BRITISH COLUMBIA UTILITIES COMMISSION

Project No.3698896, FortisBC Inc. 2016 Long Term Electric Resource Plan (LTERP) and Long Term Demand Side Management Plan (LT DSM Plan)

British Columbia Sustainable Energy Association and Sierra Club British Columbia

Response to
Commercial Energy Consumers Association of British Columbia (CEC) [Exhibit C4-5] on BCSEA-SCBC Evidence [Exhibit C5-5]

June 29, 2017

1.0 Reference: Exhibit C5-5, page 4

> Fortis does not provide evidence to substantiate its claim that high DSM savings targets are too risky. Actually, many jurisdictions in North America routinely achieve high savings goals through DSM programs, and are often required by regulators to do so. These savings goals are often considerably larger than those contemplated by Fortis. In its response to Staff IR, Fortis provides estimates of savings as a percent of total load for 2018-2022 from the 2016 LT DM Plan. These estimates range from 0.5% in the low scenario to 0.8% in the max scenario.[2] Even accounting for any mitigating factors in the comparisons, these are substantially lower savings than have been achieved in other jurisdictions in North America. For example, according to the 2016 ACEEE State Scorecard, three U.S. states achieved net savings greater than 2.0% of sales in 2015, and an additional thirteen states achieved savings between 1.0% and 2.0% of sales. In all, nineteen states achieved greater than the 0.8% savings that Fortis contemplates in its Max scenario, and many of these states have been achieving high levels of savings year after year.[3]

1.1 Please provide any targets that have been established by regulators in the other jurisdictions that routinely achieve high savings goals through DSM programs and are required by regulators to do so, if any.

RESPONSE:

This information is provided in Table 18 on pages 41-42 of the ACEEE 2016 Scorecard, reproduced here for convenience.

Table 18. State scores for energy efficiency resource standards

State	Approx. annual electric savings target (2014–2020)	Cost cap	Natural gas	Score (3 pts.)
Massachusetts	2.9%		•	3
Rhode Island	2.6%		•	3
Arizona	2.5%		•	3
Maine	2.4%		•	3
Vermont	2.1%		•	3
Maryland	2.0%			2.5

State	Approx. annual electric savings target (2014–2020)	Cost cap	Natural gas	Score (3 pts.)
Connecticut	1.5%		•	2
Minnesota	1.5%		•	2
Washington	1.5%			1.5
Hawaii	1.4%			1.5
Colorado	1.3%		•	1.5
Oregon	1.3%		•	1.5
California	1.2%		•	1.5
Iowa	1.2%		•	1.5
Michigan	1.0%	•	•	1.5
New Hampshire	1.0%		•	1.5
Arkansas	0.9%		•	1
Wisconsin	0.8%	•	•	1
New York[1]	0.7%		•	1
Illinois[2]	0.7%	•	•	1
Pennsylvania	0.8%	•		0.5
New Mexico	0.6%			0.5
Ohio	0.6%			0.5
Nevada	0.4%			0
North Carolina	0.4%			0
Texas	0.1%	•		0

States with voluntary targets are not listed in this table. Targets in states with cost caps reflect the most recent approved savings levels under budget constraints. See Appendix D for details and sources. [1] Reflects targets proposed by utilities under current REV proceeding.[2] Annual savings target as approved under rate cap. Utilities have additional energy efficiency requirements based on an energy efficiency procurement plan through the Illinois Power Agency.

1.2 Please identify the 19 jurisdictions referenced that achieved greater than the 0.8% savings.

RESPONSE:

This information is provided in Table 9 of the ACEEE 2016 Scorecard on page 28, reproduced here for convenience.

Table 9. 2015 net incremental electricity savings by state

State	2015 net incremental savings (MWh)	% of 2015 retail sales	Score (7 pts.)
Rhode Island	222,822	2.91%	7
Massachusetts	1,472,536	2.74%	7
Vermont	110,642	2.01%	7
California†	5,040,603	1.95%	6.5
Maine†	183,347	1.53%	5
Hawaii[1]	144,240	1.52%	5
Connecticut	435,740	1.48%	5
Washington	1,275,447	1.42%	4.5
Arizona†	918,582	1.19%	4
Michigan	1,177,277	1.16%	3.5
Minnesota†	750,672	1.15%	3.5
Illinois	1,553,917	1.13%	3.5
Oregon†	507,502	1.09%	3.5
New York	1,559,665	1.05%	3.5
Maryland	621,090	1.01%	3
Iowa	469,483	1.00%	3
Ohio*†	1,353,109	0.92%	3
Colorado	486,215	0.90%	3
Utah	254,153	0.85%	2.5
Wisconsin	538,678	0.79%	2.5
Indiana[2]	768,927	0.76%	2.5
Nevada†	257,034	0.72%	2
Idaho[3]	159,310	0.69%	2
Montana[4]	92,923	0.66%	2
Pennsylvania*	904,238	0.64%	2
North Carolina	827,508	0.62%	2
Missouri†	494,013	0.61%	2
District of Columbia	69,247	0.61%	2
Arkansas	282,000	0.61%	2
New Hampshire†	64,869	0.59%	1.5
New Mexico	128,834	0.56%	1.5
New Jersey†	409,957	0.55%	1.5
South Carolina[5]	435,399	0.54%	1.5
Nebraska*	156,473	0.53%	1.5
Kentucky	266,522	0.36%	1
Oklahoma	190,497	0.32%	1
Mississippi	144,401	0.29%	0.5
South Dakota	28,686	0.24%	0.5
Georgia†	315,625	0.23%	0.5
Tennessee†	185,355	0.19%	0.5
West Virginia	61,349	0.19%	0.5
Delaware†	21,624	0.19%	0.5
Texas†	698,688	0.18%	0.5
Florida*†	262,085	0.11%	0
Wyoming*†	15,515	0.09%	0
Alabama*†	78,067	0.09%	0
Louisiana	66,695	0.08%	0
Virginia*†	71,182	0.06%	0
North Dakota†	1,663	0.01%	0
Alaska*†	409	0.01%	0
Kansas*†	774	0.00%	0
Guam	–	0.00%	0
Puerto Rico	–	–	0
Virgin Islands	–	0.00%	0
US total	**26,535,588**	**0.71%**	
Median	**255,593**	**0.61%**	

Savings data are from public service commission staff as listed in Appendix A unless noted otherwise. Sales data are from EIA Form 826 (2016c). * For these states, we did not have 2015 savings data, so we scored them on 2014 savings as reported in EIA Form 861 (2016b), unless otherwise noted. [1] 2014 savings as reported in Hawaii data request. [2] 2014 savings as reported in Indiana data request. [3] 2014 savings as reported in Idaho data request. [4] 2014 savings as reported in Montana data request. [5] 2014 savings as reported in South Carolina data request. † At least a portion of savings reported as gross. We adjusted the gross portion by a net-to-gross factor of 0.817 to make it comparable with net savings figures reported by other states.

1.3 Please identify the jurisdictions that are winter peaking and those that are summer peaking.

RESPONSE:

This information is not provided by ACEEE in the 2016 Scorecard, and carrying out the research necessary to respond to this question would be beyond the resources available to Mr. Grevatt for this project.

1.4 For each of the 19 jurisdictions please provide the mix of energy options utilized and explain why they may be applicable to the FortisBC jurisdiction.

RESPONSE:

It is not clear whether "mix of energy options utilized" refers to DSM options or to supply-side options. In any event, this information is not provided by ACEEE in the 2016 Scorecard, and carrying out the research necessary to respond to this specific question would be beyond the resources available to Mr. Grevatt for this project.

However, regarding the mix of DSM program options that leading utilities are using to achieve high levels of savings, ACEEE recently conducted an analysis of high performing utility programs entitled *Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings*. It is available at http://aceee.org/research-report/u1601. While not directly correlated to the 2016 Scorecard, the report provides useful insights into the types of programs that high-saving electric utilities are using to achieve their success.

ACEEE also just released a report entitled *2017 Utility Energy Efficiency Scorecard* which

> **"…ranks the 51 largest US electric utilities on utility-sector energy efficiency programs and policies in 2015. We developed metrics reflecting how utilities are performing in a range of utility-sector energy efficiency areas. The report covers 18 metrics and allocates 50 total possible points across three categories:**
>
> **1. Energy efficiency program performance: 25 points**
>
> **2. Program diversity and emerging areas: 15 points**
>
> **3. Energy efficiency–related regulatory issues: 10 points"[1]**

This report also provides insights into industry-leading approaches to DSM programs.

Lastly, Mr. Grevatt calls attention to *The Next Quantum Leap in Efficiency: 30 Percent Electric Savings in Ten Years*, published by the Regulatory Assistance Project and cited in BCSEA's response to BCUC IR 1.2.

1.5 If the BCUC were to identify a preferred minimum target for Fortis, what preferred

[1] Relf, Grace, et al. *2017 Utility Energy Efficiency Scorecard,* ACEEE Report U1707, June 2017. P. v1. http://aceee.org/sites/default/files/publications/researchreports/u1707.pdf.

minimum would Mr. Grevatt consider as being appropriate at this time and over the next five years. Please explain.

RESPONSE:

In Mr. Grevatt's view, it is Fortis' responsibility to undertake the necessary analysis to propose appropriate energy savings targets. Of the scenarios that were considered in Fortis' LT DSM Plan, Fortis did not, in Mr. Grevatt's view, provide sufficient evidence to defend less than the Max scenario. However Mr. Grevatt is concerned that Fortis' scenario development may have been artificially limited by its arbitrary concerns about the reliability of DSM savings. It would be appropriate for Fortis to reconsider its scenarios without this arbitrary limitation. Further, Fortis should re-assess the magnitude of available and preferred DSM scenarios using marginal rather than average line losses to appropriately value the capacity savings associated with DSM.

1.6 What is the correlation, if any, between the states that achieved high savings and the energy (electricity, natural gas) prices in those states? Please explain and provide quantification of the prices and the DSM savings.

RESPONSE:

ACEEE states that "We also do not adjust savings for variations in avoided costs of energy across states, as <u>there are examples of achieving deep energy savings in both high- and low-cost states (emphasis added)</u>."[2] Neither energy prices nor avoided costs are provided in the ACEEE 2016 Scorecard and conducting the research needed to answer this question would be beyond the resources available to Mr. Grevatt for this project..

2.0 Reference: Exhibit C5-5, page 6

The Northeast Energy Efficiency Partnerships (NEEP) facilitated a collaborative process that included manufacturers, efficiency program sponsors, and consultants to develop its "Cold Climate Air-Source Heat Pump Specification." For equipment to qualify to be listed as meeting the specification it must, among other things, have a COP @ 5° F (-15° C) >1.75 (at maximum capacity operation).[8] Much of the equipment included in this specification is designed to perform in heat pump mode without electric resistance backup at temperatures as low as -25° C. The equipment that meets this specification will perform much differently, and much more efficiently, than the equipment that was tested in the 2010 study cited by Fortis as evidence that heat pumps are not reliable in terms of system planning.

2.1 Have electrical utilities in the United States created DSM incentives for customers installing heat pumps that meet the "Cold Climate Air-Source Heat Pump Specification?" Please explain and elaborate on the types of incentives that are utilized.

RESPONSE:

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[2] Scorecard, p.21.

Please see NEEP's 2017 Air-Source Heat Pump Incentive Summary,[3] attached here as Attachment CEC 2.1. Currently only Massachusetts references this relatively recent specification in its rebate requirements, though NYSERDA is developing a program that incorporates the specification for rollout later this year.[4]

2.2 Have DSM programs been successfully implemented that incent the installation of only those equipment models that meet a certain specification? Please explain.

RESPONSE:

Yes. For example, all of the programs listed in Attachment CEC 2.1 incent the installation of only those equipment models that meet the specifications described in the Attachment. The examples of other programs that only incent equipment that meets a certain specification, such as HVAC equipment, appliances, lighting products, commercial refrigeration and cooking equipment, etc. are far too numerous to list here. The Consortium for Energy Efficiency (www.CEE1.org) has worked with program administrators across North America for well over a decade to develop tiered model equipment specifications exactly for this purpose.

Requiring that certain equipment criteria be met in order to receive incentives is a primary mechanism that efficiency programs across North America use to drive the adoption of more efficient equipment. Equipment performance criteria are critical in assuring that equipment for which incentives are provided does in fact achieve the desired level of energy savings. In some cases programs develop criteria on their own, and in other cases broad industry participation results in a model specification that may be adopted by numerous program administrators. The latter was the case with the NEEP Cold-Climate ASHP specification.

2.3 Please compare electrical heating efficiency in the 2010 study cited by Fortis with currently available equipment at ambient temperatures of 0, -15 and -25 degrees Celsius.

RESPONSE:

Data for the specific temperature points referenced in the IR are not available in the link provided by Fortis regarding the COP of heat pumps, which is to a document published by the Washington State University Extension Energy Program. The linked document includes a graph showing COP of a "generic heat pump" at a range of temperatures, the lowest of which is 10 degrees F (-12 C):[5]

[3] http://www.neep.org/sites/default/files/resources/2017 ASHP Snapshot.6.7.17.pdf

[4] Personal communication with David Lis, NEEP's Director of Technology & Market Solutions, June 22, 2017.

[5] Figure 1 on p.1, http://www.energy.wsu.edu/documents/AHT_Electric%20Heat%20Lock%20Out%20on%20Heat%20Pumps%20%282%29.pdf.

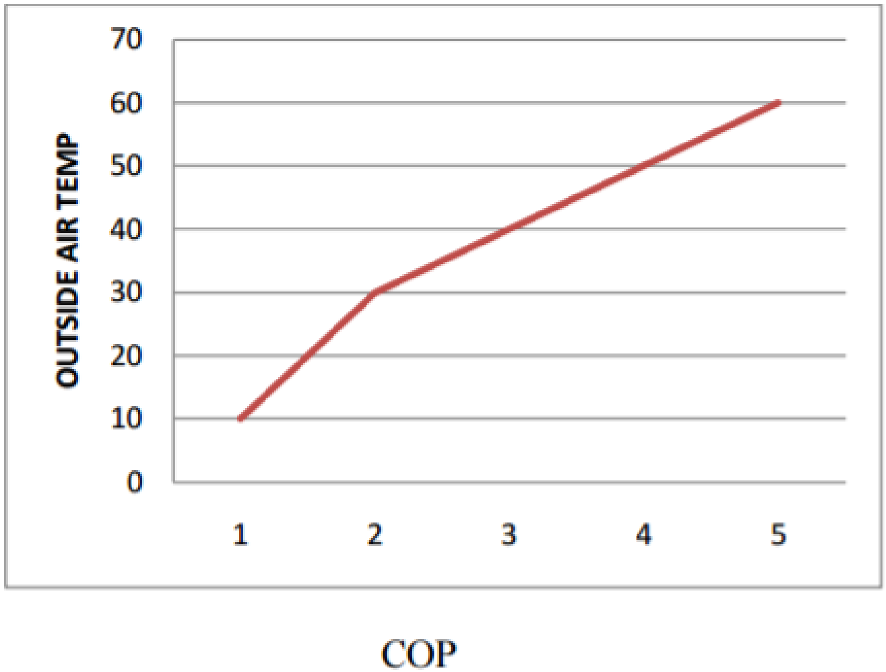


Figure 1: Generic Heat Pump Capacity Versus Outside Air Temperature

This suggests a heat pump COP of approximately 1.0 at 10 degrees F, and assumes that supplemental heating, presumably using electric resistance, is required when temperatures fall below 10 degrees F.

In contrast, the 2014 *Ductless Heat Pump Meta Study* published by Northeast Energy Efficiency Partnerships surveyed a variety of research studies that looked at heat pump efficiencies and found results that were considerably different:[6]

Table 2. COP at Various Outdoor Temperatures

Outdoor Temperature	COP
≥40°F	≥ 3.5
10°F to 20°F	≈ 2.5 to 3.5
-10°F to -20°F	≈ 1.4
Average Seasonal	2.4 – 3.0

The more recent NEEP meta study, focused in particular on cold-climate heat pumps, and based

[6] Table 2 on p.8. file:///C:/Users/jgrevatt/Downloads/NEEP-Ductless-Heat-Pump-Meta-Study-Report_11-13-14.pdf

on a number of studies, found that heating efficiencies were 2.5 to 3.5 times better than in the study referenced by Fortis.

2.4 Please comment on the cost-effectiveness of currently available electrical heating efficiency versus gas heating, and provide quantification where possible.

RESPONSE:

As outlined in the National Standard Practice Manual, cost-effectiveness is best evaluated using avoided costs that reflect jurisdictional energy costs and policy objectives:

> **"A jurisdiction's primary cost-effectiveness test should account for its energy and other applicable policy goals and objectives. These goals and objectives may be articulated in legislation, commission orders, regulations, advisory board decisions, guidelines, etc., and are often dynamic and evolving."** [7]

Accordingly, cost-effectiveness of electrical heating efficiency compared with gas heating will vary, potentially considerably, from one jurisdiction to another. In British Columbia, greenhouse gas emission reduction objectives would presumably have to be factored into such analysis. In other words, simply comparing the retail cost of heating with electricity compared with the retail cost of heating with gas would be an insufficient analysis because it would not factor in the costs that fossil fuel consumption levies on B.C.'s ability to achieve its climate action goals. Neither would it appropriately value the benefits that efficient electric heating using clean energy resources would provide in achieving those same goals.

Fortis has indicated that the next phase of the CPR will include a more complete analysis of a variety of fuel switching measures that should provide a basis for a more complete discussion of this question.

3.0 Reference: Exhibit C5-5, page 12

Line loss values used in cost effectiveness analyses should reflect the full value of the benefits that DSM provides. Fortis recognizes and reports on the capacity benefits that derive from energy efficiency measures. Line losses are greater at times of greater load, and logically the line loss reductions associated with energy efficiency that occurs during times of peak demand also occur at times of greater load. The Regulatory Assistance Project[30] (RAP) states:

> "First, energy efficiency measures typically provide significant savings at the time of the system peak demand, and that time occurs when the line losses are highest. The avoided line losses can add as much as 20% to the capacity value measured at the customer meter.
>
> Second, because they are reducing loads, including marginal line losses,

[7] *The National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*, prepared by the National Efficiency Screening Project, May, 2017. P. viii. https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf

energy efficiency measures also reduce the level of required generating reserves.

Each of these benefits increases the economic savings provided by energy efficiency investments. The compounding of a 20% marginal line loss savings and a 15% reserves savings can produce a 44% total generating capacity benefit, over and above the peak load reduction measured at the customer's meter."[31]

Energy efficiency provides significant peak demand benefits whose value should be reflected in cost effectiveness screening. Therefore, the line loss values used in cost effectiveness screening should reflect marginal, rather than average values.

3.1 Has a firm correlation been established that all or specific energy efficiency measures provide significant savings at the time of system peak demand as they relate to line losses? Please explain.

RESPONSE:

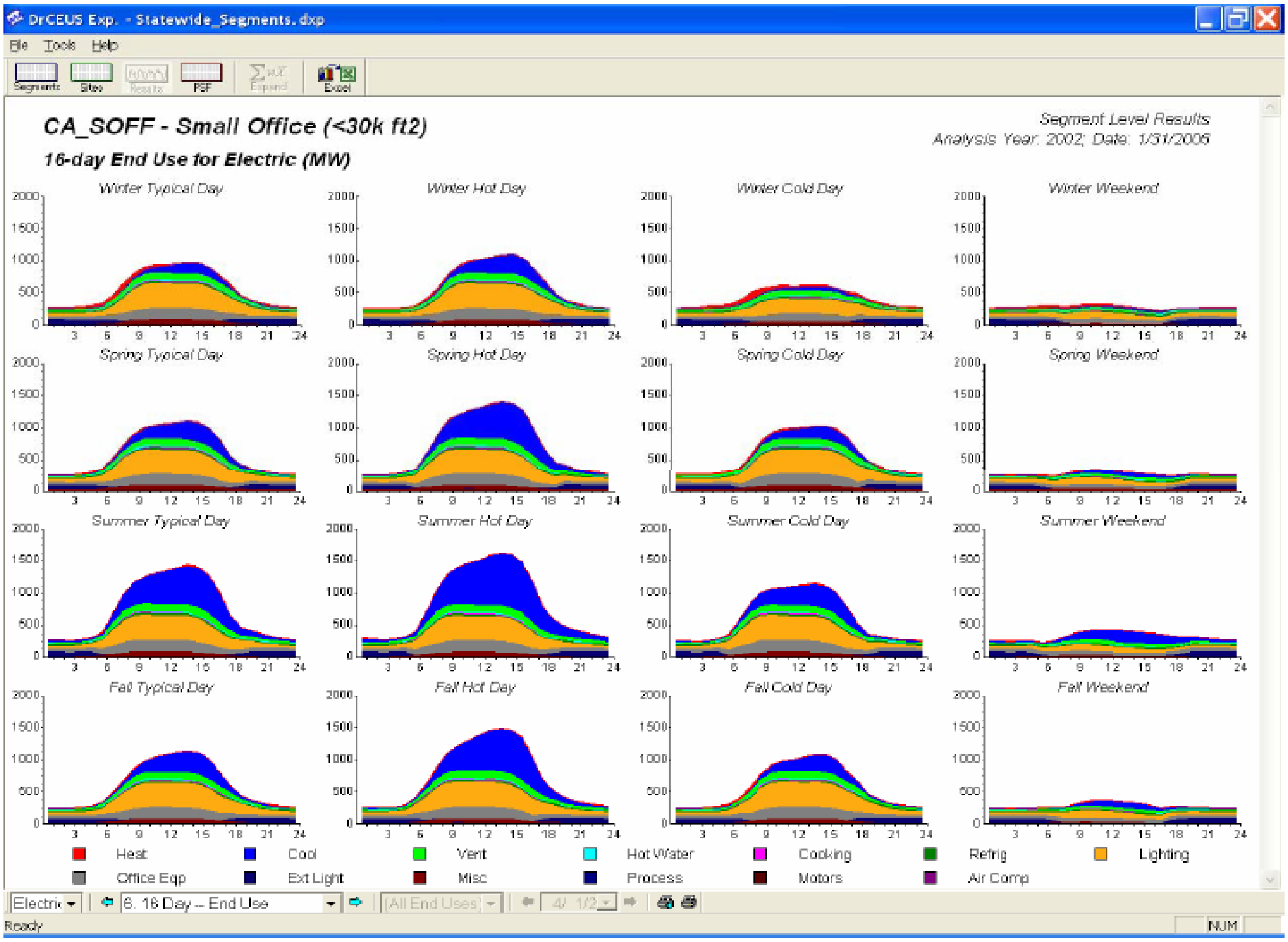
Yes. Extensive metering and analysis of specific energy end uses has led to the development of load shapes, also known as load profiles, that correlate the energy use of specific end uses with the time periods in which it is used. The load shapes for specific end uses are also used to quantify the energy savings attributable to efficiency in each time period.

An illustration of this concept can be seen in California's Commercial End-Use Survey (CEUS).[8] CEUS developed end use load shapes for a variety of customer types for California's large Investor-Owned Utilities, and then mapped them to create load profiles for 16 different prototypical weather days for each of a number of significant customer types. An example is shown in Figure 8-6[9] from the CEUS report:

[8] California Commercial End-Use Survey, Prepared For: California Energy Commission, Itron, March 2006. http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF

[9] Id. P. 171.

Figure 8-6: Small Office 16-Day Hourly End-Use Shapes



The load shapes vary by end use, and climate region. Another example can be found in BCSEA's response to BCOAPO IR 6.2. BCSEA included Figure 5 from RAP's report showing the difference in peak savings between a lighting end use and an air conditioning end use, along with resultant differences in line loss savings and overall savings at the generator.

3.1.1 If so, can the marginal line loss at peak times be applied to DSM cost effectiveness calculations in its entirety? Please explain.

RESPONSE:

Please see BCSEA response to BCOAPO IR 6.1.

3.1.2 If not, what proportion could reasonably be applied? Please explain and provide quantification of any values.

RESPONSE:

Please see BCSEA response to BCOAPO IR 6.1.

3.2 Does the RAP study suggest that FBC's methodology of using average line loss is inadequate when calculating energy and capacity requirements? Please explain.

RESPONSE:

The RAP study suggests that by using average line loss values FBC undervalues the benefits that DSM provides in meeting those requirements.

3.2.1 Could inclusion of data relating to line losses at times of system peak demand affect FBC's Load Resource Balance? Please explain and provide quantification to the extent possible.

RESPONSE:

Yes. As an illustration, the RAP study states that "…a conservation measure that saved 1 kilowatt at the time of the system peak measured at the customer's meter would save about 1.25 kilowatts measured at the generation level. The critical peak-period marginal line-loss savings of energy efficiency therefore adds another 25% to the value of the load reduction itself, in determining the amount of generating capacity required to meet critical peak period demand." [10]

3.2.2 How would Mr. Grevatt expect the employment of this information to impact FBC's expected requirements for generation or capacity related infrastructure? Please explain.

RESPONSE:

While it is beyond Mr. Grevatt's resources for this project to conduct such an analysis, a simple illustration can be provided by looking at Figure 8-5[11] **from FBC's LTERP, reproduced below for convenience. Figure 8-5 shows that roughly 10% of FBC's December, 2035 peak capacity requirement of nearly 900 MW before DSM will be provided by DSM. The RAP report suggests that the peak capacity benefit might more accurately be 10% + 25% marginal line loss adder = 12.5%, though of course this assumes that the generic 25% marginal line loss adder is in fact appropriate for Fortis, while in reality it could be more or less than this value. However, this simple analysis does not consider what the benefits of doing more DSM might be given the assumption that more DSM would be cost-effective if a more accurate reflection of its value was reflected in cost-effectiveness testing. Also, were FBC able to geographically target DSM savings that provide capacity savings with full attribution of its value, the potential beneficial effects could be significantly greater.**

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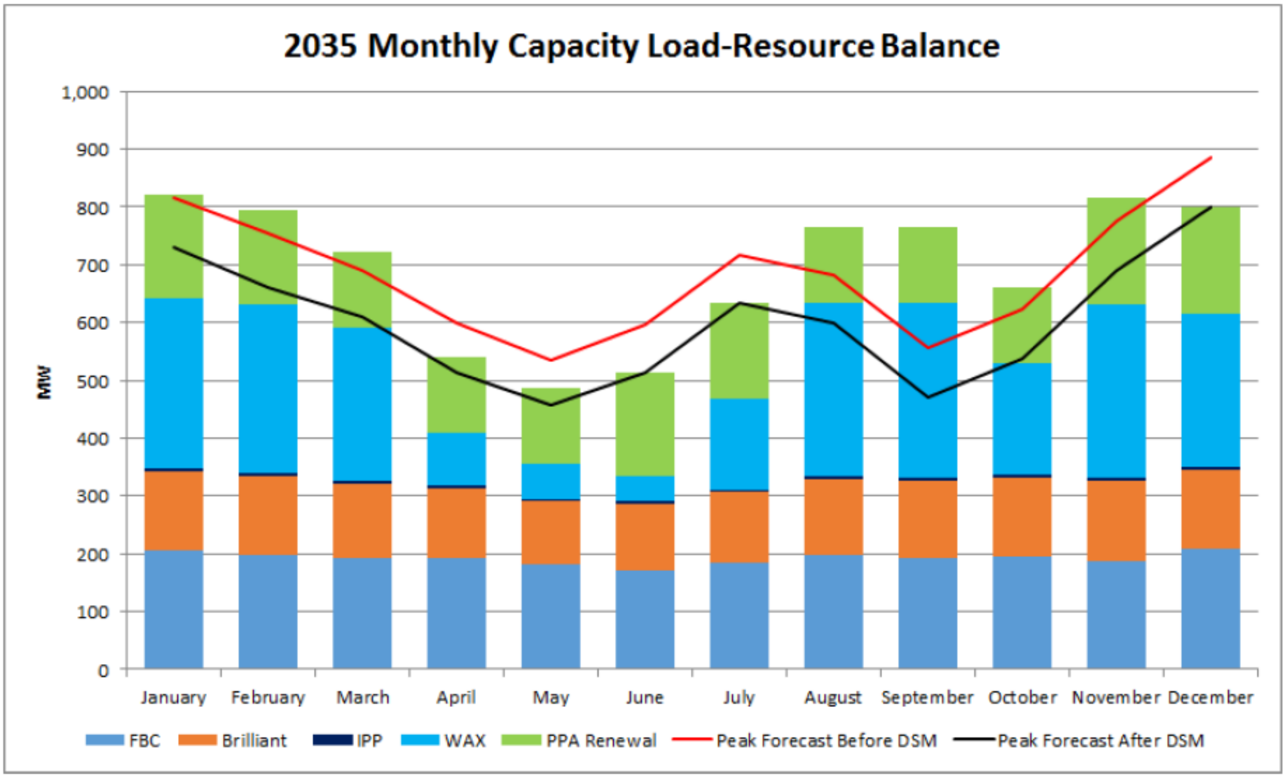
[10] RAP, p. 5.

[11] Exhibit B-1, LTERP at p.103

Figure 8-5: Monthly Capacity Load-Resource Balance for 2035, Before and After DSM



3.3 If Fortis were to measure resistance and calculate actual line losses at the time of system peak demand how would Mr. Grevatt recommend that the information be incorporated into the capacity requirement forecasts?

RESPONSE:

Fortis should use the best information available to determine the optimal approach to meeting its customers' energy and capacity needs while simultaneously working towards attaining B.C.'s climate action goals. To the extent that DSM can provide a cost-effective means of mitigating new capacity needs it should be used. This would mean accurately including the benefits of DSM in meeting capacity needs, including assessing the ability to use DSM to defer locationally-specific T&D infrastructure development rather than declining to do so based on an arbitrary determination that it is not reliable.

3.3.1 What impact would Mr. Grevatt expect to see? Please explain and provide quantification to the extent possible.

RESPONSE:

Given the high costs of providing capacity at times of peak demand, Mr. Grevatt would expect the inclusion of marginal rather than average line losses in calculations to result in greater

volumes of cost-effective DSM being available. This could result in reduced needs to purchase capacity, to develop T&D systems that would be required to deliver it, and ultimately could defer future generation needs, especially if DSM is targeted locationally to constrained areas that are driving increased capacity needs.

3.4 Would the fact that FBC's system is winter peaking (colder wires) have an effect on marginal line losses? Please explain and provide quantification where possible.

RESPONSE:

The specific conditions that determine line losses for FBC would affect both average and marginal losses, and should be determined by FBC's engineers, who would be in the best position to make such determinations.

Attachment CEC 2.1

2017 Air-Source Heat Pump Incentive Summary

Below is an Incentive Summary of Heat Pump Promotional Activities (Separate lists for Ductless and Ducted ASHP programs) that are in place throughout the region.

(Updated June 2017)

Incentive and Requirement Summary for Ductless Heat Pumps

State	Rebate Incentive	ENERGY STAR certification	HSPF	SEER	EER	Other Requirements
Connecticut[1]	$300/Home (Single-Zone)	X	10	20	12.5	Midstream Program.
	$500/home (Multi-Zone)	X	9	18	12.5	
Massachusetts	$100	X	≥ 10	≥ 18		
	$300	X	≥ 12	≥ 20		
Massachusetts Clean Energy Center[2]	$625 (Single- Zone)	X	≥ 10	≥ 20	≥ 12.5	NEEP ccASHP Spec, 100% of rated heating capacity delivered at 5°F
	$625/ton (Multi-Zone)	X	≥ 10	≥ 17	≥ 12.5	
Rhode Island	$250	X	≥ 9	≥ 18		
	$500	X	≥ 11	≥ 20		
Vermont	$600 (Single-Zone)		≥ 10.0	≥ 20	≥ 12.0	COP @5°F ≥ 1.75; operation at -5° Midstream Program. Updated list here.
	$800 (Multi-Zone)		≥ 10.0	≥ 17	≥ 12.0	
New Hampshire[3]	$250/ton of cooling	X	≥ 8.5	≥ 15	≥ 12.5	
	$500/ton of cooling	X	≥ 10	≥ 18	≥ 12.5	
Maine	$500 (Single-Zone)		≥12			
	$750 (Multi-Zone)		≥10			
New Jersey	$500	X	≥10	≥ 20	≥12.5	
Pennsylvania (PP&L)	$100/ton	X	≥ 8.6	≥ 16	12.5	
	$150/ton		≥ 9.5	≥ 17	12.5	
	$200/ton		10.5	19	12.5	
Energy Save PA	$100		≥ 8.5	≥ 15		
Washington D.C.[4]	$300		≥ 9	≥ 18	≥ 12.5	
	$500		≥ 10	≥ 20	≥ 13	

[1] A $1,000 rebate is available for homes with existing electric resistance heating WITH a Home Energy Assessment prior to installation

[2] Income eligible adders of $175/system or ton and $675/system or ton. Maximums apply for number of outdoor units eligible for rebates and total rebate dollar amount by project site.

[3] $250/ton Incentive available from New Hampshire Electric Coop for Heat Pump Systems offsetting 80% of total heating load. Must submit two (2) years heating fuel usage, type and efficiency of existing equipment

[4] Updated rebate amounts "coming soon"

Incentive and Requirement Summary for Ducted Heat Pumps

State	Rebate Incentive	ENERGY STAR certification [3]	HSPF	SEER	EER	Other Requirements
Connecticut	$500	X	≥ 10	≥ 16	≥ 12.5	
Massachusetts	$250	X	≥ 8.5	≥ 16		
	$500	X	≥ 9.6	≥ 18		
Massachusetts Clean Energy Center[5]	$625/ton	X	≥ 10	≥ 17	≥ 12.5	NEEP ccASHP Spec, 100% of rated heating Capacity Delivered at 5°F
Rhode Island	$250	X	≥ 8.5	≥ 16		
	$500	X	≥ 9.6	≥ 18		
New Hampshire	$70/ton	X		≥ 15	≥12.5	
Maine	$500	X	≥10			
New Jersey	$300		≥10	≥ 16	≥13	For units purchased through June 30, 2017.
	$500		≥10	≥ 18	≥13	
PSEG- Long Island	$350		≥8.5	≥15		
	$450		≥8.5	≥16		
Pennsylvania (PP&L)	$200		≥8.5	≥ 16	≥12.5	
Energy Save PA	$250		≥8.5	≥ 14.5		
	$325		≥8.5	≥ 15		
	$400		≥8.5	≥ 16		
Washington D.C.[6]	$350		≥ 9	≥ 16	≥ 13	
	$750		≥ 9.5	≥ 18	≥ 13	

Other Heat Pump Program Information:

Specification	Applies to	HSPF	SEER	EER	Other Requirements
ENERGY STAR V5.0	Ducted/Ductless	≥ 8.5	≥ 15	≥ 12.5	
ENERGY STAR 2016 Most Efficient Criteria	Ducted	≥ 9.6	≥ 18	≥ 12.5	Unit setup information, fault history display, and resident alerts
ENERGY STAR 2016 Most Efficient Criteria	Ductless	≥ 10	≥ 20	≥ 12.5	Meet system status and messaging requirements
CEE Tier 0	Ducted/Ductless	≥ 8.5	≥ 14.5	≥ 12	
CEE Tier 1	Ducted/Ductless	≥ 8.5	≥ 15	≥ 12.5	
CEE Tier 2	Ducted/Ductless	≥ 9	≥ 16	≥ 13	
CEE Tier 3	Ducted/Ductless	≥ 10	≥ 18	≥ 13	
NEEP ccASHP	Ductless (Single-zone)	≥ 10			ENERGY STAR, COP @ 5° ≥ 1.75
NEEP ccASHP	Ductless (Multi-zone)	≥ 9			
NEEP ccASHP	Ducted	≥ 10			

[5] Income eligible adders of $175/system or ton and $675/system or ton. Maximums apply for number of outdoor units eligible for rebates and total rebate dollar amount by project site.

[6] Updated rebate amounts "coming soon"