NSUARB P-128.10

NOVA SCOTIA UTILITY AND REVIEW BOARD

In the Matter of: An Application by Nova Scotia Power Inc. for Approval of Capital Work Order CI 39029, Port Hawkesbury Biomass Project

DIRECT TESTIMONY OF

PAUL CHERNICK

ON BEHALF OF

THE CONSUMER ADVOCATE

Resource Insight, Inc.

JUNE 16, 2010

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I. Identification & Qualifications

Q: Mr. Chernick, please state your name, occupation, and business address.

A: I am Paul L. Chernick. I am the president of Resource Insight, Inc., 5 Water St, Arlington, Massachusetts.

Q: Summarize your professional education and experience.

A: I received an SB degree from the Massachusetts Institute of Technology in June 1974 from the Civil Engineering Department, and an SM degree from the Massachusetts Institute of Technology in February 1978 in technology and policy. I have been elected to membership in the civil engineering honorary society Chi Epsilon, and the engineering honor society Tau Beta Pi, and to associate membership in the research honorary society Sigma Xi.

I was a utility analyst for the Massachusetts Attorney General for more than three years, and was involved in numerous aspects of utility rate design, costing, load forecasting, and the evaluation of power supply options. Since 1981, I have been a consultant in utility regulation and planning, first as a research associate at Analysis and Inference, after 1986 as president of PLC, Inc., and in my current position at Resource Insight. In these capacities, I have advised a variety of clients on utility matters.

My work has considered, among other things, the cost-effectiveness of prospective new electric generation plants and transmission lines, retrospective review of generation-planning decisions, ratemaking for plant under construction, ratemaking for excess and/or uneconomical plant entering service, conservation program design, cost recovery for utility efficiency programs, the valuation of environmental externalities from energy production and use, allocation of

costs of service between rate classes and jurisdictions, design of retail and wholesale rates, and performance-based ratemaking and cost recovery in restructured gas and electric industries. My professional qualifications are further summarized in Exhibit____PLC-1.

Q: Have you testified previously in utility proceedings?

A: Yes. I have testified more than two hundred times on utility issues before various regulatory, legislative, and judicial bodies, including utility regulators in thirty states and five Canadian provinces, and two US Federal agencies. This testimony has included the review of many utility-proposed power plants and purchased-power contracts.

Q: Have you previously testified before this Board?

A: Yes. I testified in the Board's review of Nova Scotia Power's Demand Side Management Plan for 2010 and Demand Side Management Cost Recovery Rider in May 2009, and in Board's review of the proposed purchased-power agreement between Nova Scotia Power Inc. (NSPI) and a biomass project to be constructed at the NewPage Port Hawkesbury pulp and paper mill (NSUARB P-172).

II. Introduction

Q: On whose behalf are you testifying?

A: My testimony is sponsored by the Nova Scotia Consumer Advocate.

Q: What is the purpose of your testimony?

A: The Consumer Advocate has asked me to comment on the proposal of NSPI to purchase NewPage Port Hawkesbury's (NPPH) existing Power Boiler #3, modify the boiler, and add a steam turbine to construct a 60-MW biomass

cogeneration system that would supply steam to NPPH's pulp and paper mill. The construction would be managed by NPPH, which would also operate the plant and procure fuel under the Management, Operations, and Maintenance Agreement (MOMA).[1]

Q: Please summarize your observations on the NSPI proposal.

A: I have identified the following two categories of issues with NSPI's proposal: issues related to least-cost planning and minimizing the costs of meeting the Renewable Energy Standards (RES), and issues related to the structure and evaluation of the project transactions. I have identified the following planning issues:

- The Company has once again put the Board into an awkward situation, proposing a project on a tight time schedule without having done the work necessary to allow the Board to make an informed decision. In this case, NSPI's major omission is the failure to solicit bids for wind energy to meet the 2013 RES, as anticipated in NSPI's own November 2009 IRP update.
- The Company has restricted the range of competing resources by excluding wind (on the ground that wind energy is not "firm") and co-firing of bio-mass in NSPI's coal boiler (on the ground that co-firing does not count toward the RES until 2015).
- It is not clear that NSPI's proposed review of the July 15, 2010, responses to its pending RFP for renewable energy will provide enough information to allow the Board to fully incorporate the Port Hawkesbury Biomass Project in light of those proposals.

[1]When I use terms defined by the MOMA, I will generally capitalize those terms.

- The Company has not properly compared the costs of power supplied under a fixed-price PPA, in which most cost and performance risks fall on the supplier, and power supplied by NSPI-owned plants, in which most risks are borne by the ratepayers.
- It is not clear that NSPI will provide equal access to transmission for other renewable projects on Cape Breton Island and other parts of eastern Nova Scotia.

In terms of the structure and evaluation of the project, I have identified the following issues:

- NSPI appears to have understated the costs of the project, by assuming that (1) the project does not create any administrative overheads and (2) NSPI would incur no cost of overseeing, monitoring or auditing NPPH's operation of the project.
- The cost of fuel—specifically fuel from NPPH's woodroom—is not well defined and may impose contract and litigation costs in the future.
- The levels of other projected costs of the project, particularly oversight (which NSPI assumes to be zero) and sustaining capital, are not well-documented.
- The levels of other projected costs of the project, particularly property taxes (which NSPI assumes to be zero) and sustaining capital, are not well documented.
- The cost of power from the project may increase substantially, depending on whether (1) the plant operates for 40 years; (2) the cost of fuel continues to be set by the escalators in the MOMA; (3) NSPI must assume responsibility for operating the plant and procuring fuel; (4) the pulp and paper mill continues operating as a steam load and a source of biomass.

- The bulk of NPPH's benefit from the project would be concentrated in the upfront cash payment for Power Boiler #3, which would do little or nothing to keep the mill in operation.

Q: What are your recommendations to the Board in this matter?

A: I recommend that the Board adopt the following requirements:

- A full filing of the costs of the RFP proposals, and an opportunity for review of the proposals and questioning of NSPI, prior to approval of the Port Hawkesbury Biomass Project.
- That NSPI seek wind bids and compare those bids to the cost of the Port Hawkesbury Biomass Project prior to approval of this proposal.
- That NSPI present a mechanism for comparing the costs of purchased power and NSPI-owned renewable plants, taking into account the different risk characteristics.
- The clarification of the pricing of fuel from the NPPH woodroom under MOMA §2.4.2.
- That other renewables not be disadvantaged compared to the Port Hawkesbury Biomass Project in terms of access to east-west transmission.
- That NSPI renegotiate the package of agreements for the Port Hawkesbury Biomass Project, so that more of the benefits to NPPH accrue during the operation of the project, rather than as an up-front cash payment.
- If the project is approved, that NSPI file notice with the Board of any conditions (such as actual fuel costs exceeding targeted costs) that could result in the termination or revision of the MOMA.

In addition, in recognition of the incompleteness of NSPI's filing in this proceeding, the Board should condition any approval of Port Hawkesbury

Biomass by leaving NSPI at risk for costs exceeding the projections in the application.

III. Least-Cost-Planning Issues

Q: How would approval of NSPI's proposal be inconsistent with least-cost planning principles?

A: I have identified the following three inconsistencies with least-cost planning:

- Failure to commit to a process for comparing the Port Hawkesbury Biomass Project to alternative biomass projects;
- Dismissing new wind generation as an alternative to the Port Hawkesbury Biomass Project;
- Treatment of transmission costs for the Port Hawkesbury Biomass Project in a manner that raises questions about whether it will provide equal access to transmission for other renewable projects on Cape Breton Island and other parts of eastern Nova Scotia.

A. Incentives for Nova Scotia Power

Q: Can the Board rely on NSPI to act in the interest of ratepayers in this matter?

A: No. The Company has incentives that differ from ratepayer interests in three ways. First, NSPI is at risk if its RES obligations are not met, but would normally flow the costs of meeting the RES through to ratepayers. This would tend to make NSPI very risk-averse in planning for RES compliance. If the Board approves the Port Hawkesbury Biomass Project, NSPI's risk of complying with the 2013 RES is very low.

Second, NSPI may be concerned with the reliability of its estimates of renewable-energy production from wind farms under construction and that may be proposed in future procurements. This risk arises from both uncertainty in the long-run average wind resource at hub height for various sites and the variability in weather patterns, which could reduce wind generation province-wide over a period of a year or more. In either case, NSPI could fall short of its obligations and could be penalized by the Province, despite good-faith efforts to comply with the REC.[2]

Third, while the general approach to renewable-energy procurement in Nova Scotia is to acquire energy through purchased-power agreements (PPAs) with third-party developers, the Port Hawkesbury Biomass Project presents NSPI with an opportunity to build rate base. Expanding capital investment is often attractive to utility management. While there are also some benefits for ratepayers from utility ownership of resources, such as greater flexibility in plant operation and modification, there are corresponding costs, especially performance risk.

B. Alternative Biomass Projects

Q: What is the advantage of the Port Hawkesbury Biomass Project compared to alternative uses of the biomass?

A: The alternative uses of the biomass would include co-firing NSPI's coal boilers, fueling other cogeneration facilities, and fueling stand-alone steam-electric biomass plants.

[2]Even if this outcome seems unlikely to outside observers, it may seem to be an important risk to corporate management.

Cogeneration systems are usually more efficient than a combination of stand-alone steam-electric plants and process boilers, so a cogeneration system —either at Port Hawkesbury or elsewhere—should produce more electricity and/or steam than the same amount of biomass used in separate plants. From the data provided by NSPI, I estimate that the heat rate attributed to the electric generation would be about 12.7 MMBtu/MWh, which is at the low end of the range of heat rates for free-standing wood-fired power plants (which range up to about 15 MMBtu/MWh). On the other hand, the energy allocated to steam production for NPPH appears to fall about 30% from free-standing operation to cogeneration. Overall, the energy (and hence biomass) consumption of the Port Hawkesbury Biomass Project appears to be about 13% less than the sum of the current consumption by NPPH and the consumption by a free-standing biomass plant producing 388 GWh at a heat rate of 13.5 MMBtu/MWh.

Q: Has NSPI sought offers from other potential biomass plants?

A: Yes. The proposals due July 15 could include biomass projects, including cogeneration. The Board should review the biomass and any other bids and consider the risk-reduction advantages of PPAs before deciding whether to approve the Port Hawkesbury Biomass Project.[3]

Nova Scotia Power has committed only to providing a very limited amount of information on the RFP results in this proceeding. The Company

> will request the evaluator prepare a preliminary assessment for filing with the Board in advance of the Port Hawkesbury Biomass Hearing. The preliminary assessment will provide the Board and stakeholders with the evaluator's initial assessment with respect to the number of viable RFP respondents and the associated energy offered by the project proponents. CA IR-112a

[3]See the discussion of PPAs and risk on page 12.

The Board and parties should also see the pricing proposed by the projects.

Q: How much confidence can the Board have in the independence of the evaluator NSPI selects for this project?

A: At this point, not much. NSPI expects to select an evaluator by the end of June (CA IR-112), but we do not know who that will be. The Company asserts that a

> preliminary assessment [of]...the number of viable RFP respondents and the associated energy…. and the fact that NSPI has already filed its proposal with the Board regarding its plan to meet 2013 Renewable Energy Standard requirements demonstrate the independence of the RFP evaluator. CA IR-112a

This assertion makes no sense. Preparing a table summarizing the number of bidders and amount of energy that the evaluator finds "viable" would not demonstrate the evaluator's independence. And the fact that NSPI has already stated its preferred solution for meeting the 2013 RES would tend to compromise the independence of its contractor, not enhance it.

Q: How does the Port Hawkesbury Biomass Project compare with co-firing of biomass in NSPI's coal-fired plants?

A: Co-firing has minimal capital and incremental operating costs (CA IR-40e), but would use somewhat more fuel than cogeneration and would not enjoy whatever efficiencies in fuel procurement result from NPPH's experience and connections in the forest products industry.

Q: Does the Port Hawkesbury Biomass Project compete with co-firing for fuel supply?

A: Not directly, since the Renewable Energy Plan limits co-firing to 150,000 dry tonnes of biomass and total new biomass generation to 500,000 dry tonnes, and Port Hawkesbury Biomass would use about 240,000 of the 350,000 tonnes difference. Once NSPI is committed to Port Hawkesbury Biomass, the amount

of new biomass generation that can be developed without impinging on the supply for cofiring would be limited to 110,000 tonnes, which is less than half the usage by Port Hawkesbury Biomass.

Q: Does NSPI evaluate cofiring as an alternative to the Port Hawkesbury Biomass Project?

A: No. The Company explains that the Port Hawkesbury Biomass Project "has been proposed to allow NSPI to meet the 2013 Renewable Energy Standard (RES) requirements. Co-firing does not comply with the 2013 RES." (IR CA-34b) As I discuss below (Section C), the 2013 RES could be met with wind power, probably at a cost lower than the Port Hawkesbury Biomass Project, and co-firing does comply with the 2015 RES.

C. Wind-Plant Alternatives

Q: Has NSPI considered additional wind energy as an alternative to the Port Hawkesbury Biomass Project?

A: Not in any serious way. This is odd, in that Application Appendix 7 shows Port Hawkesbury Biomass backing out 100 MW of wind that was included in the November 2009 IRP update to meet the 2013 RES.

In Application Appendix 8, NSPI compares its estimate of the costs of Port Hawkesbury Biomass to the costs of a hypothetical wind PPA plus a backup charge. The Company has not solicited proposals for additional wind energy, and does not plan on doing so for some years to come. While NSPI has a pending renewable RFP, with bids on July 15, 2010, the Company has barred wind projects from the pending RFP, on the grounds that they do not provide "firm" energy (CA IR-43, Liberty IR-61). The Company

> does not intend to update Appendix 8 of the Application following receipt of the RFP bids. Wind proposals are not anticipated as they will not satisfy the requirement for firm energy. CA IR-43

Neither the cost comparison in Appendix 8 nor the suspension of wind-energy procurement is appropriate.

Q: How did NSPI compare the cost of wind generation to its estimate of the cost of power from the Port Hawkesbury Biomass plant?

A: The Company compared its estimate of the busbar cost of power from Port Hawkesbury Biomass to the cost of a hypothetical wind PPA starting in 2003. NSPI assumed that the wind PPA would be priced at $105/MWh for a 2008 in-service date, or $115.47/MWh for five years of inflation at 1.92% to a 2013 in-service date, plus an $11/MWh adder for "backup" (Application Appendix 8). The backup adder is computed from the annual fixed costs of an LM 6000 peaker, assuming that 0.32 MW of peaker capacity is required to provide "provide regulation and load following" (CA IR-44).

Note that the NSPI's rationale for an adder to wind costs changed from "backup" (having enough generating capacity if the wind plants are not generating) to "regulation" (balancing load and generation on the scale of seconds to minutes, also called automatic generation control, or AGC) and "load following" (balancing changes in load and generation on the scale of five to ten minutes).

Q: Are these assumptions about wind costs appropriate?

A: No, for at least five reasons. First, all of the selected projects in the 2007 Solicitation for Renewable Energy, and some of the rejected proposals, had prices lower than the Company's assumed $105/MWh.

Second, NSPI projects that Nuttby and Point Tupper costs will be even lower with NSPI ownership. For Nuttby, at $84.54/MWh, the cost with NSPI

ownership is about 14% less than that of the Nuttby as a PPA and 19% less than NSPI's $105/MWh benchmark.[4] Under a PPA, the owner assumes all the risks of plant costs and performance, while under NSPI ownership those risks are borne primarily by ratepayers. Comparing costs of power from a wind PPA with those of an NSPI-owned Port Hawkesbury Biomass Project is inappropriate. Even were NSPI's $105/MWh estimate of the cost of a wind PPA realistic, NSPI -owned projects should be compared to NSPI-owned wind costing $90–$95/MWh.

Third, the 2007 projects were planned for operation in late 2009, about three years before Port Hawkesbury Biomass, not the five years NSPI uses in its computation of inflation.

Fourth, wind-farm costs have fallen since 2007, with the recession-related reduction in demand for turbines and materials, increased turbine-production capacity, the stronger Canadian dollar, and development of larger, more cost-effective units.[5]

Fifth, NSPI has provided no evidence that it will require additional capacity for either "backup" or "regulation and load following." The Company quotes the 2008 Wind Integration Study conducted by Hatch for the Nova Scotia Department of Energy as recommending that additional analysis be performed when 200 MW of wind generation is on line:

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[4]Similarly, NSPI projects that the cost of Point Tupper power will be significantly less with 49% NSPI ownership. Since NSPI has not publicly released the price of the Port Tupper contract, I cannot be more specific in a public document.

[5]I discussed these factors in my testimony in NSUARB P-172. These cost reductions would be offset to some extent by the ending of the Federal ecoENERGY program.

> The expected generation patterns of the wind power plants were assessed using the available wind data records for each of the zones. It is recommended that the actual generation patterns of the wind power plants should be compared with these assessed values when the system has some 200 MW or more of wind power capacity. Based on the comparison, the future generation patterns of wind power plants by zone and within zones should be appropriately predicted and the impact of wind power plants on AGC and load following requirements should be assessed based on the new predictions. Avon IR-33, quoting Wind Integration Study p. 8-4

The Company then reframes this study recommendation into a ceiling on wind development:

> As described in the application, NSPI has made commitments for over 275 MW of wind generation. Much of this wind capacity (157 MW) is currently under construction. Accordingly, there has not yet been opportunity to examine the actual performance and impact of this quantity of wind on the power system. If all of the 2013 RES requirement were to be met with additional wind, a further 130—150 MW of wind commitments would be necessary, taking the system total to over 400 MW. Accordingly, NSPI has decided to diversify this portfolio and add firm energy to achieve 2013 RES compliance. This will allow an interval of time to understand the actual operating performance and system impacts of the wind projects for which commitments are already in place. Avon IR-33

Contrary to NSPI's interpretation, the Hatch report does not recommend a ceiling on wind development. Based on data on wind speeds and volatilities, Hatch found the additional requirements for load following and regulation shown in Table 1:

Table 1: Load-Following and Regulation Requirements as Function of Wind Penetration

Wind Installed (MW)	Ten-minute Load- Following Requirement (MW)	Regulation Requirement (MW)	Incremental Requirement (MW)	Load Following as % Incremental Wind
61	54.8	16.3		
311	72.7	26.4	17.9	7%
581	91.7	37.9	19.0	7%
781	123.4	57.0	31.7	16%
981	138.4	63.2	15.0	8%

Source: Nova Scotia Wind Integration Study (Hatch 2008), Tables 7-1 and 7-3

Where Hatch reported different values for varying wind-plant locations, I took the case with the higher requirements. Since Hatch "assumed that the AGC capacity requirement is part of the 10-minute load following requirement" (p. 7-9), I compute the incremental requirement from the load-following requirement.

Neither the Hatch report nor NSPI's discovery responses specify the amount of load-following and regulation provided by NSPI's existing system. It seems likely that the 10-minute load-following capability of the system is much greater than the estimated requirements, even at 981 MW of wind, which is about 250% of the wind capacity that NSPI says would be needed in 2013 without the Port Hawkesbury plant. The existing system includes the following capacity:

- The 212-MW Wreck Cove peaking hydro unit, which would generally not be operating when the wind output is high and would be available to ramp up as the wind ramps down.
- Additional load-following capacity in 100 MW of other hydro plants.[6]
- Steam plants totaling 1,568 MW (not all of which would be on line at most times), which are likely to be able to ramp at more than 1% (or over 16 MW if all units were on line) per minute, covering most or all of the load-following requirement for 981 MW of wind.
- Combustion turbines totaling 320 MW. Many combustion turbines (including LM6000s, the technology installed at Tufts Cove) can reach full output in ten minutes.

[6]This value does not include 59 MW of capacity that Hatch describes as not providing reserve (Wind Integration Study, p. 5-4). I have not found any other data on the flexibility of NSPI's hydro dispatch.

The key finding of the Hatch report is that the current system would provide adequate reserve even with 981 MW of wind and provide current levels of regulation accuracy up to 581 MW of wind:

> Spin requirements of 32 MW and non spin requirements of 140 MW were met in all runs. Statistical analysis of the achievement of AGC spin requirements was performed and indicated that violations of AGC spin requirements were generally kept below 3% for the year for wind power capacity injections up to 581 MW. For wind capacity of 781 MW or higher, AGC spin violations were seen to occur between 5% and 10% of the time but were also seen to increase in magnitude showing an average violation varying between 12 and 27 MW. "Nova Scotia Wind Integration Study," p. 5-12[7]

Q: Were some additional peaking capacity required, would 0.32 MW of peaker be required per MW of wind?

A: No. Table 1 indicates that, even if NSPI did not have sufficient load-following capacity, the incremental capacity requirement would be only about 0.07 MW of peaker per MW of wind capacity. Using NSPI's other assumptions, that capacity would cost about $2/MWh rather than $11/MWh.

Q: Does NSPI reasonably estimate of the cost of an LM6000 to provide backup for wind plants?

A: While I have not reviewed all aspects of the cost estimate, I have noticed that NSPI assumes that the LM6000 would have no benefits other than its role in providing backup for the wind generation. Since NSPI's existing LM6000s operate at significant capacity factors under economic dispatch, it is likely that any additional LM6000 would provide substantial energy benefits, offsetting a portion of its costs.

[7]The same point is clear in the Wind Integration Study, Table 5-8.

Q: Other than the putative backup capacity, should NSPI adjust for any differences between the generation from wind plants and Port Hawkesbury Biomass?

A: Yes. Wind farms will generate energy at different times than Port Hawkesbury Biomass would. Specifically, Table 4-2 of the Wind Integration Study estimates that wind generation in the various zones would have winter capacity factors 6% to 29% greater than their average annual output, and capacity factors in the 10% of highest-load hours 7% to 41% greater than average.[8] Power prices are higher in the winter than the summer, due to higher loads and higher gas prices. Port Hawkesbury Biomass would produce electricity in a pattern determined by the operation of the pulp and paper mill, and is not likely to have as favorable a generation pattern as wind. Indeed, NS IR-20 Attachment 1 indicates that Port Hawkesbury Biomass is likely to produce more electric energy in the summer months than in the winter.[9]

Q: How much might this load-shape benefit of wind be worth?

A: Weighting the monthly export or import prices in NSPI's 2010 FAM filing by the various monthly generation patterns in the Hatch report and in the FAM filings results in a value about $1–$2/MWh more than the simple average of the wholesale price. The tendency of wind generation to produce above-average output at high-load times would increase the wind benefit. The advantages of wind in the time pattern of energy delivery may well exceed whatever costs NSPI incurs as a result of wind variability.

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[8]These estimates are confirmed by confidential wind-generation data in NSPI's FAM filings.

[9]The value of Port Hawkesbury Biomass to NSPI ratepayers would be increased if the MOMA incorporated stronger language allowing NSPI some influence on the dispatch of power from the project. It is unusual for a utility to own a power plant and yet have no input into its dispatch.

Q: What do you conclude about NSPI's treatment of wind generation in its cost comparison with Port Hawkesbury Biomass?

A: It does not appear that the wind generation that would be required to replace Port Hawkesbury Biomass would require any backup capacity, since NSPI probably has sufficient load-following and regulation capacity. Any dispatch costs that may result from the variability in wind output would be offset by the favorable seasonal and daily patterns of wind generation.

The Port Hawkesbury Biomass Project does not appear to be attractive compared to the cost of NSPI-owned wind at $90–$95/MWh.

D. Transmission Issues

Q: How does NSPI deal with the transmission costs of the Port Hawkesbury Biomass Project?

A: Only the direct costs of interconnection are included in the cost of the project, since NSPI has priced out the project assuming that its transmission service would be interruptible. The interconnection cost remains uncertain, pending additional studies (IR CA-20 to 22).

Interruption of the project's output would be driven by the amount of power generated on Cape Breton Island, load on the island, and availability of transmission across the Canso Strait.

> The operational significance of this is that there are times when the project could be curtailed due to a lack of transmission service. NSPI believes this to be unlikely given the current RES requirements which require that by 2015, 25 percent of all energy sales will come from renewable sources. NSPI must also dispatch its units to comply with carbon emissions constraints which are increasing by 25 percent between now and 2020. These obligations will require the NSPI fleet of generation facilities to be environmentally dispatched. This may cause coal fired generation to be curtailed from time to time which may free up transmission capacity over the term of the contract. (IR CA-23)

No generation on Cape Breton Island is constrained on the island with all transmission available and the NPPH project (IR CA-26). When some transmission equipment is unavailable, NSPI may need to curtail some generation on the island; given renewable-energy and carbon constraints, NSPI may choose to curtail coal first.

Q: Are the potential costs of firm service very high?

A: Yes.

> The power from generation additions in Areas 6 to 8 [Canso Strait and two areas on Cape Breton Island] would be required to be transmitted over the existing high voltage 230 kV and 345 kV grid that is already near its transfer limit. Generation blocks of 100 to 150 MW in Area 6 (Canso Strait) would require new 345 kV transmission lines and path upgrades to Halifax amounting to about $200–$250 Million. The development of 150 to 250 MW of Cape Breton wind generation would also trigger the aforementioned new 345 kV lines, and in addition, new transmission lines into Cape Breton. "Transmission and System Operator Options for Nova Scotia," SNC-Lavalin, 2009, prepared for Nova Scotia Department of Energy, p. 37

Q: What is the implication of these high costs for additional firm transmission service from the eastern part of the province?

A: If new generators are required to bear the cost of these upgrades, it may preclude development of new generation. This is not a concern for NSPI in developing the Port Hawkesbury Biomass Project, since its fixed costs will be in its rate base. Third-party developers who recover capital investments through energy charges must be assured that they will not be penalized by NSPI's dispatch decisions.

This problem can be resolved by NSPI committing to dispatch renewable energy before its coal plants, in the event of transmission constraints.

IV. Economics of the Project

Q: What are your concerns with NSPI's financial analysis of the Port Hawkesbury Biomass Project?

A: I have identified the following six issues with the financial analysis in Application Appendix 8:

- The treatment of administrative overheads during construction;
- The exclusion of property taxes, emission fees, oversight, and other continuing costs from the analysis;
- The assumed level of sustaining capital;
- The assumed 40-year life of the plant;
- The determination of actual fuel costs, and the effect of actual fuel costs rising above the fuel rate;
- The potential effect of termination of the MOMA and operation of the plant by NSPI.

A. Administrative Overheads during Construction

Q: How does NSPI's analysis reflect administrative overheads during construction?

A: The Company assumes some administrative overheads will be allocated to Port Hawkesbury Biomass during construction. Those costs are added to the capital cost of the project and subtracted from revenue requirements in 2010–2012. The net result is that administrative overheads during construction slightly decrease NSPI's estimate of the levelized cost of power from the project.

The Company has not provided a derivation or breakdown of its estimate of administrative overheads during construction, so I do not know what costs are included.

Q: Is this treatment appropriate?

A: No. As modeled by NSPI, there are no incremental overhead costs due to Port Hawkesbury Biomass. That assumes that the overhead costs are totally fixed and that the demands of overseeing the project do not increase any of them.

B. Operating Costs Excluded from the Financial Analysis

Q: What operating costs are excluded from the financial analysis?

A: The only operating costs included in the analysis are those that would be charged by NPPH as operator under the MOMA. Under the terms of the MOMA, the Services Rate excludes property taxes on the Utility Plant (which would include Power Boiler #3), emission fees, and other potential costs (Application Appendix 3, p. 122). I understand that NSPI believes that these costs will be zero (although the response to IR CA-49 fails to make this clear).

However, the financial analysis does not include any ongoing costs related to the complex relationship between NSPI and NPPH. These costs include participation in the Joint Operating Committee and oversight of the following issues:

- The Company's computation of fuel costs (including audits),
- the determination of the steam credit,
- The Company's allocation of costs between maintenance (paid by NSPI through the fixed dollars-per-MWh service charge) and sustaining capital (paid by NSPI directly),
- The adequacy of NPPH's maintenance of NSPI's plant, which may revert to NSPI operation in the relatively near term.
- As a result, the operating costs in NSPI's financial analysis appear to be understated.

C. Sustaining Capital

Q: What are NSPI's projections of the sustaining capital necessary to keep the Port Hawkesbury Biomass Project in operation?

A: The Company provides its projection of sustaining capital in Application Appendix 8, pp. 2–3, in IR Multeese-17, and in IR Multeese-5, in great precision. In most years, NSPI estimates sustaining capital as the 2014 value plus 2% inflation. In 2021, 2026, 2031, and 2041, NSPI includes additional costs, with no apparent pattern.

Q: How did NSPI project the level of sustaining capital?

A: The Company has not provided that information. The additional 2031 sustaining capacity appears to represent a boiler rebuild. Otherwise, NSPI has not identified the projects included in sustaining capital, provided a derivation of sustaining capital, or compared its projection of sustaining capital to the costs of similar-sized wood-fired plants in operation.

D. Project Life

Q: What does NSPI assume about the operating life of the Port Hawkesbury Biomass Project?

A: The Company assumes that the project would operate for 40 years, with a boiler rebuild costing up to $16 million in 2031 (Multeese IR-5 Attachment 1). At the end of the analysis period, the boiler would be 69 years old.

Q: Is this realistic?

A: Forty years of operation for the new turbine and generator, and 69 years of operation for the boiler are certainly possible. But earlier failure of major components is also plausible. Very few power boilers are still in operation from the 1940s.

A 40-year evaluation period for an entirely new boiler electric plant is unusual. Assuming 40 years of operation for a plant retrofitted with a 30-year-old boiler is even more aggressive.

Q: What would be the effect on the project's levelized cost if it operates for much less than 40 years?

A: The levelized cost per MWh would rise as the operating life falls. If the plant operates for 20 years, and retires prior to the boiler rebuild NSPI projects for 2031, the levelized cost would increase to about 25%.

E. Fuel-Pricing Formula

Q: How would the cost of fuel vary over time?

A: As long as the current MOMA is in effect, the starting cost of fuel is escalated annually with an inflation composed of 75% based on a confidential fraction of non-energy CPI inflation and 25% at the inflator for diesel fuel. This inflator seems to be reasonably related to the cost of harvesting and transporting biomass to the plant.

This pricing scheme can be terminated by NPPH if, averaged over a few years, an allocation of the Actual Cost of Fuel as defined in MOMA Schedule 11 exceeds a fixed dollar Deemed Cost of Fuel—which is similar to the annual fuel charge in the MOMA times the Base Output Requirement of 388 GWh (MOMA §2.4.2 and Schedule 11)—by either 20% or $3 million annually. Over time, as fuel costs rise, the $3 million would become much less restrictive than the 20% requirement.

While NSPI could in principle assume responsibility for providing fuel to the Port Hawkesbury Biomass Project, the most likely outcome of MOMA §2.4.2 is that NSPI and NPPH would negotiate a new, higher price for fuel.

Q: What factors might trigger the tests in MOMA §2.4.2?

A: Since the actual cost of fuel is measured in millions of dollars per year, it can be increased by increased fuel prices or increased fuel quantities. The cost can be increased by any of the following factors:

- Increased prices per tonne for various types of fuel. Much of the cost is sensitive to the market demand for biomass.
- Shifting of supplies from less-expensive sources (the NPPH woodroom, Bear Head reclaim, sawmills and hog suppliers) to more-expensive sources (e.g., the hardwood suppliers).
- Increasing steam output (since the actual cost is a fixed fraction of total fuel supply for electricity and steam).
- Increasing electric output. NPPH can produce (and NSPI must pay for) 10% more electricity than the Base Output Requirement averaged over a three-year period.

Combining these factors, the actual cost of fuel, as defined in the MOMA, can easily exceed the Deemed Cost of Fuel.

Q: Is the Actual Cost of Fuel for MOMA §2.4.2 well defined?

A: NewPage states, "All of the biomass supplied to the project will be priced at the cost of arms-length purchase from third parties, with the exception of biomass supplied from the NPPH woodroom and Bear Head" (CA IR-14). "The cost of biomass supplied from the woodroom will be calculated based on a proportionate allocation of the cost of supplying and processing pulpwood. The cost of Bear Head reclaim will be based on the cost of excavating, screening and delivering the material" (CA IR-15).

Conceptually, at least, the pricing of the third-party purchases and the Bear Head reclaim is clear.[10] Actually auditing the costs of the purchases will require some effort, and NSPI may have a hard time ensuring that NPPH is not linking, for example, delivery prices for biomass with delivery prices for pulpwood from the same contractors.

In contrast, the pricing of NPPH's woodroom fuel is not clearly defined. The cost could be "calculated based on a proportionate allocation of the cost of supplying and processing pulpwood" in several ways, depending on the meaning of "based on," what the allocation is "proportionate" to, and the scope of the "supplying and processing" of pulpwood including in the computation.

The Board should require a clear explanation of how NPPH's woodroom fuel will be priced for the purposes of MOMA §2.4.2.

F. Economics if the Agreement Terminates and Nova Scotia Power Becomes the Operator

Q: What would be the effect on the economics of the Port Hawkesbury Biomass Project if the MOMA terminates and NSPI becomes the operator of the project?

A: That is a very difficult question to answer. It is not clear how much more it would cost NSPI to purchase biomass than the price of the fuel in the MOMA. Certainly, NSPI lacks NPPH's experience and contacts in the forest-products industry. The cost of operating the project would also probably be greater for

[10]Since NPPH is proposing to price the Bear Head biomass at cost, it may use Bear Head supply when the Actual Cost of Fuel is well below the Deemed Cost, to displace more expensive suppliers, but it is unlikely to use Bear Head supply if the Actual Cost of Fuel is close to the Deemed Cost.

NSPI than for NPPH, which has operating and maintenance staff on site to run its portion of the steam system and the remainder of the mill.

If the pulp and paper mill continues to operate, under the ownership of NewPage or some other entity, the costs of the project may increase only due to the effects on fuel cost and operating costs.

If the mill shuts down, eliminating the steam host and the economies of shared operating costs higher fuel-use efficiency, costs would be still higher. In CA IR-9, NSPI estimates rather modest increases in the costs without a steam host. Unfortunately, NSPI does not provide any information about how it modeled the effect of losing the woodroom supply of biomass in this computation. I estimate that replacing the woodroom biomass with market supplies would raise the cost of the project by about $7/MWh, and replacing all the biomass supplies with market purchases would raise the cost by about $13/MWh.

The uncertainty regarding the continuation of the pricing in the MOMA adds significant risks to the cost of this project. Those risks are not present for power-purchase agreements that are predetermined in dollars per MWh.

G. Benefits of the Proposal to NewPage Port Hawkesbury

Q: What are NPPH's benefits from the proposed transactions?

A: I have identified two major benefits from the transactions. First, NPPH would receive $80 million for Power Boiler #3. This is an arbitrary payment to NPPH, since Power Boiler #3 would continue to provide steam supply to the mill. Second, it appears that NPPH would save perhaps $0.5 million annually on fuel for its steam, netting the payment for woodroom biomass (at the price in IR Multeese-11) from the share of aggregate fuel costs allocated to steam (MOMA Schedule 11, IR Multeese-7 and IR Multeese-11) and comparing it to the mix of

supplies NPPH reports for IR CA-10.[11] This saving appears to be largely due to the reduction in fuel energy allocated to NPPH under the MOMA.

In addition, NPPH may earn a profit on its management of the construction of the project and on the non-fuel portion of the Services Rate.

Q: What effects do these benefits have on the likelihood of NPPH's continued operation?

A: The reduction in fuel costs and the possible profit on the Services Rate would tend to keep NPPH more profitable and more likely to remain in operation. Continuing operation of NPPH is desirable, from the perspective of minimizing the cost of energy from the Port Hawkesbury Biomass Project and from the perspective of provincial interest in maintaining jobs and tax base. Even if NewPage has financial problems at the corporate level, the reduction in operating costs would increase the probability that the Port Hawkesbury mill would continue operating, perhaps with a different owner.

Neither the capital payment for the boiler nor a profit on the construction contract would have these effects. That cash would flow to NewPage and stay with the corporation. It would not reduce the cost of continuing operation at the Port Hawkesbury mill.

Q: What are the implications of these observations for the design of the transaction?

A: Ratepayers and the Province are likely better off if more of NPPH's benefit from the project is in the form of a continuing saving or benefit tied to continued operation of the Port Hawkesbury mill, rather than cash up front. That continuing

[11]This benefit would grow if fuel costs grow slower than the Fuel Index Rate and decline if the costs of fuel supply grow faster than the Fuel Index Rate, up to the point at which the provisions of §2.4.2 of the MOMA take effect.

benefit could be a lease payment contingent on the mill taking steam from the project, an adder to the non-fuel services rate, a reduction in NPPH's fuel allocation, or some other form.

V. Recommendations

Q: What is your recommendation to the Board in this matter?

A: I recommend that the Board require the following steps and conditions:

- A full filing of the costs of the RFP proposals, and an opportunity for review of the proposals and questioning of NSPI, prior to approval of the Port Hawkesbury Biomass Project.
- That NSPI seek wind bids and compare those bids to the cost of the Port Hawkesbury Biomass Project prior to approval of this proposal.
- That NSPI present a mechanism for comparing the costs of purchased power and NSPI-owned renewable plants, taking into account the different risk characteristics.
- The clarification of the pricing of fuel from the NPPH woodroom under MOMA §2.4.2.
- That other renewables not be disadvantaged compared to the Port Hawkesbury Biomass Project in terms of access to east-west transmission.
- That NSPI renegotiate the package of agreements for the Port Hawkesbury Biomass Project, so that more of the benefits to NPPH accrue during the operation of the project, rather than as an up-front cash payment.
- If the project is approved, that NSPI file notice with the Board of any conditions (such as actual fuel costs exceeding targeted costs) that could result in the termination or revision of the MOMA.

- In recognition of the incompleteness of NSPI's filing in this proceeding, condition any approval of Port Hawkesbury Biomass by leaving NSPI at risk for costs exceeding the projections in the application.

Q: Does this conclude your testimony?

A: Yes.