment built, deployed and in operation, an extensive monitoring program will be undertaken of the systems for performance, environmental impact, and impacts on any other stakeholders.

The plant will be operated for the duration of the 15-year demonstration program, after which decisions will be made for extending the life of the plant and/or deployments in other locations regionally, nationally, and internationally.

Schedule D – Insurance Requirements

Commercial General Liability Insurance

Comprehensive General Liability Insurance for liabilities arising out of property damage, personal injury and bodily injury including death resulting from any activity connected with the existence, management, maintenance and operation of Nova Innovation CAN Ltd. tidal energy project in the Permit Area. All such policies shall name as Additional Insureds Nova Scotia, their successors and assigns, and their respective directors, officers and employees. This insurance will include the following provisions:

- policy limit of liability of \$5 million per occurrence (can be structured as primary plus supplementary layers or primary plus Umbrella and/or Excess);
- annual aggregate limits permitted for Products Hazard & Completed Operations, Pollution coverage and Employee Benefits liability coverage; no other policy aggregates permitted;
- Products Hazard and Completed Operations, Pollution coverage subject to separate annual aggregate limits equal to the policy limit of liability;
- Sudden & Accidental Pollution coverage for all insured perils;
- nil deductible for Bodily Injury;
- maximum deductible all other occurrences of \$100,000 per occurrence, except Sudden & Accidental Pollution (\$1.0 million each claim);
- no hazardous operations exclusion permitted (i.e. excavation, pile driving, shoring, blasting, under-pinning or demolition);
- owners' and contractors' protective liability;
- blanket written and oral contractual liability;
- contingent employers' liability;
- personal injury liability;
- broad form occurrence property damage; and
- fire fighting expense liability.

Environmental Impairment Liability Insurance

Environmental Insurance insuring Nova Innovation CAN Ltd., all contractors, subcontractors, suppliers, and tradesmen while working on site, engineers, architects, consultants and subcontractors, Nova Scotia, their successors and assigns and their respective directors, officers, employees, agents and servants.

The insurance shall include the following provisions:

- policy limit of \$5 million per occurrence (can be structured as Primary plus Supplementary, Layered or Primary plus Umbrella and/or Excess);
- Claims made form permitted;
- Extended reporting period of 24 months, as required;
- Minimum of 24 months completed operations coverage;
- Cross liability and separation of interest with respect to each Insured;
- Nova Scotia and their respective directors, officers and employees included as Additional Insureds;
- Breach of any of the terms or conditions of the policy, or any negligence or willful act or omission or false representation by an Insured or any other person, shall not invalidate the insurance with respect to Nova Scotia; and
- Primary insurance without right of contribution of any other insurance carried by Nova Scotia.

Marine - Hull & Machinery And P&I (Protection & Indemnity)

Insuring the machinery equipment vessels and other marine property of contractors and subcontractors not insured under any other water craft provisions found in the course of construction policies.

The insurance shall include the following provisions:

- policy limit of liability Hull & Machinery of \$5 million per occurrence; and
- Protection & Indemnity (P&I) limit of liability as defined by Canadian Marine Underwriting Standards.

Documentation Required

The general insurance documentation to be produced by Nova Innovation CAN Ltd. shall meet the following requirements. No other documentation is required. For general insurance purposes, Nova Innovation CAN Ltd., may elect to have separate letters produced for the construction period and the operating phase, or may combine these into one letter from one broker covering both the construction period and the operating phase.

General Insurance – Construction Period

For the general insurance program covering the construction period, Nova Innovation CAN Ltd. must produce by at the latest four months prior to deployment a letter from its insurance broker appointed for the project, on the broker's letterhead, dated and signed by an authorized representative of the insurance broker, stating:

- that the broker has been appointed by Nova Innovation CAN Ltd. as its insurance broker for the construction period of the Nova Innovation CAN Ltd. tidal energy project;
- that the broker has examined the general insurance requirements included in this document, identified as the Insurance Requirements;
- the estimated total amount of the insurance premiums for the full construction period, including any coverage extension periods beyond completion of Nova Innovation CAN Ltd. tidal energy project and confirming that all of the general insurance requirements set out in the Insurance Requirements have been included in this estimated cost;
- that in the opinion of the broker, the estimated total insurance premium cost is its best estimate as of the date of its letter;
- that in the opinion of the broker, that there is no known impediment as of the date of its letter to producing general insurance policies meeting all of the Insurance Requirements with coverage to take effect from the date of the signing of the Agreement.

If more than one insurance broker has been appointed by Nova Innovation CAN Ltd. with each broker responsible for a portion of the construction period insurance program, each of the brokers shall produce a letter meeting the above requirements. Each of these letters shall clearly identify the elements of the construction period general insurance program that have been assigned to the respective brokers. Each broker's letter will deal solely with the elements of the construction period insurances that have been assigned to it.

General Insurance – Operating Phase

For the general insurance program covering the operating phase, Nova Innovation CAN Ltd. must produce a letter from its insurance broker appointed for the project, on the broker's letterhead, dated and signed by an authorized representative of the insurance broker, stating:

- that the broker has been appointed by Nova Innovation CAN Ltd. as its insurance broker for the operating phase of the Nova Innovation CAN Ltd. tidal energy project;
- that the broker has examined the general insurance requirements included in this document, identified as the Insurance Requirements;
- the estimated total amount of the insurance premiums for the first full year of the operating phase after completion of Nova Innovation CAN Ltd. tidal energy project, and confirming that all of the general insurance requirements set out in the Insurance Requirements have been included in this estimated cost;

- that in the opinion of the broker, the estimated total insurance premium cost is its best estimate as of the date of its letter;
- in the opinion of the broker, that there is no known impediment as of the date of its letter to producing general insurance policies meeting all of the Insurance Requirements with coverage to take effect from the date of the signing of the Agreement.

If more than one insurance broker has been appointed by Nova Innovation CAN Ltd., with each broker responsible for a part of the operating phase insurance program, each of the brokers shall clearly identify the elements of the operating phase insurance program that have been assigned to the respective brokers. Each broker's letter will deal solely with the elements of the operating phase insurances that have been assigned to it.