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April 6, 2017

Andy Shadrack
Box 484
Kaslo, BC V0G 1M0

Attention: Mr. Andy Shadrack

Dear Mr. Shadrack:

Re: FortisBC Inc. (FBC)

Project No. 3698896

2016 Long Term Electric Resource Plan (LTERP) and Long Term Demand Side Management Plan (LT DSM Plan)

Response to Mr. Andy Shadrack (Shadrack) Information Request (IR) No. 1

On November 30, 2016, FBC filed the Application referenced above. In accordance with the British Columbia Utilities Commission Order G-197-16 setting out the Regulatory Timetable for the review of the Application, FBC respectfully submits the attached response to Shadrack IR No. 1.

If further information is required, please contact Joyce Martin at 250-368-0319.

Sincerely,

FORTISBC INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

1. FortisBC (FBC) stated in its application at 2.3.3 "Small Scale Distributed Generation" that:

"...the fixed charges in current rate structures do not adequately recover the cost of connection to the distribution system".

i. Please compare the average cost to FBC, by rate class if available, of connecting Net Metering (NM) customers with the average cost to FBC for connecting regular customers.

Response:

The majority of NM customers are already connected when they enroll in the net metering program. The physical requirements for interconnection are comparable to customers in general (although the ability of the utility to recover these common costs from the NM customer may be lessened as discussed in the response to BCUC IR 1.11.4).

There are, however, incremental costs associated with connecting a NM customer and with the ongoing administration of the program. FBC does not recover these costs from program participants and does not therefore separate them in a manner that can provide reporting. Costs prior to interconnection include any required site visit, review of the NM design and documentation by FBC staff, administering the Net Metering Application and Agreement and billing review to ensure eligibility. Post-connection, NM metering customers require manual billing and account reconciliation each billing period. Currently all of these costs are recovered from customers in general.

ii. Does the expression *"fixed charges in current rate structures"* refer, for residential services under 200 amps, to the $533 Schedule 82, Sheet 40 installation charge, or does it refer to something else? If it does refer to something else, please elaborate on what costs or charge FBC is referring to.

Response:

"*The fixed charges in current rate structures*" refers to the Customer Charge that is part of each rate schedule. The phrase, "…*cost of connection to the distribution system*", is not intended to refer to the discrete task of the initial connection to the FBC system. Rather, it is intended to mean the cost of being connected to the distribution system, including all of the fixed costs that are partially recovered through the Customer Charge.

iii. Are there any pro-rata or other connection or installation charges based on service size which are applied to residential services at 100 amps, 125 amps, 150 amps and 200 amps? If so, please list these charges and elaborate as to why these different charges are levied

Response:

The standard charges for the installation of a new or upgraded service are detailed in Schedule 82 of the FBC Electric Tariff. Standard overhead installation charges for residential service apply to service sizes of 200 amps or less.

There is an additional charge for either an underground service or a 400 amp service that reflects the additional cost of performing these connections.

iv. Are there any other charges, excluding line extension ones, related to connection of a new or upgraded residential service under or over 200 amps? If so, please list these charges and elaborate as to why they are levied.

Response:

Please refer to the response to Shadrack IR 1.1iii.

v. Please provide a table showing the average per annum kWh household residential consumption rates by 100 AMP, 125 AMP, 150 AMP and 200 AMP service.

Response:

FBC is unable to provide the requested data as it does not have service size data in its customer service systems for all customers.

2. In section 2.3.3, FBC mentions a "*perception that distributed generation is 'greener'* " amongst the reasons that small scale generation is gaining customer traction. Is photovoltaic generation, in FBC's opinion, actually "*greener"* overall? Please elaborate.

Response:

Based on customer interactions and public discourse, it appears that customers may believe that the decision to install a solar PV system will result in the displacement of energy sourced from environmentally unfriendly technologies and therefore carries a significant environmental benefit.

FBC has characterized resource options as either clean or renewable, or not, according to what the CEA defines as clean or renewable resources generated in BC, but has not ranked resources within that designation in terms of which one is “greener” than the other.

3. FBC stated in its application at 2.3.4 "Rate Design Considerations" that:

"...the growth in interest and participation in small scale customer - owned generation, such as the installations that qualify for the Company's Net Metering Program, may begin to pose rate stability challenges for all customers. While the current participation rates and installed capacity are not a cause for concern, FBC recognizes that a proliferation of grid -connected customers with greatly reduced, zero, or periodic load is problematic for the current regulatory model where the costs of providing all aspects of service are recovered primarily through volumetric rates. FBC, like many other utilities, is concerned that the result of the widespread installation of customer - owned generation will be the transfer of costs to customers who either cannot participate, or choose not to participate".

i. Can FBC project a level or degree of small scale generation at which the Company would expect rate structures to become unstable, and please describe how it would expect such instability to manifest itself?

Response:

FBC did not state that the "rate structures" themselves would no longer work and would become unstable, rather that there may be rate stability challenges. These challenges increase as the level of DG on the system rises, but FBC does not have a projection of the point where the issues described below would become unacceptable.

A tenet of rate design is that to the extent possible, the fixed costs of the utility, those that do not vary with the level of customer consumption, should be collected through a fixed charge, and similarly that variable costs are collected through a variable charge. There is seldom a full recovery of fixed costs through the fixed charges and most utilities collect at least some of the fixed cost in a variable energy rate. The issue of rate stability for customers is manifested in higher rates driven by an increasing disparity in the fixed cost/fixed charge relationship. While FBC is supportive of a customer's ability to offset his or her own consumption, it is a cause for concern that all customers, including those that do not have the ability or desire to own and operate generation, will ultimately see an impact through higher rates.

ii. FBC states that all aspects of service are "*recovered primarily through volumetric rates*". If this is correct, please explain in detail the existence and purpose of the Basic Charge.

Response:

The basic charge (or Customer Charge as it is described in some rate schedules) is applied to each customer bill to recover a portion of FBC's fixed costs. Fixed costs do not vary with how much or how little energy customers use and include costs such as reading meters and maintaining poles and wires. Currently, FBC's basic charge does not recover all of FBC's fixed costs, such that a portion of those fixed costs are instead being recovered through volumetric rates.

4. BC Hydro Net metering Evaluation Report No 3 states:

"Generally speaking, the economic value of customer self-generation to BC Hydro and non- participating customers is measured in terms of avoided costs because customers supply part or all of their own electricity. For example, customer self-generation may reduce forecast load that BC Hydro is expected to serve or it may appear as a supply resource, reducing the amount of electricity BC Hydro must generate or acquire. Customer generation may also allow BC Hydro to avoid or defer system costs, such as upgrades to enhance the reliability of the system in a particular area" (A-21/BC Hydro Netmetering Evaluation Report No 3, April 30th , 2013, Value of RS 1289: Avoided Cost and Load Resource Balance, p 15, line 11-18).

i. BC Hydro suggests that self-generation provides value to the utility and non-participating customers measured in avoided costs, and postulates that self-generation may reduce the amount of electricity the utility must generate or acquire, and may allow the utility to avoid or defer upgrade costs in particular areas. Does FBC share BC Hydro's views on customer self- generation? Please elaborate.

Response:

FBC believes the view expressed by BC Hydro with respect to the potential benefit of self-generation to be largely hypothetical and relevant to a high level of DG proliferation.

In the cited report, BC Hydro concludes the following (with FBC emphasis added):

> However, the impact of RS 1289 customer generation on the load forecast is inconsequential, given the size of BC Hydro's system and the very small amount of installed RS 1289 generation (1.1 MW). On the supply side, BC Hydro does not include surplus RS 1289 electricity in its LRB portfolio of existing or planned resources given the nature of RS 1289 and the associated small volume of energy.
>
> Under RS 1289, customers are not obligated to generate any electricity. In F2012, the total energy purchases from RS 1289 customers was about 0.5 GWh. To BC Hydro's knowledge, there are no material system costs that have been avoided or deferred due to RS 1289 generation. At this time, the installed capacity of RS 1289 generators and the volume of energy generated by those customers is simply too small to result in any appreciable avoided cost benefits to BC Hydro and other ratepayers, both in terms of the impact on BC Hydro's LRB and avoided system costs.

The situation with respect to small-scale DG on the FBC system and resource requirements is similar with the exception that FBC is severely limited in its ability to store energy for use in a

later season as compared to the BC Hydro system. Therefore, any benefits on the FBC system may be smaller than they would be on the BC Hydro system. Please also refer to the response to BCUC IR 1.36.3.1.

ii. Please list the documents and reference the sections where FBC has previously provided to the BC Utilities Commission cost-benefit analyses of the overall positive and negative financial and system stability attributes of Distributed Generation (DG) and Net Metering (NM) in particular.

Response:

FBC is not aware of any such submissions to the BCUC.

5 FBC expresses specific concern about NM customers "*with greatly reduced, zero, or periodic load" as "problematic for the current regulatory model where the costs of providing all aspects of service are recovered primarily through volumetric rates*".

i. What percentage of FBC's seasonal, occasional and conservation minded residential customers have a volumetric consumption level that would give rise to a similar concern as that of NM customers, or is FBC's focus just on NM customers?

Response:

FBC does not categorize its customers on the basis requested. However, it is only the net metering customers that, under the current rate structure, have the ability to reduce their contribution to fixed costs to zero, or negative, despite remaining connected to, and using the FBC system.

6. In accordance with 2 (l) of the Clean Energy Act FBC is encouraged to "*foster the development of first nation and rural communities through the use and development of clean or renewable resources*"?

   i. What percentage of FBC's customers are first nation and/or live in remote/rural locations where the cost of delivering electricity is considerably more expensive than to highly concentrated urban areas?

Response:

While FBC works closely with First Nations communities and governments, the Company does not ask First Nations customers to self-identify. As such, FBC cannot provide a percentage of customers that are First Nations. In addition, FBC cannot comment on the assertion regarding the relative cost of delivery to remote/rural locations versus highly concentrated urban areas because FBC does not examine costs in this way.

   ii. Please elaborate on how the concern about "*greatly reduced, zero, or periodic load*" fits in with the *Clean Energy Act's* overarching goal of energy self-sufficiency and promotion of economic development for First Nations and rural regions within the FBC service area

Response:

FBC notes that the *CEA* includes 16 energy objectives and does not agree with the assertion in the question that energy self-sufficiency and promotion of economic development for First Nations and rural communities are 'overarching' goals of the *CEA*.

To answer this question, some discussion of FBC's LTERP objectives is required. These objectives, as stated in Section 1.3 of the LTERP include the following:

- Ensure cost-effective, secure and reliable power for customers;
- Provide cost-effective demand side management; and
- Ensure consistency with provincial energy objectives (for example, the applicable *CEA* objectives).

These objectives can, in some cases, compete with each other. For example, the self-sufficiency objective of the *CEA*, if implemented by FBC in the short term, would require potentially more expensive generation to be acquired or built by FBC to replace lower cost

market purchases. This would reduce the cost effectiveness of FBC's resource portfolio, as discussed in Section 9.3.2 of the LTERP and in Figure 9-2.

FBC balances its LTERP objectives but places emphasis on the first objective of ensuring cost-effective, secure and reliable power for customers. Ensuring consistency with provincial energy objectives is still important to FBC but does not take priority over the first objective.

FBC's concern with greatly reduced, zero, or periodic load that potentially results in costs being shifted from one group of customers to another lies in the impact this could have on its primary objective of providing cost-effective, secure and reliable power for customers. This concern is not tied specifically to the *CEA* objectives. As discussed in Section 8.2.9 of the LTERP, if new supply-side resources are needed in the future, FBC would consider generation projects that promote First Nations and community development if they are competitive with the cost of alternative resources and meet FBC's LTERP objectives.

iii. Please provide cost comparisons of transmitting and service delivery of power to remote and rural service populations versus delivery of power to densely populated urban and city populations.

Response:

FBC believes that any analysis of the costs of serving customers should be done using sound cost causation principles in a Cost of Service Analysis (COSA). FBC does not conduct a COSA in consideration of regional differences and is therefore not able to provide the cost comparisons as requested. FBC supports the concept of postage stamp rates throughout its service territory, in accordance with prior direction from the Commission.

iv. Are there remote and rural portions of FBC's service delivery area where take up of FBC's NM program, using micro-hydro, wind or solar PV etc, would allow FBC to defer upgrades of transmission lines, etc?

Response:

No. Assuming a level of program uptake such that localized, aggregated Net Metering (NM) systems could have an impact on actual system peak loads and thereby influence FBC's load forecast, NM systems could in theory result in the deferral of future capital growth projects.

However, given the uncertainties associated with non-firm power produced by customer DG, it is not considered a practical alternative to the firm capacity and the more certain construction timelines associated with conventional infrastructure upgrades. The primary issues are that net generation produced by NM customers is often intermittent and is unlikely to peak concurrently with system peak load.

v. Has FBC considered a pilot program offering incentives to customers in remote and rural areas to install their own self-generation,such that the cost of electricity is offset, thus educing overall cost to FBC and non-participarting NM customers?

Response:

FBC has not considered such a pilot program. The question is focused only on costs, without considering the revenue that would be lost as a result of the load reduction. At the level of rates and cost for energy as they currently exist, and will exist for the foreseeable future, the loss of load as described would lead to an increase in rates to all customers.

7i. In accordance with s.2(k) of the *Clean Energy Act*, please provide examples of how FBC is encouraging "*economic development and the creation and retention of jobs*" within its electrical service area.

Response:

FBC encourages economic development and the creation and retention of jobs within its service territory through its operations, generation requirements, DSM programs and other initiatives. FBC currently directly employs about 500 FTE employees within its various offices and plants located in its service area. These employees operate the FBC system, provide transmission and distribution system planning, provide customer service and implement DSM and other initiatives such as the AMI project.

As discussed in Sections 8.2 and 9.3.6 of the LTERP, FBC has considered the contribution to economic development and the creation of jobs of future resource options by including full-time equivalents per year in the resource attributes (for example, see Table 9-2 of the LTERP).

As discussed in the response to Shadrack IR 1.6ii, FBC places emphasis on the objective of ensuring cost-effective, secure and reliable power for customers. Ensuring consistency with provincial energy objectives is still important to FBC but does not take priority over the first objective.

ii. How many Full Time Equivalent (FTE) employees were directly employed by West Kootenay Power/Utilicorp in the FBC electrical service area in 1997?

Response:

FBC does not have an FTE figure for 1997 but can confirm it employed 369 persons in 1997.

iii. How many FTE employees were directly employed in the electrical service area by FBC in 2007?

Response:

FBC employed 561 FTEs in 2007.

iv. How many FTE employees does FBC directly employ in the FBC electrical service area in 2017?

Response:

As of February 28, 2017, FBC directly employs 489 FTEs in its service area.

v. How many FTEs has FBC both directly and indirectly helped create and retain within the FBC service area through corporate economic activity, for each of the last five years?

Response:

The following table shows the FTEs FBC has directly employed within the FBC service area for the last five years. FBC does not have any data regarding indirect FTEs.

	2016	2015	2014	2013	2012
FBC FTE	487.29	507.08	503.29	477.68	551.30

8. BC.'s energy objectives as outlined in the Clean Energy Act included reducing, by 2016, B.C. greenhouse gas emissions by 18% (s.2 (g)(ii), and at s.2(i) "*encourage communities to reduce greenhouse gas emissions and use energy efficiently*".

i. Have FBC's existing Plan and Demand Side Management programs, by any calculation, succeeded in reducing, by 2016, greenhouse gas emissions by 18% in any area or category? Please elaborate.

Response:

B.C.'s energy objectives as outlined in the *CEA* are provincial objectives and, unless otherwise, stated, are not specific to individual utilities. In Table 1-3 of Section 1.4.2 of the LTERP, for the *CEA* objective relating to reducing B.C. GHG emissions (s. 2(g)), FBC notes that its GHG emissions represent only about 0.078 percent of total provincial GHG emissions. As discussed in Section 5 of the LTERP and the response to CEC IR 1.1.5, FBC's portfolio of generation resources are largely clean and renewable, comprised mostly of hydro generation. Therefore, FBC expects that its DSM programs have not significantly contributed to reducing B.C.'s overall GHG emissions by 18 percent by 2016.

ii. Have FBC's existing Plan and Demand Side Management programs, by any calculation, succeeded in encouraging "*communities to reduce greenhouse gas emissions and use energy efficiently*". Please elaborate.

Response:

FBC DSM activities include supporting initiatives such as community energy planning (see Section 4.4.2 of the LT DSM Plan). Under this category, and with measure funding from specific DSM programs, the Company has successfully initiated the following:

- Provided utility data for foundational CEEI[1] reports
- Rossland Energy Diet pilot (2011-12)
- Regional West Kootenay/Okanagan Energy Diets (2012-13)
- Strategic Community Energy Planning workshops in nine Boundary and Kootenay communities (2015-16), City of Kelowna (2017), Selkirk College (2015-16) and UBC Okanagan(2015-16)
- Support for energy policy development for City of Nelson (2016)
- Co-sponsor a Senior Energy Advisor for Central Kootenays (2016-17)
- Co-sponsor a Community Energy Ambassador for Okanagan Nation Alliance (2016-17)

Although FBC funding is focused on enabling electricity savings, by partnering with FEI for all of the above initiatives, FBC ensures the scope of community energy planning includes natural gas savings and hence reductions in greenhouse gas emissions.

iii. Have FBC's existing Plan and Demand Side Management programs, by any measure, succeeded in reducing consumption of electricity in any rate class?

Response:

Yes. Please refer to the response to Shadrack IR 1.8iv.

[1] Community Energy & Emissions Inventory (http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/community-energy-emissions-inventory).

iv. Can FBC's existing Plan and Demand Side Management programs be said to have demonstrably influenced lowering average per household consumption of residential electricity during the past five years? Please elaborate

Response:

Please refer to the response to BCUC IR 1.14.1 that indicates a UPC drop from 12.77 (2011A) to 11.80 (2016F) in average household usage (MWh per year).

In addition to DSM program effects, there are a number of other factors that likely contributed to the overall drop in average consumption:

- The RIB/RCR rate became effective July 2012;
- Incorporating the former Kelowna electrical utility customer base in 2012;
- General price elasticity effects, including fuel switching; and
- Natural stock turnover.

9. FBC stated in its application at 2.3.3 "Small Scale Distributed Generation" that:

"...Grid stability the distribution grid must be able to handle unpredictable distributed generation output without causing power quality problems for other customers"

i. Please explain in detail, using examples, what exactly is being referred to in this statement.

Response:

This statement primarily refers to the intermittent nature of wind and photovoltaic (PV) generation. In the case of PV, fluctuations in generation output can occur when there is a varying amount of cloud cover. Depending on PV size and distribution circuit characteristics, this can lead to transient voltage issues experienced by adjacent customers.

ii. How does FBC currently adjust load production from its facilities on the Kootenay River, in accord with overall customer power needs?

Response:

As a result of the Canal Plant Agreement (CPA), the overall physical balancing of generation and load in BC is done by BC Hydro. Typically, BC Hydro does not use FBC's Kootenay River facilities as a balancing resource for the province. On an hourly basis, FBC must ensure it has resources in place to meet overall customer needs, which includes using the maximum amount of generating capability from the Kootenay River facilities derived from entitlement under the CPA, even though those units may not be generating at their maximum capability. If FBC does not have sufficient resources in place to meet overall customer power needs, unauthorized inadvertent power will flow from BC Hydro to FBC, and FBC must pay financial penalties to BC Hydro.

10. Recently it was reported that:

"The U.S. Energy Department's National Renewable Energy Lab expects [solar] costs of about $1.20 a watt now declining to $1 by 2020"

(https://www.bloomberg.com/news/articles/2017-01-03/for-cheapest-power-on-earth-look-skyward-as-coal-falls-to-solar)

i. Can FBC please supply the source for its solar and other power cost estimates stated in Table 8-1 of its application?

Response:

As described in Section 1 of the Supply-Side Resource Options Report (Appendix J of the LTERP), the supply-side resource options costs were developed in collaboration with BC Hydro as it updated its Resource Options Inventory. As part of this engagement process, consultants and industry experts helped update the potential energy and capacity available from various resource options in B.C[2]. Compass Renewable Energy Consulting Inc. was hired to prepare a report on the solar market potential for B.C.[3] Other consultants, including Hatch, Amec Foster Wheeler and Kerr Wood Leidal contributed to the development of the resource potential and costs for the other resources options.

The FBC-BC Hydro collaboration developed cost estimates for 13 hypothetical 5-MW single access tracker solar PV projects located in various high potential areas of B.C, five of which were in the southern B.C. Capital costs included estimates of machinery and equipment, civil, and interconnection costs. In its portfolio modelling, FBC narrowed this down to three of the lower cost projects near its service territory.

Section 3.3.3 of the Resource Options Report notes that FBC's estimated unit costs for solar generation are higher than unit costs in many U.S. jurisdictions, despite solar costs coming down generally over the past few years. This is largely due to the relatively small size of the solar projects considered, the lower solar PV yield in Canada compared to the more southerly U.S. states and U.S. government subsidies provided to utilities for solar power.

[2] https://www.bchydro.com/energy-in-bc/planning-for-our-future/electricity-supply-options/updates.html.

[3] British Columbia Solar Market Update 2015. Compass Renewable Energy Consulting https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/rou-characterization-solar-report-20150624-compass.pdf.

ii. Given the range of reported PPA Tranche 1 Energy costs of between $47 and $56 per MWh in Table 8-1, can FBC please provide the average cost of Tranche 1 Energy, Tranche 2 Energy (where applicable) and Market purchases per MWh for the last five years.

Response:

The table below shows the average unit cost for FBC's energy purchases from PPA Tranche 1 and the market from 2012 to 2016. FBC did not purchase any PPA Tranche 2 energy during the last five years.

Year	PPA Tranche 1 ($/MWh)	PPA Tranche 2 ($/MWh)	Market ($/MWh)
2012	$37.60	N/A	$21.10
2013	$39.27	N/A	$29.44
2014	$41.35	N/A	$31.43
2015	$44.41	N/A	$38.65
2016	$46.40	N/A	$38.46

iii Please provide the average cost to the company of NM customer electrical power transfers per MWh for each of the last five years.

Response:

The information provided in the reference is related to the installation costs for a solar system on a per watt basis. FBC has no visibility of customer installation costs and cannot comment on the total customer cost for power inclusive of that produced by the customer-owned resource.

The Company does not understand what costs the question may assume to be included in electrical power transfers, however, if the request is for the average amount at which the Company compensates customers for excess generation that flows into the FBC system, the rate would be somewhere between the Tier 1 and Tier 2 rate of the Residential Conservation Rate, currently $0.10117/kWh and $0.15617/kWh respectively. These amounts are both in excess of the current lowest alternative source of power and the LRMC of the Company's preferred resource portfolio.

iv. Please provide the cost to the company of NM Net Excess Generation (NEG) per MWh for each of the last five years.

Response:

The response to a similar question was provided in the 2016 Net Metering Update Application, Response to BCSEA IR 1.2.2 (Exhibit B-6), an excerpt of which is as follows:

> 2.2 What is the estimated amount of positive NEG (i.e., in kWh) for the 6-8 program participants who will have a positive NEG balance after a 12 month period? What is the dollar amount? What is the effective average price?
>
> Response:
>
> In the analysis completed for Order G-59-16, there were 9 customers who, over the 36 months, had NEG that would have been purchased by the Company. These customers had a total of approximately 518,000 kWh of NEG over that period. Under the current billing methodology, the value of NEG is derived from the net kWh that would have been credited at either the Tier 1 or Tier 2 rate. Over the 36 months, these net kWh would have a value of approximately $68,000 FortisBC Inc. for an average value of $0.13/kWh. Under the proposed billing methodology, the value of NEG is derived from the net kWh that would have been used to offset consumption at either the Tier 1 or Tier 2 rate plus the value of any kWh purchased at the end of the billing year. In this case, the value of the annual excess NEG purchased at the end of the billing year is approximately $24,400 for an average value of approximately $0.047 / kWh.

The Company had not undertaken the significant work required to update these figures for each of the last five years, but expects that the annual totals will be fairly consistent.

v. FBC provides three different Unit Energy Cost estimates in Table 8-1 for DSM. For comparison purposes, please provide the average DSM UEC MWh expenditures for each of the last five years.

Response:

The Unit Energy Cost (UEC) estimates in Table 8-1 (LTERP, page 96) for DSM represent the unit costs of the incremental cost for the Base, High and Maximum scenarios, including program administration. The derivation of the numbers is shown in Table 3-1 in the LT DSM Plan and values are presented in $2016.

The comparable average UECs for the three scenarios of the LT DSM Plan, along with the UEC for Actual DSM expenditures over the last five years are as follows:

Year/Scenario	UEC Incremental 2016 $/MWh	UEC Average 2016 $/MWh	UEC Average $/MWh
2017 LT DSM Plan - Base	88	54	
2017 LT DSM Plan - High	104	61	
2017 LT DSM Plan - Max	114	67	
DSM Actual 2016			47
DSM Actual 2015			60
DSM Actual 2014			59
DSM Actual 2013			67
DSM Actual 2012			51

vi. FBC provides no Unit Capacity Costs for DSM and PPA Tranche 1 and Tranche 2 energy, but does for PPA Capacity and Market Purchases. Please explain why a different approach is taken for each of these different options.

Response:

This response refers to Table 8-1 in the LTERP. The PPA Tranche 1, Tranche 2 and Capacity costs are energy rates as per the BC Hydro tariff, which breaks out the costs into energy and capacity. As such, they are included in the table as UEC and UCC for illustrative purposes since to arrive at the total PPA cost, both the energy and capacity costs must be added together. This is not the case for true UEC and UCC costs, which cannot be added as they will both include many of the same costs but just expressed in terms of costs per unit of either energy or capacity.

DSM provides both capacity and energy in the LTERP and the total costs are expressed in terms of energy as DSM is primarily an energy resource. The market can be used to supply both energy and capacity depending on the situation so both a UEC and a UCC cost is presented.

11. In Part 8, Resource Options, FBC states:

"FBC does not treat DG supply in the same manner as other generation resource options. This is because the availability of DG in the future is not predictable or within FBC's control to operate or call upon on demand when needed. As discussed in the FBC Net Metering Program Update Application dated April 15, 2016: The Company does not consider small - scale customer - owned renewable power to be a secure or reliable firm resource...

"FBC has also not included power supply from self-generators within FBC's service area in the table above. This is because FBC does not have any information regarding available energy or capacity, timing or cost related to any self - generation supply at this time".

i. Has FBC ever had discussions with any of its NM customers prior to enrollment about designing their systems so that they could provide power to FBC's system in a "*secure or reliable*" manner, including matters related to "*available energy or capacity, timing or cost*"?

Response:

The two references quoted above are related to two separate potential DG resources. Small-scale DG, including NM, is distinct from self-generators as defined in the LTERP. The latter are large commercial enterprises with self-generation facilities.

Discussions with NM customers are focused on eligibility and safe interconnection. As stated, FBC does not consider small-scale customer-owned renewable power, including NM, to be a secure or reliable firm resource. NM as designed and approved is not intended to be a supply resource.

ii. Has FBC ever had discussions with any of its NM customers, especially those who consistently provide Net Excess Generation (NEG), about ways to make that supply source "*secure or reliable*", in matters related to "*available energy or capacity, timing or cost*"?

Response:

Please refer to the response to Shadrack IR 1.11i.

iii. Please elaborate on why FBC believes that its current DSM programs are more reliable than its NM program?

Response:

FBC is not suggesting that its current DSM programs are more or less reliable than its NM program; but regardless, the two are not directly comparable. DSM programs reduce consumption and drive efficiency while the NM program helps facilitate distributed generation within the FBC system.

iv. Please provide, data, or provide estimates, in MWh, of the amount per annum by which each DSM program is reducing consumption of power in a table so that the figures can be compared with the amount of power being transferred from NM program customers to FBC for each of the last five years.

Response:

Please refer to the following table:

	MWh savings				
	2011	**2012**	**2013**	**2014**	**2015**
Residential					
Home Improvements	3,692	4,656	5,222	1,299	231
Heat Pumps	2,257	2,161	2,100	865	569
Residential Lighting	3,308	2,599	3,300	3,411	4,144
New Home Program	689	1,040	3,000	733	356
Appliances[1]		1,248	578	-	52
Water Heating[1]				92	5
Low Income	1,447	1,054	2,000	2,286	282
Residential Total	**11,393**	**12,758**	**16,200**	**8,686**	**5,639**
Commercial					
Lighting	20,577	14,256	7,600	3,353	4,089
Building and Process Improvements	1,386	1,959	2,600	1,926	1,606
Municipal (Water Handling)	2,199	1,677	700	-	187
Irrigation[2]				-	-
Commercial Total	**24,162**	**17,892**	**10,900**	**5,279**	**5,882**
Industrial					
Compressed Air					
Industrial Efficiencies (incl. EMIS)	794	937	2,500	614	1,087
Industrial Total	**794**	**937**	**2,500**	**614**	**1,087**

[1] These programs were included in Home improvements program
[2] Irrigation was included in Municipal (Water Handling)

12. In 8.2 Supply-Side Resource Options FBC states:

"...all of the generation plants FBC owns are located in the Kootenay region whereas most of the load and expected load growth is in the Okanagan region".

Has FBC ever considered contracting out load supply for the Okanagan Region to BC Hydro, in the same manner that BC Hydro contracts with FBC to supply electrical power to its Lardeau and Yahk service areas?

Response:

As noted in Section 6.1.2 of the LTERP, the Okanagan region has no generation resources and thus all demand is met by external generation delivered either directly through FBC's system or wheeled via the BC Hydro network. Thus, while FBC is not "contracting out load supply to the Okanagan Region to BC Hydro", FBC is already heavily reliant on the transmission interconnections between FBC and the surrounding BC Hydro bulk transmission system to meet load requirements in the Okanagan area.

13. Have FBC and BC Hydro ever had discussions about swapping hard-to-reach service areas, like Lardeau and Yahk, for similar areas that are harder for FBC to service?

Response:

FBC is not able to comment on any discussions with BC Hydro on this subject. Further, this question is out of scope for this proceeding.

14i. What is the MWh cost differential between producing and delivering power to the Kootenays versus producing and delivering power to the Boundary and Okanagan?

Response:

Please refer to the response to Shadrack IR 1.6iii.

ii. Has FBC ever done a cost benefit analysis of solely purchasing power from BC Hydro for the Boundary and Okanagan region, and discontinuing use of the transmisson lines from the West Kootenay?

Response:

FBC is not aware that relying solely on BC Hydro supply through either purchases or additional wheeling has ever been formally studied. However, FBC believes this is not a practical operating configuration due to reliability requirements for the loads in the Boundary and Grand Forks region. If the existing FBC transmission interconnection between the Okanagan and West Kootenay region was discontinued, customers in the Boundary and Grand Forks regions would experience significantly reduced levels of reliability.

15. The Drake Landing Solar Community (DLSC) is a planned community in Okotoks, Alberta, Canada, equipped with a central community solar heating system, the first of its kind in North America, and which achieved 100% space heating from solar PV collectors and seasonal thermal energy storage in 2015/16, as well as other energy efficient technology (http://www.dlsc.ca and https://en.wikipedia.org/wiki/Drake_Landing_Solar_Community)

i. Has FBC conducted any solar hours studies in the north, mid and south Okanagan and/or talked to any of their NM customers in the Okanagan region about solar PV production capacity with a view toward developing a similar seasonal thermal energy storage project?

Response:

FBC has not conducted or discussed a project of this type.

ii. What have been the ten highest peak consumption days for FBC in 2017?

Response:

Please refer to Table 1 below, which shows the ten highest peak consumption days for FBC thus far in 2017.

Table 1: Top Ten Peak Consumption Days in 2017

Date	Peak Demand (MW)
January 04, 2017	731
January 03, 2017	715
January 12, 2017	711
January 11, 2017	703
January 05, 2017	695
January 13, 2017	692
January 06, 2017	682
January 10, 2017	677
February 02, 2017	665
January 02, 2017	659

16. Please reconstitute Figure 9.1 to include an NM LRMC.

Response:

Figure 9-1 of the LTERP shows the LRMC values for portfolios with varying levels of DSM. As discussed in Section 1.2 of Appendix K of the LTERP, FBC's LRMC values are based on a portfolio approach, which includes a combination of existing resources, DSM resources and incremental supply-side resources to meet forecast load requirements. As FBC does not have a forecast of the required attributes for potential future generation from NM customers for its portfolio analysis, such as monthly energy and capacity profiles and costs, it is not able to provide a LRMC for a portfolio with NM generation at this time.

Please also refer to the response to BCUC IR 1.36.3.

17. With reference to A3 BCUC IR #1.19 has FBC experienced any time, since 2010, an inability to purchase power on the spot market at any price?

Response:

Yes, on April 22, 2013 FBC attempted to secure market power for one hour in the morning, and could not at any cost.

i. On what dates and for what length of hours did this occur?

Response:

Please refer to the response to Shadrak IR1.17i.

ii. Did this situation result in power outages or forced shut down of certain customers' electricity supply? Please elaborate.

Response:

In this situation, FBC was attempting to purchase a relatively small volume of 10 MW in order to meet forecast demand plus a reasonable buffer, which is typically 15 to 30 MW, depending on the hour. Actual load for the hour was such that the 10 MW was not required to meet load, and therefore it did not cause an imbalance on the FBC system. Had it caused an imbalance, it would not have resulted in a forced shut down of any customer's electricity supply, as FBC has contractual methods of dealing with any imbalance transfer with BC Hydro.