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May 26, 2022

British Columbia Utilities Commission
Suite 410, 900 Howe Street
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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 Rebuttal Evidence

In accordance with the Regulatory Timetable established in British Columbia Utilities Commission Order G-130-22, FBC hereby files its Rebuttal Evidence in the above referenced proceeding.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Diane Roy

Attachments

cc (email only): Registered Interveners

BRITISH COLUMBIA UTILITIES COMMISSION

FORTISBC INC.

2021 Long-Term Electric Resource Plan and Long-Term Demand-Side Management Plan

REBUTTAL EVIDENCE OF

FORTISBC INC.

May 26, 2022

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REBUTTAL EVIDENCE OF FORTISBC INC.

1.0 INTRODUCTION

Q1: What is the purpose of this Rebuttal Evidence?

A1: The purpose of this FortisBC Inc. (FBC) Rebuttal Evidence is to respond to the evidence of Midgard Consulting Inc. (Midgard) on behalf of the Residential Consumer Intervener Association (RCIA) filed in Exhibit C8-6 and in RCIA's responses to information requests (IRs) in Exhibit C8-7.

Q2: How is this Rebuttal Evidence organized?

A2: This Rebuttal Evidence is organized under the following main topic headings:

1. Introduction
2. FBC's Definitions of Resiliency and Reliability
3. FBC's Approach to Resiliency is Comprehensive and Proactive
4. Scenario Planning
5. Evaluation of the Portfolios
6. Evaluation of Resiliency in Future LTERPs
7. Conclusion

2.0 FBC'S DEFINITIONS OF RESILIENCY AND RELIABILITY

Q3: RCIA's evidence states: "In Midgard's opinion, the way FortisBC Inc. ("FortisBC") used the term Resiliency in its Long-Term Electric Resource Planning ("LTERP") filing more closely approximates the classical use of Reliability." Is this accurate?

A3: No, this is not accurate. FBC has been maintaining the reliability and resiliency of its integrated electric system for decades, and is well aware of the distinction between the two concepts which is common knowledge in the utility industry and is reflected in FBC's LTERP. For example, resiliency was one of the four key attributes which FBC used to evaluate resource portfolios. Diversification in terms of both resource type and geographic location and portfolio operational flexibility are important considerations in developing resiliency to unexpected events, as FBC notes in Section 11.3.9 of the LTERP when discussing the preferred portfolio C3:

> This portfolio also provides FBC with high levels of resiliency given that its resource mix provides high geographic diversity and higher levels of operational flexibility with the to two SCGT plants using RNG fuel, which is important for contingency planning as discussed in more detail in Section 11.3.9.1. The inclusion of SCGT plants in the preferred portfolio provides some additional flexibility to handle new large or unexpected loads as these resources have some remaining availability at the end of the planning horizon to accommodate additional energy and capacity growth. The SCGT plants would also provide added reliability in the event the wind and solar resources in the portfolio do not provide energy and capacity when required.

As another example, the LTERP, in Section 6.6, includes the following discussion of the need to improve system resiliency in the context of climate change:

> The utility industry, including regulators, continues to discuss the need to be proactive in preparing and taking action to respond to climate change and improve the resiliency of the grid. Industry standards and organizations such as the Institute of Electrical and Electronics Engineers (IEEE) and Canadian Standards Association (CSA) have discussed adopting standards to support utilities in integrating considerations of climate change impacts.

FBC explained further in response to BCUC IR1 24.3 that, while IEEE and CSA are updating standards related to climate change impacts, FBC intends to be proactive regarding the resiliency of its system in light of climate change impacts.

Q4: How does FBC define resiliency?

A4: FBC's definition of resiliency is the same as the definition provided by FortisBC Energy Inc. (FEI) in its Tilbury LNG Storage Expansion Project Certificate of Public Convenience and Necessity (CPCN) Application (TLSE Application), currently under review by the British Columbia Utilities Commission (BCUC). In Section 3.2.1.3 of the TLSE Application, FEI states the following:

Resiliency refers to the ability to prevent, withstand, and recover from system failures or unforeseen events. Resiliency is directly linked to the concept of reliability in the sense that a system cannot be resilient without first having reliable components. However, resiliency also encompasses concepts such as preparing for, operating through, and recovering from significant disruptions, no matter the cause.

Q5: How does resiliency differ from reliability?

A5: FBC defines reliability consistent with FEI's definition in Section 3.2.1.2 of the TLSE Application, which is as follows:

> Reliability refers to designing and operating a system to ensure it meets the expected customer demand at all times, and is a combination of two concepts: adequacy and security. Adequacy refers to the ability to ensure a sufficient supply of energy, whereas security refers to the ability to consistently deliver that supply to customers.

As noted in the definition of resiliency above, reliability is required to achieve resiliency and so resiliency builds on reliability. A reliable system is one in which supply and demand are balanced to keep electricity flowing and is robust enough to minimize the risk of disruptions. A resilient system is one that is able to quickly and efficiently restore the electricity flow after an outage has occurred. The more robust and reliable the system is, the better it is able to lower the impact of outages on customers and increase the system's resiliency.

3.0 FBC'S APPROACH TO RESILIENCY IS COMPREHENSIVE AND PROACTIVE

Q6: Midgard states that "FortisBC claims that "geographic diversity" and "operational flexibility" are the sum of its resiliency needs." Is this true?

A6: No. FBC selected two resiliency attributes, geographic diversity and operational flexibility, for the purposes of its LTERP portfolio analysis. These attributes, along with others relating to cost, the environment and economic factors, were selected to help assess the potential supply-side resource portfolios at a high level appropriate for long-term resource planning. They were not meant to represent a complete or exhaustive list of all the resiliency attributes that FBC considers relevant and important in its long-term planning. FBC's resiliency requirements extend to the operational flexibility and diversity of its existing supply-side resource portfolio, in order to manage short-term sudden and disruptive events, as well as the resiliency of its transmission and distribution system, including plans for implementing strategies to maintain reliable and resilient assets and mitigate climate-related risks.

Q7: What is FBC's approach to resiliency in the LTERP?

A7: FBC addresses resiliency in the LTERP from several different perspectives, including from that of:

1. Existing supply-side resources;
2. Future resource portfolios; and
3. The transmission and distribution system.

Each of these perspectives is discussed below.

In Section 5 of the LTERP, FBC discusses its current supply-side resource portfolio which includes a mix of diverse and flexible resources. These resources enable FBC to withstand, adapt and recover from a variety of short-term sudden and unexpected events:

- As discussed in the response to B.C. Sustainable Energy Association (BCSEA) IR1 6.3, FBC has significant flexibility to withstand unplanned loads or unit outages on an operational basis, as confirmed by the planning reserve margin (PRM) calculations.
- As discussed in the response to Commercial Energy Consumers Association of B.C. (CEC) IR1 28.3, 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 Capacity and Energy Purchase and Sale Agreement (CEPSA) with Powerex Corp. (Powerex). FBC may also choose to reduce the amount of surplus Waneta Expansion (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 Power Purchase Agreement (PPA) contract with the British Columbia Hydro and Power Authority (BC Hydro), as FBC is rarely using the full 200 megawatts (MW) of PPA capacity available and has never used the full amount of energy available under the contract.

In terms of future resource portfolios, FBC considered resiliency in its assessment of alternate supply-side resource portfolios under various load scenarios, which represent deviations from the status quo assumptions. FBC's portfolio evaluation framework, provided in Section 11.3.8 of the LTERP, assesses portfolios against various criteria, including two attributes relating to resiliency: operational flexibility and geographic diversity. FBC's contingency planning, discussed in section 11.3.9.1 of the LTERP, discusses how portfolios perform and meet the LTERP objectives in the event of changing conditions, including unexpected temporary load events such as the June 2021 heat wave. FBC's preferred portfolio C3 includes one with a geographically diverse mix of energy and capacity resources able to handle unexpected events and longer-term deviations from the Reference Case load forecast.

In terms of its transmission and distribution system planning, Section 6 of the LTERP discusses FBC's investments in the resiliency of its transmission and distribution system and how 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 system element out of service). FBC's planning criteria are consistent with those used by other utilities in the Western Interconnection. As discussed in the response to BCUC IR1 24.1, there are several ways in which FBC has been building climate resiliency using its standards and practices over time. For example:

- FBC has 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 also discusses its plans for implementation of strategies to maintain reliable and resilient assets and mitigate climate-related risks. In the response to BCUC IR1 24.4, FBC notes that it is in the process of developing a roadmap for climate change adaptation, with wildfires, flooding, and extreme weather events (including windstorms) being considered the highest risks for the FBC service territory.

Further, in Section 6.2.2 of the LTERP, FBC discusses the eight transmission interconnections between the FBC system and the systems of neighbouring transmission entities, including BC Hydro. FBC transmission interconnections improve reliability and resiliency 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 resiliency 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.

Section 2.1.1 of Appendix M (2021 Planning Reserve Margin Report) to the LTERP also discusses FBC's Imbalance Agreement with BC Hydro. Although the Imbalance Agreement is not a service or reliability planning tool, imbalance energy may transfer between the FBC and BC Hydro systems during unexpected conditions. If an unexpected condition occurs, FBC is required to avoid, minimize, or end as soon as possible the transfer of imbalance energy, including cutting export schedules or buying in the market as necessary, but not including curtailing domestic customers or other Canal Plant Agreement (CPA) Entitlement Parties. Therefore, the Imbalance Agreement provides some resiliency benefits to FBC customers in low probability, but high consequence events.

Q8: Midgard states that FBC's "ability to meet resiliency objectives is uncertain." Is FBC's system and supply portfolio resilient?

A8: Yes, FBC's system and supply portfolio have exhibited a reasonable level of resilience as they can withstand and adapt and are able to recover rapidly and effectively from system failures or unforeseen events. FBC's system has been subject to significant unexpected and disruptive events over time, with some of the most significant ones occurring during the last 12 months. The June 2021 heat dome event resulted in record-high customer loads, which FBC was able to meet with minimal customer outages due to the depth and flexibility of its capability to meet unplanned load on an operational basis, as discussed in the response to CEC IR1 38.2. FBC was also able to meet the new record-high loads associated with the December 2021 cold snap with no major outages.

As discussed in the response to BCUC IR2 52.1, FBC's system has been exposed to weather events from windstorms, snowstorms, flooding and wildfires during recent years that have resulted in customer outages. FBC's system was able to recover quickly from these events. In light of these events, FBC continues to be proactive in its approach to resiliency and is taking further steps to improve its resiliency in responding to future disruptive events.

Q9: Midgard states that FBC's "planning answer is monitoring rather than evaluation". Is this true?

A9: No. FBC is taking a proactive approach to resiliency by developing and implementing plans to ensure its transmission and distribution system and supply portfolio remain resilient in the future.

While monitoring developments in the external planning environment is an important part of long-term resource planning, as discussed in Section 1.3 of the LTERP, FBC also develops load scenarios that provide insight into different potential futures for which FBC should be prepared, evaluates various resource options, assesses the potential impacts of various load drivers and load scenarios on its transmission and distribution system, and evaluates alternate resource options portfolios to meet its resource planning objectives. FBC also develops contingency plans for the preferred portfolio to ensure that it can meet the objectives if assumptions and conditions change, and a four-year action plan to implement the LTERP's conclusions and to ensure continuing assessment of resource requirements and alternatives.

Further, as discussed in the response to BCUC IR1 24.4, 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.

As discussed in Section 11.3.9 of the LTERP, FBC's preferred portfolio (portfolio C3) provides high levels of resiliency given that its resource mix provides high geographic diversity and higher levels of operational flexibility with two simple-cycle gas turbine (SCGT) plants (using renewable natural gas (RNG) fuel), which is important for contingency planning and the ability to help manage unexpected and sudden changes in loads.

4.0 SCENARIO PLANNING

Q10: Midgard claims in response to BCUC IR 3.1 that 'FBC has acknowledged in its LTERP application evidence that has not robustly tested its portfolio options for resilience when it stated: "At this point in time, there is too much uncertainty to know which of the scenarios, if any, will occur in the future."' In response to BCSEA IR 1.2, Midgard also claims based on the same statement that "FBC admits that its definition of resiliency does not involve testing for resiliency." Did FBC acknowledge or admit this?

A10: No. The quoted statement from the executive summary of the LTERP makes the non-controversial point that there is uncertainty as to which load scenario will actually unfold over the next 20 years. In short, FBC cannot foresee the future. It simply does not follow from this statement that FBC has acknowledged that it has not robustly tested its portfolio for resilience or that its definition of resiliency does not involve testing for resiliency.

Q11: Midgard describes scenario planning in section 3 of its evidence. How does FBC's scenario planning compare to what Midgard describes? In particular, has FBC tested 'alternative resource portfolios against future "extreme" or "surprise" scenarios that incorporate one (1) or more significant discontinuities from BAU'?

A11: FBC's scenario planning in the LTERP includes identifying emerging trends and technologies, i.e., load drivers, not reflected in the Reference Case load forecast and examining their potential uptake or penetration levels through load scenarios. These loads drivers included elements, not captured at all or in any material way, in FBC's historical trends, such as significant electric vehicle (EV) growth, temperature changes due to climate change, new large commercial and industrial loads (such as cryptocurrency facilities) and hydrogen production. Several alternative load scenarios based upon these potential load drivers were developed, to explore the potential increase or decrease in FBC's load requirements relative to the business as usual (BAU) load forecast. Therefore, the scenarios represent discontinuities, and not just extrapolation, of historical trends. FBC's portfolio analysis includes developing alternative resource portfolios to meet the Reference Case load forecast as well as the alternative load scenarios. Given the 20-year planning horizon of the LTERP, the load drivers and scenarios were developed to reflect emerging technologies and new load trends which have the potential to be relevant and impactful over the entire 20-year period.

FBC's load drivers and scenarios did not include future "extreme" or "surprise" scenarios, such as those including significant climate/environmental/geologic disruptions, energy supply discontinuities, epidemics and pandemics, market crashes and financial collapses or wars, insurrections or malicious actors, included by RCIA in its evidence. FBC assumes these types of load drivers to be lower probability events and relatively short term in nature as compared to the load drivers included in the LTERP. FBC's system has proved to be reasonably resilient in response to significant climate and environmental disruptions, as noted in the response to Question 8 above, as well as pandemics and market and financial crises that have occurred over time. However, FBC has not explicitly tested alternative resource portfolios against future "extreme" or "surprise" scenarios as part of its LTERP portfolio analysis.

Q12: Midgard states: "In Midgard's opinion, FortisBC's alternative resource portfolios could be more compellingly evaluated against these resiliency elements by using a structured scenario planning approach, thereby testing

the resiliency of each portfolio against plausible futures that feature significant discontinuities with the status quo assumptions upon which the LTERP forecasts are based." Does FBC agree that the scenario planning is the appropriate way to plan for resiliency?

A12: FBC does not agrees that scenario planning is the appropriate way to plan for resiliency. As discussed in the response to Question 11 above, the LTERP scenario planning is based on assessing the impacts of load drivers, not captured in any significant way in historical trends, on various resource portfolios over the 20-year planning horizon. The load drivers typically have the impact of increasing or decreasing the load requirements over the entire planning horizon and so are continuous and long lasting in nature. In order to incorporate resiliency in its portfolio analysis, FBC recommends that the various resource portfolios should be evaluated, or stress tested, against various resiliency metrics, such as those related to the more discrete short-term and low-probability "surprise" or "extreme" events. For example, how one portfolio compares to another portfolio in terms of resiliency to a specific potential flooding or wildfire event.

It is also important to plan for resiliency in terms of the transmission and distribution system. It is critical that both the supply-side resources and the transmission and distribution system are resilient in order to ensure FBC is able to prevent, withstand, and recover from system failures or unforeseen events. FBC takes a proactive approach in this regard, as discussed in Question 9 above.

5.0 EVALUATION OF THE PORTFOLIOS

Q13: Midgard describes three methods of evaluating portfolios: portfolio theory, risk mitigation and structured decision making. Does FBC endorse any of these techniques? How does FBC evaluate its portfolios?

A13: In responding to this question, FBC will discuss each one of these three methods separately.

Portfolio theory demonstrates that the performance of a portfolio, in terms of resiliency, improves with the combination of non-correlated assets. In other words, a more diverse mix of resources options in a portfolio can improve the overall resiliency of the portfolio. While FBC has not utilized this method directly, the LTERP portfolio analysis does consider resource diversity and geographic locational diversity in assessing the various portfolios. FBC's preferred portfolios include a diverse mix of non-correlated energy and capacity resources, including PPA, market, wind, solar, battery storage and SCGT plants. These resources each have different energy and capacity profiles and different locational characteristics on FBC's system. While FBC has not explicitly performed analysis relating to portfolio theory, the mix of non-correlated resources in the preferred portfolios in the LTERP reflect its intent.

Risk mitigation involves assessing the risk of scenarios through risk matrices, where event risks for a scenario are calculated as the product of the probability that the event will materialize multiplied by the consequence of that event. When a risk score indicates that the risk is unacceptable, it is generally expected that mitigations are required to change the risk so that it moves into either the acceptable or manageable categories. Different mitigations may result in different residual risks and have different costs. FBC has not used this method in its resource planning as it considers this a more complex exercise than is required for high-level long-term resource planning. Furthermore, it is not clear to FBC how it would assign probabilities to "extreme" and "surprise" events that are outside of the historic experience of the utility. For example, prior to the heat dome event in June 2021, FBC would not have predicted such extreme temperatures and loads as likely to occur, especially in June. If the assignment of probabilities and consequences of such events are highly subjective, the value of this method becomes questionable.

Structured decision making is an approach for organized analysis of resource management decisions. It involves defining objectives, establishing evaluation criteria, developing alternatives and evaluating trade-offs so that a decision can be made. FBC has used this approach in its LTERP, developing several alternate portfolios and evaluating them based on several different attributes, relating to the objectives, and alternate load scenarios so that a preferred portfolio can be determined. FBC considers this approach to be appropriate for long-term resource planning as it enables the assessment of different portfolios against various attributes that relate to the planning objectives and alternate load scenarios. This method is also consistent with the BCUC Resource Planning Guidelines, which include the development of multiple resource portfolios and evaluation and selection of resource portfolios.

6.0 EVALUATION OF RESILIENCY IN FUTURE LTERPS

Q14: RCIA submits in response to BCUC IR 3.1 that "FBC's resiliency planning deficiency should be identified in the BCUC decision." Does FBC's treatment of resiliency make the resource plan deficient in any way?

A14: No. The 2021 LTERP meets the requirements for a long-term resource plan per the *Utilities Commission Act* (UCA) and the BCUC Resource Planning Guidelines, addresses the BCUC directives from the 2016 LTERP decision, and is consistent with the applicable *Clean Energy Act* (CEA) objectives, as discussed in Sections 1.4 and 1.5 of the LTERP. Furthermore, in its decision regarding FBC's 2016 LTERP, the BCUC Panel accepted the objectives of FBC's 2016 LTERP, which are consistent with those of the 2021 LTERP, as being in the public interest.[1]

[1] BCUC Order G-117-18, dated June 28, 2018, page 4.

As discussed above, FBC's system is reasonably resilient and FBC's LTERP considers resiliency from several different perspectives, including from that of existing supply-side resources, future resource portfolios and the transmission and distribution system. As discussed in response to Question 12 above, FBC does not agree with Midgard's recommended approach to resiliency. There is also no evidence that Midgard's recommendations are indicative of industry best practices or have been implemented anywhere in the utility industry. In response to BCSEA IR 3.6, Midgard was not able to identify any utilities in North America that practice resiliency evaluation in their long-term planning as described by Midgard. Midgard also clarifies in response to CEC IR1 8.1 that it is not its experience "that most utilities make use of resiliency planning to a greater degree than presented by FBC." Therefore, Midgard has not identified any aspect of FBC's LTERP that is out of step with long-term resource planning practices.

Finally, as discussed throughout this rebuttal evidence, FBC is proactive in its approach to resiliency and is taking steps to further improve the resiliency of its system and supply portfolio in responding to future disruptive events. FBC recognizes that many utilities are developing methods to evaluate and improve resiliency, especially in light of the impacts of climate change. FBC is committed to continual improvement and discusses below how it may improve its resource planning process with respect to resiliency.

Q15: Is FBC open to taking a different approach to resiliency in future LTERPs?

A15: While FBC's approach to resiliency has been appropriate and effective (as discussed in the previous responses), in light of the extreme and unpredictable weather events that have occurred in the recent past, FBC considers that it should expand its approach to more systematically considering resiliency in its next LTERP. This could include enhancing the LTERP portfolio analysis through the development of "extreme" or "surprise" events and evaluating various resource portfolios against these to assess, or stress-test, the portfolios' resiliency. FBC would need to develop an evaluation criteria for its portfolio analysis and likely need to include resiliency in its LTERP planning objectives. FBC would also need to consider the transmission and distribution system's ability to manage these types of events, as the interdependent relationship of supply-side resources and the system infrastructure should be considered in combination. However, FBC does not know, at this point, what incremental time and resources would be required to perform such analysis. Any enhanced approach to resiliency is something that FBC expects it would develop with input and feedback from stakeholders, such as through the LTERP Resource Planning Advisory Group (RPAG) process. Therefore, FBC recommends exploring this approach further and bringing forward recommendations as part of the development of its next LTERP.

7.0 CONCLUSION

Q16: Does this conclude FBC's Rebuttal Evidence?

A16: Yes.