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April 21, 2022

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, B.C.
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Attention: Mr. Patrick Wruck, Commission Secretary

Dear Mr. Wruck:

Re: FortisBC Inc. (FBC)

2021 Long-Term Electric Resource Plan (LTERP) and Long-Term Demand-Side Management Plan (LT DSM Plan) (Application) – Project No. 1599244

FBC Information Request No. 1 to the Residential Consumers Intervener Association (RCIA) on its Intervener Evidence

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In accordance with the regulatory timetable established in BCUC Order G-24-22 for the review of the Application, attached please find information request No. 1 to RCIA on its Intervener Evidence.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Diane Roy

Attachments

cc (email only): Registered Parties

TOPIC: Purpose and Background

1.0 Reference: Midgard Evidence submission page 7

Based on these three (3) materially similar definitions of resiliency, the definition of resiliency that will be used in the remainder of this paper is the one (1) provided by the US Department of Energy because it is the simplest and most direct: *"The ability of a power system and its components to withstand and adapt to disruptions and rapidly recover from them."*

Reference: FBC LTERP Response to BCSEA IR1 6.3

6.3 Does Action Item 3 mean that FBC's resource portfolio is not sufficiently flexible and adaptable to unexpected changes in loads?

Response:

This action item does not mean that FBC's current resource portfolio is not sufficiently flexible and adaptable to unexpected changes in loads. Planning and operations should not be confused. FBC has significant flexibility to deal with unplanned loads or unit outages on an operational basis as confirmed by the PRM calculations.

Reference: FBC LTERP Section 11.3.8

The resiliency attribute includes operational flexibility and geographic diversity. Operational flexibility refers to the ability of the portfolio to manage higher than expected energy and capacity loads. These loads may occur over a short period of time such as occurred this past June 2021 with record setting daily loads or over a longer period of time due to unexpected load growth.

Geographic diversity reflects whether or not the portfolio resources are located within or near the Kootenay or Okanagan regions of FBC's service area. As discussed in Section 5.1, FBC's existing generation resources are located within the Kootenay region, while most of FBC's customer load requirements are in the Okanagan. Therefore, adding resource options to the Okanagan improves FBC's resource diversity. All three portfolios in the table below have 'high' geographic diversity ratings given that they contain solar resources, which are located in the Okanagan, as well as battery and SCGT plants, which could be located in either region and most likely closer to key load growth centres, like Kelowna.

Questions:

1.1 **In general, does the RCIA agree that a portfolio with battery storage and two SCGT plants located near the Kelowna area, could add resiliency, as defined by the US Department of Energy, to FBC's current resource portfolio?**

1.1.1 **If not, why not?**

2.0 Reference: FBC LTERP Section 6.2.2

There are a total of eight transmission interconnections between the FBC system and the systems of neighbouring transmission entities, including BC Hydro. FBC transmission interconnections improve reliability by providing the flexibility to move energy between FBC and other utilities (primarily BC Hydro), to transfer FBC's own resources from the point of generation in the Kootenays to its major load centre in the Okanagan, to import market power and also provide economic benefits based on the ability to share generation operating reserves. FBC's ability to import and export electricity from other members of the Western Interconnection improves system reliability and has economic benefits for FBC by allowing the Company to access transmission and generation resources that it would not otherwise be able to access.

Questions:

2.1 **In general, does the RCIA agree that multiple transmission interconnections help provide system resiliency?**

2.1.1 **If not, why not?**

3.0 Reference: FBC LTERP Section 6.3.2

FBC's planning criteria require that the system be planned, designed and operated to serve all customer loads both during normal operations and during contingency operations (i.e. one or more system elements out of service). The most basic criterion is that the system infrastructure must be sufficient to meet all reasonably forecast customer demand with all system components (e.g. transmission lines and transformers) in service. This is referred to as "all elements inservice" or N-0 operation. The next, more limiting, condition is single contingency (N-1) operations where FBC's planning criteria state that the transmission system infrastructure must also be sufficient to meet all reasonably forecast customer demand even with the single most limiting transmission component out of service. Exceptions are allowed for customer loads supplied radially by the faulted element or affected area. For double contingency (N-2) and higher conditions, the criteria allow planned and controlled disconnection of customer loads. Remedial Action Schemes may be employed during system operations to minimize the scope of customer outages for N-2 contingencies. These planning criteria are consistent with those used by other utilities in the Western Interconnection.

Questions:

3.1 **In general, does the RCIA agree that planning criteria requirements to N-1 and higher system reliability standards provide system resiliency?**

3.1.1 **If not, why not?**

4.0 Reference: FBC LTERP Response to BCUC IR1 24.1

24.1 Please discuss how FBC has been building climate resiliency using its standards and practices over time. Please provide specific examples.

Response:

There are several ways in which FBC has been building climate resiliency using its standards and practices over time.

FBC performs an annual inspection for all transmission and distribution lines, and conducts repairs for any urgent work identified. Condition assessments are completed on an eight-year cycle for transmission and distribution lines and on a six-year cycle for substations. Rehabilitation work to repair the aging infrastructure is completed in the following years.

FBC has also been working to harden the power system to withstand higher wind speeds and other environmental factors through updated designs and material selection. A recent example is the rehabilitation work on the 63kV transmission line 27L to account for increased snow loading as this is a frequent environmental factor that impacts this line.

Substations that fall within a flood zone are redesigned and raised above the flood level when the stations are rebuilt. A recent example includes the Ruckles Substation Upgrade, which raised the site above the 1 in 200-year flood level and successfully avoided flooding damage in 2018.

FBC continues to enhance its system protection by upgrading distribution recloser protection to detect and clear faults faster, as well as providing communications-assisted system automation.

FBC is conducting assessments to analyze the vulnerability of its system to the impacts of climate change. FBC is currently working with an external consultant to develop wildfire risk modeling. The assessment is expected to be complete in 2022. After this project is complete, FBC will begin to further assess the risks related to flooding and extreme weather in more detail.

Reference: FBC LTERP Response to BCUC IR1 24.3

24.3 Please discuss whether FBC is aware of current standards that integrate considerations of the impacts of climate change on electric utilities.

24.3.1 If yes, please identify the standard(s) and whether FBC has considered adoption of the standard(s).

24.3.2 Please discuss whether FBC is aware of other electric utilities that have adopted the standards identified.

Response:

FBC follows industry practices, and IEEE and CSA standards (including CSA C22.3 No. 1 Overhead Systems, CSA C22.3 No. 7 Underground Systems, and CSA C22.3 No.

60826 Design Criteria of Overhead Transmission Lines). FBC is aware that these organizations are working on updating the standards related to integrating considerations of climate change impacts. Once completed, FBC intends to consider, and adopt if appropriate, the updated standards as guidelines. However, FBC intends to be proactive regarding the resiliency of its system in light of climate change impacts regardless of the timing of standards development.

Reference: FBC LTERP Response to BCUC IR1 24.4

24.4 Please discuss what progress FBC has made to date in analyzing the need for the above noted adaptation measures in FBC's service territory.

Response:

FBC is in the process of developing a roadmap for climate change adaptation. Wildfires, flooding, and extreme weather events (including windstorms) are considered the highest risks for the FBC service territory.

To mitigate the impacts of flooding, substation construction takes into account floodplain data to ensure that stations are raised to an appropriate height. FBC is also researching and assessing, through pilot programs, the use of alternative materials for poles in areas impacted by flooding.

FBC is developing an internal business case to assess various mitigation strategies for wildfires. Some of these solutions will be dependent on the results of the wildfire risk modeling currently under development with an external consultant. These strategies include, but are not limited to, application of fire-retardant gel to wood poles, current-limiting fuses, fire-protection mesh, and updates to FBC's reclosing policy.

Similar business cases will be developed for flooding and extreme weather events (including windstorms) once similar assessments for these climate change impacts are completed.

Questions:

4.1 **In general, would the RCIA agree that the type of work and plans regarding system enhancements described in the IR responses in the question preamble above play a role in providing system resiliency?**

4.1.1 **If not, why not?**

5.0 Reference: FBC LTERP Response to CEC IR1 28.3

28.3 Please identify any redundancy in the supply that can respond to outages of certain facilities.

Response:

FBC's available energy and dependable capacity from the FBC CPA entitlements, BPPA, BRX, and WAX (net of RCA) are subject to generation outages at the

corresponding facilities. FBC has several options to respond to outages, and replace lost power. On a short-term, operational basis, FBC can call on operating reserve to cover any power lost for the first 60 minutes of any outage. For any outages longer than 60 minutes in duration, FBC has the option of purchasing replacement power from the wholesale market, via its CEPSA contract with Powerex. FBC may also choose to reduce the amount of surplus WAX capacity that it sells to Powerex under the CEPSA, and retain that capacity for its own use. Furthermore, FBC can also increase its usage under the PPA contract with BC Hydro, as FBC is rarely using the full 200 MW of PPA capacity available, and has never used the full amount of energy available under the contract.

Reference: FBC LTERP Response to CEC IR1 38.2

38.2 Please provide a discussion of the full capability FBC would need to have in order to fill this gap in the event that contingency requirements were necessary because of a failure of any particular source of capacity needed.

Response:

In the response to CEC IR1 38.1, FBC provided a list of FBC's resources and the corresponding capacity (in MW) that FBC used to meet its capacity needs in June 2021. During that period, FBC's available capacity exceeded the load level during the heat dome event. Although there can be no "planning" for such an unprecedented event, this illustrates the depth and flexibility of FBC's capability to meet unplanned load on an operational basis.

The magnitude of the load was itself a severe contingency requirement. If further resource contingency events had occurred (such as FBC generator outages), FBC would have been able to call on Operating Reserve for 60 minutes. After that, even higher market purchases would have been required, if available. If the market resources were unavailable, then there would have been no other recourse but to exercise the Imbalance Agreement with BC Hydro, which allows FBC to rely on BC Hydro supply on an emergency basis. If that had also been insufficient due to BC Hydro's inability to provide the needed capacity, then FBC would have had no choice but to manually curtail load.

The largest capacity resource used to meet the June 2021 heat dome event was market supply of 265 MW. Of this, 239 MW was required to meet load. Therefore, if the market had been unavailable, 239 MW of additional generation resources within FBC's service area would have been required to meet the peak load demands.

Questions:

5.1 **In general, would the RCIA agree that the ability, if qualified, to call on tools such as Operating/Contingency Reserve (under the NWPP Reserve Sharing Program) and exercising the Imbalance Agreement, if there were no other recourse, provides resiliency?**

5.1.1 **If not, why not?**

TOPIC: Scenario Planning

6.0 Reference: Midgard Evidence submission page 13

However, adequately evaluating system resiliency requires testing alternative resource portfolios against future "extreme" or "surprise" scenarios, that incorporate one (1) or more significant discontinuities from BAU.

Reference: FBC LTERP Response to CEC IR1 21.2

21.2 Please provide the probability of the peak weather events observed over the summer of 2021.

Response:

FBC estimates the probability of meeting or exceeding the average daily temperature experienced on June 29, 2021 is about 0.00025 percent.

To calculate this probability, FBC used temperature records from the Penticton airport from 1941 to 2021. FBC examined the data and calculated the average daily temperature for the warmest day each summer (referred to as the "maximum mean daily temperature", or MMDT[1]). FBC then used the average and standard deviation to construct a normal distribution of MMDTs to determine the probabilities of experiencing a peak summer temperature at or below any selected MMDT. Based on this calculation, the probability of the peak summer temperature being 33.6 degrees Celsius or lower is 99.99975 percent. Therefore the probability of meeting or exceeding the MMDT experienced in 2021 is (1.0 - 0.9999975) or 0.00025 percent.

FBC notes:

- Many different return periods have been reported in the public discourse.
- The method presented assumes the weather experienced in June 2021 is anomalous. If this event is not anomalous then there is no reliable objective method to calculate the return period based on a single data point.
- Probabilities this small should only be considered as directional as precision cannot be guaranteed and should not be expected.

Questions:

6.1 **Would RCIA agree that the "heat dome" experienced in 2021 was an example of a "surprise event"?**

6.2 **Would RCIA agree that the return period of the "heat dome" event is greater than 500 years?**

6.2.1 **If not, what is the return period for this event?**

1 The MMDT can be thought as the "hottest day of the summer".

6.3 **Should the utility identify a consistent return period for anomalous events for resiliency modelling?**

6.3.1 **If so, what return period should be used for modelling anomalous events that are presumably outside of the historic experience of the utility?**

6.3.2 **If not, why not?**

6.4 **Based on RCIA's experience, does it have any recommendations to provide to FBC on how to incorporate anomalous events into its forecasts?**

Topic: Modern Portfolio Theory and Capital Asset Pricing Model Portfolio Theory

7.0 Reference: Midgard Evidence submission page 18-19

Markowitz's theory demonstrates that the performance of a portfolio improves with the combination of noncorrelated assets. In other words, if an incremental asset is added to a portfolio, then the risk adjusted performance of the resulting overall portfolio will improve if the attributes which influence the new asset's performance are uncorrelated to the prior portfolio's performance attributes. The extent of improvement is inversely related to the level of performance attribute correlation. As stated by Markowitz [4], the only reason the overall risk adjusted performance of a combined portfolio would not improve is if individual assets are perfectly correlated. An uncorrelated financial asset portfolio would likely perform better than a correlated portfolio when faced with a market discontinuity – in other words, it would be more resilient to a significant forced perturbation.

Reference: FBC LTERP Section 5.1

FBC owns the Corra Linn, Upper Bonnington, Lower Bonnington, and South Slocan generating plants (collectively, the FBC Plants) located on the Kootenay River between Nelson and Castlegar, BC. The FBC Plants supplied approximately 44 percent of FBC's energy requirements and approximately 28 percent of the Company's peak demand in 2020.

Reference: FBC LTERP Section 5.8

FBC meets its energy and capacity requirements primarily through a portfolio of FBC-owned entitlement resources, long-term entitlement purchase agreements, and purchases under the BC Hydro PPA. Any remaining energy needs are met through short to medium term market, IPP, and other resource purchases.

Reference: FBC LTERP Section 11.3.9.1

The preferred portfolios include a diverse mix of resource options, including the PPA, market energy, battery storage, SCGT plants using RNG, solar, wind and run of river generation.

Questions:

7.1 **Does the RCIA agree that a portfolio of resources, such as those in FBC's mix of existing resources and those included in the preferred portfolios includes a mix of 'noncorrelated' resources, thus providing resiliency?**

7.1.1 **If not, why not?**