NOVA SCOTIA UTILITY AND REVIEW BOARD

NSPI P-882

IN THE MATTER OF: *The Public Utilities Act*, R.S.N.S. 1989, c.380 as amended

- and -

IN THE MATTER OF: An Application by Nova Scotia Power Incorporated for Approval of Certain Revisions to its Rates, Charges and Regulations

Comments and recommendations regarding

NSPI's Conservation and Energy Efficiency Plan 2006

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1. Introduction

Part of NSPI's rate increase application presented to the UARB included a $5 million Demand Side Management (DSM) programme, described in NSPI's document, *Conservation and Energy Efficiency Plan 2006* (NSPI, 2005c) (hereafter referred to as "the document"). This brief includes a final analysis of NSPI's proposed DSM programme and offers an alternative approach that comes closer to achieving some of NSPI's justifications for a DSM programme.

2. NSPI's DSM Projections

NSPI presented two sets of projections for the potential reduction in electricity usage by 2007 associated with their proposed DSM programme:

- Appendix F (Load Forecast Report), which shows reductions of 43 GWh and 16 GWh by their residential and commercial customers, respectively; industrial customers show no reductions associated with the DSM programme (NSPI, 2005a). The overall reductions are calculated to be 59 GWh (see Table 1).

  With the DSM programme in place, NSPI projects system growth to increase to 11,922 GWh in 2006, an increase of 1.2 percent over 2005. Without the DSM programme in place, the growth in demand is projected to be 1.7 percent.

- The DSM document projects reductions of 59.97 GWh, 10.51 GWh, and 1.1 GWh for NSPI's residential, commercial, and industrial customers, respectively. The total demand reduction is 71 GWh.

  Assuming a non-DSM growth in electrical demand in 2006 to 11,981 GWh (from Table 1), and applying the demand reduction of 71 GWh, there is a system growth of 11,910 GWh.

Only time will tell if either of these projections for DSM reduction are correct; however, for the purposes of this submission, the data from the DSM document will be used.

3. NSPI's proposed DSM programme

The document's Executive Summary lists five reasons justifying NSPI's proposed DSM

programme. This section examines each of these reasons and considers, based upon the material supplied in the document, whether they actually justify the DSM programme. The primary focus of this examination is the residential sector.

3.1. Reduce electricity usage and save our customers money

The annual cost to any residential customer is determined from the monthly customer charge ($10.83 per month or $129.96 per year; this is unchanged in the proposed residential rate) plus the total annual electricity usage times the rate per kilowatt-hour:

$$AnnualCost = \$129.96 + Usage \times Rate$$

Table 2 shows the impact of NSPI's proposed rate increase on residential customers for various levels of electrical usage (demand). Although the proposed residential rate increase is 13 percent (from $0.0922 per kWh to $0.1042 per kWh[1]), the actual increase in the annual cost is less than 13 percent because of the influence of the customer charge. For example, a customer with a demand of 10,000 kWh would have paid $1,051.96 (annual customer charge of $129.96 plus $922.00 in demand charges) under the old residential rate, whereas the cost to the customer would increase by 11.39 percent to $1,171.82 (annual customer charge of $129.96 plus demand charges of $1,041.86).

Although one could argue that any increase above the old cost to the customer is not saving the customer money, it is worth considering possible ways in which the customer could save money using NSPI's DSM programme:

- In the unlikely event that all residential customers reduced their demand equally, the savings per customer would be the projected residential demand decrease of 59.97 GWh divided by 400,000 (a rough estimate of NSPI's total residential customers[2]), or about 150 kWh per customer. This is an annual savings of about $15.62 per customer.
- Table 3 shows the average potential savings and the expected number of customers

[1] The residential rate of $0.1042 per kWh is an estimate based upon NSPI's announcement that they would only be seeking a 13 percent increase rather than the 16 percent increase. NSPI originally requested a residential rate increase of about 18 percent, from $0.0922 to $0.1089 per kWh (NSPI, 2005b).

[2] In NSPI's response to Hughes IR-6, the residential customer count was 420,547. However, in the DSM document, the number of residential customers was 393,076. The choice of 400,000 customers for this calculation was a compromise.

participating in each element. If a customer could take advantage of any or all of NSPI's proposed savings as described in the DSM document, the savings would range from $10.42 (100 kWh from participating in all possible Partner-led programmes) to $708.56 (6,800 kWh by having an approved EnerGuide for New Houses home upgraded with NSPI's assistance). Customers lucky enough to live in a house with a child in Grade 5 participating in NSPI's Youth education programme could save 800 kWh or $83.36 per child.

- Finally, the total number of beneficiaries of the DSM programme is estimated to be about 223,000 or 56 percent of the residential customer base (assuming that no customer benefits from more than one programme element). This suggests that about 44 percent of NSPI's residential customers will not save money from the programme.

3.2. Reduce greenhouse gas emissions and help the environment

Greenhouse gas emissions are mentioned once in the entire document (in the Executive Summary), as part of the justification for the DSM programme. There are no calculations performed to demonstrate the benefits, if any, of the proposed programme on greenhouse gas reduction or the environment.

NSPI projects that by 2007, the proposed DSM programme will reduce demand by about 72 GWh. This is based largely on optimistic projections with respect to CFL (compact fluorescent light) sales and educational programmes in the residential sector (see Table 4).

Although the Executive Summary mentions greenhouse gas emissions, there are no calculations in the document showing the potential reductions in greenhouse gas emissions. Using NSPI's projected savings of 71.6 GWh, the emissions reduction would be 60.8 kt (kilotonnes)[3], as shown in Table 5.

The greenhouse gas reduction associated with the residential programme elements make up the majority of the savings at 51 kt. In turn, almost half of the total greenhouse gas reductions are achieved from the installation of CFLs.

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[3] This assumes that the electricity generation displaced by these savings comes from thermal (coal-fired) facilities. The greenhouse gas intensity for coal in Nova Scotia is 850 tonnes per GWh (Environment Canada, 2004).

If NSPI is at all serious about achieving significant reductions in its greenhouse gas emissions, the proposed DSM programme falls short of this goal. It is clear from the DSM document that the most significant reductions in both demand and greenhouse gases, will occur through the introduction of CFLs.

Despite the obvious benefits of CFLs, the proposed DSM residential lighting programme is based entirely upon the belief that the 59 percent of NSPI's residential customers who are using less than five CFLs will purchase 393,076 CFLs during 2006 (it is worth noting that according to NSPI, 41 percent of NSPI's residential customers do not have a CFL in their homes)[4]. NSPI's total budget for CFLs is about $50,000 for the promotion, not purchase.

There are about 240,000 residential customers with five or fewer bulbs; if NSPI was to purchase and install 1 million bulbs in these houses, the demand reduction would vary between 82 and 133 GWh, for 60 watt and 100 watt incandescent replacements, respectively (see Table 6). The greenhouse gas reductions in both of these cases, between 69 and 113 kt, exceed the total projected reductions as described in the DSM document.

In 2004, NSPI's greenhouse gas emissions were about 10 Mt (or 10,000 kt). The greenhouse gas emissions reduction associated with replacing one-million 100-watt equivalent CFLs is 113 kt, slightly more than 1 percent of NSPI's total emissions in 2004. If these bulbs could be purchased in bulk by NSPI for $4 each, the programme would cost $4 million.

It is worth noting that NSPI has contracted the Pubnico Point windfarm to produce 100 GWh/year for $7 million/year. The ideal reduction in greenhouse gases associated with the windfarm will be about 85 kt, based upon the greenhouse gas intensity for coal of 850 tonnes per GWh.

The bulb replacement programme is less expensive ($4 million vs. $7 million) and is more cost effective (an average of 91 kt reduction vs. an 85 kt reduction) than the

[4] It should be noted that all of these statistics are based upon a survey conducted by Corporate Research Associates for NSPI as part of their development of the DSM document.

contract with Pubnico Point windfarm. This is not intended to cast doubt on the windfarm, rather to show the potential benefits of a CFL rebulbing programme.

There are other benefits to a rebulbing programme, such as reducing the need for capacity during the system peak (whereas wind can add to the peak capacity only if it is blowing during the system peak). For example, the potential peak savings from either of the proposed CFL replacement schemes are shown in Table 7 (the coincident peak demand reduction of 60 percent is the number used by NSPI in the DSM document).

3.3. Help build a conservation and energy efficiency culture in Nova Scotia, led by our young people and our schools

Over the past several years, NSPI has been subject to particularly bad press, in part due to their responses to weather-related outages. This part of the DSM programme seems more like a promotional scheme for NSPI in the classroom. If this is allowed to proceed, any relationship with NSPI must be removed from the education material, as this could unduly influence "*our* young people" in "*our* schools".

The NS Department of Energy has the staff and, one would like to think, the expertise to develop such a programme. The Department of Energy, in conjunction with the Department of Education, should be running such a programme. NSPI should not be involved.

3.4. Bring Nova Scotia Power together with community based partners in the province, leveraging the efforts and investments of all in this worthwhile pursuit

The sole "worthwhile pursuit" in the DSM document is the proposal to partner with the EnerGuide for Houses programme, matching federal grants (up to $1,000) for as many as 450 electrically-heated homes. However, the existing EnerGuide for Houses programme has at least two barriers to many Nova Scotians who could benefit from the programme: the first being the cost of the initial energy audit ($150), and the second being that the householder must pay for any energy upgrades before being reimbursed.

For this to be a truly "worthwhile pursuit", NSPI should target those residential customers who are on low- or fixed-income and use electric heating. This would mean covering the cost of the initial energy audit and helping pay for the energy upgrades.

The need for such a programme is best illustrated by considering the energy burden (that is, the percentage of someone's income spent on energy) on those on low- and fixed-income. Figure 1 shows the energy burden on low-income Nova Scotians in terms of annual electricity consumption. Not surprisingly, the higher the usage and the lower the income, the greater the burden. For example, the energy burden of a customer consuming 10,000 kWh per year (slightly above the residential average of 9,464 kWh per year) would depend upon the customer's income: the energy burden ranges from 23.4 percent ($5,000 income) to 7.8 percent ($15,000 income) to 4.7 percent ($25,000 income). Similarly, a customer's energy burden depends upon demand; someone earning $15,000 per year has an energy burden ranging from 4.3 percent (5,000 kWh) to 18.2 percent (25,000 kWh).

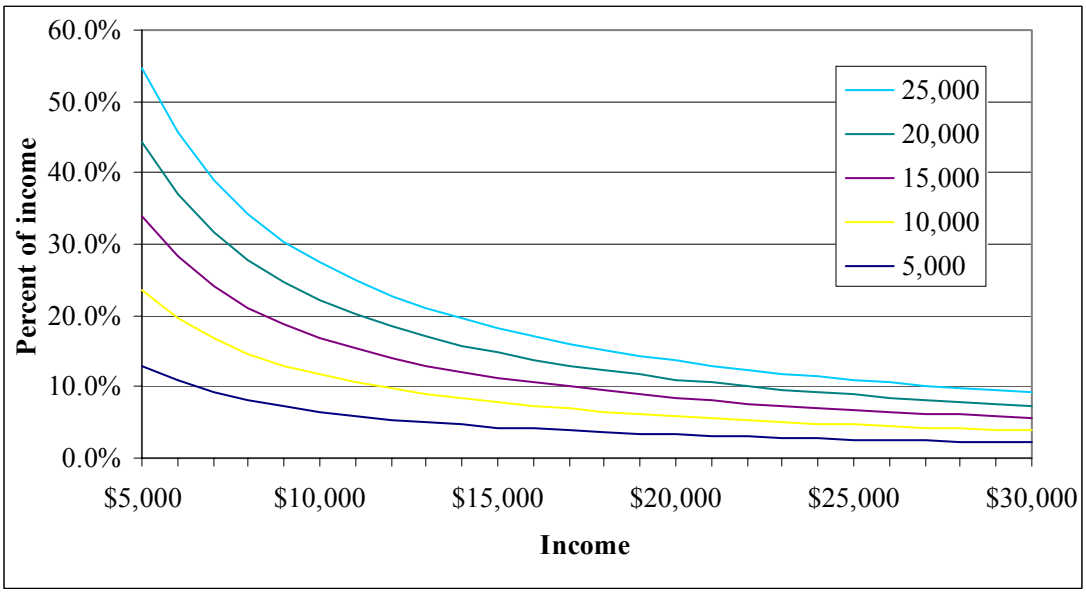

Figure 1: Energy burden on low-income Nova Scotians

3.5. Meet customer expectations that Nova Scotia Power do more to advance energy efficiency and conservation

Most, if not all, of the arguments for, and the contents of, the proposed DSM programme are based upon a survey of customers invited to NSPI's second "Customer Energy Forum" by Corporate Research Associates (CRA). The survey involved interviewing 200 residential and 200 business customers. There were a total of 16 sets of questions in the survey (see Table 8), most dealing with lighting and education; apparently resulting in

the DSM document's focus on lighting and education.

Much of the content of the proposed programmes seems to be more concerned with promoting the NSPI brand than actually advancing energy efficiency or conservation. A good example is the lighting campaign, in which NSPI will be spending $100,000 on a Christmas light exchange programme, exchanging strings of LED Christmas lights for strings of non-LED lights, resulting in a potential annual demand reduction of 0.31 GWh. Although the demand reduction is minor, it will raise NSPI's profile during the 2006 Christmas season. On the other hand, NSPI is proposing to spend $50,000 on promoting CFLs and hoping that 100,000 residential customers who have never purchased a CFL before will purchase about 400,000 of them, resulting in a demand reduction 100-times greater than that of the LED Christmas light exchange.

NSPI is also proposing that it spend $732,300 on the "development of future programmes" (consisting of "pricing design" and "other future programmes"). It is unclear why the 2006 DSM programme should be saddled with these costs; as there are no demand savings, real or imagined. If anything, pricing design (at a cost of $300,000) should be performed by those responsible for developing NSPI's rate cases. Similarly, future programmes can be paid for and developed by NSPI's public relations department.

Given that NSPI is a member of various North American utility councils and organizations, one would have thought that NSPI would have taken the lead, rather than being led by its consumers. Examples abound across the continent of forward-thinking utilities introducing energy saving and conservation programmes.

4. Alternative Rate Schemes

NSPI has rejected any possible change in its rate structure because of the responses they received from a survey conducted by CRA. The rate-related questions appeared to be structured to ensure a rejection of any rate scheme that encourages reduced usage, such as time-of-use, inverted block rate, or winter-summer differential rates.

Although it is generally agreed that low-demand consumers cross subsidize high-demand consumers, it does not appear that anyone participating in the survey was informed of this fact. Similarly, no one had been told the following about NSPI's 2004 residential

consumer consumption (from NSPI's response to Hughes IR-6):

- Half of NSPI's residential consumers (210,000) used 840 GWh or 21.1 percent of NSPI's residential generation. The other half of NSPI's residential consumers consumed almost 80 percent of NSPI's residential generation.
- NSPI's average residential consumption was 9,464 kWh. Almost 62 percent (259,546) of NSPI's residential consumers consumed less than 9,464 kWh.
- Half of NSPI's residential generation (about 2,000 GWh) was consumed by almost 25 percent (103,808) of NSPI's consumers.

Those surveyed also rejected time-of-use metering, despite the fact that it allows price signaling to change consumption habits and can result in lower electricity bills. For example, in NSPI's supplemental response to Hughes IR-3, the time-of-day tariff was shown to result in considerable savings for consumers of electric heating:

- The annual consumption of an average ETS (Electric Thermal Storage) consumer is 25,614 kWh. If the consumer purchased the electricity at the proposed domestic service tariff of $0.1083 per kilowatt-hour, the annual cost for electricity would be $2,919.32, whereas using the proposed time-of-day tariff, the annual cost would be $2,076.64, a savings of $842.69 (28.9 percent).
- Average weekday savings depend upon the time of year, varying from 14.2 percent (December to February) to 20.9 percent (March to November); similarly, weekend and holiday savings vary from 47.1 percent (December to February) to 43.8 percent (March to November).

Without being told this information, it is unclear how those surveyed could have come to any other conclusion than to reject alternative rate structures that allow for the generation of price signals that can encourage real decreases in demand.

5. Recommendations

Of the $5 million earmarked for this year's DSM, only the Christmas LEDs and the two EnerGuide proposals actually spend money on something that is tangible (notably LEDs, energy upgrades, heat pumps, and electric thermal storage); these expenditures come to

about $750,000[5]. The other programme elements focus on education, studies, and information, all of which appear to be promoting NSPI, either directly or indirectly – whether these programmes will actually result in measurable reductions in electricity demand is another matter entirely.

The following are recommendations for an alternative DSM programme:

- More of the funds should be devoted to demand reduction: this means a CFL programme that targets those on low- and fixed-income first, replacing all bulbs (those involved in last year's Keep the Heat programme are apparently pleased with them). If $4 million were devoted to this at $4/bulb, 1 million bulbs could be purchased and installed.
- The EnerGuide for Houses programme element should be increased to $520,000 (to include audit costs) and targeted at those on low- and fixed-income who use electric heating.
- The remaining $480,000 should be used to promote conservation and energy efficiency; for example, through advertising campaigns encouraging customers to use less electricity during peak periods.

6. Summary

NSPI's customers should have access to a DSM programme; however, the one proposed in *Conservation and Energy Efficiency 2006* should not be approved by the UARB, as it fails to achieve significant and meaningful demand reduction. Rather than demand reduction, the proposed programme seems more like a promotion of the NSPI brand – something many people would call a typical case of corporate "greenwash".

The programme's primary focus on public relations through activities such as awareness, workshops, and youth education, yields limited demand reduction. If NSPI is interested in significant demand reduction, a provincial rebulbing program, replacing incandescent bulbs with CFLs is needed. Such a programme is cost effective and will help achieve

[5] The $750,000 figure was obtained as follows: LED Christmas lights ($100,000), EnerGuide for Houses ($497,500), and EnerGuide for New Houses ($150,000).

reduction in both demand and greenhouse gas emissions.

Residential heating is central to surviving a Canadian winter. NSPI's proposal to match federal grants for those benefiting from the EnerGuide for Houses programme is a good idea; however, it can be taken further by targeting those on low- and fixed-income who use electric heating and live in sub-standard housing. By covering the audit cost and part of the energy upgrade, those in greatest need stand to benefit the most.

Finally, NSPI should not be permitted to wait for the approval of its consumers to introduce price signals to discourage demand, especially when the justification for waiting is based upon a poll in which those surveyed were given limited information. An inverted block rate or a rate structure based upon fuel usage will generate price signals that will go much further in helping NSPI achieve its stated goals in *Conservation and Energy Efficiency 2006*.

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Table 1: NSPI's projected demand for 2005 and 2006 (NSPI, 2005b). Italics denote derived figures.

Class Sales (GWh)	**2004 Actual**	**2005 projected**	**2006 with DSM**	**2006 without DSM**	***Difference (2006 with and without DSM)***	***Percentage Growth***		
						04-05	***05-06 with DSM***	***05-06 without DSM***
Residential	4,040	4,106	4,149	4,192	*43*	*1.63%*	*1.05%*	*2.09%*
Small General	165	241	246	246	*0*	*46.06%*	*2.07%*	*2.07%*
General Demand	2,426	2,405	2,451	2,467	*16*	*-0.87%*	*1.91%*	*2.58%*
Large General	401	421	426	426	*0*	*4.99%*	*1.19%*	*1.19%*
Unmetered	105	108	110	110	*0*	*2.86%*	*1.85%*	*1.85%*
Small Industrial	239	243	247	247	*0*	*1.67%*	*1.65%*	*1.65%*
Medium Industrial	567	576	586	586	*0*	*1.59%*	*1.74%*	*1.74%*
Large Industrial	135	137	138	138	*0*	*1.48%*	*0.73%*	*0.73%*
RTP	49	226	218	218	*0*	*361.22%*	*-3.54%*	*-3.54%*
Interruptible	924	885	916	916	*0*	*-4.22%*	*3.50%*	*3.50%*
Mersey	190	190	190	190	*0*	*0.00%*	*0.00%*	*0.00%*
GR&LF	223	192	195	195	*0*	*-13.90%*	*1.56%*	*1.56%*
Municipal	190	193	194	194	*0*	*1.58%*	*0.52%*	*0.52%*
Expansion Rate	0	0	0	0	*0*	*NA*	*NA*	*NA*
ELII Rate	1,870	1,859	1,858	1,858	*0*	*-0.59%*	*-0.05%*	*-0.05%*
Total Billed Sales	11,525	11,781	11,922	11,981	*59*	*2.22%*	*1.20%*	*1.70%*
Losses & Unbilled	863	872	863	868	*5*	*1.04%*	*-1.03%*	*-0.46%*
Net System Requirement	12,388	12,653	12,785	12,850	*65*	*2.14%*	*1.04%*	*1.56%*

Table 2: Impact of rate increase for various demands for residential customers

Demand (kWh)	Old demand charges	Old cost to customer	New demand charges	New cost to customer	Increase in demand charges	Percentage increase in total costs
5,000	$461.00	$590.96	$520.93	$650.89	$59.93	10.14%
7,500	$691.50	$821.46	$781.40	$911.36	$89.90	10.94%
10,000	$922.00	$1,051.96	$1,041.86	$1,171.82	$119.86	11.39%
12,500	$1,152.50	$1,282.46	$1,302.33	$1,432.29	$149.83	11.68%
15,000	$1,383.00	$1,512.96	$1,562.79	$1,692.75	$179.79	11.88%
17,250	$1,590.45	$1,720.41	$1,797.21	$1,927.17	$206.76	12.02%
20,000	$1,844.00	$1,973.96	$2,083.72	$2,213.68	$239.72	12.14%
22,500	$2,074.50	$2,204.46	$2,344.19	$2,474.15	$269.69	12.23%
25,000	$2,305.00	$2,434.96	$2,604.65	$2,734.61	$299.65	12.31%
30,000	$2,766.00	$2,895.96	$3,125.58	$3,255.54	$359.58	12.42%

Table 3: Potential customer savings from various programme elements

Programme element	Expected number of participants	Average savings (kWh)	Potential annual savings[6]
Installing four CFLs	100,000	329	$34.28
Residential price awareness	12,000	400	$41.68
Workshop	2,000	1,800	$187.56
Youth education	6,000	800	$83.36
Partner-led programme(s)	100,000	100	$10.42
EnerGuide for Houses: Using supplemental information	2,400	400	$41.68
EnerGuide for Houses: Implementing recommendations	425	4,017	$418.57
EnerGuide for New Houses	250	6,800	$708.56

[6] Potential annual savings are calculated by multiplying the average savings by the proposed residential rate ($0.1042 per kWh).

Table 4: Projected energy savings from proposed DSM programme

Program element	Residential (GWh)	Commercial (GWh)	Industrial (GWh)
Lighting	32.65	3.41	0
Awareness	4.72	1.08	0
Workshop	3.6	2.3	0.9
Youth	4.8	1.13	0.2
Partner	9.83	2.59	0
Energuide houses	2.67	0	0
Energuide new houses	1.7	0	0
Price design	0	0	0
Future program	0	0	0
Total expected reduction	59.97	10.51	1.1

Table 5: Potential greenhouse gas reduction from DSM programme

Source	GWh saved	Greenhouse gas reduction (kt)
All program elements	71.6	60.8
Residential only	59.97	51.0
Residential lighting	32.65	27.8

Table 6: Savings associated with CFLs in residential homes

Source	Savings per bulb	GWh saved	Greenhouse gas reduction (kt)
Total projected reduction for 2006	-	71.6	60.8
NSPI's CFL proposal (residential and commercial)	45 watts	32.65	27.8
1 million CFL replacement (60 to 15 watt)	45 watts	82.1	69.8
1 million CFL replacement (100 to 27 watt)	73 watts	133.2	113.2

Table 7: Peak savings from the CFL replacement schemes

CFL replacement scheme	Peak savings (MW)
1 million 15W CFLs × 45W savings × 60%	27
1 million 27W CFLs × 73W savings × 60%	43.8

Table 8: Types of questions used in NSPI-CRA survey

Questions on…	Number of questions
Lighting and CFLs	8
Customer spending on electricity	1
Support for electricity pricing	1
Education (NSPI alone or with partners)	4
Support for energy conservation actions	2