BEFORE THE NOVA SCOTIA UTILITY AND REVIEW BOARD

In the Matter of An Application Nova Scotia Power Incorporated (NS Power) for approval of a Smart Grid Nova Scotia Solar Garden Pilot Rate Rider

(NSUARB M10176)

Evidence of
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On Behalf of
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I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, title, and employer.

A. My name is Melissa Whited. I am a Principal Associate at Synapse Energy Economics ("Synapse"), located at 485 Massachusetts Avenue, Cambridge, MA 02139.

Q. Please describe Synapse Energy Economics.

A. Synapse is a research and consulting firm specializing in electricity and gas industry regulation, planning, and analysis. Our work covers a range of issues, including economic and technical assessments of demand-side and supply-side energy resources; energy efficiency policies and programs; integrated resource planning; electricity market modeling and assessment; renewable resource technologies and policies; and climate change strategies. Synapse works for a wide range of clients, including attorneys general, offices of consumer advocates, public utility commissions, environmental advocates, the U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Justice, the Federal Trade Commission, and the National Association of Regulatory Utility Commissioners. Synapse has over 30 professional staff with extensive experience in the electricity industry.

Q. Please summarize your professional and educational experience.

A. I have 12 years of experience in economic research and consulting. At Synapse, I have worked extensively on issues related to utility regulatory models and rate design. I have been an invited speaker in numerous industry conferences, including as a panelist for the National Association of Regulatory Utility Commissioners (NARUC) Subcommittee on Rate Design at the 2021 Winter Policy Summit and the 2018 Annual Meeting.

I have sponsored testimony before the Nova Scotia Utility and Review Board, the Newfoundland and Labrador Board of Commissioners of Public Utilities, the Georgia Public Service Commission, the Rhode Island Public Utilities Commission, the Massachusetts Department of Public Utilities, the Maine Public Utilities Commission, the California Public Utilities Commission, the Hawaii Public Utilities Commission, the Public Service Commission of Utah, the Public Utility Commission of Texas, the Virginia State Corporation Commission, and the Federal Energy Regulatory Commission. I hold a Master of Arts in Agricultural and Applied Economics and a Master of Science in Environment and Resources, both from the University of Wisconsin-Madison. My resume is attached as Appendix A.

Q. Have you previously testified before the Nova Scotia Utility and Review Board?

A. Yes. I submitted evidence in NS Power's time-varying pricing application (M09777). In addition, I supported Alice Napoleon, consultant to the Board Counsel in the Advanced Meter Infrastructure cases (Matter Nos. M07767 and M08349).

Q. On whose behalf are you providing evidence in this case?

A. I am providing evidence on behalf of Counsel to the Nova Scotia Utility and Review Board ("Board").

Q. What is the purpose of this evidence?

A. My evidence describes certain aspects of Nova Scotia Power's (or "the Company") solar garden rate rider proposal that, in my opinion, would limit project benefits or are inconsistent with the most recent policy developments and Company plans, and identifies areas where additional information and transparency is needed. I provide

recommendations for modifications to the structure of the Company's rider, the calculation of the solar generation credits, and additional tracking and reporting.

II. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. Please describe your conclusions.

A. My conclusions are as follows:

1) NS Power's proposed tariff does not provide subscribing customers with an annual net benefit until around 2027 or a cumulative net benefit until around 2031. A ten-year payback period may make it difficult to attract customers, thereby providing an incomplete picture of customer interest in community solar and potentially increasing the marketing costs associated with the project.

2) The ten-year payback period associated with NS Power's proposed rider is unlikely to appeal to many low-income customers, older customers, or renters. This may hinder one of NS Power's objectives of expanding access to ratepayers without the financial resources or property to invest in rooftop solar.

3) The credit provided to subscribers of the solar garden is based on the avoided costs from an IRP scenario (Scenario 2.0C) that is inconsistent with recent policy pronouncements by the government and NS Power's own statement that it is developing plans to eliminate coal-fired generation by 2030.[1]

4) The avoided cost calculations do not include avoided environmental compliance costs associated with the government's proposed implementation of a Renewable Energy Standard of 80 percent by 2030 or regulations that will increase carbon prices.[2]

5) NS Power does not specify how it will track revenues from solar garden participants to reduce NS Power's revenue requirements.

[1] M10178, 2021 10-Year System Outlook Report, June 30, 2021, pages 39-40.
[2] M10178, 2021 10-Year System Outlook Report, June 30, 2021, pages 39-40.

6) Additional information regarding system performance, customer participation, and benefits is needed to inform potential subscribers of the expected solar garden output, as well as inform evaluation of the pilot and the design of community solar projects going forward.

Q. What are your recommendations?

A. I recommend that the Board:

1) Reject NS Power's proposed rider and instead direct the Company to offer customers a rate rider that is designed to provide net benefits to participating customers in each year in order to expand access to customers who would otherwise be unable to take advantage of the project, particularly low-income customers.

2) Direct NS Power to base the solar generation credits on an IRP scenario that retires coal-fired generating units by 2030, such as Scenario 3.1C.

3) Direct the Company to track benefits associated with avoided environmental compliance costs that may occur due to future legislative actions.

4) Require NS Power to track revenues received from subscribing customers in a separate account for the purpose of reducing revenue requirements.

5) Require NS Power to post a monthly report on its website with historical monthly generation, details regarding any equipment outages, and a forecast of annual generation per kW for each of the next five years, taking into account expected panel degradation and historical solar garden production trends.

6) Require NS Power to track and report metrics on program enrollment, exits, bill impacts, and participant benefits, in addition to the metrics detailed in the M09519 Compliance Filing.

III. BACKGROUND AND OVERVIEW

Q. Please provide an overview of the Company's application.

A. As part of the Smart Grid Nova Scotia Project (SGNS Project) established in Matter No. M09519, NS Power is constructing a 2 MW solar garden in Amherst, Nova Scotia. On June 29, 2021, NS Power submitted its application in this matter for approval of a pilot solar garden rate rider that will establish the charges and solar generation credits that customers who participate in the solar garden project will pay and receive as part of their subscription.

NS Power's solar garden is part of a larger smart grid project that, according to the Company, aims to "better understand how a centralized Energy System Platform (ESP) can be used to monitor and manage Distributed Energy Resources (DERs) to achieve customer benefits such as maintaining reliability and grid stability, and reducing costs."[3] In addition, NS Power claims that the solar garden pilot rate rider will:

- Help increase renewable energy on the Nova Scotia grid by providing an option for low-cost power through grid-scale solar;
- Provide access to solar to customers without the required financial resources or property to install roof-top solar; and

[3] NS Power Smart Grid Nova Scotia Solar Garden Pilot Rate Rider Application ("Application"), June 29, 2021, at 3.

- Avoid cross-subsidization between participating and non-participating customers by recognizing both the costs and benefits that the solar provides in the charge and credit structure offered to subscribing customers.[4]

Q. How is the proposed rate rider structured?

A. The rider consists of two components:

1) a monthly subscription fee of $6.86 per kW to account for the capital, operational, and tax costs associated with the project, and

2) a solar energy credit for each kWh of generation equal to $0.05493 in 2021 and escalating at an annual rate of 2 percent.

Q. Have you identified issues with the proposal?

A. Yes, I have. My concerns relate to the following:

1) NS Power's proposed tariff does not provide subscribing customers with an annual net benefit until around 2027 or a cumulative net benefit until around 2031. A ten-year payback period may make it difficult to attract customers, thereby providing an incomplete picture of customer interest in community solar and potentially increasing the marketing costs associated with the project.

2) The ten-year payback period associated with NS Power's proposed rider is unlikely to appeal to many low-income customers, older customers, or renters. This may hinder one of NS Power's objectives of expanding access to ratepayers without the financial resources or property to invest in rooftop solar.

[4] Application, at 3-4.

3) The solar energy credit provided to subscribers of the solar garden is based on the avoided costs from an IRP scenario that is inconsistent with recent government policy pronouncements and NS Power's more recent planning.

4) The avoided cost calculations do not include avoided environmental compliance costs associated with the government's announcements regarding renewable energy standards and carbon costs.

5) NS Power does not specify how it will track revenues from solar garden participants to reduce NS Power's revenue requirements.

6) Additional information regarding customer participation and system performance is needed to inform potential subscribers of the expected solar garden output, as well as inform evaluation of the pilot and the design of community solar projects going forward.

I describe each of these concerns and my recommendations in the sections below.

IV. NET BENEFITS TO PARTICPATING CUSTOMERS

Q. Under NS Power's proposed tariff, when would subscribing customers experience bill savings?

A. The Company projects that participating customers will not receive annual bill savings until 2027, and that cumulative bill savings will not be realized until 2031 for customers who subscribe from the beginning of the pilot program.[5] By 2051, the total discounted savings for customers who enroll in 2021 is expected to total $1,300 for an 8 kW subscription.

[5] Synapse calculations based on quarterly net benefits data provided in NS Power's Appendix B, "Dashboard" worksheet and customer discount rate of 4.75%.

Q. Why do subscribers not experience annual bill savings immediately?

A. The subscription payment is fixed on a dollar per-kW basis throughout the life of the project, whereas the solar generation credits, paid on a dollar per-kWh basis, increase by 2 percent each year. In the early years of the project, the credits accrued by a subscriber will be worth less, in dollars, than the cost of the subscription.

Q. Do you have concerns regarding the delay in net benefits?

A. Yes, I have two primary concerns. First, I am concerned that the lack of immediate savings may result in slow uptake, making it difficult to accurately evaluate customer enthusiasm for solar PV by the culmination of the pilot. Second, I am concerned that the program will not achieve one of its stated benefits of enhancing access to PV for customers without the property or financial means to install roof-top solar.

Q. Why would it be difficult to accurately assess customer enthusiasm for PV under this tariff structure?

A. The pilot program allows customers to enroll at any time. If customers realize that they will incur a net loss in the early years but a net benefit in later years, many may decide to wait to enroll in the program until they are likely to experience annual bill savings. However, the duration of the pilot is not long enough to test customer enthusiasm for the project during years with positive annual net benefits under the Company's proposed tariff structure. This could create the appearance of a lack of customer interest in solar PV, rather than a more complete conclusion that customers are not interested in immediately participating in a program that produces negative cash-flows.

Q. Please explain why the program might not enhance access to PV for customers without the property or financial means to install roof-top solar.

A. The Company's model suggests that subscribing customers will not see a cumulative net benefit until 2031 – approximately a decade after program commencement. Because of this, early participants are likely to be customers who can afford to absorb a decade of financial losses before earning a return on their investment and who are quite certain that they will not relocate out of NS Power's territory. Thus, I am concerned that customers who do sign up will skew younger, wealthier, and be more likely to own their homes, rather than lower-income customers, older customers, and renters. Such an outcome would run counter to one of NS Power's claimed benefits of the project: providing greater access to solar to customers who lack the required financial resources or property to install roof-top solar.[6]

Q. Are there alternative community solar tariff structures that could address your concerns?

A. Yes. If expanding access to solar PV is truly an objective for NS Power, the Company should design the tariff so that participating customers can achieve net benefits from day one. Providing immediate bill savings for low-income customers is consistent with research indicating that low-income customers may require faster returns than other customers[7] and best practices for serving low-income customers and communities.[8] It

[6] Application, at 3.
[7] NREL
[8] *See:* Stanton, Tom. (2020) *Solar Energy that Pays for Low-Income Customers and Communities.* NRRI Insights. Available at https://pubs.naruc.org/pub/46965D7D-155D-0A36-315D-58319B591EB8, and Vote Solar and the Interstate Renewable Energy Council, Inc. (2018) A Checklist for Voluntary Utility-Led Community Solar Programs: A Guide to Evaluate and Inform Program Design and Implementation. Available at https://irecusa.org/resources/checklist-for-voluntary-utility-led-community-solar-programs/.

would also better support participation by older customers and renters, who may be less able to wait ten years to receive benefits from the project.

There are several modifications that NS Power could make to the solar garden rider in order to provide immediate savings to participants. One method would be to begin with a lower subscription fee and increase it over time, so that over 30 years, the total costs borne by participants remains the same, but the timing of those costs is weighted more toward the later years when the value of the solar generation credits are also higher. This subscription model could be offered to all participants, or just limited to certain types of customers (e.g., low income customers and renters).

Alternatively, the Company could offer subsidies to certain types of customers, such as low-income customers. However, this method has the disadvantage of requiring other customers to pay more in order to subsidize low income customers.

Q. Did the Company consider an escalating subscription fee that would provide customers with net benefits from the beginning of the project?

A. No. NS Power states that an "escalating monthly fee was not considered as the intent is to emulate the same mechanics that a customer would experience if they took out a loan for the installation of rooftop PV."[9]

Q. Is the Company's rationale for not considering an escalating subscription fee reasonable?

A. No, for several reasons. First, there is no obvious reason why emulating a solar loan for installing rooftop PV is desirable for a community solar project. If a customer can receive

[9] Response to NSPI (Synapse) IR-3.

net benefits from subscribing to the solar garden beginning in the first month of subscription, then there is less risk to that customer at the time of enrollment, making program participation both more appealing and more accessible to lower-income customers, as well as to older customers and customers who have less certainty regarding the location of their future residence. The loan repayment schedule that NS Power seeks to emulate is precisely one of the key barriers to solar for low-income households who cannot afford to wait ten years to achieve savings.

Second, a program that offers net benefits sooner is more likely to be fully subscribed, thereby reducing marketing costs. An escalating subscription fee that begins lower than the Company's fixed-fee proposal and grows to eventually be larger than the proposed fee would resolve these concerns.

Q. What do you recommend regarding providing participating customers with bill savings?

A. I recommend that the Board direct NS Power to offer customers a rate rider that is designed to provide net benefits to subscribing customers in each year to expand access to customers with more limited incomes, or who are older or renters, and improve the likelihood of a successful pilot. Although NS Power could limit enrollment in an escalating fee model to a subset of customers (e.g., low-income customers), the additional cost and complexity associated with verifying customer eligibility makes this option less appealing than offering an escalating subscription fee to all customers.

V. IRP SCENARIO

Q. What IRP scenario was used to develop the solar generation credits?

A. NS Power states that the avoided costs associated with solar PV are derived from the current IRP Reference Case, Scenario 2.0C.[10]

Q. Is IRP Scenario 2.0C consistent with recent government energy policy pronouncements?

A. No. The IRP report was published in November of 2020. In June 2021, NS Power released its 10-Year System Outlook, which notes several new governmental policy developments, including the government's stated intent to eliminate coal-fired generation by 2030, strengthen renewable energy standards, and increase the carbon price.[11] In contrast, IRP Scenario 2.0C would retire NS Power's coal fleet by 2040.

Q. What is the implication of these new government policy statements?

A. NS Power notes that it "continues to monitor and evaluate such developments and to the extent they become law, NS Power will incorporate them into its planning studies and reflect them in future 10 Year-System Outlook Reports." At the same time, the Company states that it is also developing a comprehensive plan to eliminate coal-fired generation by 2030.[12] Given these new energy policy statements and NS Power's more recent planning efforts that would retire coal-fired generation by 2030, alternative IRP scenarios could provide a more accurate estimate of the future avoided costs associated with solar

[10] Response to NSPI (Synapse) IR-1
[11] M10178, 2021 10-Year System Outlook Report, June 30, 2021, pages 39-40.
[12] M10178, 2021 10-Year System Outlook Report, June 30, 2021, pages 39-40.

PV. In particular, Scenario 3.1C, which contemplates retiring coal by 2030, may be a more reasonable forecast of NS Power's future generation fleet.

Q. How would the net benefits to participating customers change using Scenario 3.1C?

A. In response to NSPI (Synapse) IR-13, the Company estimated that the value of the solar garden generation would increase by approximately 6 percent, as shown in the table below.

	Cents per kilowatt hour	
Year	Application (IRP Scenario 2.0C)	Using IRP Scenario 3.1C
2021	5.493	5.825
2022	5.603	5.941
2023	5.715	6.060
2024	5.829	6.181

If IRP scenario 3.1C is used as the basis for the solar energy credit per kWh, participating customers would begin to experience annual bill savings in 2023, even with a flat subscription fee.

Q. What do you recommend regarding the calculation of avoided costs and associated solar generation credits?

A. I recommend that the Board direct NS Power to base the solar generation credits on an IRP scenario that retires coal-fired generating units by 2030, as this is more consistent with the government's recent policy statements and NS Power's own planning efforts.

VI. ENVIRONMENTAL COMPLIANCE COSTS

Q. How did the Company account for environmental benefits in developing the solar generation credits?

A. NS Power states that the avoided cost of solar generation includes "the production cost value of emissions reductions provided by the solar resource by re-optimizing other generation resources" to maintain compliance with annual emissions caps.[13] However, the avoided cost calculations do not include avoided environmental compliance costs associated with the government's intent to implement of a Renewable Energy Standard of 80 percent by 2030 or higher carbon prices. In particular, NS Power's 2021 10-Year System Outlook notes that the government intends to increase the cost of carbon emissions by increasing the Federal carbon price, on which emissions reductions will be based, by $15/tonne beginning in 2023 and reaching a level of $170/tonne by 2030.[14]

Q. Why did NS Power not include these costs in the solar generation credits?

A. In support of this omission, NS Power points to the 2020 IRP report, which states that due to the "significant uncertainty regarding the depth, liquidity, pricing, and duration of the Cap-and-Trade market," NS Power did not model the ability to sell carbon credits into the market.[15] Although there is still some uncertainty surrounding future environmental compliance costs, recent government announcements provide much more clarity regarding the likely timing and magnitude of such avoided compliance costs than existed when the 2020 IRP report was published.

[13] Response to NSPI (CA) IR-6(d).
[14] M10178, 2021 10-Year System Outlook Report, June 30, 2021, pages 39-40.
[15] Response to NSPI (CA) IR-6(d).

Q. Should the solar generation credits be modified to include these avoided environmental compliance costs?

A. In general, it would be reasonable to include either the forecasted value of avoided environmental compliance costs in the schedule of solar generation credits, or adjust the credit annually to account for the actual value of avoided environmental compliance costs. However, it is also reasonable to not include these avoided costs in the solar generation credits for this specific project since a significant portion of the project was funded through government grants, and thus it would be appropriate to return some benefit of the project to all ratepayers. For this reason, I recommend that the value of these avoided environmental compliance costs be tracked for the purpose of informing future solar energy projects, but I do not find it necessary to include these avoided costs in the calculation of subscribers' solar generation credits at this time.

VII. SUBSCRIPTION REVENUE TRACKING

Q. How does NS Power propose to use and track the subscription revenues from the project?

A. The Company states that "The revenues related to the subscribed portion of the solar garden were not included in the capital application and therefore will provide additional benefit to all customers as the revenues related to subscriptions will lower the overall revenue requirement for customers."[16] However, the NS Power does not specifically identify how these revenues will be accounted for in order to ensure that they reduce the Company's revenue requirement.

[16] Response to NSPI (Synapse) IR-8 (b).

Q. What do you recommend with respect to tracking subscription revenues?

A. In the Board's September 11, 2020 order in Matter M09519, NS Power was directed to account for all of the SGNS Project costs in a separate cost pool. I recommend that a similar treatment be applied to the subscription revenues received for the solar garden. That is, these subscription fees should be tracked in a separate account so that they can be readily used to offset the costs of the solar garden and thereby reduce the Company's revenue requirement.

VIII. ADDITIONAL METRICS

Q. Are there performance metrics the Company should track and report in addition to those provided in the M09519 Compliance Filing?

A. Yes. NS Power states that the use of the solar garden inverters to provide grid services may reduce the credits received by subscribers. Additionally, any outages at the solar garden will reduce the solar generation credits received by customers.[17] Although customers can unsubscribe at any time, NS Power only proposes to notify customers if there are outages longer than three days and involving more than 25 percent of the solar garden capacity. Customers will not necessarily be aware of shorter duration outages or outages affecting smaller portions of the solar garden.[18] For these reasons, customers would benefit from the availability of detailed information about the solar garden's performance on an ongoing basis. Accordingly, I recommend that the Company post a monthly report on its website with the following solar garden performance data:

[17] Response to NSPI (Synapse) IR-21.
[18] Response to NSPI (Synapse) IR-9.

1) Total generation (kWh) and average generation per kilowatt (kWh/kW) for each of the past 12 months,

2) Details regarding any equipment outages or replacements affecting solar garden output, and

3) A good-faith forecast of annual generation per kW for each of the next five years, taking into account expected panel degradation and historical trends in generation.

In addition, I recommend that the Company report information regarding customer enrollments and exits, bill impacts, and benefits in its SGNS Project semi-annual reports. Given the concerns I described above about whether low-income customers will be able to participate, the Company should explicitly track low-income participation, to the extent possible.

Specifically, I recommend that the Company include the following statistics in its SGNS Project biannual reports:

- The system's generation by month;
- Annual generation compared to the forecasted generation;
- Details regarding system outages, including what equipment (e.g. panels, inverters) suffered outages and for how long, the cause of the outage, what steps the Company expects to take to fully or partially remedy the outage, and how much time the Company expects those steps will require;

- Monthly program enrollment and exits from the program in terms of number of participants and subscribed capacity;
- Low-income participation, to the extent possible;
- Estimated average participant bill impacts by class; and
- Estimated cumulative benefits to participants and non-participants.

Reporting the data above will help inform the evaluation of the pilot and design of future programs, as well as alert the Board and stakeholders to any issues that might arise, such as excessive system outages.

Q. Does this conclude your testimony?

A. Yes, it does.