
A DISCUSSION PAPER

Marine Renewable Energy Legislation for Nova Scotia

Contents

SECTION 1: Introduction	2
SECTION 2: Marine Renewable Energy: The Opportunity	5
SECTION 3: Marine Renewable Energy: The Challenges	6
SECTION 4: The Global Experience	7
SECTION 5: Framework for Development of Nova Scotia's Marine Renewable Energy Industry	9
SECTION 6: Getting Involved: Participation in Marine Renewable Energy Development	11
SECTION 7: Planning Issues: A Framework for Development	13
SECTION 8: Economic Opportunities	15
SECTION 9: Environmental Issues	17
SECTION 10: Occupational Health and Safety	19
SECTION 11: Rights Allocation	20
SECTION 12: Regulatory Issues	21
SECTION 13: Going Forward	23
Compiled Questions	24

Introduction

1

The dream of harnessing the energy of the Bay of Fundy tides and currents is the stuff of legend, and of history.

Back in 1607, the first mill using tidal energy was built in Nova Scotia. In 1984, North America's only tidal generating station was built on the Annapolis River. Today, it produces enough electricity for 6,000 homes.

In November, 2009, a commercial-scale tidal turbine was lowered into place in the Minas Basin. In 2010, Nova Scotia plans to open the continent's first tidal power demonstration centre.

Why all the interest?

Every day, 100 billion tonnes of seawater ebb and flow through the Bay of Fundy. This exceeds the daily combined flow of the world's freshwater rivers.

The energy potential is huge, so much so that one industry expert called the Bay of Fundy the "Saudi Arabia" of marine renewable energy. The U.S.-based Electric Power Research Institute has also identified the Bay of Fundy as a prime site for potential tidal power generation. Nova Scotia obviously enjoys unique advantages as a tidal power jurisdiction—starting with the fact that the raw resource is unparalleled.

This story is not only about tidal power, though. Marine renewable energy can also be produced from wind, currents and waves. In Nova Scotia, tidal energy is the most advanced of these renewables.

But imagine a wider range of possibilities. Someday, for instance, a fish plant or an aquaculture farm might take electricity from its own micro-project, generating power from winds and currents.

Ocean energy presents a significant opportunity, but technologies are at different stages of development and some are currently more viable in the Nova Scotia context. Like tidal, wave energy technologies are very much at the investigative stage. Offshore wind energy may only come to the fore after Nova Scotia's land-based wind energy sector has matured.

The goals of this marine renewable energy legislation are focused on the long-term, however. One of those goals is to put in place a regulatory and legal framework for all marine renewable energy.

What Nova Scotia has in place now is a set of guiding principles: protection of the marine ecosystem; a commitment to a collaborative process; and ongoing consultations that respect the rights of aboriginal people and the views of users of the province's offshore waters.

The province is also committed to a staged development of this industry, one that allows it to develop in a sustainable manner, putting a priority on the health and safety of the public, environmental protection, and the conservation of natural resources.

What do you think?

While those core principles will remain in place, many crucial details of a legislative framework have yet to be worked out. The Province of Nova Scotia wants your input as it develops a marine renewable energy policy and its enabling legislation.

That's what this discussion paper is all about—generating an informed and helpful public conversation aimed at finding the best way forward. Here are some of the key issues that have to be worked out:

Regulation: The best way to regulate the sector to protect the environment, keep people safe, and sustain the industry.

Development: The framework created to support development of the industry and reach commercialization.

Balance of interests: The balancing of traditional offshore interests (fishing, aquaculture) with marine renewable energy projects.

Support: The best way to encourage development of this new industry.

Public Benefit: Ensuring Nova Scotians benefit from development of a new resource.

The Technologies

A range of different technologies exist, some more advanced than others, that can be used to harness the energy produced by tidal currents, waves, and offshore wind.

Tidal current (in-stream): Tidal in-stream energy is found in naturally occurring tidal currents and can be directly extracted and converted into electricity. Devices similar to wind turbines are fully submerged and used to convert the kinetic energy of tidal currents.

Tidal range (dams, barrages, lagoons): The tidal range is the vertical difference between the high tide and

the succeeding low tide. Structures are built to capture energy created from the rising and falling tide.

Barrages are essentially dams across the full width of a tidal estuary. When the tide goes in and out, the water flows through tunnels in the barrage and generates electricity.

Tidal lagoons use a rock-walled impoundment, which would look like an oval or similar shaped breakwater enclosing an area of shallow coastal sea forming a 'lagoon'. Tidal water is trapped and released from the lagoon

through electricity generating water turbines built within the impoundment walls. Preliminary research has indicated that a tidal lagoon technology may have less of an environmental impact than a barrage.

Wave energy: Energy produced by winds passing over the surface of the ocean creating waves, can be converted into electricity. Devices extract energy directly from the surface motion of ocean waves or from pressure fluctuations below the surface.

Offshore wind: Offshore wind turbines harness the energy of the moving air over the oceans and convert it to electricity. Offshore wind turbines are larger than onshore turbines (to take advantage of the steadier offshore winds and economies of scale) and are

built to take into account the more demanding climatic environmental exposure offshore.

Opportunities and challenges

Clean, green electricity generated from tides, winds, currents and waves could help the province meet crucial policy goals. These include greater energy security, more energy self-sufficiency, a reduction in greenhouse gas emissions, and economic growth.

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Still, marine renewable energy is a pioneering sector worldwide. Project development will impact many stakeholder groups, affect the marine environment, and involve several levels of government.

In this context, Nova Scotia is taking an adaptive approach to this industry. Development will proceed within a framework that supports technologies in their infancy, as well as those that are developmental or commercial. This approach recognizes that it takes time to introduce new technology, to understand its environmental effects, and to integrate new activity with more traditional commercial and recreational uses (including aquaculture and fishing). For proven technologies, like wind, it may not be necessary for developers to meet the same technical criteria as required for prototype technologies.

This work has already begun for in-stream tidal energy. In 2008, the Nova Scotia Department of Energy sponsored a Bay of Fundy Strategic Environmental Assessment (SEA) to better understand the potential impact of in-stream tidal devices on fisheries and the overall marine ecosystem.

In response to this assessment, conducted by OEER (Offshore Energy Environmental Research Association), the province has committed itself to creating marine renewable energy legislation before allowing commercial-scale projects. This commitment was again emphasized in the province's recent *Renewable Electricity Plan*.

Legislation should serve to provide clear, predictable, and efficient processes to support the sustainable growth of the sector. Development of the industry would, in turn, help the province reduce greenhouse gas emissions and other air pollutants and generate more electricity from renewable sources of energy.

Development of marine renewable energy projects would pose several challenges from regulatory, environmental, and socio-economic perspectives.

- There are multiple governments involved, including the federal government, municipalities and the provinces of New Brunswick and Nova Scotia.
- The industry is in its infancy around the world. No mature legislative regime exists for these industries, though some jurisdictions such as the United Kingdom and Denmark have developed legislation for their marine renewable energy sectors in the past few years. Made-in-Nova Scotia legislation should help to keep the province at the forefront of this emerging sector.
- The marine ecosystem supports multiple users and uses, and development of this sector impacts Mi'kmaq people and multiple stakeholders, including fishers, and adjacent municipalities.

Marine Renewable Energy: The Opportunity

2

Nova Scotia's marine renewable resource provides exciting opportunities and potential benefits for the province. For starters, this public resource could provide an inexhaustible supply of green energy. Over time, marine renewable generated electricity could also reduce dependence on imported fossil fuels, and make Nova Scotia less susceptible to fluctuating market prices. In addition, the province could build its expertise, skills and technological know-how inside an industry that is expected to grow in many parts of the globe.

The province has recently introduced the *Renewable Electricity Plan* which sets out a detailed program to move Nova Scotia away from carbon-based electricity generation towards greener, more local sources. Through the plan the province commits to law its 2015 target of 25 percent renewable electricity and sets a new goal of 40 percent renewable electricity by 2020.

The plan will use several different mechanisms to achieve an orderly transition to new, local renewable energy sources. Some of the mechanisms have been designed to encourage development of marine renewable energy. The Government currently provides support for tidal energy through FORCE (Fundy Ocean Research Centre for Energy). The plan expands that support by establishing:

- A community based feed-in-tariff for distribution connected tidal projects.
- Enhanced net metering to give individuals and small businesses the opportunity to participate in green energy projects.
- A feed-in-tariff for developmental tidal arrays, connected at the transmission level that reflects the cost of the turbines and their deployment.
- A Marine Renewable Energy Task Force, an interdepartmental task force, assisted by the private sector, to develop strategies for commercializing marine renewable energy.

In working toward its renewable energy goals, the province has a responsibility to ensure that development is carried out in the best interests of the public and the environment. Marine renewable energy legislation must ensure that projects and development take place with appropriate licensing, environmental protection, community benefits, and appropriate provincial revenue.

Legislation should place a high value on the long-term public interest while protecting internationally-recognized habitats and species.

QUESTION:

What in your view are the most important opportunities for Nova Scotia? What are the values that government should focus on when developing legislation that will impact the viability of these opportunities?

Marine Renewable Energy: The Challenges

3

The marine renewable energy industry poses several challenges from regulatory, socio-economic, and environmental perspectives. This sector will operate inside a complex marine ecosystem that already supports the fishery, aquaculture, shipping, tourism, traditional use and recreational activities. Legislation governing the development of the industry must address several major issues, including:

- Both federal and provincial governments have roles to play in this sector. This **Multi-Jurisdictional Challenge** is complex. No clear boundary lines between federal and provincial offshore jurisdictions have been established, though some guiding principles exist in law. The province and the federal government have often set aside such issues in favour of collaborative law-making and joint administration of offshore resources. One of the best known examples of this may be the legislation governing Nova Scotia's offshore petroleum resources and creation of the Canada-Nova Scotia Offshore Petroleum Board, which regulates offshore oil and gas activity. The regulatory regime for the under-sea Donkin coal mine is another.
- The marine renewable energy sector would be developed inside a **Complex Regulatory Environment**. Nova Scotia laws which might impact the sector include the *Electricity Act*, the *Nova Scotia Environment Act*, and the *Fisheries and Coastal Resources Act*. Pertinent federal

laws include the *Fisheries Act*, the *Oceans Act*, and the *Canadian Environmental Assessment Act*, *Navigable Waters Protection Act* and the *Environment Act*. A new Nova Scotia law on marine renewable resource development would have to recognize the regulatory responsibilities and roles of both governments. (For more extensive detail on applicable legislation please see the background discussion document on our website.)

- Nova Scotia's **Unique Marine Environment**, and the pioneering nature of this industry, requires a staged approach. The effects of introducing new technologies must be monitored and understood as development proceeds. This need is underlined by the fact that the most prospective areas for tidal energy projects are the Bay of Fundy and the Minas Basin, which are part of one of the most productive marine ecosystems in the world.
- Nova Scotia's offshore now supports many uses by **Aboriginal, Commercial and Recreational Users**. Marine renewable energy developments would potentially have an impact on fish and fish habitat, offshore mammals and birds, aboriginal activities, the fisheries and economic development. To reduce potential conflicts and impacts, integrated management of Nova Scotia's marine environment should be addressed by legislation. A strategic approach to managing marine activities should better protect resources, conserve biodiversity, and accommodate a new industry like marine renewable energy.

QUESTION:

What should the Government of Nova Scotia do to ensure all users of the marine environment are treated fairly?

The Global Experience

4

Laws or regulatory regimes governing the development of marine renewable energy are being put in place in several locations around the world. The industry is so new, though, that no “model legislation” has been established. Still, the lessons learned in other nations may prove relevant to Nova Scotia as it develops its own legislation. Here is a review of current approaches in other jurisdictions.

United Kingdom: Like Nova Scotia, the U.K. is also taking a staged approach to tidal and wave energy development, starting with pre-commercial or demonstration projects before moving on to commercial projects. However, offshore wind technology has been proven at the commercial-scale and developments generally begin at this stage. The U.K. has legislation to regulate the marine renewable energy industry. It covers licencing and navigation, and includes the concept of Renewable Energy Zones. In addition, steps have been taken toward introducing complementary regulatory regimes in all U.K. waters, including areas offshore Wales, Northern Ireland and Scotland. The co-operative approach of various U.K. governments should help ensure that the marine environment and marine resources are properly managed.

United States: The U.S. has regulated the industry under existing legislation. This resulted in regulatory conflict (and jurisdictional overlap) between the Federal

Energy Regulatory Commission (FERC) and the Department of Interior’s Mineral Management Service (MMS). The regulatory gridlock in the U.S. was finally eased in April 2009, when the two federal regulators signed an agreement under which MMS will have jurisdiction over offshore wind and solar energy, while FERC will be responsible for tidal and wave current projects. MMS will be the main advisor to FERC on environmental issues.

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New Zealand: Like the United States, New Zealand uses existing legislation to guide regulatory processes for marine renewable energy projects. Project developers must secure permits under the Resource Management Act 1991 (RMA) for space occupation, deployment, and extraction of energy. This is essentially an environmental management regime, and not broad enough to weigh social and economic interests.

Norway: Proposed marine renewable energy legislation in this country is based on public administration and control of the sector. The primary aim of Norway’s legislation will be to ensure co-ordinated development of marine renewable energy projects. The legislation is aligned with an overall strategy to promote the development of renewable energy within offshore zones defined by the Norwegian government. The proposed act includes regulations regarding security and working environment, infrastructure, area tax, electricity

system operation, export and import of electricity, a process of applying for land rights, and fisheries compensation.

New Brunswick: Large-scale marine renewable energy generation/development is currently not permitted in New Brunswick. The Department of Natural Resources developed an interim policy in 2007 that prohibits large-scale tidal energy development and provides guidelines for research. A new policy for tidal energy development is currently being developed which outlines permitting and approvals requirements and sets standards for potential sites.

British Columbia: Marine renewable energy projects in British Columbia are currently permitted under existing legislation. A policy was developed in 2006 to provide direction for permitting and approval of marine renewable energy projects. One demonstration project is under development and several investigative permits have been issued. As in Nova Scotia, some projects may fall under the authority of multiple jurisdictions. B.C. is also developing an Ocean Energy Operational Policy, expanding on the 2006 directive regarding Crown land tenures for marine renewable energy projects.

For further information and details on marine renewable energy in other jurisdictions please see “Marine Renewable Energy Legislation Policy Background Paper” posted on our website www.gov.ns.ca/energy.

QUESTION:

What lessons can we learn from marine renewable energy policies around the world?

Framework for Development of Nova Scotia's Marine Renewable Energy Industry

5

The marine renewable energy industry in Nova Scotia will be developed using a staged, adaptive approach. This will enable the province and stakeholders to learn as the industry progresses. The sector will be developed in a sustainable manner that puts premiums on the health and safety of the public, environmental protection, and the conservation of natural resources. This approach is consistent with the industry norms in other jurisdictions.

The framework is intended to support marine renewable energy technologies that are in their infancy as well as technologies that are developmental or commercially available. It covers several development phases that define required steps and milestones for progression of the industry.

1. Strategic Environmental Assessment (SEA)

A strategic environmental assessment (SEA) is a process that takes place before specific projects are considered. It assesses the environmental and social impacts of potential marine renewable energy projects and provides stakeholders with the opportunity to influence decisions related to planning, policies, regulation, and management early in the process.

The SEA process was one of the first steps in Nova Scotia towards developing marine renewable energy. The 2008 SEA provided an assessment of the social, economic,

and environmental effects and factors associated with potential development of renewable energy sources in the Bay of Fundy.

2. Planning Phase

All marine renewable energy projects will be required to obtain specific regulatory approvals and permits before development can commence. As each project will be unique in terms of technology, location, and scope, regulatory requirements may be different. As the first step in the project planning process, proponents would need to engage in technical and environmental studies and activities that would help inform project design and provide details necessary for determining applicable regulatory requirements. Proponents could potentially obtain a conditional permit that reserves the site for the collection of baseline data and to gather information

necessary for final regulatory approvals and to gather information for an environmental assessment (EA) (if required).

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Once a final project application is submitted by a proponent and reviewed by regulatory authorities, final permits/approvals would be granted as well as a Crown land lease upon review and approval of the EA. (See section 11 “Rights Allocation” for more information on types of permits and approvals).

3. Research and Development (R&D) Phase

Many marine renewable energy technologies (particularly for wave and in-stream tidal) are in their infancy and require further refinement through demonstration, research, and development. The R&D phase provides an opportunity to build expertise in the adaptation of technologies for marine renewable energy under Nova Scotian conditions.

At this phase, demonstration and developmental (pre-commercial) technologies are tested for survivability, environmental information, and if possible, certification. This phase of industry development has been supported by the province through their agreement to provide funding for an in-stream tidal testing facility—Fundy Ocean Resource Centre for Energy (FORCE)—in the Bay of Fundy. Devices tested at FORCE will be monitored for wear, environmental impacts, and performance that will lead to further technological developments. Information gathered and experience acquired will also help regulatory bodies determine how best to assess, approve, and manage the emerging industry.

Once a device is proven, a small array of devices can be tested for technical and commercial viability. Data gathering, surveying, monitoring, and evaluating will continue to build understanding of possible impacts, environmental effects, risks, and technology success or failure.

4. Commercial Phase

The commercial phase would begin when fully developed projects are brought forward for regulatory approvals (including environmental approvals) and a Crown land lease. A proponent’s decision to move to this phase will depend on normal commercial factors—including viable technology, an acceptable level of risk, a competitive price for delivered electricity, and a market for that electricity. Commercial viability will also be influenced by regulatory requirements and environmental advantages associated with marine renewable electricity including emerging policy with respect to the cost of carbon.

At the commercial phase, the industry would continue to be regulated and monitored to protect people and the environment.

For further details on a permitting and approvals process for marine renewable energy projects please see Appendix C of the “Marine Renewable Energy Legislation Policy Background Paper” posted on our website www.gov.ns.ca/energy.

QUESTION:

How do we integrate this approach into our current regulatory approach and legislation?

Getting Involved: Participation in Marine Renewable Energy Development

6

The development of marine renewable energy would have significant economic and social effects on many groups in Nova Scotia including the Mi'kmaq and communities. Sustainable development of the industry will depend on broad involvement of all key players. All interested and affected parties will need to know what is proposed and the consequences, positive and negative, for them and their communities, as well as the local environment and economy.

First Nations

The Province of Nova Scotia wants to encourage the sustainable development of marine renewable energy in a manner consistent with the recognition and affirmation of existing Aboriginal and treaty rights in section 35 of the Constitution Act, 1982, including the duty to consult; and to minimize the impact of marine renewable energy activities on the health and safety of the public, and the environment.

Nova Scotia consults with the Mi'kmaq on all energy projects through the Mi'kmaq-Nova Scotia-Canada Consultation Terms of Reference. The Government of Nova Scotia is currently undertaking consultations with the Mi'kmaq under these terms and is working on a specific Mi'kmaq Renewable Energy Strategy. It will include an examination of tidal energy among other renewable energy opportunities.

The Province, in partnership with Offshore Energy Environmental Research (OEER) Association and

the developers at Fundy Ocean Research Centre for Energy (FORCE) commissioned a Mi'kmaq Ecological Knowledge Study (MEKS) in the area of the demonstration project. This study reported that the Mi'kmaq have historically undertaken fishing activities

in the project site, and that this practice continues today. In the general vicinity of the Minas Passage, including onshore areas, it has been reported that traditional use activities, including harvesting of fish species, plants and animals continue to occur today and there are several archaeological sites, historical sites, legend areas and a reported burial site that were identified as part of the study. There may be plans to extend the MEKS to other parts of the Bay of Fundy, beginning with the inner portion of the bay, where projects are being

proposed in the future. The MEKS provides a clearer picture of Mi'kmaq traditional land and resource use activities both past and present.

As interest in marine renewable energy projects develops, the province has committed to encouraging developers to engage directly with the Mi'kmaq during the early stages of the project development.

Communities

Community engagement and participation will play a very important role in marine renewable energy development.

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The planning of new projects will require broad and early support from all stakeholders. This can go a long way to reducing risk for developers and making potential projects more attractive for investors. Engagement policies and procedures will likely be determined by how the permitting process is established through existing and new legislation.

Increased marine renewable energy development also presents an opportunity for members of the community and community-based groups such as municipalities, First Nations, non-profit groups, and co-operatives to directly participate in new projects. Under the *Renewable Electricity Plan* community-based renewable energy projects are supported by a feed-in tariff (the “COMFIT”). The creation of marine renewable energy legislation will further support these projects by ensuring that straightforward approvals and permitting are in place to facilitate projects under the COMFIT.

QUESTION:

How should community interests be considered in project planning and development decisions made by government and regulators?

Planning Issues: A Framework for Development

7

Wind, wave, and tidal devices may have impacts on tourism, landscapes, seascapes, habitats and ecosystems. As a result, the development and operation of marine renewable energy projects will require an integrated management approach.

This would involve the coordinated efforts of governments, and many departments and agencies within those governments. Communication and collaboration with stakeholder groups is also an important aspect of an integrated management approach.

As developments proceed, steps may have to be taken to prevent impacts from affecting areas in which marine renewable energy projects are sited.

Many impacts can be minimized through careful site selection. When planning new installations other coastal uses should be considered so as to avoid conflict, preserve tourism, and protect biodiversity.

Multiple federal and provincial authorities have responsibilities and mandates for planning, management, and regulation of energy activities in Canadian marine waters:

The Role of Federal Government: Key departments include Natural Resources Canada, Fisheries and Oceans Canada, Environment Canada, the Canadian Environmental Assessment Agency, and Transport Canada.

The Role Provincial Government: Key departments include the departments of Energy, Environment, Natural Resources, Fisheries and Aquaculture, and Labour and Workforce Development.

The Role of Municipal Government: Some marine renewable energy projects will be subject to municipal regulatory authority. For example, project development may have impacts on local communities, specifically on onshore facilities, taxation and zoning. It will be important for the province to continue to work with municipalities to ensure they are informed about new projects or developments in this emerging sector.

Here are some of the factors and issues that will prove significant during development of marine renewable energy resources.

User Conflicts: The rise of new users and potential uses of ocean resources (like liquid natural gas terminals or aquaculture operations) in addition to new marine renewable energy projects, could lead to conflicts over space and access. Increased activity could also put pressure on complex ecosystems.

Fisheries Issues: The footprint and safety zones around marine renewable energy projects could have an impact on fishing activities. Several mitigation measures exist and will be further evaluated and determined through the regulatory process.

Research: OEER, DFO, and universities are working on several research efforts to better understand the links between offshore renewable energy and fisheries. Information gathered will contribute to the province's approach to strategic and adaptive planning.

Several steps can be considered to deal with possible conflicts. These include appropriate public engagement and First Nations consultation before the site of a marine renewable energy project is determined, and the development of an appropriate dispute resolution mechanism.

Spatial conflicts (that is, turf wars) can be managed through safety zones that would exclude certain vessels and activities during development phases. The creation of a safety zone could limit commercial and recreational fishing, navigation, and other marine activities, but not necessarily for the duration of the offshore project.

Although there are currently no standards for determining the need or size of a safety zone, a safety zone has been deemed necessary for the Fundy Ocean Research Centre for Energy (FORCE) demonstration facility in the Minas Basin. In order to mitigate the possibility of vessel collisions during construction, operation, and decommissioning, a 300 meter radius exclusion area for fishing has been imposed.

The disruption or displacement of fishing activities due to safety zones is recognized as a significant issue. The practicality of undertaking specific fishing activities, as well as navigation and safety issues will influence decisions on whether restrictions or safety zones will be applied to new developments. Several types of safety zones could be implemented and will be evaluated further during the creation of legislation.

For more details regarding mitigation options and safety zones, please refer to “Marine Renewable Energy Legislation Policy Background Paper” posted on our website www.gov.ns.ca/energy.

QUESTION:

If other marine users/uses are displaced, how should this be addressed?

Economic Opportunities



The development of marine renewable energy presents Nova Scotia with a range of economic opportunities. The right legislation would establish a stable, predictable regulatory environment for growth, giving the province an opportunity to realize potential benefits.

Growth in the marine renewable energy sector could allow the province to address government priorities and commitments. Potential economic benefits include:

Positive impact on local communities: Coastal communities could benefit through direct access to the resource through municipal or community-owned entities or investment funds. Other community benefits could include the use of local labour and contractors; tourism facilities; land rentals; and investment opportunities.

Knowledge and job creation: Construction, operation and maintenance of marine renewable energy projects will require skilled labor. A diverse range of expertise will be required for all jobs involved.

Trade/export potential and environmental credit: From an energy policy and strategy perspective, the renewable electricity needs of Nova Scotia should be

met before moving to export. However, Nova Scotia's demand for electricity varies widely with much less energy required in summer months. This may lead to opportunities to export surplus marine renewable energy

to the regional grid when prices are attractive and demand is lower in Nova Scotia. Exporting also may be necessary in order to maximize the economic viability of all forms electricity, including marine renewable energy.

Taxes and Royalties: Collection of royalties or taxes from the sale of renewable electricity could benefit the public.

Eco-Tourism: There is an increasing interest in new technologies and these new marine renewable energy projects could become tourist attractions.

Any approach to regional and community benefits will need to balance the economic viability of the industry with its impacts on coastal communities and the region.

Development should proceed in a strategic manner to ensure that the public benefits not only from an economic perspective, but also in the form of greenhouse gas reductions and a sustainable supply of renewable energy.

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During the early stages of this industry incentives may be necessary to get the industry off the ground—or to get electricity out of the water. The province has recognized the significant impact incentives can have in supporting and developing renewable energy industries and the feed-in tariff (FIT) under the *Renewable Electricity Plan* will cover micro and small-scale tidal and wave projects at the distribution level and developmental (pre-commercial) tidal arrays at the transmission level.

Marine renewable energy is a public resource and should be treated so. Legislation could support land and energy resource tenure systems. A licensing and permitting process for energy would serve to put limits on the amount of energy that could be safely extracted. The granting of land (seabed) and resource tenure could also be designed to enable incentive and benefits mechanisms through the use of rents/fees for use.

Once marine renewable energy technologies are proven for reliability, survivability and sustainability, other economic benefits may accrue to the province. These could include local manufacturing, job creation, and potentially royalties. This may lead to more developers becoming interested in the industry and subsequently, to more projects.

Before these economic benefits can begin to be achieved, a market for green electricity must be established. Transmission availability/capacity and long-term power purchase agreements (PPA) for marine renewable energy projects are a critical component of project success. For developers, PPAs may be essential to securing the financing needed to develop the projects.

QUESTION:

What features should be included in the licensing system to ensure development takes place in a manner that balances private and public interests?

Environmental Issues

9

The development of marine renewable energy projects will require us to ensure that there are no adverse environmental effects. Both federal and provincial authorities have legislative authority for environmental regulation of Nova Scotia's offshore. Provincial and federal governments will need to have processes, mechanisms, and personnel in place to conduct environmental reviews in an effective manner that avoids duplication and ensures clear and consistent regulation.

The range of benefits and impacts created by the generation of marine renewable energy will differ depending on project location and technology. Following are a range of selected environmental benefits and impacts that could result from marine renewable energy projects:

Possible Environmental Benefits

- Contribution to reducing greenhouse gases and other air pollutants
- Decreasing dependence on fossil fuels, particularly imported coal
- Production of clean, green energy (commercial development has potential to displace over 1 million tons of greenhouse gas per year in Nova Scotia)
- Zero to minimal emissions or pollutants during operation and energy generation

Possible Environmental Impacts

- Disruption of currents, waves, substrates and sediments
- Habitat alteration (marine, terrestrial and avian)
- Impediment to animal movement and migration
- Landscape and seascape obstruction (aesthetic)
- Electric and magnetic fields
- Noise (airborne and underwater)
- Navigation impacts (including strikes and collisions)
- Changes in water quality

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Some of these impacts also have the potential to affect other users of the marine environment such as the oil and gas industry, fisheries, shipping and tourism. Mitigation of some of these impacts will need to be achieved through research, planning, and legislation/regulations. Other potential environmental issues will also be considered. The following issues will need to be addressed:

Resource Extraction and

Limitations: It will be necessary to establish appropriate limits on the amount of energy extracted to ensure there are no adverse

environmental effects on the area surrounding—or at distance—from the facility. Impacts that will need to be avoided by such limits include a reduction in water velocity, wave height, and sea levels. The magnitude of

these impacts will depend on chosen technology and the number of devices. Changes in current velocity could affect water temperature, marine life, weather, transportation, and deposition of sediment, estuaries, inlets and bay.

A number of research initiatives are underway to study the effects of marine renewable energy extraction and will help to inform future development and policy-making.

A Jacques Whitford background report prepared for the Bay of Fundy SEA suggested that demonstration projects in the Minas Passage will have limited effect on current velocity. However, the report also noted that a commercial scale project that reduces the kinetic energy by more than a few per cent could have significantly larger effects.

Cumulative Effects: The concept of cumulative environmental effects recognizes that the environmental effects of human activities can combine and interact with each other. Identification and management of cumulative effects is important in the aquatic environment, where developments may have off-site implications that need to be mitigated before projects proceed. Assessing cumulative environmental effects will be a critical aspect of ensuring that marine renewable energy development does not adversely affect the marine ecosystem.

Monitoring: Environmental monitoring of offshore energy devices will be important for understanding the effects between offshore renewable energy devices and the environment. Monitoring should assess the impacts of a project as it moves through each development stage. Developers would conduct audits of their operations and submit results to government for review. The ultimate goal of a monitoring program will be to protect the natural environment, human health and natural resources. Monitoring will also contribute to determining technology and project viability.

QUESTION:

How should Nova Scotia and the Canadian authorities/legislation/regulation work together to ensure environmental protection?

Occupational Health and Safety

10

The complexity and uncertainties of the marine environment pose new challenges for operational and occupational health and safety. It is vital that developers ensure that they place adequate emphasis on understanding and mitigating health and safety risks associated with Nova Scotia's unique marine environment.

The emerging nature of the marine renewable energy industry means that there is a great variety in devices under development and their installation and maintenance requirements are being determined on a continuous basis. Health and safety guidance should be specific enough to give an adequate level of protection and also flexible enough to allow innovative ideas to be developed.

Occupational hazards may be associated with some activities, including:

Construction and major repair: Activities include installation of devices, laying of subsea cables, operation of jack-up barges and associated lifting operations during tower and offshore wind project development.

Operation: Primary issues include personnel transfers between boats/construction vessels/towers, working conditions, emergency response, and helicopter traffic.

External hazards: These include potential collisions involving vessels and aircraft.

There are safety issues at various stages of development including site development and planning; construction and commissioning, operation and maintenance; and decommissioning. Both federal and provincial authorities have legislative authority for health and safety regulation of Nova Scotia's offshore. Provincial and federal governments will need to have processes, mechanisms, and personnel in place to conduct safety activities in an effective manner that avoids duplication and ensures clear and consistent regulation.

The working environment should be monitored for occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals as part of an occupational health and safety monitoring program.

QUESTION:

How should Nova Scotia and the Canadian authorities/legislation/regulation work together to ensure a safe environment for workers and the public?

Rights Allocation



The system of allocating rights in terms of land, approvals, and permits should work consistently to give confidence to developers, investors, and the public. Legislation would provide a basis for ensuring that rights are allocated in a fair and transparent manner that takes public benefits into consideration.

During the early stages of the industry, an equitable and competitive process to choose proponents is required. As the industry matures and technology becomes commercially viable, a clear process for awarding commercial public rights will be essential.

New legislation would serve to coordinate and integrate the necessary permits and approvals of applicable government departments and agencies.

Obtaining a conditional lease/license could allow a developer to commence engagement and acquire required permits and approvals. Once all permits/approvals are granted, the developer could then receive a full lease (demonstration or developmental/pre-commercial project) or commercial lease. This two-step tenure process is currently used by some jurisdictions such as the U.K. and the U.S.

Process for Awarding Rights

Although the province has established a One Window Standing Committee and process for the permitting of marine renewable energy projects, Nova Scotia currently lacks a strategic system for awarding rights for a range of project-scales and technologies. A process for awarding development rights at each defined project stage will need to foster the long-term growth and sustainability of the industry.

At this early stage of development, it is difficult to anticipate all of the potential issues that may affect development of this industry. One key issue will be how to allocate desirable sites, as some developers may want to reserve favourable sites for future use. This could inhibit optimal development. The process for awarding rights should ensure the best chance of encouraging a pattern of development which allows optimal use of the resource in an environmentally and socially responsible manner.

QUESTION:

Considering the proposed staged development approach what process should Nova Scotia use to award development rights?

Regulations are designed to address the public interest and provide public and environmental protection. Across Canada, the nature of an industry or business determines what federal or provincial legislation or regulations are applicable. However, in respect to the Nova Scotia offshore, jurisdictional claims make the issue more complex. The presence of multiple public interests using a shared, public resource—the ocean—means that layers of federal and provincial regulations exist to cover different types of uses. Canada and the province have resolved this issue in respect to offshore petroleum operations through the creation of joint legislation. This may also have some important lessons for regulation of the marine renewable energy.

The marine renewable energy industry will require a legal framework to operate in the public interest. As this type of development is new and both provincial and federal governments would be involved, a regulatory process will be needed that ensures all necessary approvals, permits, and regulatory requirements are administered efficiently. This will be important for every stage of the industry. Without regulatory coordination between governments, there is a potential for conflicting regulatory decisions. This could lead to compromised public and worker safety and risk to the environment.

A regulatory model developed under new marine renewable energy legislation would need to encompass a variety of objectives that would ensure that the industry progresses in the public interest. The regulatory model should:

- Separate policy formulation and advice from regulatory administration
- Minimize the need for multiple approvals or duplicate assessments
- Minimize overlapping administration by multiple authorities
- Minimize inconsistencies in legislative requirements and decision-making
- Provide the ability to regulate activities in the presence of different viewpoints regarding ownership (provincial or federal)
- Ensure regulators have independence, accountability, and clear objectives

Environmental and Safety Regulatory Responsibilities

Currently, environmental and safety issues are governed by federal and provincial legislation. Environmental and safety regulation have been identified as two key areas where provincial and federal regulatory responsibilities should be coordinated or integrated.

Environment: A coordinated regulatory process covering provincial and federal requirements could assign responsibilities for environmental protection, assessments, approvals, and operations. Current legal requirements flow from both the Nova Scotia *Environment Act* and the Federal *Canadian Environmental Assessment Act*. Installation of marine renewable energy projects/ technologies may trigger assessment requirements under either or both laws.

Safety: During the start-up of the industry the number of employees and contractors will be small, but as the industry grows, the workforce will grow. Currently, provincial safety legislation includes: *Occupational Health and Safety Act; Labour Standards Code; Human Rights Act; Trade Union Act; Workers Compensation Act; Health Protection Act; Smoke Free Places Act*. Federal legislation includes the *Canada Human Rights Act* and the *Canada Labour Code*. Regulatory duplication could lead to confusion regarding workers' rights and workplace responsibilities.

A process that addresses both federal and provincial environmental and safety regulatory requirements and responsibilities would allow for more efficient and comprehensive regulation.

Potential Regulatory Models

There are three regulatory models that could be used in the marine renewable energy industry, each addressing different approaches to jurisdictional responsibility and arrangements between relevant provincial and federal authorities.

Cooperation: A cooperative regulatory model would involve information-sharing between federal and provincial authorities on the development and management of marine renewable energy. This model has proved successful when applied to the environmental assessment and permitting process for the in-stream tidal projects at FORCE. However, this model could become inefficient if the volume of projects increase. It also may not easily resolve potential conflict, as each jurisdiction would maintain its role and responsibilities in the planning and permitting process. In offshore locations

where the issue of federal or provincial ownership is unsettled, proponents could face conflicting advice and regulatory processes.

Collaboration: A collaborative approach to regulating marine renewable energy would involve federal and provincial authorities working together to establish, develop and manage the industry. This model would allow for more coordination and joint efforts than a cooperative approach. However, proponents of the industry would still be subject to approval by a number of regulatory authorities.

Integration: An integrated regulatory model would set jurisdictional and ownership issues aside, allowing for the creation of one body administering regulatory tasks on behalf of both federal and provincial authorities. The creation of an integrated model may initially result in higher costs and take longer to establish due to the involvement and commitment required of both provincial and federal governments. However, in the long-term it may well offer the most comprehensive and accessible way to manage the marine renewable resource.

QUESTION:

Which regulatory model would be most effective for Nova Scotia: cooperation, collaboration, integration, or other approach?

As this document shows, marine renewable energy presents a significant opportunity for Nova Scotia. Harnessing the resource effectively could allow the province to obtain a clean, green source of energy and address a number of policy objectives and goals. However, development of the industry poses several challenges from regulatory, environmental, and socio-economic perspectives.

These challenges can be addressed through marine renewable energy legislation. Any new law should provide regulatory clarity to ensure appropriate licensing, environmental protection, safety of workers and the public, resource conservation, recognition of other users/uses, community benefits, and appropriate provincial revenue.

To meet these goals, the province will continue to consult and collaborate with representatives of aboriginal groups and key stakeholders, including, environmental organizations, project proponents, fishers, the aquaculture sector, and tourism organizations.

For further information and details on marine renewable energy policy and legislation issues please see “Marine Renewable Energy Legislation Policy Background Paper” posted on our website www.gov.ns.ca/energy.

Compiled Questions

SECTION 2:

The Opportunity

What in your view are the most important opportunities for Nova Scotia? What are the values that government should focus on when developing legislation that will impact the viability of these opportunities?

SECTION 3:

The Challenges

What should the Government of Nova Scotia do to ensure all users of the marine environment are treated fairly?

SECTION 4:

The Global Experience

What lessons can we learn from renewable offshore energy policies around the world?

SECTION 5:

Framework for Development of Nova Scotia's Marine Renewable Energy Industry

How do we integrate this approach into our current regulatory approach and legislation?

SECTION 6:

Getting Involved: Participation in Marine Renewable Energy Development

How should community interests be considered in project planning and development decisions made by government and regulators?

SECTION 7:

Planning Issues

If other marine users/uses are displaced, how should this be addressed?

SECTION 8:

Economic Opportunities

What features should be included in the licensing system to ensure development takes place in a manner that balances private and public interests?

SECTION 9:

Environmental Issues

How should Nova Scotia and Canadian authorities/legislation/regulation work together to ensure environmental protection?

SECTION 10:

Occupational Health and Safety

How should Nova Scotia and Canadian authorities/legislation/regulation work together to ensure occupational health and safety?

SECTION 11:

Rights Allocation

Considering the proposed staged development approach what should Nova Scotia use to award development rights?

SECTION 12:

Regulatory Issues

Which regulatory model would be most effective for Nova Scotia: cooperation, collaboration, integration, or other approach?

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