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March 31, 2022

Residential Consumer Intervener Association
c/o Midgard Consulting Inc.
Suite 828 – 1130 W Pender Street
Vancouver, B.C.
V6E 4A4

Attention: Mr. Peter Helland, Director

Dear Mr. Helland:

Re: FortisBC Inc. (FBC)

2021 Long-Term Electric Resource Plan (LTERP) and Long-Term Demand-Side Management Plan (LT DSM Plan) (Application) – Project No. 159924

Response to the Residential Consumer Intervener Association (RCIA) Information Request (IR) No. 2

On August 4, 2021, FBC filed the Application referenced above. In accordance with the regulatory timetable established in British Columbia Utilities Commission Order G-24-22 for the review of the Application, FBC respectfully submits the attached response to RCIA IR No. 2.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

CHAPTER 1: EXECUTIVE SUMMARY

40.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 2.2 & 2.2.1

Executive Summary, Section 3 – Long-Term Load Forecast

FortisBC Inc. states:

> "As noted in the Section 2.3.2 of the Application, Guidehouse has estimated that 80 percent of light- duty EV charging will occur at home, and would potentially be eligible for participating in an EV charging peak mitigation program (i.e., 120 MW of the overall 150 MW of estimated peak demand associated with EV charging by 2040). It is estimated that an EV charging peak mitigation program may be able to shift up to 75 percent of this peak demand from EV charging at home, resulting in 90 MW that could potentially be shifted by 2040."

40.1. Please discuss if there anything prohibiting the start of the Electric Vehicle ("EV") charging peak mitigation program earlier than planned, if it proves cost effective to offset demand growth and defer resource additions?

40.1.1. If not, please elaborate on the steps required to implement this program.

Response:

FBC cannot start an incentive-based permanent EV charging peak mitigation program until it is approved in a future DSM Expenditure Plan. FBC anticipates including a permanent residential DR program in its upcoming DSM Expenditure Plan Application (to be filed later in 2022) that would include EV charging. FBC is also investigating software-based tools for shifting EV loads, which could be incorporated into the permanent DR program if it proves to be an effective solution and is approved in the next DSM Expenditure Plan.

41.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 4.1 & 27.2

Executive Summary, Section 10 – Supply-Side Resource Options
Section 10.2.3 – Environmental Attributes

FortisBC Inc. states in response to RCIA IR 4.1:

> "Under the BC Government's Carbon Neutral program, legislated under the Climate Change Accountability Act,1 the Province has operated an emissions offset system since 2009 to attain carbon-neutral government operations. Offsets under this regulated program are made in BC, are incremental, and are validated and verified to Provincial standards. This regulated carbon offset program currently does not extend to the private sector, and therefore any use of carbon offsets in BC to create "carbon neutral" gas are voluntary and are at risk of not being recognized by the provincial and federal governments. Until such time that a regulated carbon offset system is in place provincially or federally, FBC cannot rely on carbon offsets to satisfy its CleanBC targets.
>
> Note that this also applies to the use of Renewable Energy Certificates (RECs) in BC to reduce the carbon footprint of electricity, as the Province currently does not officially recognize the use of RECs in BC."

FortisBC Inc. also states in response to RCIA IR 27.2:

> "The clean market adder for electricity purchases was developed by IHS Markit. IHS Markit has requested that FBC not disclose the yearly forecasted values publicly due to the commercial sensitivity. The clean market adder was estimated by IHS Markit to be approximately $2 per MWh on a levelized basis over the planning horizon. The actual cost of a clean market adder will be a point of negotiation between FBC and Powerex or a third party.
>
> The implied premium for renewable natural gas is the difference between the forecast prices of renewable natural gas and conventional natural gas in Appendix E."

41.1. What is the forecast cost of clean market adders, by year, over the planning period?

Response:

As noted in the cited response, the clean market adder for electricity purchases was developed by IHS Markit. IHS Markit has requested that FBC not disclose the yearly forecast values as they consider it commercially sensitive and proprietary information. The clean market price of $2 per MWh on a levelized basis is a reasonable placeholder established by an independent third party for the premium associated with the delivery of clean power and should be viewed as an estimate only. The actual cost for clean market power will be a point of negotiation between FBC and

Powerex or another third party. The implementation may not necessarily be a REC adder, but rather a service fee for sourcing and providing power from resources considered clean and renewable under the *Clean Energy Act*.

As noted in the cited response, the implied premium for renewable natural gas is the difference between the forecast prices of renewable natural gas and conventional natural gas in Appendix E. However, this implied premium was not used as a variable within the LTERP, as FBC instead used the RNG or conventional natural gas forecasts provided in Appendix E.

41.2. Please confirm if FortisBC Inc. ("FBC") has investigated the concept of generating natural gas, selling it to a third party, adding the $2/MWh clean market adder, and buying it back as clean energy?

Response:

Since this IR specifically refers to FortisBC Inc. or FBC (the electric utility) and FBC cannot generate natural gas, FBC interprets this IR as asking if FBC has investigated "the concept of generating electricity using natural gas, selling it to a third party, adding the $2/MWh clean market adder, and buying it back as clean energy?" FBC notes that the clean market adder is an additional cost on top of electricity market power to purchase clean and renewable power (and the associated clean energy attributes), not to "green-up" non-clean power.

FBC has not considered the concept posed in this IR and does not believe it to be plausible. FBC intends to purchase certified clean market power through paying an adder for the certification, and does not intend to arbitrage non-clean power into the market for the purposes of "greening-it-up" and claiming it back as being clean energy.

FBC would consider acquiring renewable natural gas (through FortisBC Energy Inc.) and either using that to generate electricity in a RNG SCGT (as proposed in this LTERP) or selling the RNG to a third party to generate electricity and buying it back. However, the $2 per MWh adder would not apply in these situations as they result in a capacity product[1] and FBC expects an alternate price arrangement would be required.

[1] The $2 per MWh clean market adder is for wholesale market energy purchases only (even though the product may come with firm capacity, FBC is buying for the energy), not capacity resources. FBC has little expectation that if market capacity is required for any reason that the $2 per MWh adder would apply, or even that clean market capacity would be available. Alternatively, if RNG were to be used in a SCGT to produce an energy product, the electricity price would have to be based on the price of the RNG and the cost of the plant, not the wholesale market electric price, and is not competitive at this time with alternate energy products such as wind.

41.3. If yes, please discuss the financial implications for FBC customers.

Response:

Please refer to the response to RCIA IR2 41.2.

CHAPTER 2: PLANNING ENVIRONMENT

42.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 11.3, 36.1, & 36.5

Section 2.3.4 – Small-Scale Distributed Generation

Section 12.3 – Direct Customer Surveys Section 13.2 – 2021 LTERP Action Plan

FortisBC Inc. states in response to RCIA IR 11.3:

> "Currently, less than one percent of residential customers have net metering systems. Therefore, if all 34 percent of residential customers cited in the preamble were to install solar panels, the cumulative percentage would be in the 34 to 35 percent range. FBC does not expect that all of the customers surveyed will actually complete installations, but does not have a basis for speculating on the number that can or will."

FortisBC Inc. also states in response to RCIA IR 36.1:

> "It is likely that the actual number of residential customers purchasing or leasing an EV in the next three years will be less than 43 percent, as intent indicated through a survey does not always translate to action."

FortisBC Inc. also states in response to RCIA IR 36.5:

> "Not confirmed. FBC does not expect that solar PV installations will reach the level indicated by the survey results and notes that only 0.5 percent of customers have net metering installations (which are required for grid-connected solar installations) today. Many customers aspire to install solar, but clearly barriers (primarily economic) exist to actual implementation."

42.1. Regarding gauging customer adoption of Solar Photovoltaic ("PV") technology and Electric Vehicles ("EVs"), please confirm if there are any known issues with survey methodologies (e.g., does FBC have a concern that customers are responding enthusiastically beyond their willingness to act)?

Response:

The survey methodology, which evaluated the stated intentions of respondents, was sound. However, FBC did not intend to use the "intention" data gathered in the survey to forecast customer behavior or, specifically, to infer the adoption rates of solar photovoltaic technology and electric vehicles.

Many factors can influence a customer's intentions to act, including the barriers noted in the response to RCIA IR1 36.5. Barriers that affect technology adoption rates can be economic, social, and personal in nature. For example, customers may lack the necessary financial means

to invest in solar PV and EVs even if they would like to do so. Other customers may miss opportunities to act on time-limited incentives, while others may not respond as expected to necessary lifestyle changes. The complexity of these issues makes it impossible to draw direct correlations between intention data and actual purchase behavior.

42.2. Does FBC account for these survey results in forecast models?

42.2.1. If yes, please elaborate.

42.2.2. If not, please explain why not.

Response:

FBC does not directly account for the survey results in LTERP load forecasts. As discussed in Section 3.1, the BAU load forecast is developed based on historical intrinsic load drivers, which captures historical rooftop solar and EV charging penetration. The Reference Case load forecast builds on the BAU forecast by including forecast additional electric vehicle charging load (per the *ZEV Act* light-duty sales targets) and new industrial loads with high confidence of materializing. As discussed in Section 12.3, the surveys were intended to gain insight from customers on their thoughts about FBC's LTERP objectives, resource options, EV ownership and charging, and rooftop solar and battery storage in order to generally inform FBC of customers' potential future needs, at a high level, and preferences in terms of options for FBC to help manage these new loads should they materialize.

43.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 9.1, 9.2, 9.3, & 9.4

Section 2.3.2 – Electric Vehicles

FortisBC Inc. states in response to RCIA IR 9.1 & 9.1.1:

> "For clarity, there are no mandated investment levels for FBC related to encouraging EV adoption. However, the Province has encouraged public utility investment in public direct current fast charging (DCFC) stations by making such investment a prescribed undertaking under section 18 of the Clean Energy Act as set out in the Greenhouse Gas Reduction (Clean Energy) Regulation (GGRR).
>
> FBC believes that investments by the Company related to supporting provincial objectives for EV adoption should be paid for by the customers directly receiving the associated benefits to the extent possible. For example, customers using the FBC public DCFC network are charged a rate that is designed to recover all incremental costs from station users over the life of the stations. It is reasonable to expect the costs of DSM measures to shift customer EV charging loads will be recovered from all ratepayers given the distributed nature of the capacity and infrastructure benefits."

FortisBC Inc. also states in response to RCIA IR 9.2 and 9.2.1:

> "The feedback received from RPAG stakeholders has generally been focused on encouraging FBC to mitigate EV load impacts and develop measures to shift EV demand, rather than asking FBC to undertake additional spending to encourage EV adoption. It is expected, however, that EV peak mitigation programs will help support adoption of EVs by providing incentives for customers that are able to shift their EV charging loads."

FortisBC Inc. also states in response to RCIA IR 9.3:

> "For clarity, there are no mandated investment levels for FBC related to EV adoption. FBC does not expect to incur capital and operating costs at a level for which it would not be afforded a reasonable opportunity to recover those costs from ratepayers."

FortisBC Inc. also states in response to RCIA IR 9.4:

> "For clarity, there are no mandated investment levels for FBC related to EV adoption. To date, FBC's investments have primarily focused on the deployment and operation of public DCFC stations; RS 96 has been designed to recover the costs of this program from EV drivers. In the response to BCUC IR1 14.1 from the Application for Approval of Rate Design and Rates for EV DCFC Service, FBC provided a sensitivity analysis (Table 3-4) for the rate impacts to all FBC customers if EV usage of the public DCFC stations varies from forecast.

FBC is still developing its plans and related forecasts for investments for other EV-related initiatives, including peak demand mitigation as well as incentive programs for fleet and workplace charging infrastructure. Where possible, EV-related programs will be designed to recover costs from EV drivers (as with FBC public DCFC stations) or will be designed to directly benefit all ratepayers (e.g., EV charging demand reduction programs)."

43.1. Does FBC have concerns that EV peak mitigation programs will shift costs associated with EV ownership onto customers who cannot afford EVs?

Response:

FBC has not yet developed program details of a future EV peak mitigation program, so it is unable to comment at this time on whether the program will have a ratepayer impact measure test (i.e., a metric that assesses a program's impact on customer rates and non-participants) less than one. By shifting EV charging from peak demand periods, an EV peak mitigation program would reduce FBC's requirement for additional system infrastructure and generation resources, to the benefit of all customers. FBC will continue to monitor its DSM programs, including any future EV peak mitigation program, to ensure they meet the appropriate cost-effectiveness test as required by regulation.

43.1.1. Is your answer to the above question valid at all levels of EV penetration as a percentage of total vehicles?

43.1.1.1. If not, please discuss different cost-shifting effects at different levels of penetration.

Response:

FBC confirms the answer to the above question is valid at all levels of EV penetration.

44.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 10.1

Section 2.3.4 – Small-Scale Distributed Generation

FortisBC Inc. states:

> "In any Net Metering program where participating customers have the ability to reduce or eliminate electricity billing, and the energy rates normally recover some of the fixed costs of operating the electric system (as is the case with FBC), participating customers will avoid some cost responsibility which will need to be recovered from other customers. In the case of FBC's residential customers, this is demonstrated by the 2017 Cost of Service Analysis filed with the BCUC on December 22, 2017. It can seen in the cost summary that on a cost per kWh basis, energy costs were $0.04185, while the demand (fixed) costs were $0.10255.3 As an energy-only rate, the Residential rate notionally collects both of these costs in a blended energy rate. A customer that requires little or no energy from FBC still benefits from being connected to the FBC system, but avoids costs related to its operation."

44.1. FBC appears to acknowledge that there is effectively a subsidy to residential solar PV customers. In FBC's opinion, at what level of subsidy could this be considered materially unfair to customers who cannot afford or are not physically able to install solar PV installations (e.g., apartment dwellers)? Please elaborate.

Response:

FBC would consider it unfair, and may apply to the BCUC for a change to existing rates, when the subsidy inherent in the current Net Metering rate results in a noticeable impact to the rates of other residential customers reflected by a decline in the class revenue-to-cost ratio to below 95 percent that is attributable to customers participating in the program.

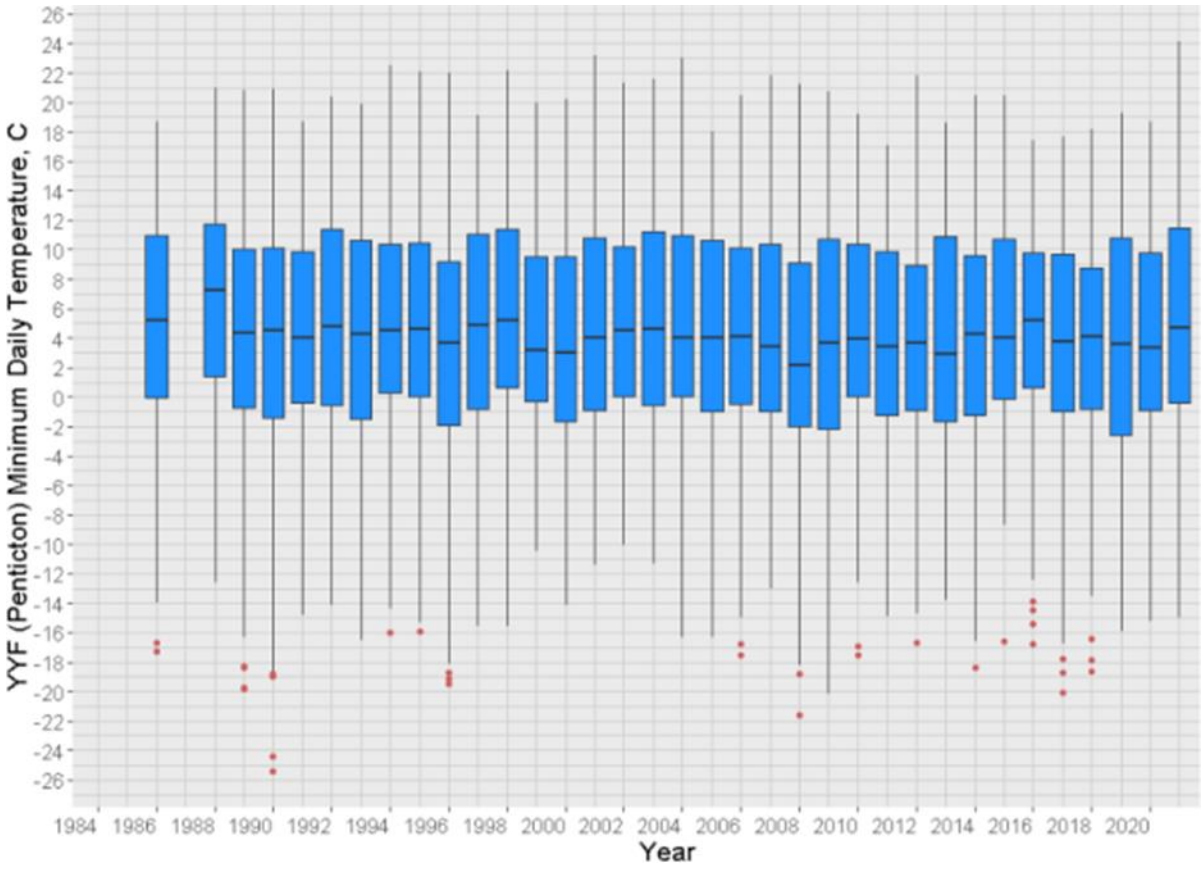
FBC has taken steps to reduce the subsidy inherent in the Net Metering rate by capping both the capacity and energy generation capability of Net Metered systems, limiting Net Excess Generation, and setting the price at which it purchases Net Excess Generation at a proxy for the avoided cost of power. In addition, in 2019, FBC received approval to gradually increase the recovery of fixed costs by raising the residential rate Customer Charge.

CHAPTER 4: LOAD SCENARIOS

45.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 20.1
Section 4.1.1 – Load Drivers
Section 2.2.1 – Climate Change

FortisBC Inc. states:

> "As discussed in Section 2.2.1, while the figures relate to average warming temperatures over time, they do not capture the increase in the weather and temperature volatility that has occurred in recent years and which is expected to continue in the future. Therefore, while overall annual warming of average temperatures is expected, there is also the possibility for colder cold snaps and warmer hot spells due to the volatility associated with climate change. Environment Canada data for Penticton airport (YYF) includes minimum temperatures from 1986 to present day[2]. The plot below shows the minimum temperatures by year.



45.1. Please confirm that the mean trend is downward (i.e., average annual temperature is decreasing over the shown period).

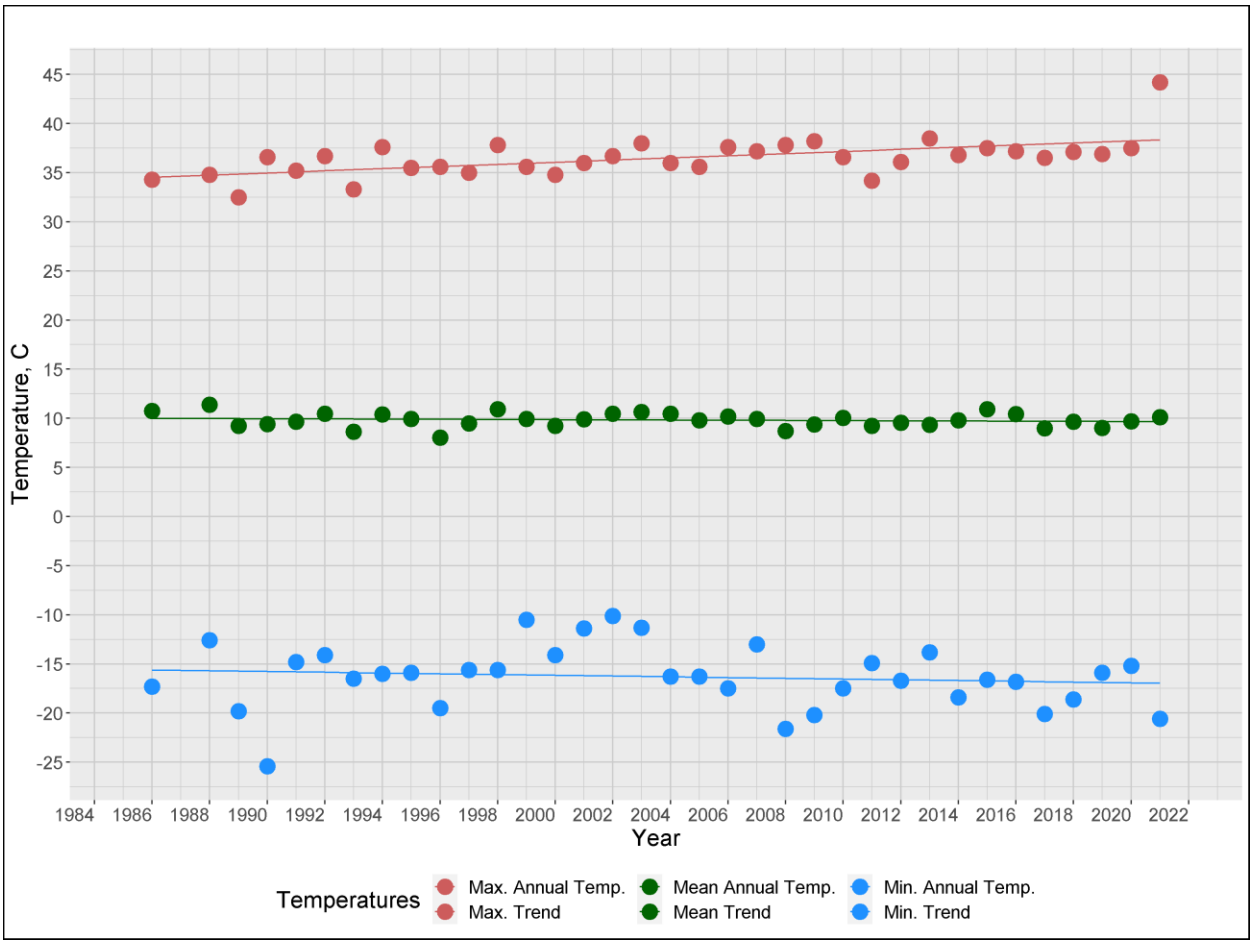
[2] Minimum temperature data for 1987 is not available.

45.1.1. Please confirm the same observation is true for the peak trend (high whiskers), despite the 2021 Heat Dome event.

Response:

The figure provided in the response to RCIA IR1 20.1 (and cited in the preamble) only shows the daily minimum temperatures in a box plot. The figure does not show the Penticton average annual temperature.

For the purposes of this IR, FBC created the figure below which shows the high and low peak annual temperatures, as well as the average (mean) annual temperature. The figure also includes trend lines for each series.



The table below summarizes the temperature data trends illustrated in the figure above.

	Maximum Temperature	Mean Temperature	Minimum Temperature
Trend (degree Celsius/year)	0.11	-0.01	-0.04
R^2	33%	1.9%	1.4%

FBC confirms that the mean temperature trend is downward, but is very gradual (0.01 degrees Celsius/year). The maximum temperature trend is increasing, and the year-over-year increase is slightly more than 1/10th of a degree Celsius.

In summary, the historical temperature data from Environment Canada shown in the figure above illustrates that, while the mean annual temperature is quite stable, the extreme cold temperatures are getting colder while the extreme warm temperatures are getting warmer.

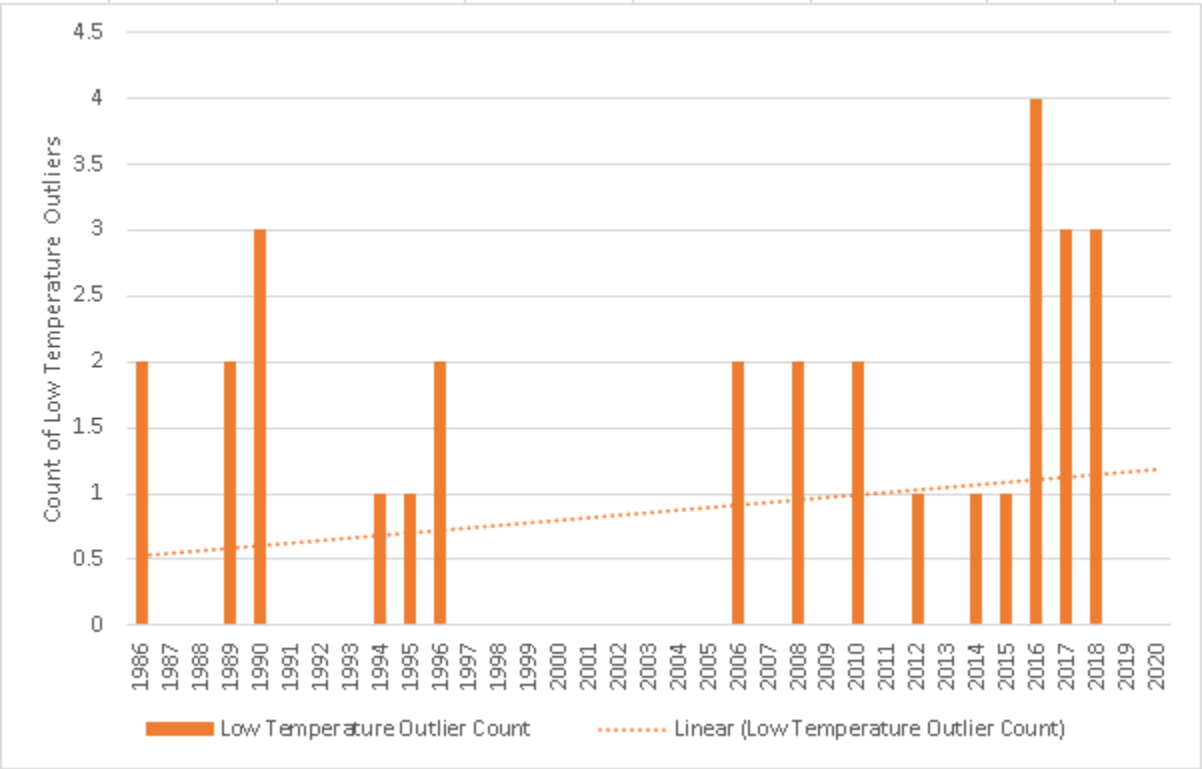
Additionally, the figure shows that the weather events of 2021 resulted in the widest gap yet recorded between the annual minimum and maximum temperatures.

45.2. Please provide statistical verification of the "*increase in the weather and temperature volatility*" including a P-Test of false-negative/false-positive events.

Response:

The response to RCIA IR1 20.1 was intended to be descriptive in nature and simply observed that the count of low temperature anomalies has increased recently.

The figure below plots the count of low temperature outliers in each year using the same data set in developing the response to RCIA IR1 20.1.



Qualitatively, it appears that the number of low temperature outliers is increasing, and the dotted line confirms this apparent trend. However, the p-value for the slope is 32 percent, indicating that the correlation between years and the number of low temperature outliers in any given year is not statistically significant.

FBC notes that p-tests are an element of inferential statistics, normally used to discern whether or not features of a random sample of observations are applicable to a wider population. FBC does not believe that inferential statistics is an appropriate methodology in this case, as the requirements for a random sample cannot be met.

45.3. On what analytical basis did FBC choose 1.5 as your whisker's multiplier, including supporting academic references, if any.

Response:

The figure shown in the response to RCIA IR1 20.1 was prepared with the R programming language and, specifically, the ggplot2 package. Links to documentation are as follows:

https://ggplot2.tidyverse.org/reference/geom_boxplot.html

https://vita.had.co.nz/papers/boxplots.pdf

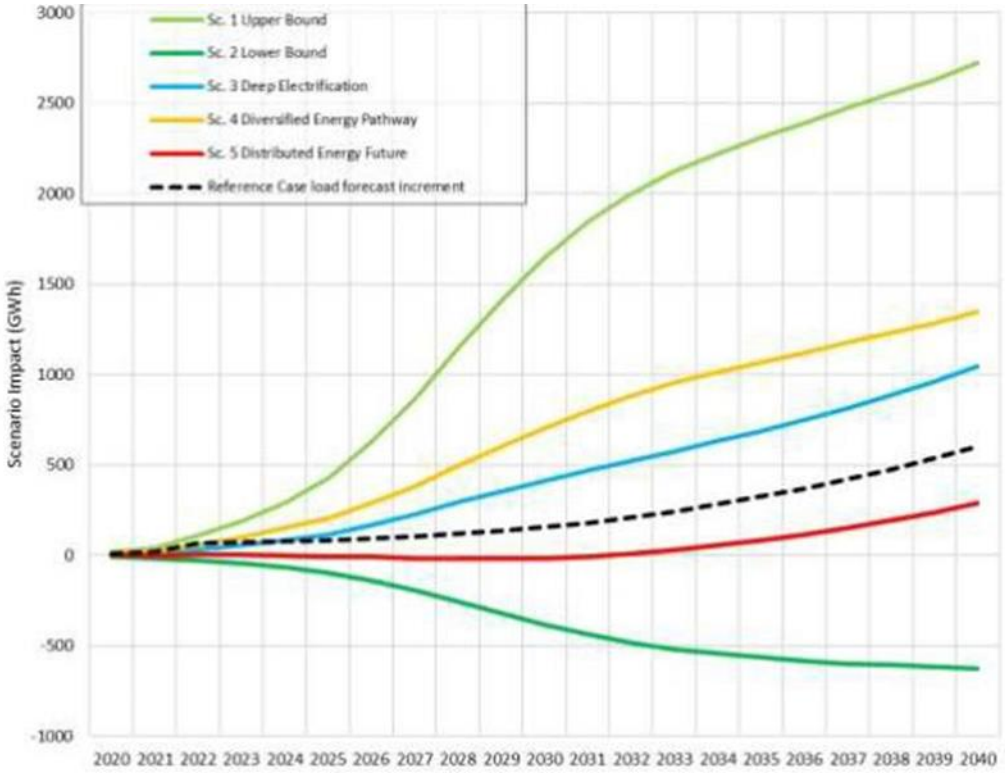
The referenced web site above includes the following method assumptions:

> The upper whisker extends from the hinge to the largest value no further than 1.5 * IQR from the hinge (where IQR is the inter-quartile range, or distance between the first and third quartiles). The lower whisker extends from the hinge to the smallest value at most 1.5 * IQR of the hinge. Data beyond the end of the whiskers are called "outlying" points and are plotted individually.

46.0 Reference Exhibit B-8, FortisBC Inc. Response to RCIA IR 21.1 & 21.1.1
Section 4.1.3 – Load Scenario Results

FortisBC Inc. states:

> "Not confirmed. As discussed in Section 4.1.1, the load scenarios developed by Guidehouse should be considered incremental to the BAU forecast but not the Reference case forecast. Therefore, in Figure 4-1, the BAU load forecast has a 0 GWh impact for all years. The figure below includes the annual energy included in the Reference Case load forecast which is incremental to the BAU forecast. As shown in Figure 3-3, this incremental annual energy is primarily related to EV charging."



46.1. Please explain how the Guidehouse load scenarios contribute to the Reference case?

Response:

The Guidehouse load scenarios do not contribute to the Reference Case load forecast. As discussed in Section 4, FBC employed the consulting services of Guidehouse to identify emerging trends and technologies not reflected in the Reference Case load forecast and to examine their potential uptake or penetration levels through several alternate load scenarios.

46.2. Please provide a table with the six (6) lines shown in figure above, plus the BAU case, showing the energy quantities in absolute terms.

Response:

The table below provides the annual energy quantities in absolute terms for the lines shown in the figure provided in the response to RCIA IR1 21.1.1 as well as for the BAU load forecast.

Year	BAU load forecast	Reference Case load forecast	Sc. 1 Upper Bound	Sc. 2 Lower Bound	Sc. 3 Deep Electrification	Sc. 4 Diversified Energy Pathway	Sc. 5 Distributed Energy Future
2020	3,589	3,597	3,611	3,580	3,595	3,601	3,591
2021	3,698	3,717	3,738	3,678	3,708	3,718	3,698
2022	3,723	3,788	3,831	3,692	3,754	3,781	3,725
2023	3,716	3,787	3,902	3,670	3,770	3,815	3,718
2024	3,716	3,794	4,007	3,650	3,799	3,865	3,716
2025	3,770	3,855	4,199	3,672	3,887	3,976	3,764
2026	3,811	3,904	4,437	3,671	3,978	4,097	3,802
2027	3,852	3,957	4,713	3,658	4,076	4,229	3,836
2028	3,893	4,012	5,038	3,638	4,186	4,386	3,876
2029	3,934	4,070	5,339	3,617	4,289	4,534	3,917
2030	3,975	4,130	5,618	3,593	4,385	4,676	3,958
2031	4,017	4,196	5,862	3,580	4,485	4,816	4,011
2032	4,058	4,266	6,053	3,575	4,577	4,937	4,064
2033	4,098	4,341	6,223	3,580	4,674	5,053	4,127
2034	4,138	4,420	6,360	3,594	4,769	5,152	4,192
2035	4,179	4,501	6,486	3,614	4,866	5,247	4,260
2036	4,218	4,586	6,606	3,636	4,966	5,339	4,331
2037	4,258	4,677	6,731	3,661	5,073	5,435	4,408
2038	4,300	4,774	6,852	3,694	5,187	5,531	4,493
2039	4,341	4,875	6,969	3,725	5,302	5,625	4,578
2040	4,383	4,983	7,103	3,758	5,428	5,731	4,671