

William J. Andrews

Barrister & Solicitor

1958 Parkside Lane, North Vancouver, BC, Canada, V7G 1X5
Phone: 604-924-0921, Fax: 604-924-0918, Email: wjandrews@shaw.ca

February 9, 2017

British Columbia Utilities Commission
Sixth Floor, 900 Howe Street, Box 250
Vancouver, BC, V6Z 2N3
Attn: Laurel Ross, Acting Commission Secretary and Director
By Web Posting

Dear Madam:

Re: BC Hydro F2017-F2019 Revenue Requirements Application,
BCUC Project No. 3698869
BC Sustainable Energy Association and Sierra Club BC evidence

Enclosed for filing in the above-noted proceeding by BCSEA-SCBC please find "Testimony of James Grevatt, Energy Futures Group, Inc., February 9, 2017."

Yours truly,

William J. Andrews



Barrister & Solicitor
Encl.

BRITISH COLUMBIA UTILITIES COMMISSION

British Columbia Hydro and Power Authority
F2017-F2019 Revenue Requirements Application and
F2017-F2019 Demand-Side Measures Expenditure Schedule
BCUC Project No. 3698869

Testimony of James Grevatt, Energy Futures Group, Inc.

for

B.C. Sustainable Energy Association and Sierra Club B.C.

February 9, 2017

I. Introduction and Summary

BCSEA-SCBC retained James Grevatt, Energy Futures Group, Inc., (EFG) to review and analyze BC Hydro's F2017-F2019 Revenue Requirements Application and F2017-F209 DSM Expenditure Schedule (DSM Plan) in order to determine if there are opportunities for BC Hydro to increase the benefits it provides to ratepayers and to the Province through its DSM initiatives.

Mr. Grevatt has provided expert review of programs in Maryland, Pennsylvania, Mississippi, New Hampshire, and Maine and currently leads strategic planning for the New Jersey Clean Energy Program for EFG. He brings 25 years' leadership experience in energy efficiency program operations to his consulting practice. As Director of Residential Energy Services for Efficiency Vermont for over five years, and then in the same role for the District of Columbia Sustainable Energy Utility for its startup operation, Mr. Grevatt has hands-on experience with industry-leading markets-based approaches to managing energy efficiency programs, including multi-family, low income, residential retrofit, new construction, HVAC, and efficient products programs. Mr. Grevatt's CV is attached as Appendix A.

Based on its review and analysis, EFG concludes that there are indeed opportunities for BC Hydro to improve its F17-F19 DSM Plan in the following areas:

- 1. BC Hydro can and should pursue greater levels of cost-effective energy savings from DSM programs than will be achieved in the DSM Plan. Specifically, BC Hydro should pursue program savings at the level of the DSM plan in the approved 2013 Integrated Resource Plan (2013 IRP).**
- 2. BC Hydro refers to "changing customer needs" as one rationale for modifying the program offerings in the proposed plan, but provides no evidence that customers do not continue to also want and need opportunities to participate in "traditional" programs. Participation levels in the DSM Plan represent only a fraction of the likely number of eligible customers.**
- 3. It is not clear that BC Hydro's determination that the DSM Plan provides broad access to programs is correct.**
- 4. BC Hydro should accelerate DSM investments consistent with Provincial policies**

that support low-carbon electrification.

- 5. BC Hydro’s assertion that it can easily ramp up programs from the reduced levels proposed in the DSM Plan is not well supported by evidence.**
- 6. It is reasonable for the Commission to allow BC Hydro to invest in exploring capacity-focused DSM initiatives.**

II. Detail

A detailed explanation of EFG’s findings follows.

- 1. BC Hydro can and should pursue greater levels of cost-effective energy savings from DSM programs than will be achieved in the DSM Plan. Specifically, BC Hydro should pursue program savings at the level of the DSM plan in the approved 2013 Integrated Resource Plan (2013 IRP¹).**

In its evidence and in response to BCSEA-SCBC information requests, BC Hydro demonstrates that the level of savings in the 2013 IRP is cost-effective in terms of both programs and the portfolio as a whole.

For programs, the total resource cost test at the long-run marginal cost (TRC-LRMC) for the 2013 IRP is 2.0, compared with the only slightly higher TRC-LRMC of 2.1 for the DSM Plan. The 2013 IRP level of savings is also cost-effective in the Utility Cost Test (UCT) at market price (UCT-Market), with a result of 1.2, compared with the DSM Plan result of 1.4. Figure 1, below, shows a comparison of summary benefit-cost

¹ The term “2013 IRP” in the DSM context refers to an alternative F2017-F2019 DSM plan based on the Long Term DSM Plan in the 2013 IRP. BC Hydro states: “The 2013 Integrated Resource Plan alternative referenced in Table 10-5 of the Application was an updated outlook that reflected a similar level of activity as the demand-side management plan included in Chapter 9 of the 2013 Integrated Resource Plan, but incorporated changes resulting from new market information.” Exhibit B-10, BCSEA 1.2.9.

ratio (BCR) results from “Table 9”, first for the DSM Plan,² and then for the updated 2013 IRP³. Notably, the UCT-Market result of 1.2, being greater than one, means that savings that would be achieved at the level of DSM program spending in the 2013 IRP would reduce BC Hydro’s revenue requirement.

	LRMC			Market Price
	Total Resource Cost Test	Utility Cost Test	Modified TRC	Utility Cost Test
DSM Plan Total Programs	2.1	3.2	2.5	1.4
2013 IRP Total Programs	2.0	2.9	2.4	1.2

Figure 1: Total Programs, Benefit Cost Ratios, DSM Plan vs. 2013 IRP

The BCRs for “Portfolio” for the 2013 IRP and the DSM Plan are shown in Figure 2. The portfolio TRC-LRMC is 3.5 for the 2013 IRP and 4.0 for the DSM Plan. The UCT-Market for the 2013 IRP is 3.0 for the 2013 IRP and 5.1 for the DSM Plan. The fact that the UCT-Market for the 2013 IRP portfolio is greater than one means that the 2013 IRP portfolio would reduce BC Hydro’s revenue requirement.

	LRMC			Market Price
	Total Resource Cost Test	Utility Cost Test	Modified TRC	Utility Cost Test
DSM Plan Total Portfolio	4.0	10.3	4.7	5.1
2013 IRP Total Portfolio	3.5	7.0	4.1	3.0

Figure 2: Total Portfolio, Benefit Cost Ratios, DSM Plan vs. 2013 IRP

BC Hydro confirms that all DSM that is cost-effective at the Market Price is

² Exhibit B-1-2, Errata Appendix W, Table 9, pdf p.62.

³ Exhibit B-10, BCSEA 1.2.9 Attachment 1, Table 9, pdf p.485.

beneficial to ratepayers because it will reduce revenue requirements:

“In summary, BC Hydro used the market price comparison as a filter to prioritize demand-side management investments. Any demand-side management initiative that did not pass the Total Resource Cost Test (at long-run marginal cost) and the Utility Cost Test at the value of \$36 per MWh was investigated for modifications to pass these tests, with the exception of the demand-side measures initiatives specified in section 3 of the Demand-Side Measures Regulation. In this way, the use of the Utility Cost Test compared to market price ensures that even surplus energy resulting from demand-side management will have a positive impact on BC Hydro’s revenue requirements, because the utility cost of demand-side management would be less than the wholesale market price.”⁴

BC Hydro characterizes the DSM Plan as “more cost-effective” than the 2013 IRP because the DSM Plan has higher BCRs than the 2013 IRP. EFG acknowledges that the DSM Plan has BCRs that are somewhat higher than those of the 2013 IRP. However, EFG disagrees with the notion that a DSM option with a higher BCR is necessarily better for ratepayers than a DSM option with a lower BCR. A DSM option with a higher BCR is not better if it results in lower savings and lower benefits for ratepayers, particularly if it reduces or delays progress in supporting Provincial climate and energy goals. While supportive of the general premise that paying less to get the same amount of energy savings is better, EFG respectfully points out that it is better still to pursue all cost-effective opportunities to maximize the total net benefits that are provided to ratepayers.

At its simplest, an investment is cost-effective if it returns greater benefits than it costs. A primary goal of an energy efficiency portfolio is to maximize the benefits that it delivers to ratepayers. Artificially limiting investments based on maximizing the benefit-cost ratio reduces the net benefits that ratepayers receive. In the DSM Plan BC Hydro proposes to reduce cost-effective energy efficiency investments from the level described in the approved 2013 IRP. Maximizing the benefits, or more specifically the net benefits after accounting for costs, is achieved by pursuing all energy efficiency that is cost-

⁴ Exhibit B-14, BCUC 2.312.1, p.2 of 3, pdf p.937.

effective.

BC Hydro states that its “...view is that its F2017-F2019 Demand-Side Management Plan is generally consistent with the approach to demand-side management in the 2013 Integrated Resource Plan.”⁵ The logic behind this statement appears to be that because the 2013 IRP called for moderating DSM investments in response to lower energy demand for F2014-F2016 it would be appropriate for BC Hydro to also moderate DSM investments for F2017-F2019 given lower than expected energy demand—even though this was not specifically called for in the 2013 IRP. In EFG’s analysis it would be more beneficial for BC Hydro to invest at the level that was actually proposed for F2017-F2019 in the 2013 IRP, rather than at the “moderate”⁶ DSM Plan level, because the level of DSM investment proposed for this period in the 2013 IRP is cost-effective, and provides greater support for the Climate Leadership Plan and related Provincial priorities.

The DSM program investment described in the 2013 IRP would provide considerably more savings for residential and industrial customers than will the DSM Plan. Over the F2016 – F2024 period, total customer bill savings from programs would be \$576 million less in the DSM Plan than in the 2013 IRP, and over the F2017 – F2019 test period customer bill savings from programs would be \$105 million less than in the 2013 IRP. This is shown in Figure 3 below, which compares BC Hydro’s data for the DSM Plan⁷ and the 2013 IRP.⁸

⁵ Exhibit B-15, BCSEA 2.58.5, pdf p.697.

⁶ In its application (Exhibit B-1-1), the Minister Briefing (Exhibit B-15, BCSEA IR 2.59.1, pdf p.702) and elsewhere, BC Hydro refers to reduced DSM spending levels as “moderate” relative to higher levels of DSM spending.

⁷ Exhibit B-1-2, Errata Appendix W, Table 8, pdf p.61.

⁸ Exhibit B-10, BCSEA 1.2.9 Attachment 1, Table 8, pdf p.484.

Customer Electricity Bill Savings (\$ Millions)										
	Actual / Forecast F2016	Forecast F2017	Forecast F2018	Forecast F2019	Forecast F2020	Forecast F2021	Forecast F2022	Forecast F2023	Forecast F2024	Total F2016-F2024
		Test Period								
DSM Plan Total Programs	16	43	66	95	114	133	150	167	184	967
2013 IRP Total Programs	42	74	105	130	158	192	235	276	317	1,542
Reduction in Customer Bill Savings from Programs 2013 IRP to DSM Plan	-26	-31	-39	-35	-44	-59	-85	-110	-133	-576
		-105								

Figure 3: Total Program Customer Bill Savings, DSM Plan vs. 2013 IRP

The total portfolio at the DSM Plan level of investment also produces less bill savings than does the 2013 IRP. Over the F2016 – F2024 period, total customer bill savings from the total portfolio would be \$842 million less in the DSM Plan than in the 2013 IRP, and over the F2017 – F2019 test period customer bill savings from the total portfolio would be \$190 million less than in the 2013 IRP. This is shown in Figure 4 below, which compares BC Hydro’s data for the DSM Plan⁹ and the 2013 IRP.¹⁰

Customer Electricity Bill Savings (\$ Millions)										
	Actual / Forecast F2016	Forecast F2017	Forecast F2018	Forecast F2019	Forecast F2020	Forecast F2021	Forecast F2022	Forecast F2023	Forecast F2024	Total F2016-F2024
		Test Period								
DSM Plan Total Portfolio	61	128	188	253	312	388	462	522	579	2,893
2013 IRP Total Portfolio	107	187	255	317	400	488	572	650	725	3,735
Reduction in Customer Bill Savings from Programs 2013 IRP to DSM Plan	-46	-59	-67	-64	-88	-100	-110	-128	-146	-842
		-190								

Figure 4: Total Portfolio Customer Bill Savings, DSM Plan vs. 2013 IRP

Regarding BC Hydro’s point that with the proposed DSM Plan it remains on track to meet the *Clean Energy Act* target to offset at least 66 per cent of incremental demand

⁹ Exhibit B-1-2, Errata Appendix W, Table 8, pdf p.61.

¹⁰ Exhibit B-10, BCSEA 1.2.9 Attachment 1, Table 8, pdf p.484.

for electricity from 2008 to 2020 through conservation,¹¹ EFG does not dispute BC Hydro’s calculation that to meet the 66% target, incremental savings of 100 GWh, or 2% of incremental load, would be required in the test period.¹² However, EFG notes that the 66% target itself is somewhat arbitrary, as it is not based on maximizing the return to ratepayers on their DSM investments nor on achieving specific, identified Provincial priorities. In EFG’s view a savings target such as the 66% target should be considered a floor, rather than a ceiling for savings. In other words, investment in cost-effective DSM programs should be determined on the basis of achieving all cost-effective savings and maximizing ratepayer benefits—rather than on an artificially limiting value that describes an intermediary goal.

Further, basing a goal on a percentage of load growth presents some practical challenges. In particular, the uneven nature of load growth can lead to rising and falling energy efficiency and conservation investments as growth fluctuates due to external forces. This leads to instability in DSM program funding, which does not send strong positive signals to give the energy efficiency markets confidence in a predictable future. If a step-goal on the path to all cost-effective savings is needed, it might be more effective to base the goal on saving an annual percentage of sales, as do a number of other jurisdictions with energy efficiency resource standards, rather than load growth.

In light of BC Hydro’s interest in pursuing “capacity-focused DSM” (discussed further, below) it is worth noting that the DSM Plan¹³ achieves significantly less capacity savings than does the 2013 IRP¹⁴. In fact, the cumulative program-related capacity savings are 189 MW less by F2024, or 42% below the 2013 IRP level. For F2019, representing the cumulative result at the end of the test period, the capacity savings are 53 MW less than in the 2013 IRP. This is shown in Figure 5 below.

¹¹ Exhibit B-1-1, pdf pp.602-603.

¹² Exhibit B-10, BCSEA 1.28.1, pdf p.952.

¹³ Exhibit B-1-2, Errata Appendix W, Table 2, pdf p.55.

¹⁴ Exhibit B-10, BCSEA 1.2.9 Attachment 1, Table 2, pdf p.478.

Cumulative CAPACITY Savings at Customer Meter (MW)									
	Actual / Forecast F2016	Forecast F2017	Forecast F2018	Forecast F2019	Forecast F2020	Forecast F2021	Forecast F2022	Forecast F2023	Forecast F2024
		Test Period							
DSM Plan Total Programs	29	77	113	161	187	210	230	248	266
2013 IRP Total Programs	74	129	177	214	253	297	354	405	455
Reduction in Capacity Savings from Programs: 2013 IRP to DSM Plan	-45	-52	-64	-53	-66	-87	-124	-157	-189
		Cumulative -53							

Figure 5: Reduction in Capacity Savings from Programs, DSM Plan vs. 2013 IRP

It is also true that the DSM Plan portfolio produces less capacity savings than does the 2013 IRP portfolio. The cumulative portfolio-related capacity savings are 223 MW less by F2024. For F2019, representing the cumulative result at the end of the test period, the MW savings are 103 MW less than in the 2013 IRP. This is shown in Figure 6 below:

Cumulative CAPACITY Savings at Customer Meter (MW)									
	Actual / Forecast F2016	Forecast F2017	Forecast F2018	Forecast F2019	Forecast F2020	Forecast F2021	Forecast F2022	Forecast F2023	Forecast F2024
		Test Period							
DSM Plan Total Portfolio	130	276	373	473	556	680	797	869	932
2013 IRP Total Portfolio	217	379	486	576	715	858	972	1,068	1,155
Reduction in Capacity Savings from Programs: 2013 IRP to DSM Plan	-87	-103	-113	-103	-159	-178	-175	-199	-223
		Cumulative -103							

Figure 6: Reduction in Capacity Savings from Total Portfolio, DSM Plan vs. 2013 IRP

BC Hydro’s selection of the DSM plan rather than the 2013 IRP also increases risks in several key areas noted in Table 10-5.¹⁵ By choosing the DSM Plan instead of the 2013 IRP, BC Hydro reports that there is an increased impact on broad access to DSM programs for customers in the DSM Plan as well as an increasing likelihood of missed

¹⁵ Exhibit B-1, p.10-22, pdf p.623.

opportunities.¹⁶ The DSM Plan decreases support for “other BC Hydro or Government initiatives” from “high” to “medium-high”. BC Hydro also estimates that it will take 3-5 years to ramp programs up to the 2013 IRP level. This does not represent, in EFG’s view, a quick or easy ramp-up. These issues are discussed in more detail in subsequent sections of this filing.

In light of these observations, EFG suggests that it would be appropriate for BC Hydro to increase the level of savings that it is pursuing at least to be consistent with the level proposed in the 2013 IRP.

2. BC Hydro refers to “changing customer needs” as one rationale for modifying the program offerings in the proposed plan, but provides no evidence that customers do not continue to also want and need opportunities to participate in “traditional” programs. Participation levels in the DSM Plan represent only a fraction of the likely number of eligible customers.

In its response to BCSEA-SCBC IR 1.3.6.1, BC Hydro provides several studies that informed its understanding of changing customer expectations and explains that its DSM portfolio has been modified accordingly. EFG agrees that the studies “provide support...for broadening the energy management focus within BC Hydro’s proposed Demand-Side Management Plan, investigating new and emerging technologies and moving to engage BC Hydro’s customers digitally.”¹⁷ While it is appropriate for BC Hydro to explore and address these innovative opportunities, EFG does not believe that the studies suggest that an “either/or” decision is appropriate. Rather, EFG suggests that it would be more appropriate to describe customer expectations for efficiency and conservation opportunities as “growing” rather than “changing.” This would be consistent with BC Hydro’s acknowledgment that the studies “...do not comment on

¹⁶ BC Hydro estimates the magnitude of missed opportunities resulting from the reduced DSM investment level at an annual 10-30 MWh. See Exhibit B-10, BCSEA 1.71., pdf pp.812-813; Exhibit B-15, BCOAPO 2.123.1, pdf p.200.

¹⁷ Exhibit B-10, BCSEA 1.3.6.1, pdf p.502.

whether customers expect or desire the availability of ‘traditional’ demand-side management programs.”¹⁸

More generally, it is noted that BC Hydro has not claimed that its customers are no longer interested in “traditional” DSM programs. Indeed, BC Hydro states:

“[BC Hydro] made adjustments to manage some programs such as limiting the duration of selected program offers within a fiscal year and reserving customer incentives for projects in later periods. It is unknown how many eligible customers might have otherwise chosen to participate in the programs had they not been adjusted.”¹⁹

EFG finds two important points here. First, BC Hydro has not provided an estimate of the number of customers who may have cost-effective efficiency opportunities of which they are unaware because BC Hydro in the DSM Plan has reduced customer outreach in order to reduce the DSM budget.

Second, by implying that program participation needs to be time-limited to keep within budgets BC Hydro implicitly acknowledges that there will be unmet customer demand for programs and that additional participation would occur should program budgets be larger than those in the DSM Plan. These conclusions are supported by looking at historic participation levels compared with the eligible population.

For example, BC Hydro estimates that it provides electric service to approximately 300,000 single-family homes that are heated by electric resistance heat.²⁰

¹⁸ Id.

¹⁹ Exhibit B-15, BCSEA 2.49.3.1, pdf p.600, underline added.

²⁰ Exhibit B-10, BCSEA 1.18.1, pdf p.882. “The response assumes that the term ‘single family home’ was intended to broadly refer to single family detached homes, duplexes, townhomes, and mobile homes and to exclude multi-family condominium and apartment buildings.” Exhibit B-15, BCSEA 2.53.1.1, pdf p.664.

Between 2008-2016 BC Hydro provided incentives for a total of 7,131 heat pumps.²¹ Assuming, for illustration, that all of these were for single-family homes heated with electric resistance heat, then the heat pump program reached only 2.4% of the eligible customer pool over an eight-year period. On average these projects saved nearly 2,500 kWh/year each,²² with average project BCRs of 1.3 in the TRC test, 2.1 in the modified TRC, and 5.6 in the UCT.²³ Rebate averages ranged from \$570-\$800 depending on the specific program and time period.²⁴ If another 10% of the 300,000 homes with electric resistance heat could cost-effectively install highly efficient heat pumps to replace the existing resistance heating, which seems plausible, it would be four times the number that were completed over the previous eight-year period, with substantial savings for homeowners and (based on the UCT) all BC Hydro ratepayers. While BC Hydro was unable to answer specific IR questions regarding the magnitude of cost-effective opportunity, EFG found no basis in BC Hydro's evidence to indicate that such potential does not exist.

3. It is not clear that BC Hydro's determination that the plan provides broad access to programs is correct.

As described above, BC Hydro explains the steps that it has taken in prior program cycles to manage program participation to match budgets.²⁵ EFG agrees that it is a program implementer's responsibility to manage participation to fit within budget limitations, and appreciates BC Hydro's attention to this responsibility. However, EFG believes, and BC Hydro acknowledges, that budgets at the 2013 IRP level would provide greater customer opportunity than the DSM Plan does. Indeed, in Table 10-5 BC Hydro notes that the DSM Plan will have a "medium" impact on broad access compared with

²¹ Exhibit B-15, BCSEA 2.53.1, pdf p.663.

²² Exhibit B-15, BCSEA 2.53.1.3, pdf p.666.

²³ Exhibit B-15, BCSEA 2.53.1.6, pdf p.669.

²⁴ Exhibit B-15, BCSEA 2.53.1.4, pdf p.667.

²⁵ Exhibit B-15, BCSEA 2.49.3.1, pdf p.660.

the 2013 IRP which will have a “low” impact on broad access. EFG understands this distinction to mean that customers will have less access to programs in the DSM Plan than in the 2013 IRP.

BC Hydro equates “broad customer access to conservation programs” with individual customers having access to one or more demand-side management programs.²⁶ To be true this must be more than theoretical. In other words, just because customers are eligible to participate in a program, if the program has no available budget then it is unreasonable to suggest that those customers have access to the program. Customers should not only have nominal access to participate in programs that they are funding through their utility bills, but should have access that is not unduly limited by constrained budgets.

For example, BC Hydro estimates that scaling back the Leaders in Energy Management-Commercial program will reduce participation by 2,356 projects²⁷— projects that would occur if budgets remained at the 2013 IRP level. It is difficult to reconcile such a reduction in participation with the concept of broad access. Rather, the DSM Plan might be better described as providing targeted opportunities to all customer classes, which is not the same in EFG’s view as broad access, and which EFG views as insufficient.

4. BC Hydro should accelerate DSM investments consistent with Provincial policies that support low-carbon electrification.

EFG sees two general weaknesses in how the DSM Plan responds to low-carbon electrification. First, BC Hydro does not appear to be actively pursuing electrification of fossil-fuel end-uses, and the DSM Plan appears to devote no significant resources to developing and implementing carbon-reduction electrification measures during the test period. Second, by achieving substantially less savings than the 2013 IRP would, the DSM Plan passes up opportunities to put downward pressure on existing loads. Reducing

²⁶ Exhibit B-15, BCSEA 2.49.1; Exhibit B-9, BCUC 1.176.5.

²⁷ Exhibit B-15, BCSEA IR 2.49.3.

the magnitude of existing loads through energy efficiency will “free up” energy and capacity that BC Hydro will need to meet the load growth that will be associated with low-carbon electrification.

EFG finds that BC Hydro’s response to its Climate Leadership Plan mandate in the DSM Plan is too slow and too little. BC Hydro states:

“We see low carbon electrification and energy conservation as being complementary. BC Hydro’s objective is to maximize the use of our clean electricity to meet the province's power needs, while supporting our customers through conservation and efficiency to use the least amount of electricity possible to meet their needs.”²⁸

Despite this statement, BC Hydro does not appear to be actively pursuing obvious strategies to maximize the use of its clean electricity. For example, in EFG’s view BC Hydro should work quickly with Government to develop programs to promote cost-effective fuel switching from fossil fuel heating to efficient heat pumps that are rated to provide effective heating even at colder temperatures. This should not be delayed until after finalization of the 2018 IRP. Regardless of how efficient a natural gas appliance is it will have a higher carbon footprint than clean electricity used at the highest efficiency levels for the same end use. Comparing the carbon impact of a highly efficient cold-climate ductless air source heat pump that uses BC Hydro’s clean power with that of a highly efficient gas furnace will demonstrate this.

BC Hydro says it “is exploring potential low-carbon electrification initiatives”²⁹ and that it “is furthest advanced with exploring a potential program for electrification of natural gas developments.”³⁰ It also says that it “is working toward having programs in place during the test period but the timing related to these programs and any resulting

²⁸ Exhibit B-15, BCSEA 2.57.1, pdf p.692.

²⁹ Exhibit B-10, BCSEA 1.35.1, pdf p.990.

³⁰ Exhibit B-15, BCSEA 2.55.2.1, pdf p.687.

low-carbon electrification is still uncertain.”³¹ However, when asked how it plans to develop low-carbon electrification initiatives given the lack of a DSM budget requested for these activities, BC Hydro’s response is that “To date, the cost of these staff resources [for exploring low-carbon electrification initiatives] is estimated to be approximately \$200,000, and consists of a small portion of time from several staff members.” BC Hydro says that “Given the scale, specific funds have not been allocated within the Demand-Side Management Plan.”³²

BC Hydro acknowledges that “the Climate Leadership Plan ... is expected to increase the need for both energy and capacity.”³³ Therefore, EFG finds that BC Hydro should also more aggressively promote efficiency improvements for its existing electrical heating customers as a long-sighted strategy to mitigate the peak demand and energy growth that will accompany low-carbon electrification. This can be done, for example, by promoting installations of cold-climate ductless mini-split heat pumps to replace electric resistance heating, and by aggressively promoting cost-effective installations of insulation and air sealing measures for electrically heated homes and small businesses.

Moderating existing loads will create additional room for the load growth that will be associated with low-carbon electrification, and will reduce the need for new generation and transmission in the future. As described previously in this testimony, there appears to be ample cost-effective opportunity for BC Hydro to do this.

Lastly, the Minister of Energy’s November 3, 2016 letter to BC Hydro regarding the CLP states that reorienting DSM to promote low-carbon electrification is “expected to be revenue positive compared to current Rates Plan assumptions.”³⁴ Given that part of BC Hydro’s rationale for moderating DSM investments during the test period is based on revenue and rate impacts it would seem reasonable for it to more quickly pursue actions

³¹ Id.

³² Exhibit B-14, BCUC 2.323.2, pdf p.1050.

³³ Exhibit B-9, BCUC 1.182.11, pdf p.4835.

³⁴ Exhibit B-9, BCUC 1.7.2 Attachment 1, pdf p.155, underline added.

that are anticipated to improve its revenue position over time.

5. BC Hydro’s assertion that it can easily ramp up programs from the reduced levels proposed in the current plan is not well supported by evidence.

In response to an IR, BC Hydro describes its approach to engaging the “...broad workforce who can assist with the delivery of our demand-side management plan.”³⁵ BC Hydro states:

“We engage this workforce by providing information, training, and support to foster knowledge of our programs and energy efficiency opportunities. Through this engagement we have established a foundation of existing relationships, and we are able to increase our engagement to ramp up support as needed to fulfill our demand-side management plans...In the past, this workforce structure and strategy has been responsive in allowing the ramp up of program elements.”³⁶

EFG agrees that maintaining relationships with program partners is a critical activity, but questions the sufficiency of this approach in allowing BC Hydro the necessary flexibility to quickly ramp up programs to respond to changing utility loads and Provincial climate policies. Indeed, as noted above, BC Hydro shows in Table 10-5 that it anticipates that 3-5 years would be required to “...ramp programs up to IRP incremental GWh levels” from the DSM Plan. In EFG’s view this would be too slow, and could cause ratepayers to lose significant monetary benefits that would be captured through larger DSM savings.

There is a wide understanding among energy efficiency implementers that achieving savings in certain types of programs requires a specialized contractor base—a pool of contractors who have the specific technical skills, sufficient staff capacity, and the willingness to invest in complying with program reporting requirements. Nascent programs frequently invest considerable efforts in recruiting and training contractors so

³⁵ Exhibit B-10, BCSEA IR 1.12.1, pdf p.846.

³⁶ Id.

that there is capacity in the markets to install the measures that they are promoting. And once the initial capacity has been established, programs often find that there is a certain amount of natural attrition as some contractors find that the program is just not a good match for their business models. This means that in many cases ongoing efforts are required to maintain a contractor base that is sufficient to meet program savings targets.

Since contractors are bound to produce sufficient revenue to ensure the viability of their businesses, it should not be surprising that reductions in program budgets will initially lead to increased competition among contractors for the more-limited program resources. There are winners and losers, and the losers are forced to either scale-back their businesses or pursue other lines of work. Logically, business owners are unable to keep staff on hand in the event that future work develops because doing so would cause them to lose money.

Experience in other jurisdictions suggests that contractors who are unable to sustain historic levels of activity in energy efficiency programs due to budget reductions will reduce staff or re-orient toward different business opportunities. EFG recommends that BC Hydro increase program activity to the 2013 IRP level to provide greater assurance of the future availability of the specialized contractors upon whom the programs rely. Reducing the availability of these contractors will limit BC Hydro's ability to grow programs quickly if needed in the future. While EFG agrees with the importance of the steps BC Hydro is taking to maintain open communications with its contractor base, it also believes that BC Hydro's rhetoric is optimistic regarding future availability of the contractor base, and that this optimism provides unreasonable risk to the ability to pursue the energy efficiency envisioned in the CLP.

6. It is reasonable for the Commission to allow BC Hydro to invest in exploring capacity-focused DSM initiatives.

Some of the information requests from Commission staff question BC Hydro's past and proposed spending on capacity-focused DSM.³⁷ In F2015-F2016, BC Hydro

³⁷ BCUC Exhibit B-14, BCUC 2.311, 2.317 to 2.320.

invested a total of \$13.4 million on capacity-focused DSM, mostly on industrial load-curtailment and the remainder on demand-response initiatives.³⁸ For F2017-F2019, BC Hydro proposes to spend a total of \$38.6 million on capacity-focused DSM,³⁹ comprised of completion of the industrial load-curtailment pilot (\$7.8 million), industrial demand response (\$8.6 million), commercial demand response (\$9 million), and residential demand response (\$13 million).⁴⁰

Capacity-focused DSM initiatives, in the form of interruptible contracts and demand-response programs, are increasingly used by electric distribution companies to cost-effectively manage demand to match the available supply. EFG believes that the Province would be well-served if BC Hydro gains valuable experience in designing, implementing and evaluating such programs. EFG also reiterates the point made earlier in this evidence, that BC Hydro's DSM Plan leaves out a significant amount of capacity savings along with the energy savings in the "missed opportunities" that would be captured with the levels of DSM investment in the 2013 IRP. As stated above, EFG suggests that pursuing the 2013 IRP levels of DSM savings rather than the DSM Plan would yield significant benefits, including additional system-wide capacity savings.

Capacity-focused DSM can provide both a cost-effective system-wide resource and also valuable relief in constrained service delivery areas, especially when used in conjunction with other geographically-targeted demand-side resources. Capacity-focused DSM is a resource that can compare favourably to supply-side capacity resources in terms of carbon emissions, capital cost and lead time.

Industry leading conservation and efficiency administrators consider energy efficiency, distributed energy resources, and demand-response to all be valuable tools in managing supply and demand. For example, Con Edison is currently implementing a massive project in New York City known as the Brooklyn Queens Demand Management

³⁸ Exhibit B-14, BCUC 2.317.3, pdf p.979, et seq.

³⁹ Exhibit B-1-1, Table 10-7, pdf p.634.

⁴⁰ Exhibit B-14, BCUC 2.319.1, pdf p.1006.

(BQDM) program to address a rapidly expanding load in a section of its service territory:

“The BQDM Program was approved by the New York Public Service Commission on December 12, 2014, when it issued its Order Establishing Brooklyn/Queens Demand Management Program. Under the BQDM program, Con Edison intends to procure 52 MW of non-traditional resources by summer of 2018, with 41 MW of the total 52 MW expected to be provided by customer-side solutions such as DR, energy efficiency, storage, fuel cells and CHP. These resources will enable the deferral of a major new substation build by over 5 years while resulting in benefits to customers.”⁴¹

Other leading examples of using geographically targeted energy efficiency as a resource to defer capacity-related construction projects can be found in *Energy Efficiency as a T&D Resource: Lessons from Recent U.S. Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments*.⁴²

Deploying a combination of cost-effective solutions to defer construction of utility infrastructure makes sense. EFG suggests that the Province could benefit from having BC Hydro explore and learn about such approaches, including targeted energy efficiency, as means for addressing any future system constraints that could arise.

III. Conclusion

EFG concludes that BC Hydro should pursue DSM program savings at the level

⁴¹ BROOKLYN QUEENS DEMAND MANAGEMENT DEMAND RESPONSE PROGRAM GUIDELINES, June 28, 2016. p.2.

<https://conedbqdmauctiondotcom.files.wordpress.com/2016/03/bqdm-dr-program-overview-6-28-161.pdf>

⁴² Neme, Chris and Grevatt, Jim: *Energy Efficiency as a T&D Resource: Lessons from Recent U.S. Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments*. Northeast Energy Efficiency Partnerships, 2015.

http://www.neep.org/sites/default/files/products/EMV-Forum-Geo-Targeting_Final_2015-01-20.pdf.

of the approved 2013 Integrated Resource Plan (2013 IRP) rather than at the reduced level of the DSM Plan. As demonstrated in BC Hydro's Evidence and IR responses, doing so will provide greater cost-effective benefits to ratepayers and improve broad access to programs. Pursuing the greater level of DSM program savings in the 2013 IRP will also have important benefits for the Province as it will more quickly advance progress toward low-carbon electrification, consistent with the Provincial policies laid out in the Climate Leadership Plan. Lastly, EFG concludes that there are potentially great benefits associated with the development of capacity-focused DSM initiatives, and therefore is supportive of BC Hydro's pilot programs in this area.

Appendix A. JAMES GREVATT, Curriculum Vitae



JAMES GREVATT, MANAGING CONSULTANT

EDUCATION

B.F.A., University Honors, University of Illinois, 1982

EXPERIENCE

2013-present: Managing Consultant, Energy Futures Group, Hinesburg, VT
2012-2013: Director, Targeted Implementation, Vermont Energy Investment Corp., Burlington, VT
2011-2012: Director, Residential Energy Services, District of Columbia Sustainable Energy Utility for Vermont Energy Investment Corp., Washington, D.C. and Burlington, VT
2010-2012: Managing Consultant, Vermont Energy Investment Corporation, Burlington, VT
2005-2010: Director, Residential Services, Vermont Energy Investment Corp., Burlington, VT
2001-2005: Manager, Energy Services, Vermont Gas Systems, S. Burlington, VT
1998-2001: Manager, Residential Energy Services, Vermont Gas Systems, S. Burlington, VT
1996-1998: Manager, HomeBase Retrofit Program, Vermont Gas Systems, S. Burlington, VT
1994-1996: Technical Specialist, Vermont Gas Systems, S. Burlington, VT
1991-1994: Associate Director and Technical Specialist, Champlain Valley Weatherization Program, Burlington, VT

PROFESSIONAL SUMMARY

James Grevatt brings 25 years' experience as a leadership professional in energy efficiency program operations to his consulting practice. Mr. Grevatt uses an in-depth knowledge of the nuts and bolts of running programs and a clear understanding of strategic thinking and planning to assess the effectiveness of program designs and identify improvement areas that will ensure achievement of desired outcomes. Throughout his career, Mr. Grevatt has focused on building strong relationships with staff, peers, trade allies, regulators, and clients as the best way to understand the needs and challenges that each sector faces. As Director of Residential Services for Efficiency Vermont for over five years, and then in the same role for the District of Columbia Sustainable Energy Utility for its startup operation, Mr. Grevatt has hands-on experience with industry-leading markets-based approaches to managing energy efficiency programs, including multi-family, low income, residential retrofit, new construction, HVAC, and efficient products programs. In his leadership roles he was responsible for finding successful consensus approaches among diverse groups of partners and stakeholders, and for policy interactions with regulators, assuring that program processes were efficient and effective. Prior to his roles with Vermont Energy Investment Corporation, Mr. Grevatt managed Vermont Gas' residential and commercial energy efficiency programs. In each of these roles he had overall responsibility both for program design and operations.

SELECTED PROJECTS

- ***Coalition of Maryland Energy Efficiency Advocates*** Prepared written comments and multiple appearances before the Commission to present evidence regarding Maryland utilities' 2015-2017 EmPOWER Maryland energy efficiency plans, and in subsequent proceedings related to utility goal-setting, cost-effectiveness testing, and energy efficiency financing (2014-2017)
- ***New Jersey Clean Energy Program: Planning Team Lead for F2018-F2022 Strategic Plan*** Facilitated focus groups, worked with Board of Public Utilities Staff, program administrators,



JAMES GREVATT, MANAGING CONSULTANT

utility companies, and other stakeholders to identify opportunities to improve NJCEP strategic direction and increase benefits for ratepayers. Lead author drafting strategic plan (2015-2017)

- ***Energy Efficiency for All: Expert technical support for affordable multifamily energy efficiency advocacy in Pennsylvania and Virginia*** Worked with a coalition of energy efficiency and affordable housing advocates to shape advocacy efforts with utilities and regulators (2015-2017)
- ***Regulatory Assistance Project: Researched and co-authored with Chris Neme: The Next Quantum Leap in Efficiency: 30 Percent Electric Savings in Ten Years***, addressing program and policy questions related to doubling the best efficiency program results (2016)
- ***Natural Resources Defense Council***: Provided expert witness testimony in support of NRDC's intervention in Ameren Illinois' 2014-2016 energy efficiency plan. Testimony demonstrated that Ameren would be capable of capturing significantly greater efficiency savings than it had proposed (2013)
- ***Regulatory Assistance Project: Expert technical support for DSM in China*** Worked with various government agencies and grid companies, as well as advocacy organizations to provide technical support related to advancing DSM and energy efficiency in China (2015)
- ***Vermont Public Service Department: Evaluation of Clean Energy Development Fund*** Conducted interviews of staff and key stakeholders under contract to NMR and prepared memo outlining process findings and recommendations (2014-2015)
- ***Evaluation of Efficiency Maine Low-Income Multi-Family Weatherization Program***- Responsible for program staff and building owner interviews and process evaluation under contract to NMR and Efficiency Maine (2014-2015)
- ***Northeast Energy Efficiency Partnerships***- Researched and co-authored meta-study of the use of energy efficiency to defer T&D investments (2014)
- ***Northeast Energy Efficiency Partnerships***- Researched and co-authored meta-study of ductless heat pump performance and market acceptance (2014)
- ***High Meadows Fund***- Co-authored a study assessing the market viability of "High Performance Homes" in Vermont (2014)
- ***Energy Savings Potential Study, Delaware Department of Natural Resources***- led narrative development for the residential programs for a study of the energy efficiency savings potential in Delaware (2013-2014)
- ***Regulatory Assistance Project***- Provide technical support to energy efficiency advocates in proceedings in Maryland, Mississippi, and Missouri (2013-2014)
- ***Better Buildings Solutions Center, U. S. Department of Energy***- Energy Futures Group's lead author in drafting and reviewing web content for ten how-to "handbooks" detailing proven approaches to designing and implementing residential retrofit efficiency programs (2013-2014)



JAMES GREVATT, MANAGING CONSULTANT

- ***Utility Program Benchmarking***-led research on behalf of a California IOU to compare the cost of saved energy across ~10 leading utility portfolios. The research sought to determine if there are discernable differences in the cost of saved energy related to utility spending in specific non-incentive categories, including administration, marketing, and EM&V (2013)
- ***Research on trends in multi-family, HVAC, and new construction programs***- developed an analysis of emerging program trends on behalf of a leading energy efficiency industry firm (2013-2014)
- ***Efficiency Power Plant, Regulatory Assistance Project***- Partnered with RAP to develop a demonstration tool to show how energy efficiency measures can be used to mitigate air quality impacts related to power production (2013)
- ***Natural Gas Energy Efficiency Analysis, the Green Energy Coalition***- Provided analytical support to demonstrate in testimony that Enbridge Gas could reduce the scale of its proposed pipeline expansion by implementing aggressive energy efficiency programs (2013)
- ***Targeted Implementation, VEIC***- Responsible for market analysis and strategic planning for a new division expanding VEIC's energy efficiency program implementation projects (2012-2013)
- ***DC Sustainable Energy Utility***- Led the planning and startup implementation of Residential programs for the DC SEU, including single and multi-family and retail market programs. Led the development of the initial portfolio-level Annual Plan. Led client and partner interactions around planning and policy development. Member of DC SEU Senior Management Team (2011-2012)
- ***EmPOWER Maryland Critical Program Review***- Expert consultant to the Maryland Office of Peoples' Counsel in EmPOWER Maryland hearings regarding utility energy efficiency planning and reporting. Represented the OPC in stakeholder meetings that informed the current 2012-2014 EmPOWER plans. Multiple appearances before the Maryland Public Service Commission. (2010-2012)
- ***Efficiency Vermont 20 year Forecast of Efficiency Potential***- Senior Advisor in developing the forecast scenarios that led to significantly increased efficiency investment in Vermont (2010-2011)
- ***Efficiency Vermont Residential Programs***- Directed 100% growth in program budgets to nearly \$10M annually. Responsible for strategic direction, leadership, and results for Efficiency Vermont's award-winning residential retrofit, new construction, retail, and low income programs. Supported excellence in a staff of 30 (2005-2010).
- ***Vermont Gas Systems Efficiency Program Leader***- Directed strategic planning and program operations that led to six programs and portfolio as a whole being recognized as exemplary in Responding to the Natural Gas Crisis: America's Best Natural Gas Energy Efficiency Programs (ACEEE, 2003). Built contractor infrastructure and internal support to consistently meet program objectives. Led development of Annual Reports, planning and budgeting. Collaborated with Efficiency Vermont staff to develop a fuel-blind, state-wide, jointly offered residential new construction program (2001-2005)



JAMES GREVATT, MANAGING CONSULTANT

- ***Residential Retrofit Program Development-*** Enhanced design and performance of VGS' residential retrofit offerings by streamlining delivery and building strong relationships with contractors, homeowners, and property managers (1994-2005)
- ***Demonstrated Technical Excellence in Approaches to Residential Retrofits*** Conducted hundreds of residential energy audits and quality assurance inspections for natural gas and alternative-fueled homes. Trained and coached installers to obtain desired quality. Worked to satisfy homeowners through explanation, education, sound listening to concerns, and ultimately assuring that concerns were addressed. Trained new staff in auditing techniques. (1991-1998)

SELECTED PRESENTATIONS

Keys to the House: Unlocking Residential Savings with Program Models for Home Energy Upgrades-ACEEE 2016 Summer Study on Energy Efficiency in Buildings, August, 2016

Home Upgrade Program Design & Implementation Models for Acquiring Savings in Multiple Climate Zones- 2016 National Home Performance Conference, April, 2016

EERS Advancements in Maryland: EmPOWER After 2015- Presentation at ACEEE Energy Efficiency as a Resource Conference, September, 2015

Leveling the Playing Field for Distributed Energy Resources- Panelist discussing the use of energy efficiency to defer T&D investments, Acadia Center forum on Envisioning Our Energy Future, February, 2015

Residential Retrofit Programs: What's Working? Perspectives from National Program Leaders- Panelist at AESP National Conference 2012

Elements of Retrofit Program Incentive Design- DOE Technical Assistance Program Publication, April, 2011

Designing Effective Incentives to Drive Residential Retrofit Participation- DOE Technical Assistance Program Webinar, October, 2010

Quality Assurance for Residential Retrofit Programs- DOE Technical Assistance Program Webinar, October, 2010

Home Performance with ENERGY STAR, Quality Assurance in Vermont- Panelist at the ACI Home Energy Retrofit Summit, April 2010

Delivering on the Promise-Engaging Communities and the Public- Panelist at 2010 NEEP Summit, March, 2010

Home Performance with Energy Star in Vermont - Presentation at CEE Member meeting, June 2009

Leading by Example: Exemplary Low Income Energy Efficiency Programs –Presented on Efficiency Vermont's Residential low income services at California's Low Income Energy Efficiency Symposium, June 2006

"Natural Gas Efficiency Policies, Responding to the Natural Gas Crisis One Therm at a Time" - Co-presented with Dan York and Anna Monis Shipley of American Council for an Energy-Efficient Economy (ACEEE) -ACEEE/CEE Market Transformation Symposium, 2004