Review of EMGC's Recommendations for Net Metering

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Abstract

The Electricity Marketplace Governance Committee (part of the Nova Scotia Energy Strategy) Second Interim Report focuses on renewables and renewable generation of electricity. One section of the Report makes a series of recommendations regarding net metering, a way for electrical customers to generate and supply electricity to themselves as well as electricity utilities and distributors.

The Second Interim Report makes seven recommendations for net metering, none of which favour the customer who is generating electricity. This paper considers the recommendations, highlighting the limitations of each. A series of alternate recommendations are proposed.

1 Introduction

Part of the provincial government's energy strategy announced late in 2001 was to "create an Electricity Marketplace Governance Committee (EMGC), accountable to the Minister of Energy, to facilitate the implementation, development, structure, and rules for introducing electricity competition" [6]. The EMGC's Terms of Reference stated that it was "to deliver several interim reports", the second of which would address the issue of renewable energy in Nova Scotia [2].

The EMGC's Second Interim Report was released in March 2003 [3]. In addition to defining renewables and proposing a renewable portfolio standard, the report devoted one section to "net metering", a way for electrical customers to generate and supply electricity to electricity utilities and distributors. The EMGC makes seven recommendations with respect to how the province should proceed with net metering.

This paper examines EMGC's recommendations for net metering. In the next section, some of the issues associated with net metering are discussed. The third section considers each recommendation, discussing the implications of each.

Certified renewable net metering sources can receive emissions credits since electricity from these generators is considered to displace carbon dioxide emitted from thermal (fossil fuel) sources of electrical generation. The fourth section of this paper considers the possible consequences of the EMGC's recommendations for the handling of emissions credits.

A summary of the paper and its findings are presented in the last section. This includes a set of recommendations for net metering in Nova Scotia.

Statements taken from the Second Interim Report are presented in *italics* followed by the associated page number. For brevity, all references to "Report" refer to the Electricity Marketplace Governance Committee Second Interim Report.

2 Net Metering

Traditionally, electricity has been produced by utilities and consumed by customers. The cost to the customer is typically based upon the customer's demand (expressed in kilowatt-hours) multiplied by the cost per kilowatt-hour. Rising fuel prices, which can cut into shareholder dividends, have led many utilities to introduce techniques that encourage customers to reduce their demand. Similarly, when faced with rising electricity prices, many customers have made efforts to reduce their demand in order to reduce costs.

Short of 'getting off the grid', the most dramatic way a customer can reduce demand is to "self-generate" electricity using technologies such as solar PV, wind, and micro-hydro. When using these technologies, which typically produce electricity intermittently, the customer's demand may be met with electricity:

- Entirely generated by the utility;
- From both the utility and the customer's generating facilities;
- Entirely from the customer's generating facilities.

There is a fourth possibility that occurs when the customer's electrical demands are less than what they are generating. In this situation, if there is an agreement between the customer and the utility, the excess electricity can be supplied to the utility and the customer given credit for the electricity generated (essentially 'banking' the electricity). At the end of a billing period, the customer is either:

- A net energy consumer, meaning that the customer is charged for the net consumption of electricity (i.e., electricity generated by the utility and used by the customer).
- A net energy generator (or NEG), meaning that the customer has supplied more electricity to the utility or distributor than they have consumed.

The net electricity usage is determined by examining the customer's meter, hence the term "net metering".

Nova Scotia Power (NSPI) presently allows net metering. Customers with generating facilities of up to 10 kW can enter into an agreement with NSPI to net meter. The 10 kW limit is presently under review (it is unclear whether the EMGC recommendations will influence NSPI's net metering policy).

3 EMGC Net Metering Recommendations

Part of the preamble to the recommendations states:

> *To review net metering practice in other jurisdictions, the EMGC received a report surveying all states in the United States with net metering programs. That survey addressed most of the issues identified above, and showed that their practice varied across jurisdictions, which was useful when considering possible policy changes for Nova Scotia.* [Page 20]

Although net metering programmes exist across Canada, no mention is made of them in the Report. The source of the survey is not given although it is the basis of the Report's seven recommendations for net metering.

3.1 Recommendation 2-23

Recommendation 2-23 defines a net metering generator:

> *The EMGC recommends that a qualifying generator be one with a suitable interconnection and operating agreement, using renewable resources for generation.* [Page 20]

In the preamble to this recommendation, the Report states:

> *If the generator chooses not to be certified, the distribution utility would make the determination of whether it meets the criteria for renewable generation.* [Page 20]

Electricity generated from renewable sources has two potential revenue streams: the sale of electricity and the sale of emissions credits (or tags). Part of Canada's Kyoto commitment is based upon emissions trading, in which organizations buy and sell emissions credits [5]. Emissions trading schemes allow utilities to purchase credits to offset their carbon dioxide emissions.

However, in order to sell emissions credits, generators must be certified. The Report devotes several pages and two recommendations (2-6 and 2-7) to the issue of certification. Briefly, Recommendation 2-6 proposes adoption of the EcoLogo definition of renewable low-impact electricity, while Recommendation 2-7 calls for the Nova Scotia government to authorize agencies to certify generation facilities.

3.2 Recommendation 2-24

Recommendation 2-24 addresses the issue of generator capacity:

> *The EMGC recommends that qualifying generators with installed capacity of 100 kW or less, connected to a distribution system, be eligible for net metering programs.* [Page 20]

This recommendation is based upon the following arguments:

- *Formal certification is not likely to be cost-effective for generators less than 100 kW*. [Page 20]

  This argument stems from an arbitrary interpretation of a table from EcoLogo presented in Section 3-3 of the Report. Appendix I extends the EcoLogo table to include various generator sizes of between 1 and 90 kW. If the 'Size'

in Table 1 is taken as the expected average excess capacity, it is apparent that generators with a capacity of more than about six kilowatts will 'break even'.

Quite simply, if a customer wishes to become a generator and to sell electricity to the local distributor, it should be up to the generator, not the EMGC, to decide whether the decision is cost-effective.

- *A survey of practice in the United States showed that the largest eligible size is 100 kW (excepting California, where it is 1 MW).* [Page 20]

  It may well be true that the largest eligible net metering size in the United States is 100 kW; however, it should not mean that Nova Scotia must adopt this limit. Other net metering limits range from 10 kW to 100 kW [9]. Possible reasons for selecting this limit are discussed under the next bullet.

- *NSPI reported that potential generators with projects as small as 50 kW wished to negotiate power purchase agreements, since they are excluded from net metering under current rules. However, these projects are generally smaller than is desirable for a power purchase agreement, so that an increase in the maximum allowable net metering size would alleviate this problem.* [Page 20]

  A "power purchase agreement" (or PPA) is a contract between an independent power producer (IPP) and a utility or distributor stating that the IPP will produce a given amount of electricity over a certain period of time at an agreed upon price. This is not the same as net metering since the net metering customer is not contractually obliged to generate a given amount of electricity. When compared to a PPA, net metering requires less work on the part for the utility or distributor since there is no formal contract and determining whether the customer is a NEG simply involves reading the customer's meter.

  Creating the 100 kW net metering limit benefits NSPI more than the customer, since it eliminates projects that are "*generally smaller than is desirable for a power purchase agreement*". The issue of who benefits from net metering is revisited in Recommendation 2-26 and 2-29.

3.3 Recommendation 2-25

Recommendation 2-25 limits the amount of electricity that any distributor must accept:

> *The EMGC recommends that no distributor in Nova Scotia be required to accept net metered installations having a total installed capacity of more than 0.5% of its annual peak demand.* [Page 21]

The "annual peak demand" is the maximum demand that a distributor must meet during a one-year period. However, NSPI discusses its peak in terms of "Firm Peak" and "Total Peak", where the Total Peak is the sum of the Firm Peak and a so-called "Non-Firm Peak". NSPI calculates the Non-Firm Peak as 20 percent of the Firm Peak as a reserve margin should any equipment fail [4]. The following

table is from NSPI's 2001 Load Forecast submission to the UARB for its Generic Rate Design, it shows the estimated peaks for 2001, 2002, and 2003:

Year	Firm Peak (MW)	Non-Firm (MW)	Total Peak (MW)
2001	1644	337	1981
2002	1663	341	2004
2003	1678	345	2023

Clearly, the Report leaves open to interpretation the definition of "annual peak demand".

Since peak electricity usually costs the most to generate, most utilities try to reduce their peak demand whenever possible. For example, NSPI claims to have moved 50 MW from peak to non-peak over the past two years [4] (contradicting its load forecasts).

Using an estimated Firm Peak demand of 2,000 MW, 0.5 percent of the peak would be about 10 MW, meaning that the maximum capacity of net-metering installations in Nova Scotia would be 10 MW (or 10,000 kW).

An alternative to using peak demand is to use total capacity (in NSPI's case, this would be about 2,184 MW [4]). However, since the Report refers to 'distributors' rather than 'utilities', it is possible that a distributor would have no generating capacity; instead, they would purchase electricity from a utility or third-party and sell it to the customer.

As a side note, if the entire 10 MW of electrical capacity were to operate on an annual basis, the equivalent CO_2 emissions would be (using the EMGC assumptions shown in Appendix I):

- Total electricity generated at 35 percent capacity factor:

  10,000 kW x 8760 h/yr x 0.35 or 3.07×10^7 kWh

- Equivalent CO_2 emissions displaced:

  3.07×10^7 kWh x 0.78 kg/kWh or 2.4×10^7 kg CO_2 or about 2.4×10^4 tonnes

Using the EMGC emissions credit value of $3/tonne, the 2.4×10^4 tonnes is worth about $72,000; however, using the Federal government's figure of $10 per tonne [5] makes the total possible credits worth almost $240,000.

3.4 Recommendation 2-26

Recommendation 2-26 deals with the issue of how to pay a net energy generator.

The preamble to the recommendation lists three ways in which the distributor can pay the generator, notably:

> *Paying at utility avoided cost, paying at a premium to utility avoided cost, and letting NEG revert to the utility for no payment.* [Page 21]

Of the ways listed, two are presented as "benefits" for a generator that becomes a NEG:

- *The full retail rate paid for net metered energy represents a clear benefit to the net metered customer.* [Page 21]

  In this case, the distributor reads the customer's meter at the end of an agreed upon period. If the meter indicates that more energy than has been used than produced, the customer pays the distributor the full retail rate for the number of kWh consumed. On the other hand, if the meter indicates that the customer is a NEG, the distributor pays the customer the full retail rate for the number of kWh produced.

- *Allowing NEG to carry over from month to month could also benefit the customer in jurisdictions with seasonal pricing. It allows the customer to over generate in months when electricity prices are low and receive full credit in months when electricity prices are high.* [Page 21]

  Why the Report refers to "*jurisdictions with seasonal pricing*" rather than discussing Nova Scotia is unclear, since NSPI has two variations on seasonal pricing:

  - Outdoor Recreational Lighting Rate for outdoor sports facilities between May and October [8]. The rate is 9.5 cents/kWh. The rates between November and April are not stated since the facilities are not used during this time (meaning that the customer could only be a net generator between May and October).

  - Time of Use electricity rates. The rates are 4.305, 8.61, and 12.37 cents/kWh, depending upon the time of day, day of the week, and month of the year [7]. They are primarily intended for the relatively few customers using thermal storage for heating.

    Time of Use rate meters record both the amount of electricity and the time when the electricity is consumed. By programming the meters to record this information when electricity is generated, the distributor would be able to avoid the problems associated with seasonal price variations.

These are the only two potential "benefits" (financial or otherwise) to the generator listed in the section on net metering. The Report then states:

> *Given the benefit to the generator of net metering, the EMGC agreed to balance that off by having NEG revert to the host utility without payment.* [Page 21]

That is, at the end of the agreement between the customer and the distributor, if the customer is a net energy generator, the distributor is not required to pay the customer for any electricity produced. This being the case, it is unclear what the EMGC means by "*the benefit to the generator of net metering*".

Recommendation 2-26 states:

> *The EMGC recommends that, subject to approval by the Utility and Review Board, excess energy delivered to the distributor from net metering installations can be carried over to subsequent billing periods, for up to 12 months. At the end of each rolling 12-month period, excess energy credits are set to zero without compensation to the generator.* [Page 21]

In other words, net metering contracts between the customer and the distributor can be up to 12 months in duration. If the customer is a NEG at the end of the contract, the distributor is not required to pay the customer nor is the "*excess energy*" credited to the customer.

It is worth noting that the following Canadian electrical distributors do pay generators for production: Ottawa Hydro, Waterloo North, and Yukon Electric. Other utilities allow banking of excess generation from one billing-period to the next [1].

3.5 Recommendation 2-27

Recommendation 2-27 reads as follows:

> *The EMGC recommends that NSPI expeditiously finalize the connection standard(s) currently under development for small generators connected to a distribution system.* [Page 22]

This appears to be a tacit admission that NSPI will be the distributor of choice.

3.6 Recommendation 2-28

Recommendation 2-28 discusses technical standards:

> *The EMGC recommends that distribution utilities in Nova Scotia be required to adopt technical standards for net metering installations which properly reflect the size of the installation and its potential impact on the system.* [Page 22]

This recommendation deals only with the technical details of net metering installations, disregarding entirely the necessity of ensuring that all installations meet occupational health and safety standards.

3.7 Recommendation 2-29

Recommendation 2-29 deals with emissions credits from the generation of electricity. The preamble to this recommendation reads:

> *As an offset to the benefit net metering applications get from the host distribution utilities, the EMGC adopted the following recommendation.* [Page 22]

Exactly what these benefits are to the "*net metering applications*" (i.e., the customer) is unclear, since the distributor is not required to pay the customer for any electricity produced (Recommendation 2-26).

Recommendation 2-29 states:

> *The EMGC recommends that the host distributor be entitled to any emissions credits or allowances arising from the use of renewable energy sources to generation power in connection with a net metering installation.* [Page 22]

This recommendation proposes that, in addition to not paying the generator for any electricity it produces, the distributor gains any emissions credits associated with the generation.

Another part of the preamble to this recommendation states:

> *It may not be practical for net metering applications to get these credits, because of the requirement for certification and its cost relative to the small size of generator.*

As shown in Appendix I, this statement cannot be justified. Furthermore, there is nothing to say that the cost of certification would be as great as that demanded by Terrachoice.

4 Emissions credits

The Report makes recommendations regarding the certification of net metering customers for emissions credits; however, it does not address the issue of monitoring the customers. This, as with the proposed method of certification, is open to abuse without proper monitoring since the only monitoring equipment is the electricity meter. For example, in order to gain more emissions credits:

- A customer could claim a much greater demand than actually shown on the electricity meter, explaining that the generating equipment met the excess demand (thereby reducing consumption from the distributor).
- A distributor could claim that the demand registered on the electricity meter was actually lower than expected, implying that the customer generated electricity to meet the demand.

Quite simply, if emissions credits are to be obtained, it is necessary to monitor net metering customers so that the actual, rather than the theoretical or anticipated, generation is obtained. At a minimum, this should be an independent third party. Furthermore, there should be a means whereby the value of the actual generation is recorded in order to determine the true emissions credits.

5 Concluding Remarks

This paper has examined the EMGC's Second Interim Report recommendations for net metering. The recommendations are disappointing for at least two reasons.

First, the recommendations are written so that they favour the distributor or utility; in fact, they appear to have a two-fold purpose:

- To discourage customers from becoming generators.

There is no financial incentive to become a generator. The possible revenue streams (electricity sales and emissions credits) are not available to the generator.

- To maximize the benefits to any distributor with net metering customers.

  A distributor with net metering customers benefits from all emissions credits (both real and imagined) and is not required to pay the generator for any electricity produced. Furthermore, the percentage of net metering capacity permitted is so small that it is unlikely to have any impact on overall system operation (in other words, the distributor can continue operations with little or no concern about net metering).

Second, the proposed emissions credits scheme is open to abuse by the customer, the distributor, or both. At a minimum, the province should ensure that:

- The certification of any generator is performed by an independent third party, unrelated to the distributor or utility.
- The production of electricity is monitored in order to determine the actual rather than the theoretical output.

In summary, if net metering is to play a useful role in meeting a small part of Nova Scotia's electrical energy needs, the proposed recommendations must be reconsidered. For example:

- Customers who can demonstrate that their generating facilities can meet the contractual obligations should be given the opportunity to operate as an independent power producer. Those who cannot meet these obligations should be permitted to operate as net metering customers.
- Net metering customers must be certified and monitored to ensure that they actually generate electricity.
- If net energy generators are not to be paid, then the "excess energy" credits they have produced should be allowed to rollover from one contract period to another.
- Emissions credits belong to the customer, since the customer owns the equipment.
- Determining the limit on net metering capacity should be reconsidered. If the limit is linked to Firm Peak demand, then the percentage should be permitted to increase to compensate for any lowering of the peak. On the other hand, if the limit is tied to total provincial generating capacity, the percentage can remain unchanged at 0.5 percent, since any growth in capacity will allow for a greater number of net metering customers.

By following the above recommendations, the province could be on the road to widespread distributed generation, helping reduce our dependence on fossil fuels, and meeting "Nova Scotia's commitment to a sustainable energy future" [6].

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Appendix I. Extended EcoLogo Table

In Section 3-3 of the Report (Page 10), a table is presented with three different equipment sizes (100 kW, 1,000 kW, and 10,000 kW) and the related costing information from Terrachoice[1]. Although there are a number of mistakes in the table as presented by EMGC, a corrected version can be used to show the costs associated with equipment smaller than 100 kW.

The table is based upon the following assumptions:

1. Annual kWh assumes 35 percent capacity factor
2. Annual revenues: $0.06/kWh
3. Annual total cost is for Ecologo certification: annual license cost + 10% initial audit cost
4. Value of credits is $3/tonne of CO_2 at 0.78 kg per kWh displaced

The extended table (shown on the next page) assumes the same 100 kW initial audit cost ($1,500) and annual license cost ($1,000) for equipment with sizes between 1 and 90 kW.

[1] Terrachoice is the company chosen by Environment Canada to have exclusive rights to certify facilities that meet EcoLogo criteria.

Table 1: Extended EcoLogo Table (from Section 3-3 of the Report)

Size (kW)	Annual kWh	Annual Revenues	Initial Audit	Annual License	Annual Total cost	Tonnes CO_2	Value of credits	Revenue - costs	Revenue - costs + credits
1	3,066	$184	$1,500	$1,000	$1,150	2	$7	-$966	-$959
6.015	18,442	$1,107	$1,500	$1,000	$1,150	14	$43	-$43	$0
10	30,660	$1,840	$1,500	$1,000	$1,150	24	$72	$690	$761
20	61,320	$3,679	$1,500	$1,000	$1,150	48	$143	$2,529	$2,673
30	91,980	$5,519	$1,500	$1,000	$1,150	72	$215	$4,369	$4,584
40	122,640	$7,358	$1,500	$1,000	$1,150	96	$287	$6,208	$6,495
50	153,300	$9,198	$1,500	$1,000	$1,150	120	$359	$8,048	$8,407
60	183,960	$11,038	$1,500	$1,000	$1,150	143	$430	$9,888	$10,318
70	214,620	$12,877	$1,500	$1,000	$1,150	167	$502	$11,727	$12,229
80	245,280	$14,717	$1,500	$1,000	$1,150	191	$574	$13,567	$14,141
90	275,940	$16,556	$1,500	$1,000	$1,150	215	$646	$15,406	$16,052
100	*306,600*	*$18,396*	*$1,500*	*$1,000*	*$1,150*	*239*	*$717*	*$17,246*	*$17,963*
1,000	*3,066,000*	*$183,960*	*$1,500*	*$1,080*	*$1,230*	*2,391*	*$7,174*	*$182,730*	*$189,904*
10,000	*30,660,000*	*$1,839,600*	*$1,500*	*$6,802*	*$6,952*	*23,915*	*$71,744*	*$1,832,648*	*$1,904,392*

Notes regarding the above table:

- Annual kWh are obtained as follows size (kW) x the number of hours in a year (8760) x the capacity factor (35 percent)
- Annual revenues are the annual kWh x $0.06 per kWh
- Tonnes CO_2 are the annual kWh x 0.78 kg CO_2 per kWh / 1000 (kg per tonne)
- Value of credits are the tonnes CO_2 x $3/tonne
- The final two columns show the revenue without the emissions credits and the revenue with the emissions credits