

NOVA SCOTIA UTILITY AND REVIEW BOARD



IN THE MATTER OF THE ELECTRICITY ACT

- and -

IN THE MATTER OF a hearing to determine the **TIDAL ENERGY FEED-IN TARIFFS**
for Developmental Tidal Arrays

BEFORE:

Peter W. Gurnham, Q.C., Chair
Roland A. Deveau, Q.C., Vice-Chair
Murray E. Doehler, P.Eng., CA, Member

INTERVENORS:

CONSUMER ADVOCATE

John Merrick, Q.C.

EMERA INC.

John MacLean, LL.B.

**FUNDY OCEAN RESEARCH CENTER FOR
ENERGY**

Frank N. LeBlanc

NOVA SCOTIA DEPARTMENT OF ENERGY

Mark V. Rieksts, LL.B.

NOVA SCOTIA POWER INCORPORATED

Nicole Godbout, LL.B.

TIDAL IN-STREAM DEVELOPERS OF ENERGY

Nancy G. Rubin, LL.B.

BOARD COUNSEL:

S. Bruce Outhouse, Q.C.

HEARING DATE:

September 16, 2013

WRITTEN SUBMISSIONS:

October 15, 2013

DECISION DATE:

November 13, 2013

DECISION:

The Board sets Feed-In Tariffs for developmental tidal arrays.

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1.0 INTRODUCTION

[1] The Nova Scotia Utility and Review Board (“Board”) held a hearing to determine Tidal Energy Feed-in Tariffs (“FITs”) for developmental tidal arrays, pursuant to the *Electricity Act*, S.N.S. 2004, c. 25 (“Act”) and the *Renewable Electricity Regulations* (“Regulations”). The Board determined FIT rates for other types of renewable energy generation facilities in a Decision [2011 NSUARB 100] issued on July 4, 2011 (“COMFIT Decision”).

[2] Adopting a similar approach as in the COMFIT Decision, the Board decided to follow a consultative process with intervenors and Board Counsel Consultant, Synapse Energy Economics, Inc. (“Synapse”) to set the Tidal Energy FITs.

[3] The hearing was originally scheduled for March 19, 2013, but there was consensus among the parties that the hearing should be adjourned to allow more time for the preparation of draft FITs and to ensure, from the Board’s perspective, that Synapse had received the quantitative information it required from intervenors and potential developers to allow it to conduct its work.

[4] In an Amended Order dated March 25, 2013, the Board advised that the consultative process would be completed according to the following schedule leading to the hearing:

Final deadline for submitting data to Synapse	May 1, 2013
Synapse circulates draft tariffs.....	May 24, 2013
Information Requests to Synapse	June 28, 2013
Synapse responds to Information Requests	July 19, 2013
Final Submissions by Intervenors to Synapse	August 2, 2013
Synapse files Evidence	August 16, 2013
Intervenors file Evidence	August 30, 2013
Synapse files Rebuttal Evidence	September 6, 2013
Hearing Commences	September 16, 2013

[5] The provisions of the *Electricity Act* relevant to this matter provide:

- 4A (1)** A public utility shall
- (a) permit generators that qualify under this Section to connect a renewable low-impact electricity-generation facility to its electrical grid in the manner provided by the regulations; and
 - (b) pay for the electricity generated in accordance with the tariff set by the Board pursuant to this Section.
- (2)** When requested by the Governor in Council, the Board shall set the tariffs to be paid by a public utility pursuant to this Section.
- (3)** In setting a tariff pursuant to this Section, the Board shall make allowance for the matters set out in the regulations.
- (4)** In setting a tariff pursuant to this Section, the Board shall determine
- (a) the class or classes of generation facility that qualify for a particular tariff;
 - (b) whether a tariff is to be adjusted periodically and, where it is to be adjusted, the basis for the adjustment;
 - (c) the effective date for commencement of a tariff;
 - (d) the duration of a tariff; and
 - (e) the terms and conditions under which payment is to be made by a public utility to generators.
- (5)** In setting a tariff pursuant to this Section, the Board may exercise the same powers and authority granted to it under the Public Utilities Act.
- (6)** A public utility is entitled to recover through its rate base the tariffs paid by it pursuant to this Section on the basis approved by the Board under the Public Utilities Act.
- (7)** The tariffs set pursuant to this Section apply to renewable low-impact electricity generated by the following classes of generation facilities:
- (a) wind power;
 - (b) biomass, including the electricity produced from a combined heat and power plant;
 - (c) small-scale in-stream tidal;
 - (d) developmental tidal arrays; and
 - (e) other generation facilities as provided by the regulations.
- (8)** In order to qualify as a generator under this Section, the generator must be one of the following and comply with the requirements of the regulations:
- (a) a council of a band for a band located in the Province as defined under the Indian Act (Canada);
 - (b) a municipality;
 - (c) a not-for-profit body corporate;
 - (d) a community economic-development corporation;
 - (e) a co-operative; or
 - (f) any other entity permitted by the regulations.

[6] A total of 10 formal intervenors responded to the Notice of Hearing. A number of these parties were represented at the hearing by counsel. The following intervenors participated at the hearing: the Consumer Advocate (“CA”); the Nova Scotia Department of Energy (“Province”); Tidal In-Stream Developers of Energy (“TIDE”); Nova Scotia Power Inc. (“NSPI”); Fundy Ocean Research Centre for Energy (“FORCE”)

and Emera Inc. (“Emera”). The following intervenors did not participate in the hearing: Fundy Tidal Inc., Alstom Power & Transport Canada Inc., Ocean Renewable Power Company and Marine Current Turbines Ltd.

[7] S. Bruce Outhouse, Q.C., acted as Board Counsel.

[8] The Notice of Public Hearing was published in the Chronicle Herald and the Cape Breton Post on Wednesday, November 14, 2012, Saturday, November 17, 2012 and Monday, November 19, 2012. The hearing was held on September 16, 2013, at the Board’s offices in Halifax, Nova Scotia.

[9] Three witnesses were called to testify at the hearing with respect to their Pre-filed Evidence. Board counsel called Geoffrey L. Keith, a Principal Associate of Synapse, and Mirko Previsic, President of RE Vision Consulting, the latter having assisted Synapse in the preparation of the proposed Tidal Energy FITs. The Consumer Advocate called Paul Chernick of Resource Insight, Inc. All three witnesses were qualified by the Board to provide opinion evidence. Aaron Long, P.Eng., Director of Business Development of Minas Basin Pulp & Power Company Ltd. (“MBPP”) [a member of TIDE], provided Pre-filed Evidence, but was not required for cross-examination at the hearing. As described later in this Decision, Frank N. LeBlanc, P.Eng., made a presentation at the commencement of the hearing to explain the background of FORCE, for the benefit of the Board and all intervenors.

[10] The Board also received written submissions from some of the parties following the hearing.

2.0 RENEWABLE ELECTRICITY REGULATIONS

[11] The background of the Province's COMFIT program was fully canvassed in the Board's COMFIT Decision.

[12] In May 2012, the Province released its Marine Renewable Energy Strategy, outlining a program to develop a tidal energy sector, which is intended to help meet Nova Scotia's renewable energy objectives and to develop experience and technology for export. The Strategy identifies a commercial potential of approximately 2,400 MW of tidal power for Nova Scotia and outlines a process to support the development of technology in the sector, including the support of FITs for tidal energy generation facilities. In its Strategy, the Province anticipates that there will be commercially competitive in-stream tidal technology by 2020.

[13] Under the *Electricity Act* and s. 18(2) of the *Regulations*, the Tidal Energy FITs for developmental tidal arrays must be set by the Board. Further, the Board must set separate tariffs for single and multiple devices:

18(5) The Board must set separate tariffs for developmental tidal arrays with a single device and developmental tidal arrays with multiple devices, and may set multiple tariffs for either type of developmental tidal array.

[14] A developmental tidal generation facility must meet all of the following requirements:

Developmental tidal array tariff qualifications

22 To qualify for a developmental tidal array tariff, a generation facility must meet all of the following requirements:

- (a) it must be located in the Province;
- (b) it must meet the definition of "developmental tidal array" in these regulations;
- (c) it must interconnect with the electrical grid through a transmission system;
- (d) it must have been issued a feed-in tariff approval.

[15] It is noted that a developmental tidal generation facility must interconnect with the electrical grid through a transmission system (voltages of 69 kV or more). All other types of renewable low-impact electricity generation facilities to which the COMFIT applies must interconnect with the electrical grid through a distribution system.

[16] Under s. 2 of the *Regulations*, the “feed-in tariff program” is defined as:

“feed-in tariff program” means the program established by Section 4A of the Act under which a public utility permits a generator to connect an electricity generation facility to the public utility’s electrical grid;

[17] Since developmental tidal arrays must interconnect with the electrical grid through a transmission system, the public utility referred to above will be NSPI in all cases.

[18] The *Regulations* also contain the following provision relating to the generation capacity of developmental tidal arrays:

3(1) In the Act and these regulations, “developmental tidal array” means a generation facility that consists of 1 or more tidal generation devices with a capacity of greater than 0.5 MW each and that is capable of being interconnected with the electrical grid through a transmission system;

[19] While there is no overall limit expressed in the *Regulations*, the Province indicated in its Marine Renewable Energy Strategy that the tidal energy program will be limited to a total impact of between 1% and 2% on rates for ratepayers. The Province indicated it will limit the impact by setting a cap on the energy to be licensed once the Board sets the tariffs.

[20] In the Board's setting of tariffs, ss. 19 and 21 of the *Regulations* provide:

19(1) In this Section and in Sections 20 to 35, “community feed-in tariff” means a tariff set by the Board for any class of generation facility referred to in Section 18 except for a developmental tidal array.

(2) In setting a community feed-in tariff, the Board must determine, for each class of generation facility, the cost of the physical assets of a facility and may make allowances for any of the following matters:

- (a) depreciation;
- (b) cost of labour and supervision;
- (c) necessary working capital;
- (d) organization expenses;
- (e) overhead costs for engineering, superintendence, legal services, taxes and interest during planning and construction, and similar matters not included in the cost of the physical assets;
- (f) costs in whole or in part of land acquired in reasonable anticipation of future requirements;
- (g) costs to interconnect the generation facility with the electrical grid;
- (h) return on investment;
- (i) additional matters that the Board considers appropriate.

21 In setting a tariff for developmental tidal arrays, the Board must take into account those matters described in subsection 19(2) on a normal amortized basis, including the costs for the manufacture, deployment and operation of the developmental tidal array, but must not make any allowance for any of the following matters:

- (a) costs covered or reimbursed through any government grant;
- (b) costs to interconnect the generation facility with the electrical grid.

[21] While the Board sets the tariffs, the *Regulations* provide that it is the Minister who approves the applications by electricity generation facilities to participate in the feed-in tariff program: see ss. 23 - 28.

[22] NSPI will pay generators who qualify to participate in the feed-in tariff programs the rates as determined by the Board. Under a tariff, the developer (i.e., a generator) will only be paid for energy successfully delivered to NSPI. The cost NSPI incurs will in turn be recovered from its customers through the Board approved fuel adjustment mechanism in the same way fuel and other purchased power costs are recovered.

[23] The Board's powers are set out in the *Regulations*:

Board powers

49 The powers of the Board respecting a hearing or an appeal under the *Utility and Review Board Act* and the *Public Utilities Act* and regulations made under those Acts apply to hearings and appeals under the Act and these regulations.

[24] As noted earlier in this Decision, s. 4A(5) of the *Act* provides:

4A(5) In setting a tariff pursuant to this Section, the Board may exercise the same powers and authority granted to it under the *Public Utilities Act*.

[25] However, the *Electricity Act* prevails in the event of a conflict with the *Public Utilities Act*:

2A Notwithstanding Section 117 of the *Public Utilities Act*, where there is a conflict between this Act and that Act, this Act prevails.

3.0 FUNDY OCEAN RESEARCH CENTER FOR ENERGY

[26] At the request of the Board, Mr. LeBlanc, Director of Capital Projects with FORCE, presented an overview of the facilities, as well as the technology and status of the approved test site.

[27] FORCE is a private not-for-profit organization that operates a tidal demonstration/visitor centre and approved test site at Minas Passage, Nova Scotia. It is funded by the federal and provincial governments; Encana Corp.; and from fees paid by berth holders.

[28] It has constructed a Main Substation onshore, which is connected to NSPI's transmission grid by a 10 km transmission line. The Substation will connect with the offshore berth sites by way of four separate 34.5 kV subsea power cables expected to be installed in 2014. The installation of the first turbine is expected in 2015. FORCE has collected current and comprehensive site data at each of the berth sites.

[29] Mr. LeBlanc explained that FORCE was created to develop the shared infrastructure, as well as to conduct research and environmental monitoring functions, based on the common interests of tidal berth holders. The site can accommodate four berths. However, currently only three are occupied. FORCE is currently approved for a

5 MW capacity, though Mr. LeBlanc's presentation indicates this can be upgraded to 64 MW with small modifications.

4.0 ADOPTION OF MODEL BY CONSULTATIVE PROCESS

4.1 Synapse Model

[30] Synapse led the consultative process with the formal intervenors.

[31] Synapse explained its approach to developing Tidal Energy FITs, which it based on the Province's view of how projects would be conducted at FORCE:

Government views the FORCE facility as a testing and demonstration site and hopes that the FITs will support multiple projects, utilizing a range of different technologies and installation techniques. In comments to Synapse clarifying their intent, the Department of Energy wrote: "In order to ensure access for both single devices and arrays and to support a diversity of technology and project types, both the Test Tariff and the Developmental Tariff will be allocated specific generation amounts" (Department of Energy Information Request IR-1, June 28, 2013).

... we have sought to promote a diversity of projects and project types. There is a wide range of possible project types, with a wide range of possible costs. Setting rates based on the lowest cost project type could limit activity at FORCE to one project or one project type. In addition, there is considerable uncertainty around project costs, and if we are off on our cost estimates, this approach could result in no projects. Therefore, we have proposed rates that we believe are near the middle of the range of potential costs. We hope that this approach will allow a variety of project types to move forward, although we understand that the economics will be more difficult for higher-cost projects and less difficult for lower-cost projects.

[Exhibit T-2, pp. 6-7]

[32] Like it did in the COMFIT proceeding earlier, Synapse used a discounted cash flow model to develop FITs. In its Pre-filed Evidence, it stated:

We have collected cost information from a number of sources and evaluated that information with a discounted cash flow model. In particular, we asked device developers to provide cost data within standardized cost centers so that we were able to compare the data effectively. We excluded cost data points that appeared to be outliers. We also developed our own cost estimates, relying on Re Vision Consulting's recent experience with similar projects and additional research.

[Exhibit T-2, p. 8]

[33] This general methodology was accepted by the intervenors in this proceeding. The Board is satisfied that Synapse's discounted cash flow model is an

appropriate methodology for the development of tariffs in this matter: see also COMFIT Decision, paras. 34-36. The Board also finds that it was reasonable for Synapse to adopt an approach that will allow a variety of project types to move forward: see also COMFIT Decision, paras. 55-56.

5.0 GENERAL ADOPTION OF ASSUMPTIONS AND INPUTS

5.1 Proposed Tariffs

[34] Synapse has proposed three types of tariffs. Under the test path, developers would have access to a test tariff for a single unit for up to three years. After that, the developer would have access to a second tariff for an array developed at the same site for 15 years.

[35] Alternatively, developers could proceed on a developmental path and have access to an array tariff for 15 years.

[36] Synapse advised that it proposed 15 year contracts for the array tariffs on the basis that this term balances near-term rate impacts with long-term costs. It further explained the tariffs as follows:

To make the proposal as clear as possible, we call the two tariffs in the test path the "Phase I Test" and "Phase II Test" Tariffs, and we call the tariff in the developmental path the "Developmental Tariff." All three tariffs are derived from the estimated cost of developing 5 and 10-MW arrays. In the test path, a higher rate is paid for the output of the test unit, and a lower rate is paid to the subsequent array. The net present value (NPV) of the two test tariffs is the same as that of the Developmental Tariff (discounted at 10%) for a project with "average" characteristics. These average characteristics include a device rating of 1.25 MW and a net capacity factor of 38%. ...

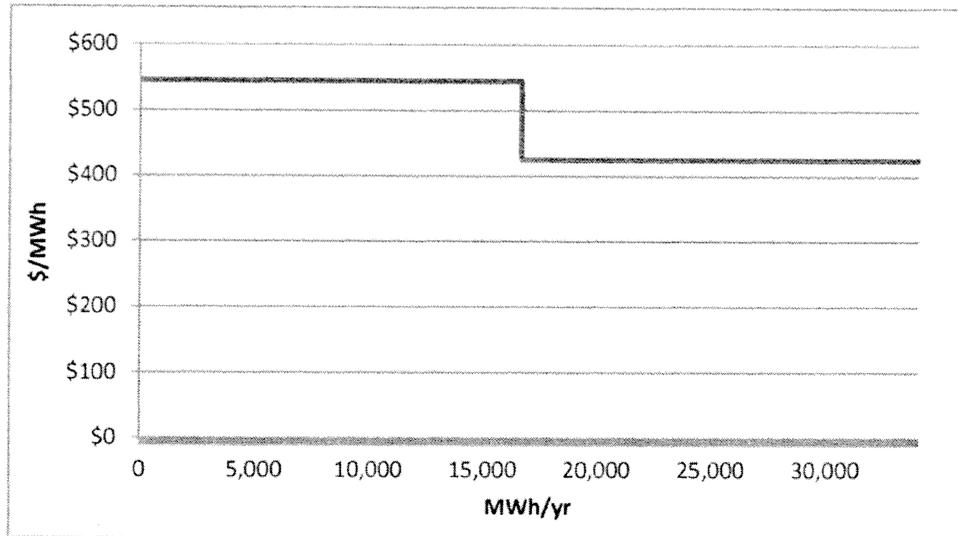
[Exhibit T-2, pp. 10-11]

[37] Synapse advised that the tariffs are based on the estimated Levelized Cost of Energy ("LCOE") for projects up to 10MW. Synapse further described the assumptions and the tariff:

Q. HOW DID YOU DEVELOP THE TARIFFS FROM THIS COST ANALYSIS?

A. We first established the Developmental Tariff. This is a declining block tariff, in which the first block is based on the cost of a 5-MW project, and the second is based on a 10-MW project. A 5-MW project operating at a 38% capacity factor would generate roughly 16,650 MWh per year, and a 10-MW project would generate about 33,290 MWh.

Figure 2. The Developmental Tariff

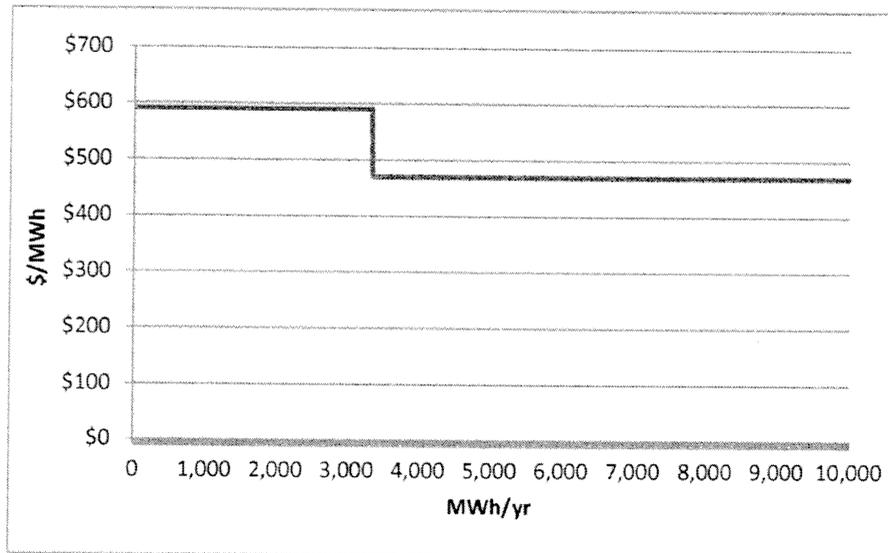


The first block of the tariff is at \$545 per MWh; therefore a typical 5-MW project would recover \$545 per MWh. Note, however, that the lower block in this tariff is not equal to the LCOE of a 10-MW project (\$485). It must be lower than that (\$425) in order for a 10-MW project's average annual revenue to be \$485 per MWh. At these rates, we would expect projects with average characteristics to earn an after-tax IRR in the range of 10%.

Q. HOW DID YOU DEVELOP THE TARIFFS FOR THE "TEST PATH?"

A. The Regulations require the Board to set a tariff for a single test unit. The Department of Energy has suggested allowing only 3,330 MWh per year to receive the test rate (consistent with a 1-MW unit operating at a 38% capacity factor). The first tariff in the test path, the Phase I Test Tariff, is for this unit. The test unit would receive \$590 per MWh for the first 3,330 MWh per year and \$470 for energy in excess of that. We are not proposing a limit on the amount of energy that could be sold on this tariff each year. The tariff would be available for up to three years.

Figure 3. The Phase I Test Tariff



The higher test rate of \$590 per MWh is not based on the cost of the test unit; it is simply designed to provide additional revenue to the project during the test period. The test unit is treated as the first unit of an array, and the two test tariffs together are designed to recover the cost of an array (the same cost the Developmental Tariff recovers).

[Exhibit T-2, pp. 12-13]

[38] The rates being proposed are:

A. The rates are summarized in Table 1.

Table 1. The Proposed Rates

Developmental		Phase I Test		Phase II Test	
≤16,560 MWh	>16,560 MWh	≤3,330 MWh	>3,330 MWh	≤16,560 MWh	>16,560 MWh
\$545	\$425	\$590	\$470	\$505	\$385

[Exhibit T-2, p. 16]

5.2 Project Costs

[39] In developing its costs assumptions, Synapse advised that it relied on cost information provided by potential project developers and independent cost build-ups Synapse developed to validate the cost assumptions provided by developers. Much of the data was received under non-disclosure agreements. Synapse also consulted with the staff at FORCE. It then engaged in an iterative process of comparing Synapse's

assumptions with the information received from developers and discussing the discrepancies.

[40] Synapse explained how the costs were put into its LCOE model:

Q. HOW HAVE YOU DIVIDED PROJECT COSTS FOR ENTRY INTO YOUR LCOE MODEL?

A. We have divided capital costs into: project development, permitting, equipment and installation, and we have divided annual operating costs into: berth fees, maintenance, general & administrative, insurance, environmental monitoring and decommissioning surety. We also include a decommissioning cost in year 15. We present the costs in each of these categories below.

[Exhibit T-2, p. 18]

[41] Synapse described, in some detail, the costs it has included in the LCOE model.

[42] The results of its analysis are summarized on the following tables:

Table 3. Project Development Costs

	1.25 MW	5 MW	10 MW
Up-Front Berth Fee	\$1,000,000	\$1,000,000	\$1,000,000
Siting and Scoping	\$150,000	\$150,000	\$150,000
Pre-Installation Studies	\$450,000	\$650,000	\$650,000
Rock Coring (50% included)	\$1,100,000	\$1,400,000	\$1,700,000
Design and Engineering	\$1,000,000	\$1,100,000	\$1,500,000
Contingency (25%)	\$675,000	\$825,000	\$1,000,000
Total	\$4,400,000	\$5,100,000	\$6,000,000
Total (\$/kW)	\$3,520	\$1,020	\$600

Figures may not sum due to rounding.

...

Table 4. Permitting Costs

	1.25 MW	5 MW	10 MW
Total	\$20,000	\$230,000	\$500,000
Total (\$/kW)	\$16	\$46	\$50

...

Table 5. Equipment Costs

	1.25 MW	5 MW	10 MW
Structural Components	\$3,000,000	\$11,900,000	\$23,000,000
Power Take Off, Rotor and Electrical	\$2,800,000	\$11,100,000	\$21,500,000
Subsea Interconnection	\$0	\$3,000,000	\$6,000,000
Environmental Monitoring Systems	\$200,000	\$800,000	\$1,600,000
Total	\$6,000,000	\$27,000,000	\$52,000,000
Total \$/kW	\$4,800	\$5,400	\$5,200

Figures may not sum due to rounding.

...

Table 6. Installation Costs

	1.25 MW	5 MW	10 MW
Foundation Installation	\$1,900,000	\$4,800,000	\$7,500,000
Deployment & Commissioning	\$700,000	\$1,800,000	\$3,100,000
Prime Contractor Overhead (20%)	\$520,000	\$1,300,000	\$2,100,000
Total	\$3,100,000	\$7,900,000	\$12,700,000
Total (\$/kW)	\$2,480	\$1,580	\$1,270

Figures may not sum due to rounding.

...

Table 7. Annual Maintenance Costs

	1.25 MW	5 MW	10 MW
Marine Operations	440,000	1,100,000	1,980,000
Shore-Side Operations	270,000	270,000	350,000
Parts/Consumables	120,000	480,000	960,000
Contingency on Marine Ops. (25%)	110,000	275,000	495,000
Total	\$940,000	\$2,100,000	\$3,800,000

Figures may not sum due to rounding.

[Exhibit T-2, pp. 19-24]

[43] Synapse also described the annual operating costs, including berthing fees, general administrative costs, insurance, environmental monitoring and decommissioning costs.

[44] Few of the specific cost assumptions were challenged by the intervenors.

5.3 Consumer Advocate

[45] Paul Chernick, who testified on behalf of the Consumer Advocate, noted the lack of well-known and easily-derived data to be used in calculating Tidal Energy FITs. This is a point conceded by Synapse.

[46] Drawing on his observation of rates in Ireland and Maine, and having regard to Nova Scotia's position as having a tidal resource, as favourable as any in the world, Mr. Chernick felt that Nova Scotia's rates "...may be maximized by tidal fit array prices in the range of \$350 to \$450 per MWh."

5.4 Minas Basin Pulp and Paper Company Ltd.

[47] Like Mr. Chernick and Synapse, MBPP pointed out that there is almost no useful publicly available energy cost data which may be used in order to calculate tidal rates. MBPP's principal concern with respect to the cost assumptions was as follows:

Synapse explained that there is a range of tidal technologies and a wide range of costs. To address the range, Synapse took an "average" of costs. It was not a true average, however, as Synapse discarded what they perceived as outliers. The problem with this approach is that with only 4-5 data points, if a high "outlier" is eliminated, it reduces the average and the input cost to the model. To illustrate this, look at a sample data set: 3, 4, 5, 7, and 11. The simple average of the set is 6. When the "outlier" of 11 is eliminated, the average drops to 4.9. While removal of a statistical outlier from a large data set may be appropriate, when dealing with so few data points, removal of what may be perceived to be an "outlier", (but which in reality is an actual cost for the particular technology) skews the results.

[MBPP Final Submission, p. 2]

5.5 Finding

[48] The Board understands the challenge faced by Synapse and the intervenors in designing and reviewing a Tidal Energy FIT because of the lack of data and information available worldwide on such rates.

[49] However, the Board is still tasked with approving tariffs.

[50] Having considered the evidence, the Board generally accepts, subject to the comments on specific issues which follow, the cost assumptions and inputs adopted by Synapse leading to the calculation of its rates. The Board finds that Synapse took reasonable steps, based on the information it had, to test the data, and while Synapse itself recognized the inherent uncertainties in the exercise it undertook, the Board is satisfied the Synapse data is the most reliable before it.

6.0 RATE OF RETURN

[51] In its modeling, Synapse assumed that projects with average characteristics would achieve a 10% after tax internal rate of return.

[52] Synapse noted that, given the risks of early tidal projects, normal debt and equity financing would not be available at reasonable terms from institutional investors such as banks and insurance companies. Synapse expected that the companies who participate in the Tidal Energy FIT program will have sufficient resources to finance these projects internally, essentially as test projects, until the technology is proven.

[53] Synapse looked at other feed-in tariffs and compared them to its own cost analysis. Based on that and discussions with developers, it concluded that the 10% internal after tax rate of return produced a total energy rate that "...developers could work with."

[54] Mr. Chernick suggested that demonstration installations of new technology would typically recover less than their full costs, and that setting any rate which would create a positive return would be generous in the demonstration phase. He suggested using an internal rate of return of about 5%.

[55] However, in his final submission, the CA suggested reducing the rate of return "...to below 9% to recognize that at the early stage of development it is not expected that developers require a competitive rate of return."

[56] MBPP stated that the targeted internal rate of return is a matter of some concern. Noting that the initial model produced by Synapse targeted a rate of return of 13%, and recognizing the rate of return for small scale in-stream tidal COMFIT projects is set at 15%, MBPP argued that the Board should resist any revisions to the 10% rate which it described as "... the lowest Synapse could propose while still hoping for a viable project to develop."

6.1 Finding

[57] The Board is satisfied that the targeted 10% after tax internal rate of return assumption used by Synapse is reasonable in the circumstances.

7.0 TREATMENT OF GOVERNMENT GRANTS

[58] In calculating its rates, Synapse assumed government grant level funding equal to 10% of installed costs up to a total of \$5 million. In Synapse's approach, grant funds are not recovered via the Tidal Energy FIT rate, but simply reduce the capital cost. In addition, Synapse excluded from the rate the cost to connect the generation facility with the electrical grid.

[59] As noted in paragraph [21] of this Decision, s. 21 of the *Regulations* provides:

21 In setting a tariff for developmental tidal arrays, the Board must take into account those matters described in subsection 19(2) on a normal amortized basis, including the costs for the manufacture, deployment and operation of the developmental tidal array, but must not make any allowance for any of the following matters:

- (a) costs covered or reimbursed through any government grant;

(b) costs to interconnect the generation facility with the electrical grid. [Emphasis added]

[60] Synapse explained its interpretation of the *Regulations* in its evidence:

We interpret this language to mean that the Board should not set FIT rates such that project developers recover grant funds or interconnection costs via the FITs. We presume that this prohibition is intended to prevent projects from retaining grant funds as profit from a project and similarly to prevent them from recovering interconnection costs that have been paid for at the Fundy Ocean Research Center for Energy (FORCE) via grant funding.

[Exhibit T-2, p. 6]

[61] MBPP interpreted the *Regulations* as directing Synapse not to make any allowance for grants and interconnection, and contended that Synapse had erred by including grant funding in the model, contrary to the *Regulations*.

[62] After reviewing various legal definitions in its post-hearing brief, counsel for MBPP went on to state:

In explicitly directing the Board not to "make any allowance for" grants and interconnection costs, the plain language of the Regulation provides that neither grants nor interconnection costs should be included in setting the tariffs. Neither line item should be reflected in the model. In the absence of ambiguity, it was inappropriate for Mr. Keith to look behind the plain language of the Regulation with respect to grants alone and therefore, include a 10% deduction to the capital costs which were developed. Having done so, however, Synapse compounded its error by failing to consistently apply the same rationale to interconnection costs i.e. include them to prevent over or under-recovery. The failure to include interconnection costs was, it seems, based at least in part on a misunderstanding of those costs. Firstly, Mr. Keith incorrectly understood that these were covered by grants and secondly, believed that these costs had already been included without accounting for the need to upgrade at additional costs.

[MBPP Final Submission, p. 10]

[63] The Province argued that Synapse's interpretation of the *Regulations* is consistent with the Province's intent.

[64] In its post-hearing submission, counsel for the Province stated as follows:

Regulation 21 refers to taking into account "those matters described in subsection 19(2)". Subsection 19(2) of the regulations deals with the costs to be included in the COMFIT rates; regulation 21 imports these costs into setting FIT rates. The language of "allowance" is also used in subsection 19(2):

19(2) In setting a community feed-in tariff, the Board must determine... the cost of the physical assets of a facility and may make allowance for any of the following matters:

- (a) depreciation;
- (b) cost of labour and supervision;
- (c) necessary working capital;
- (d) organization expenses;
- (e) overhead costs for engineering, superintendence, legal services, taxes and interest during planning and construction, and similar matters not included in the cost of the physical assets;
- (f) costs in whole or in part of land acquired in reasonable anticipation of future requirements;
- (g) costs to interconnect the generation facility with the electrical grid;
- (h) return on investment;
- (i) additional matters that the Board considers appropriate.

Regulation 21 goes on:

“the Board must take into account those matters described in subsection 19(2) ... including the costs of manufacture, deployment and operation of the development tidal array, but must not make any allowance for ... (a) costs covered or reimbursed through any government grant.”

The language of these regulations, read together, is to “make allowance for”, or include in tariffs certain categories of costs and areas of costs, expenses and capital. To “not make allowance for” such things as interconnection costs, and other costs covered through grant funds, means not to include these in the setting of rates. The use of the phrase to “make allowance for”, in this context, means to include as a cost so as to recover through rates. To “not make any allowance for”, means not recover as a recoverable cost in rates. Again, the purpose of doing this is to avoid double recovery of such costs for tidal energy projects.

Synapse had adopted this interpretation, and it is reflected in its methodology. Synapse has not allowed for costs covered through grant funding, or interconnection costs. [Emphasis in original]

[NSDOE Final Submission, pp. 5-6]

7.1 Finding

[65] The wording of the *Regulations* is confusing.

[66] However, when *Regulations* 19 and 21 are read together, the more logical interpretation is to avoid double counting.

[67] Failure to exclude grant monies from the calculation of the rate would provide a potential windfall for developers, which it appears the *Regulations* were trying to avoid.

[68] Accordingly, the Board accepts the interpretation of *Regulation 21*, as explained by Synapse and argued by the Province.

8.0 TRANSMISSION LOSSES

[69] In its assumptions regarding the production of tidal devices, Synapse assumed 90% availability and 2% transmission losses to the gross capacity factors to derive a net capacity factor.

[70] Mr. Chernick challenged the transmission loss assumption as being high, noting that the NSPI system-wide losses, recognizing transmission over hundreds of kilometres from generation to load centers, is only 3.23% of the load, or 3.1% of generation. In the circumstances, he suggested a 2% loss seems quite large for the short interconnection of the tidal plants to the system. He suggested it might be closer to 1%.

8.1 Finding

[71] Recognizing the imprecision and uncertainty that goes into a number of the assumptions, while understanding Mr. Chernick's point, the Board is not persuaded that it has sufficient evidence to change the 2% transmission loss assumption developed by Synapse as part of its rate.

9.0 INCOME TAX CALCULATIONS

[72] In the determination of the tariffs, Synapse had to calculate the income taxes that would likely be refunded to, or paid by, the developers. In calculating the

income taxes, Synapse made assumptions about the tax benefits arising from the various expenditures, including how the expenditures and tax benefits are recognized for income tax purposes.

[73] In response to Undertaking U-2 Synapse reviewed the assumptions about the tax treatment of all the expenditures and, subsequently, revised the income tax calculations. None of the intervenors commented upon the revised income tax calculations.

[74] The Board finds that the revised income tax calculations are more closely aligned with methods acceptable to the Canada Revenue Agency than those presented in the original evidence [Exhibit T-2]. The Board accepts the tariffs as calculated in response to Undertaking U-2 in the determination of a Tidal Energy FIT.

10.0 APPROVAL OF RATES

10.1 Rate Categories

[75] As noted earlier in this Decision, Synapse proposed rates under two paths, labeling the tariff that starts with a single device the “test tariff” and the tariff for an array (which may have one or multiple devices) the “developmental tariff”. Within each path there are declining block rates proposed based on the MWh of energy produced.

[76] The “developmental tariff” offers a declining block rate for a generator with a cut-over happening at an annual production of 16,560 MWh. These rates are available for 15 year terms.

[77] The “test tariff” has two phases. Phase 1 includes a declining block rate for a single device for up to three years with the cut-over happening at 3,330 MWh.

Phase 2 rates provide a declining block rate for the full array (which may continue as a single device or increase to multiple devices) with the cut-over happening at 16,560 MWh for a term of 15 years.

[78] The net present value of the developmental rate is the same as that for the combined two phased test path rates, however, the timing and amounts of the tariffs are different.

[79] There were no comments from the intervenors about either the cut-over point for the declining block rates or the availability of both a developmental rate and a two part test path rate.

[80] The Board approves the Tidal Energy FITs having three rates available, as proposed by Synapse (amended earlier in this Decision with respect to income tax calculations). Once a developer has chosen either the developmental or test tariff, it cannot later opt for the other, so that each receives, over time, the same net present value of revenue per MWh produced.

10.2 Escalating vs. Flat Rates

[81] In developing the rates, Synapse used a 2% per annum inflation factor for the calculation of the operating expenses (annual maintenance costs tabulated in para. [42] and the annual operating costs listed in para. [43]). The derivation of the LCOE was over 15 or 18 (3 + 15) year terms. An alternative, as calculated by Synapse, is to have the rates increase by this inflation adjustment each year. These escalating rates start lower, but end up higher, than the flat rate over the respective terms (but are equivalent in terms of net present value).

[82] Mr. Chernick, on behalf of the CA, identified three advantages to using escalating rates:

- Starting with lower rates in the first year may allow more Tidal FIT projects to be developed under the 1% and 2% rate-increase caps that the DOE intends to use to limit Tidal FIT contracts. In later years, escalation in labor, fuel prices, operating costs and other rate components will tend to raise average rates, leaving more room under the 2% rate-increase ceiling.
- Escalating a large portion of the rate with actual inflation will better track the costs of labor, services and materials necessary to operate the tidal plants, reducing the risks to the developers and owners of the plants.
- Reducing revenue requirements from the Tidal FIT in the near term will avoid having the highest Tidal FIT revenue requirements coincide with the highest rate effect of the Maritime Link. NSPI expects that the costs of the Maritime Link will start to flow through retail rates in late 2017, peaking in 2019 and then declining 11% through 2025 in nominal terms and 22% in constant-dollar terms. In constant dollars, the Maritime Link revenue requirements fall 23% by 2030, the final year of a 15-year Tidal FIT starting in 2015. Whenever possible, the Board should attempt to minimize other costs in the expensive early years of the Maritime Link.

[Exhibit T-6, p. 11]

[83] This was explored at the hearing by Ms. Rubin:

Ms. Rubin: Yeah. And you'd agree that escalating rates reduce the near-term rate impacts?

Mr. Keith: Yes.

Ms. Rubin: So they're generally viewed as a positive?

Mr. Keith: From that perspective, yes.

Ms. Rubin: And the downside to escalating rates is complexity?

Mr. Keith: Yes. For example, it would be potentially more complex for the Department of Energy to determine the actual rate impact if the rates were escalating over time.

[Transcript, pp. 110-111]

[84] Mr. Keith further stated:

We've heard from some developers. At least one developer told us they preferred the simplicity of the flat rates and they felt like that simplicity was very important in terms of them trying to make their -- a case for potential investors.

[Transcript, p. 112]

[85] The Board explored with Mr. Keith whether developers should be given the option of choosing a flat or escalating rate:

Mr. Keith: Well, it -- the -- as Mr. Chernick indicated, we're not likely to get any projects before 2015, and if that date slips, we're talking about 2016 or

'17. At that point, the escalating rate is getting very close to the original fixed rate, so it -- developers would probably choose the escalating rate. And so there may not be a need to do that.

Chair: But if there were -- in other words, if some developers would prefer one and some the other, it seems to me ratepayers are largely indifferent. Forget about the Maritime Link considerations and so on.

Would it be worthwhile for the Board to give them that option?

Mr. Keith: Yes.

[Transcript, pp. 190-191]

[86] The 1% to 2% rate increase cap is mentioned in government policy statements, but is not fixed in the *Regulations*. Accordingly, the Board does not make any findings as to whether having escalating rates would be an advantage or not to increase the development of tidal power.

[87] The Board finds that the developers have not stated a strong preference for either flat or escalating rates. Hence, the Board concludes that the developers may not perceive the advantages, as described by Mr. Chernick, to be significant.

[88] The Board notes that the escalating developmental rates in 2018 (when the Maritime Link is intended to be brought on stream) are close to the flat rates and are slightly lower for the test path rates. Accordingly, the impact of escalating versus flat rates on overall electricity rates to customers would be minimal.

[89] Flat rates have an advantage of being relatively straight forward and easier to understand. The Board finds that only flat rates should be offered.

[90] The Board sets the Tidal Energy FIT rates to be as follows:

Table 4. The Revised Flat Rates

Developmental		Phase I Test		Phase II Test	
≤16,560 MWh	>16,560 MWh	≤3,330 MWh	>3,330 MWh	≤16,560 MWh	>16,560 MWh
\$530	\$420	\$575	\$455	\$495	\$375

[Exhibit T-25, U-2, p. 4]

11.0 TARIFF TERMS AND CONDITIONS

[91] In determining the terms and conditions for the Tidal Energy FITs, the Board considers s. 4A(3) and (4) of the *Act* to be instructive:

4A (3) In setting a tariff pursuant to this Section, the Board shall make allowance for the matters set out in the regulations.

- (4)** In setting a tariff pursuant to this Section, the Board shall determine
- (a) the class or classes of generation facility that qualify for a particular tariff;
 - (b) whether a tariff is to be adjusted periodically and, where it is to be adjusted, the basis for the adjustment;
 - (c) the effective date for commencement of a tariff;
 - (d) the duration of a tariff; and
 - (e) the terms and conditions under which payment is to be made by a public utility to generators.

[92] The Board notes that the *Regulations* define a "developmental tidal array" as a generation facility that consists of 1 or more tidal generation devices with a capacity of greater than 0.5 MW each and that is capable of being interconnected with the electrical grid through a transmission system. This should be reflected in the tariff, as well as the requirement in s. 22(a) of the *Regulations* that the generation facility be located in the Province of Nova Scotia.

[93] With respect to the effective date of the tariffs, the Board is mindful that the Compliance Filing must be prepared and comments received, if any, from the parties. The tariffs will become effective on the date of the Board's final Order in this proceeding, which the Board expects to be no later than December 16, 2013.

[94] No party challenged Synapse's view respecting the duration of the tariffs. The Board is satisfied that the term of the developmental tariff should be 15 years. The Phase 1 test tariff shall have a term not exceeding three years, while the Phase 2 test tariff shall have a 15 year term.

[95] As submitted by NSDOE, the Board directs that the Phase 1 Test tariff will only be available to projects at FORCE berths.

[96] Like the terms and conditions applicable to COMFIT projects, other terms and conditions that should also apply to Tidal Energy FIT projects include: approval from the Energy Minister; the requirement to enter into a power purchase agreement (“PPA”); and the satisfaction of the requirements in s. 20 of the *Regulations*.

[97] The Board also notes that a PPA will use the tariff in effect at the time of its signing. To prevent arbitrage in the event a tariff is lowered, it may be appropriate to include a production date in the PPA.

[98] The Board directs Synapse, as part of its Compliance Filing, to prepare draft Terms and Conditions for each of the Tidal Energy FITs based on the above guidance and the findings in this Decision.

12.0 FUTURE REVIEWS

[99] In developing the rates, Mr. Keith stated:

... the levels of uncertainty in this proceeding are much greater than the levels of uncertainty in a typical proceeding before this Board and, you know, we're dealing with a technology that's just emerging from R&D and has been tested in the water but really hasn't been proven.

[Transcript, pp. 43-44]

[100] Experience will be gained with the commercialization of the technology. With this experience, greater certainty over costs will be achieved, and if the past is any indication, costs will be reduced, as stated by Mr. Previsic:

...Once we sort of hit a commercial opening point, we sort of see costs peak out and then, as you deploy capacity, that cost starts to reduce ...

[Transcript, p. 48]

[101] Synapse was questioned as to whether the rates should be reviewed. Mr. Keith stated:

... we would recommend that after some projects at FORCE have been in the water and operating, that Energy and the Board would revisit the feed-in tariffs to see if it was appropriate at that point to reduce them.

[Transcript, p. 122]

[102] When asked when this review should occur, Mr. Previsic responded:

Yes. So that puts you at the capacity of, you know, 5 megawatts maybe five years into the future. I mean, those are just guesses but I think that would be maybe sensible, yeah.

[Transcript, p. 133]

[103] Mr. Chernick had these comments about a review:

Yes. I think that would be a good idea. If -- currently there's a -- an expectation, as I understand it, that the first projects might go into the water in 2015. So something like 2017 might be a good time for the Board to put a little note on its calendar to check and see whether conditions warranted a new look at the pricing.

Either if in fact no projects had gone ahead or one small test unit or something of that sort, indicating that perhaps if the Province wants to have any development, the rate would have to higher or if the -- the rate limit is being filled up very quickly, indicating the perhaps the price is unnecessarily high and more development can be achieved with -- within the rate cap at a lower FIT rate.

[Transcript, p. 182]

[104] NSDOE was supportive of a review process within a reasonable period of time, taking into account the pace of project development in the province. In its Final Submission, NSDOE stated:

Instead of a time-bound trigger, NSDOE suggests that one (or more) events trigger a review: 1) an increase in the system, opening the 1-2% band to greater MWs, 2) a change in Government policy, or 3) a berth holder vacates their berth.

[NSDOE Final Submission, p. 9]

[105] The Board notes that one of the purposes of a Tidal Energy FIT is to encourage development. If no activity happens in a reasonable period of time it could

be because the rates are too low. Accordingly, if there is no significant activity, or if a berth site is vacated, the Board will consider reviewing the rates after three years.

[106] On the other hand, the Board is concerned that costs may drop such that the rates so established are too high and ratepayers are adversely affected. In such circumstances, the Board will consider reviewing the rates after five years.

[107] At this point, the Board makes no specific direction respecting future reviews, but will monitor activity at the FORCE berth sites, and in the tidal sector generally, and give directions about future reviews when appropriate in the circumstances.

13.0 ANNUAL STATUS REPORTS

[108] To monitor progress, and assist the Board in determining whether rates should be reviewed, NSPI is directed to provide an annual report to the Board. This report should include the following:

- a) Total installed nameplate capacity of the generators for each FORCE berth; and
- b) Total MWh purchased from each FORCE berth.

[109] NSDOE is requested to provide the Board with an annual report about the status of any and all Tidal Energy FIT applications.

14.0 DISCLOSURE TO CONSUMER ADVOCATE

[110] Mr. Chernick, in his evidence, complained that Synapse provided very little data and information to support some of the judgments it made in calculating the rates. Two specific items noted by Mr. Chernick were the 38% capacity factor and the 2% transmission losses. In response, Synapse indicated that much of the data it obtained

was under non-disclosure agreements. This was made clear to all parties at the technical session on November 29, 2012, where Synapse discussed the challenge of balancing data confidentiality with transparency.

[111] Synapse pointed out that Mr. Chernick could have asked the project developers and FORCE whether the CA's office could sign a non-disclosure agreement and receive the same data, but he did not.

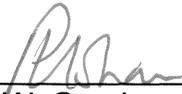
[112] The Board notes that the CA is in a different position than competing project proponents. Neither the CA, nor its consultant, would gain commercial advantage from knowing the assumptions; and therefore, there is no competitive risk to the project proponents.

[113] At the same time, the CA is well aware of the pre-hearing procedures available to him to request disclosure of information, and he did not make any application to the Board to seek disclosure. In future, if the CA feels a greater level of disclosure is required, he should ask for it in advance of filing evidence.

15.0 COMPLIANCE FILING

[114] The Board's findings in this Decision, arising from the revised income tax calculations, result in adjustments to the numerical inputs in the Tidal Energy FIT model provided by Synapse. Accordingly, the Board directs Synapse to provide, through a Compliance Filing, revised FIT model calculations for each tariff, as well as draft Terms and Conditions for each of the tariffs. The Compliance Filing shall be filed by November 27, 2013.

DATED at Halifax, Nova Scotia, this 13th day of November, 2013.



Peter W. Gurnham



Roland A. Deveau



Murray E. Doehler