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March 12, 2024

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Patrick Wruck, Commission Secretary

Dear Patrick Wruck:

Re: FortisBC Inc. (FBC)

FBC Electric Vehicle (EV) Direct Current Fast Charge (DCFC) Energy-Based Rate Application (Application)

Response to British Columbia Utilities Commission (BCUC) Information Request (IR) No. 1

On December 22, 2023, FBC filed the Application referenced above. In accordance with the regulatory timetable established in BCUC Order G-17-24 for the review of the Application, FBC respectfully submits the attached response to BCUC IR No. 1.

FBC requests that the Live Excel Spreadsheet included as Attachment 4.1 be filed on a confidential basis and held confidential by the BCUC in perpetuity, pursuant to section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-72-23. Confidential Attachment 4.1 contains commercially sensitive and market competitive information regarding detailed performance and utilization of FBC's EV DCFC service for each individual station which, if publicly disclosed, could potentially jeopardize the market competitiveness of FBC's individual stations, which could result in higher costs for customers. FBC, therefore, requests that Attachment 4.1 be filed on a confidential basis in perpetuity and that it only be made available to interveners upon executing a Confidentiality Declaration and Undertaking form acceptable to the BCUC.

For convenience and efficiency, if FBC has provided an internet address for referenced reports instead of attaching the documents to its IR responses, FBC intends for the referenced documents to form part of its IR responses and the evidentiary record in this proceeding.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Registered Interveners

1.0 Reference: BACKGROUND

Exhibit B-1, FortisBC Inc. (FBC) Electric Vehicle (EV) Direct Current Fast Charging (DCFC) Energy-Based Rate Application (Application), Section 1.1.1, pp. 2–4

Temporary Dispensation

On pages 2 and 3 of the Application, FBC states:

> […] On December 18, 2023, FBC applied to Measurement Canada's temporary dispensation program for its existing EV DCFC charging stations and expects to receive approval early in 2024. FBC's ability to implement the energy-based rates applied for in this Application is contingent on FBC receiving approval for temporary dispensation from Measurement Canada.

On page 4 of the Application, FBC indicates that FLO Services Inc. (FLO) will implement changes to FBC's EV DCFC stations and network to support energy-based rates. FLO requires at least 4 weeks for implementation. FBC proposes that the effective date of its energy-based rates be provided in a compliance filing with the British Columbia Utilities Commission (BCUC) for endorsement of the revised RS 96 tariff reflecting its energy-based rates.

1.1 Apart from the minimum 4 weeks for FLO's network changes, please briefly discuss how long FBC expects to transition to the proposed energy-based rate after receiving temporary dispensation approval from Measurement Canada (e.g. with considerations to the time needed for processing a customer notice, mobile app change, billing system configurations, etc.).

Response:

FBC does not expect further time will be needed for the transition beyond the time required for FLO's implementation of its network changes (i.e., beyond the minimum four weeks). As discussed in Section 4.1 of the Application, FBC will undertake the other transitional activities such as communication to customers and billing system configurations at the same time as FLO's implementation work.

FBC clarifies that its reference to a "minimum" of four weeks reflects that FBC is proposing to implement the energy-based rate on the 1st day of the month following when FLO's implementation is complete (as opposed to implementing the rate midway through a month). Thus, FBC would likely implement the rate a certain number of days or weeks after FLO completes its implementation, depending on when in the month FLO's implementation is complete.

1.2 Please explain whether FBC will implement energy-based rates (i) for all stations at once or (ii) in multiple phases where both energy-based and time-based rates will coexist for a certain period.

Response:

FBC intends to implement energy-based rates for all stations at once.

1.3 Please confirm, or explain otherwise, in the event one or more of FBC's DCFC stations do not qualify for temporary dispensation, whether FBC will continue to charge time-based rates for those stations.

Response:

FBC expects that all of its DCFC stations will receive temporary dispensation as they all meet the requirements set out by Measurement Canada.

However, in the unlikely event that one or more of the stations do not qualify for temporary dispensation, FBC will work with Measurement Canada and FLO to implement the changes necessary to enable these stations to receive temporary dispensation. In this unlikely scenario, FBC would seek BCUC approval to continue to charge the existing time-based rates for those individual stations for which temporary dispensation was not received and would file an updated revised RS 96 tariff that includes both time-based and energy-based rates as part of the compliance filing to the BCUC's decision on this Application.

2.0 Reference: BACKGROUND

Exhibit B-1, Section 1, p. 1

Customer Bill Impacts on Transition to Energy-Based Rate

On page 1 of the Application, FBC states:

> Currently, the rates at FBC's EV DCFC stations are approved under Rate Schedule (RS) 96 on a permanent basis pursuant to BCUC Order G-350-21, dated November 30, 2021. The current time-based charging rates are $0.26 per minute for the 50 kW stations and $0.54 per minute for the 100 kW stations.

2.1 Please complete the following tables for the three scenarios listed below to illustrate the customer bill impact for various EV models at different direct current (DC) charging acceptance rates, assuming all the EVs start at a 10% state of charge. Include any additional assumptions used.

Scenario 1 - 2019 Nissan Leaf (40 kW DC Charging Acceptance Rate)

Power Level	Charge Duration	Total kWh Dispensed	Existing Time-Based Rate (cents/min.)	Total Charging Bill ($)	Proposed Energy-Based Rate (cents/kWh)	Total Charging Bill ($)	Bill Impact (%)
(A)	(B)	(C)	(D)	(E = B*D /100)	(F)	(G = C*F /100)	(H = (G/E - 1)*100)
50 kW	30 min.		26		42		
100 kW	30 min.		54		42		

Scenario 2 - 2019 Kia Soul (77 kW DC Charging Acceptance Rate)

Power Level	Charge Duration	Total kWh Dispensed	Existing Time-Based Rate (cents/min.)	Total Charging Bill ($)	Proposed Energy-Based Rate (cents/kWh)	Total Charging Bill ($)	Bill Impact (%)
(A)	(B)	(C)	(D)	(E = B*D /100)	(F)	(G = C*F /100)	(H = (G/E - 1)*100)
50 kW	30 min.		26		42		
100 kW	30 min.		54		42		

Scenario 3 - 2022 Audi Q4 E-Tron (125 kW DC Charging Acceptance Rate)

Power Level	Charge Duration	Total kWh Dispensed	Existing Time-Based Rate (cents/min.)	Total Charging Bill ($)	Proposed Energy-Based Rate (cents/kWh)	Total Charging Bill ($)	Bill Impact (%)
(A)	(B)	(C)	(D)	(E = B*D /100)	(F)	(G = C*F /100)	(H = (G/E - 1)*100)
50 kW	30 min.		26		42		
100 kW	30 min.		54		42		

Response:

Concurrently with these IR responses, FBC has filed an Evidentiary Update to the Application which updates FBC's proposed energy-based rate from $0.42 per kWh to $0.39 per kWh. As explained in the Evidentiary Update, the change to the proposed energy-based rate is primarily due to an update to the BC Low Carbon Fuel Standard (BC-LCFS), which became effective on January 1, 2024[1] and has changed the calculation related to carbon credits. FBC describes the changes and the impact on the calculation of the energy-based rate in the Evidentiary Update. Additionally, as part of the Evidentiary Update, FBC has updated the rate calculation to include actual data for the full year of 2023 (the data included in the Application only included actuals up to November 2023).

FBC has accordingly responded to this IR using the updated proposed energy-based rate of $0.39 per kWh. Further, to respond to this IR, FBC used the charge curves and usable battery capacity[2] information publicly available from the EV-Database (https://ev-database.org/) for the three EV models identified by the BCUC.

- 2019 Nissan Leaf: https://ev-database.org/car/1106/Nissan-Leaf#charge-table
- 2019 Kia Soul: https://ev-database.org/car/1749/Kia-e-Soul-64-kWh
- 2022 Audi Q4 E-Tron: https://ev-database.org/car/1527/Audi-Q4-e-tron-45-quattro

FBC applied the same methodology for the analysis of all three EV models. FBC notes that the calculations reflect the charging conditions when the charge curves of these EV models were developed by EV-Database. The charge curves developed by EV-Database do not reflect all charging conditions, as factors such as the weather, charger configurations, and battery health can all impact charging speeds in certain circumstances. Therefore, the real life experience for the three EV models at FBC's DCFC stations may be different than the analysis shown below.

The analysis provided below shows how energy-based rates will address the disadvantage that time-based rates create for vehicles with a charging rate that is slower than the station charging rate, such as in the Nissan Leaf. While EV's with faster charging rates, such as the 2022 Audi Q4 E-Tron, will pay slightly more than under time-based rates, this is reasonable as these vehicles can take advantage of the full charging rate of the station and will be paying for the electricity they receive. Overall, none of the bill impacts are expected to be greater than 50 percent.

FBC provides the detailed analysis below for the three EV models identified.

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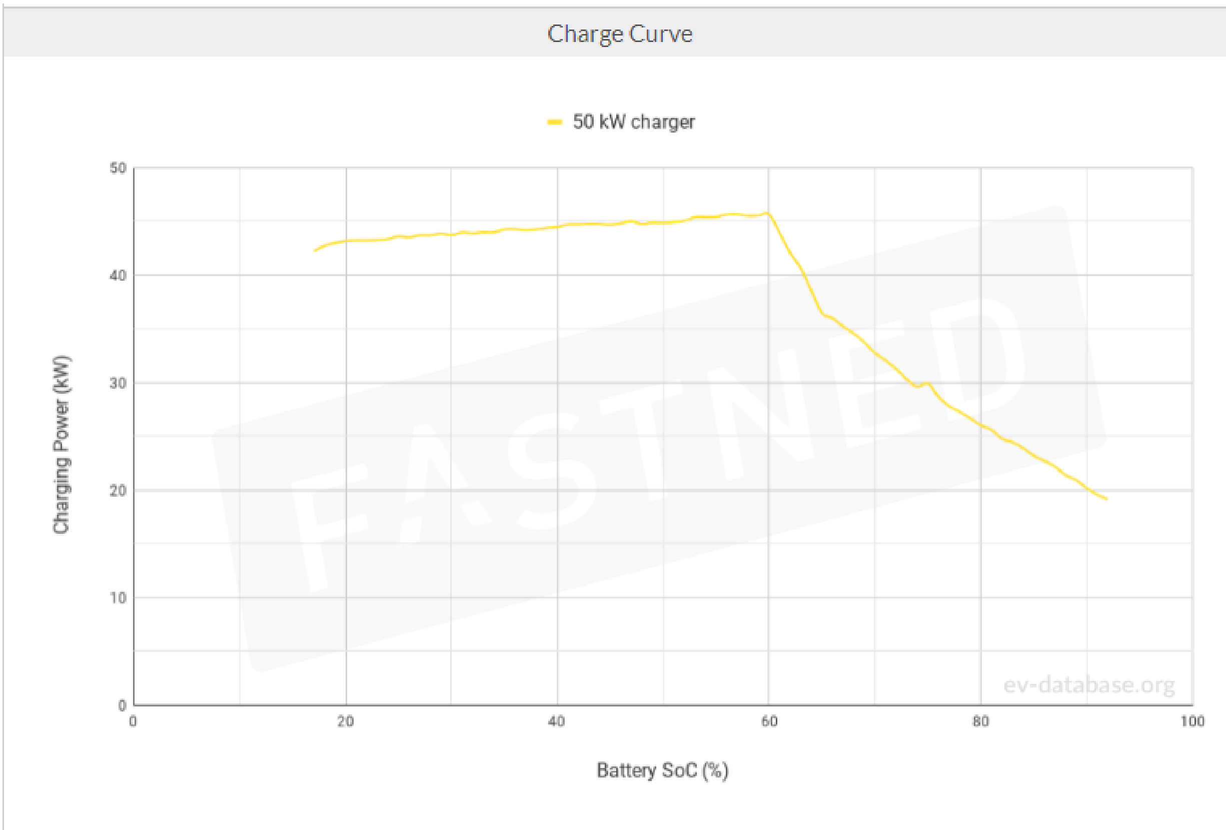
[1] https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels

[2] According to EV-Database, the usable battery capacity is estimated based on average energy consumption and range under moderate drive style and climate. Real-life values may differ significantly.

2019 Nissan Leaf

Figure 1 below shows the charge curve of a 2019 Nissan Leaf at a 50 kW DCFC station from EV-Database. According to the publicly available information, the useable capacity for a 2019 Nissan Leaf is 39 kWh.

Figure 1: Charge Curve of 2019 Nissan Leaf at 50 kW DCFC Station



Based on the charge curves shown above and the usable battery capacity of 39 kWh, Table 1 below provides the calculation for the electricity dispensed and time required to charge from a 10 percent to a 90 percent State of Charge (SoC) in 5 percent increments. FBC notes that the amount of electricity dispensed to the 2019 Nissan Leaf would be the same for the 50 kW and 100 kW DCFC stations since this EV model can only use the CHAdeMO connector and has a maximum charge rate below 50 kW.

Table 1: Calculation for Electricity Dispensed and Charging Minutes Required from 10% SoC to 90% SoC for 2019 Nissan Leaf at both 50 kW and 100 kW EV DCFC Stations

EV DCFC Charger Power Level: 50 kW
Usable Battery Capacity: 39 kWh

SoC (%)	Charging Curves (kW)	Charging Power (kW)	Electricity Dispensed (kWh)	Time (min)	Cumulative (kWh)	Cumulative (min)
(a)	(b)	(c) - See Note 1	(d) = Battery x 5%	(e) = (d) / (c)	(f)	(g)
10%	40	40	2.0	2.9	2	3
15%	42	42	2.0	2.8	4	6
20%	43	43	2.0	2.7	6	8
25%	43	43	2.0	2.7	8	11
30%	43	43	2.0	2.7	10	14
35%	44	44	2.0	2.7	12	17
40%	44	44	2.0	2.7	14	19
45%	45	45	2.0	2.6	16	22
50%	45	45	2.0	2.6	18	24
55%	45	45	2.0	2.6	20	27
60%	45	45	2.0	2.6	21	30
65%	40	40	2.0	2.9	23	33
70%	33	33	2.0	3.5	25	36
75%	30	30	2.0	3.9	27	40
80%	26	26	2.0	4.5	29	44
85%	22	22	2.0	5.3	31	50
90%	20	20	2.0	5.9	33	56

Notes to Table:

1) The charging power in kW in column (b) is estimated from the charge curves.
2) Charging power is limited by either the EV charge curves or the charging power of the EV DCFC station, i.e., the lesser of the charge curve and maximum power level at the DCFC station.

Table 2 below provides the requested information for the 2019 Nissan Leaf based on the calculation from Table 1 above. The results of the analysis show:

- The owner of a 2019 Nissan Leaf (i.e., an EV with small battery capacity and a lower charge rate) would only pay approximately $0.39 more (+5 percent) under the proposed energy-based rate if using FBC's 50 kW DCFC station for 30 minutes of charging, but would save approximately $8.01 (-49 percent) if using FBC's 100 kW DCFC station for the same 30 minutes of charging.
- The owner of a 2019 Nissan leaf would benefit from FBC's proposed energy-based rate as the owner would no longer be disincentivized from using the 100 kW station due to cost. Although the car would not charge any faster at the 100 kW station, using the 100 kW station (e.g., if the 50 kW stations were already in use) would no longer be more costly

than using a 50 kW station. Under the time-based rates, the same owner would have to pay $8.40 more if they used a 100 kW station. Thus, FBC's proposed energy-based rate creates more charging options for the owner of small EVs such as the 2019 Nissan Leaf.

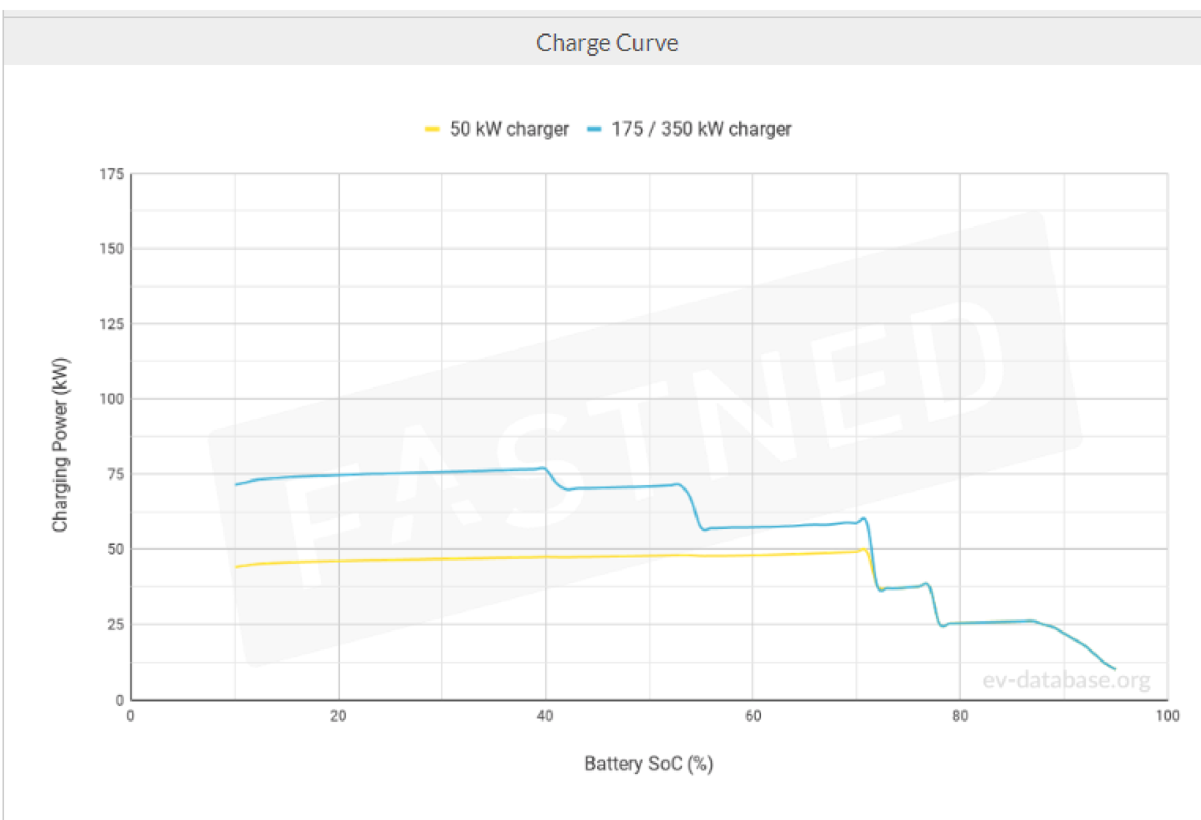
Table 2: Scenario 1 – 2019 Nissan Leaf (40 kW DC Charging Acceptance Rate)

Power Level (kW)	Charge Duration (min)	Total kWh Dispensed	Existing Time-Based Rate (cents/min)	Total Charging Bill ($)	Proposed Energy-Based Rate (cents/kWh)	Total Charging Bill ($)	Bill Impact ($)	Bill Impact (%)
(A)	(B)	(C)	(D)	(E = B*D / 100)	(F)	(G = C*F / 100)	(H = G - E)	(I = H/E*100)
50	30	21	26	$ 7.80	39	$ 8.19	$ 0.39	5%
100	30	21	54	$ 16.20	39	$ 8.19	$ (8.01)	-49%

2019 Kia Soul

Figure 2 below shows the charge curves of a 2019 Kia Soul at a 50 kW and a 175/350 kW DCFC station from EV-Database. As shown by the charge curve for the 175/350 kW DCFC station (i.e., the blue line), the maximum charging power that the 2019 Kia Soul can accept would be limited to a maximum of 75 kW due to the design of the vehicle. This charge curve (i.e., blue line) is also applicable for the purposes of calculating the dispensed electricity at a 100 kW DCFC station as the maximum charging power for the vehicle is less than the power level of the charging station.

Figure 2: Charge Curves of 2019 Kia Soul



Based on the charge curves shown above and the usable battery capacity of 64 kWh according to EV-Database, Table 3 and Table 4 below provide the calculations for the electricity dispensed and the time required to charge from a 10 percent to a 90 percent SoC in 5 percent increments for the 50 kW station and 100 kW station, respectively.

Table 3: Calculation for Electricity Dispensed and Charging Minutes Required from 10% SoC to 90% SoC for 2019 Kia Soul at 50 kW EV DCFC Station

EV DCFC Charger Power Level:	50	kW
Usable Battery Capacity:	64	kWh

SoC (%)	Charging Curves (kW)	Charging Power (kW)	Electricity Dispensed (kWh)	Time (min)	Cumulative (kWh)	Cumulative (min)
(a)	(b) - See Note 1	(c) - See Note 2	(d) = 64 kWh x 5%	(e) = (d) / (c)	(f)	(g)
10%	40	40	3.2	4.8	3	5
15%	41	41	3.2	4.7	6	10
20%	42	42	3.2	4.6	10	14
25%	43	43	3.2	4.5	13	19
30%	43	43	3.2	4.4	16	23
35%	44	44	3.2	4.3	19	27
40%	45	45	3.2	4.3	22	32
45%	46	46	3.2	4.2	26	36
50%	47	47	3.2	4.1	29	40
55%	48	48	3.2	4.0	32	44
60%	48	48	3.2	4.0	35	48
65%	49	49	3.2	3.9	38	52
70%	50	50	3.2	3.8	42	56
75%	40	40	3.2	4.8	45	61
80%	25	25	3.2	7.7	48	68
85%	25	25	3.2	7.7	51	76
90%	25	25	3.2	7.7	54	84

Notes to Table:

1) The charging power in kW in column (b) is estimated from the charge curves.
2) Charging power is limited by either the EV charge curves or the charging power of the EV DCFC station, i.e., the lesser of the charge curve and maximum power level at the DCFC station.

Table 4: Calculation for Electricity Dispensed and Charging Minutes Required from 10% SoC to 90% SoC for 2019 Kia Soul at 100 kW EV DCFC Station

EV DCFC Charger Power Level: 100 kW

Usable Battery Capacity: 64 kWh

SoC (%)	Charging Curves (kW)	Charging Power (kW)	Electricity Dispensed (kWh)	Time (min)	Cumulative (kWh)	Cumulative (min)
(a)	(b) - See Note 1	(c) - See Note 2	(d) = 64 kWh x 5%	(e) = (d) / (c)	(f)	(g)
10%	75	75	3.2	2.6	3	3
15%	74	74	3.2	2.6	6	5
20%	75	75	3.2	2.6	10	8
25%	75	75	3.2	2.6	13	10
30%	75	75	3.2	2.6	16	13
35%	75	75	3.2	2.6	19	15
40%	75	75	3.2	2.6	22	18
45%	70	70	3.2	2.7	26	21
50%	70	70	3.2	2.7	29	23
55%	57	57	3.2	3.4	32	27
60%	57	57	3.2	3.4	35	30
65%	57	57	3.2	3.4	38	34
70%	57	57	3.2	3.4	42	37
75%	40	40	3.2	4.8	45	42
80%	25	25	3.2	7.7	48	49
85%	25	25	3.2	7.7	51	57
90%	25	25	3.2	7.7	54	65

Notes to Table:

1) The charging power in kW in column (b) is estimated from the charge curves.
2) Charging power is limited by either the EV charge curves or the charging power of the EV DCFC station, i.e., the lesser of the charge curve and maximum power level at the DCFC station.

Table 5 below provides the requested information for the 2019 Kia Soul based on the calculations from Tables 3 and 4 above. The results show:

- The owner of a 2019 Kia Soul (i.e., an EV with a medium battery size and medium charge rate) would pay approximately $0.78 more (+10 percent) under FBC's proposed energy-based rate if using FBC's 50 kW DCFC station, but would save approximately $2.55 (-16 percent) if using FBC's 100 kW DCFC station for the same 30 minutes of charging.
- The owner of a 2019 Kia Soul would benefit from FBC's proposed energy-based rate as the owner would no longer be disincentivized from using the 100 kW station due to cost. Although the vehicle is unable to take full advantage of the higher 100 kW charging rate, using the 100 kW station (e.g., if the 50 kW stations were already in use) would no longer

be more costly than using a 50 kW station. Under the time-based rates, the same owner would have to pay $8.40 more if they used a 100 kW station. Thus, FBC's proposed energy-based rate creates more charging options for the owner of a medium EV such as the 2019 Kia Soul.

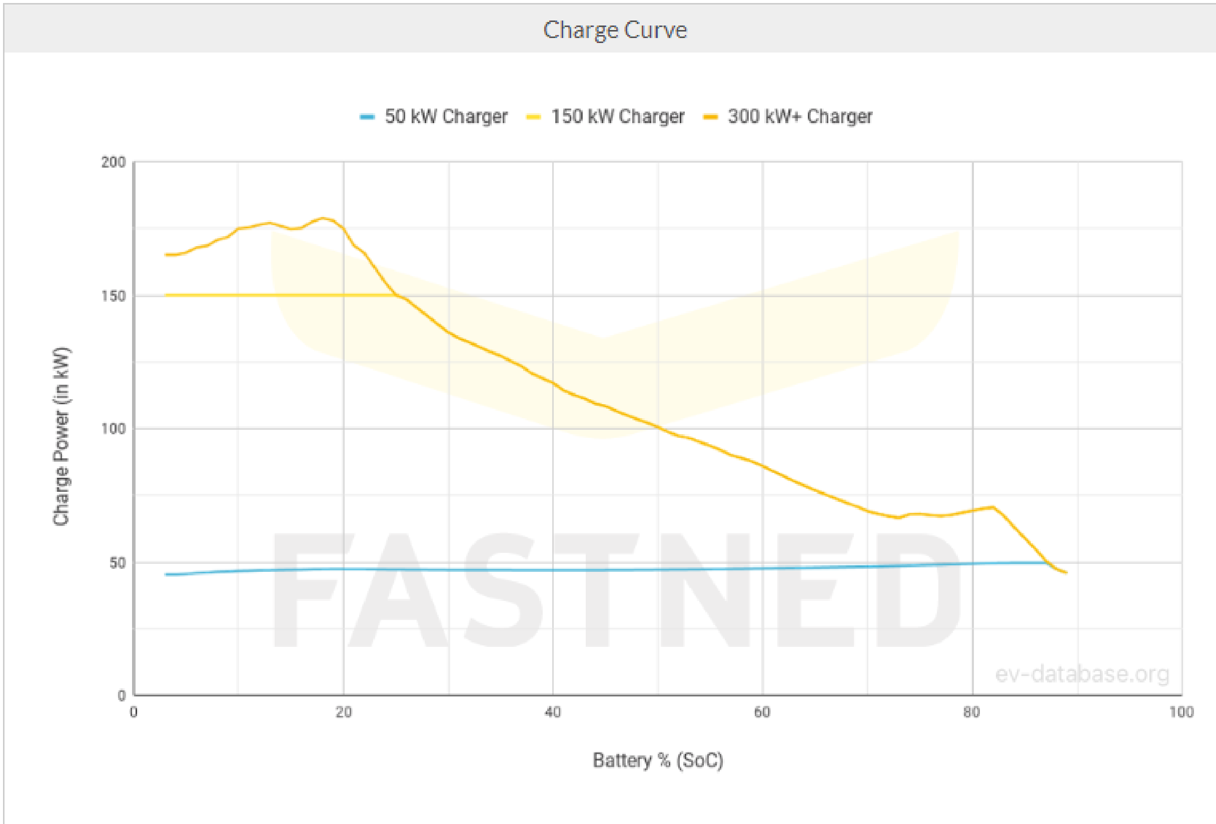
Table 5: Scenario 2 - 2019 Kia Soul (77 kW DC Charging Acceptance Rate)

Power Level (kW)	Charge Duration (min)	Total kWh Dispensed	Existing Time-Based Rate (cents/min)	Total Charging Bill ($)	Proposed Energy-Based Rate (cents/kWh)	Total Charging Bill ($)	Bill Impact ($)	Bill Impact (%)
(A)	(B)	(C)	(D)	(E = B*D / 100)	(F)	(G = C*F / 100)	(H = G - E)	(I = H/E*100)
50	30	22	26	$ 7.80	39	$ 8.58	$ 0.78	10%
100	30	35	54	$ 16.20	39	$ 13.65	$ (2.55)	-16%

2022 Audi Q4 E-Tron

Figure 3 below shows the charge curves of the 2022 Audi Q4 E-Tron at a 50 kW, 150 kW, and 300 kW DCFC station from EV-Database. FBC notes that for the purpose of completing the analysis for its 100 kW stations, FBC used the charge curves of the 300 kW charger but would limit the maximum charging power to 100 kW. This means that based on the charge curve shown below, the charging power at a 100 kW DCFC station will remain flat at 100 kW from 10 percent SoC to approximately 50 percent SoC before the charging power begins to decline below 100 kW.

Figure 3: Charge Curves of 2022 Audi Q4 E-Tron



Based on the charge curves shown above and the usable battery capacity of 77 kWh according to EV-Database, Table 6 and Table 7 below provide the calculations for the electricity dispensed and the time required to charge from a 10 percent to a 90 percent SoC in 5 percent increments for the 50 kW station and 100 kW station, respectively.

Table 6: Calculation for Electricity Dispensed and Charging Minutes Required from 10% SoC to 90% SoC for 2022 Audi Q4 E-Tron at 50 kW EV DCFC Station

EV DCFC Charger Power Level: 50 kW

Usable Battery Capacity: 77 kWh

SoC (%)	Charging Curves (kW)	Charging Power (kW)	Electricity Dispensed (kWh)	Time (min)	Cumulative (kWh)	Cumulative (min)
(a)	(b) - See Note 1	(c) - See Note 2	(d) = Battery x 5%	(e) = (d) / (c)	(f)	(g)
10%	45	45	3.9	5.1	4	5
15%	45	45	3.9	5.1	8	10
20%	46	46	3.9	5.1	12	15
25%	46	46	3.9	5.0	15	20
30%	46	46	3.9	5.0	19	25
35%	46	46	3.9	5.0	23	30
40%	47	47	3.9	5.0	27	35
45%	47	47	3.9	4.9	31	40
50%	47	47	3.9	4.9	35	45
55%	47	47	3.9	4.9	39	50
60%	48	48	3.9	4.8	42	55
65%	48	48	3.9	4.8	46	60
70%	48	48	3.9	4.8	50	64
75%	48	48	3.9	4.8	54	69
80%	49	49	3.9	4.7	58	74
85%	49	49	3.9	4.7	62	79
90%	40	40	3.9	5.8	65	84

Notes to Table:

1) The charging power in kW in column (b) is estimated from the charge curves.
2) Charging power is limited by either the EV charge curves or the charging power of the EV DCFC station, i.e., the lesser of the charge curve and maximum power level at the DCFC station.

Table 7: Calculation for Electricity Dispensed and Charging Minutes Required from 10% SoC to 90% SoC for 2022 Audi Q4 E-Tron at 100 kW EV DCFC Station

EV DCFC Charger Power Level:	100	kW
Usable Battery Capacity:	77	kWh

SoC (%)	Charging Curves (kW)	Charging Power (kW)	Electricity Dispensed (kWh)	Time (min)	Cumulative (kWh)	Cumulative (min)
(a)	(b) - See Note 1	(c) - See Note 2	(d) = Battery x 5%	(e) = (d) / (c)	(f)	(g)
10%	175	100	3.9	2.3	4	2
15%	175	100	3.9	2.3	8	5
20%	175	100	3.9	2.3	12	7
25%	150	100	3.9	2.3	15	9
30%	130	100	3.9	2.3	19	12
35%	130	100	3.9	2.3	23	14
40%	115	100	3.9	2.3	27	16
45%	110	100	3.9	2.3	31	18
50%	100	100	3.9	2.3	35	21
55%	90	90	3.9	2.6	39	23
60%	80	80	3.9	2.9	42	26
65%	75	75	3.9	3.1	46	29
70%	70	70	3.9	3.3	50	33
75%	70	70	3.9	3.3	54	36
80%	70	70	3.9	3.3	58	39
85%	50	50	3.9	4.6	62	44
90%	40	40	3.9	5.8	65	50

Notes to Table:

1) The charging power in kW in column (b) is estimated from the charge curves.
2) Charging power is limited by either the EV charge curves or the charging power of the EV DCFC station, i.e., the lesser of the charge curve and maximum power level at the DCFC station.
3) The Audi E-Tron, and other vehicles capable of charging at rates of 100 kW or more, may not achieve the full charging rate shown in column (c) due to voltage or current limitations.

Table 8 below provides the requested information for the 2022 Audi Q4 E-Tron based on the calculations from Tables 6 and 7 above. The results show:

- For both the 50 kW and 100 kW stations, the owner of a 2022 Audi Q4 E-Tron (i.e., an EV with a larger battery and faster charging rate) would experience a small increase in cost by approximately $1.17 and $1.74, respectively, for 30 minutes of charging if the rate is changed from the existing time-based to the proposed energy-based rate.

- This analysis shows that for a larger EV with a faster charging rate, the difference between the existing time-based rate and the proposed energy-based rate would be small.

Table 8: Scenario 3 - 2022 Audi Q4 E-Tron (125 kW DC Charging Acceptance Rate)

Power Level (kW)	Charge Duration (min)	Total kWh Dispensed	Existing Time-Based Rate (cents/min)	Total Charging Bill ($)	Proposed Energy-Based Rate (cents/kWh)	Total Charging Bill ($)	Bill Impact ($)	Bill Impact (%)
(A)	(B)	(C)	(D)	(E = B*D / 100)	(F)	(G = C*F / 100)	(H = G - E)	(I = H/E*100)
50	30	23	26	$ 7.80	39	$ 8.97	$ 1.17	15%
100	30	46	54	$ 16.20	39	$ 17.94	$ 1.74	11%

To summarize, as demonstrated in all three scenarios above, none of the bill impacts are expected to be greater than 50 percent. However, based on the three scenarios, FBC observes the following:

- The proposed change to a common energy-based rate will create more charging options for owners of small and medium battery capacity EVs, such as the 2019 Nissan Leaf and 2019 Kia Soul. These vehicles will not be able to take advantage of the higher charging speed of the 100 kW stations, as these EVs are either limited by the charging speed of the CHAdeMO connector for the Nissan Leaf or limited by the max charging capacity of the battery for the Kia Soul. However, the owners can use either the 50 kW or the 100 kW stations, whichever are available, without paying a premium for the 100 kW stations and without having to wait for a 50 kW station to become available.
- For EVs with larger batteries and faster charging capabilities, such as the Audi Q4 E-Tron, the owners will pay slightly more under the proposed energy-based rate because these EV models can receive significantly more electricity during a 30-minute charging session when compared to smaller EV models. FBC considers the slightly higher cost to be reasonable because the owners of these EV models can take full advantage of the faster charging stations and will therefore be paying for the amount of electricity they receive.

2.2 If the bill impact of switching from time-based to energy-based rates is expected to be greater than 50 percent in any of the three scenarios provided in the preceding IR, please highlight the same and discuss whether FBC views any mitigation is necessary.

Response:

Please refer to the response to BCUC IR1 2.1.

3.0 Reference: ENERGY-BASED RATE AND RATE DESIGN

Exhibit B-1, Section 3.2.1.1, p. 19

Levelized Period

On page 19 of the Application, FBC states:

> FBC's RS [Rate Schedule] 96 EV charging rates were originally set on a levelized-cost basis from 2018 to 2030 for the 50 kW stations (13 years) and from 2021 to 2030 for the 100 kW stations (10 years). The levelized costs were based on the original planned installation schedule of all stations to be complete in 2021 with an expected service life of 10 years for the DCFC stations.

On the same page, FBC also states that it is proposing to reset the rates for its EV DCFC service starting in 2024 over a 10-year levelization period and adds that the proposed energy-based rate is designed to fully recover the cost of service of FBC's EV DCFC service since inception to 2033.

3.1 Please explain why FBC has opted to "reset" the levelized period for recovering the forecast cost of service starting in 2024 and ending in 2033, considering that the RS 96 time-based rates matched the original 10-year service life of FBC's EV DCFC stations that would end in 2030.

Response:

FBC considered shortening the levelization period to seven years (i.e., 2024 to 2030) instead of resetting the levelization period to 10 years; however, this approach would increase the rate to $0.61 per kWh. At $0.61 per kWh, FBC's rate would be the highest of all DCFC charging stations in BC; in particular, the rate would be approximately 79 percent higher than BC Hydro's proposed energy-based rate of $0.34 per kWh (which is set based on a 10-year period) and approximately 53 percent higher than Tesla's offering of $0.40 per kWh during the peak hours according to their Time-of-Use (TOU) rates.

If the energy-based rate for FBC's DCFC stations is set at $0.61 per kWh, there would be significant risk of reduced or no station utilization, as there are alternative offerings by other service providers at much lower rates. This will result in an overall under-recovery and ultimately lead to rate impacts for FBC's other customers, with stations being under-utilized or not utilized at all.

Additionally, and as discussed on page 24 of the Application, FBC included the future costs of like-for-like replacements of its stations at the end of the 10-year expected service life, based on the costs of the EV chargers in today's dollars plus an annual escalation for inflation. Therefore, the analysis period does not end at 2030 (i.e., FBC contemplates the stations will continue service beyond the original 10 years), and the costs for future sustainment capital expenditures are incorporated in the revised levelized rate calculation.

4.0 Reference: ENERGY-BASED RATE AND RATE DESIGN

Exhibit B-1, Section 3.2.1.2, Table 3-2, pp. 19–21, Excel attachment Appendix E-1 – 50 kW Cost of Service Model_Energy Based, Tab "Volume_Rev_O&M", Excel attachment Appendix E-2 – 100 kW Cost of Service Model_Energy Based, Tab "Volume_Rev_O&M"

Total Annual Charging Minutes

On page 19 of the Application, FBC states:

> In order to develop the growth rates for FBC's owned EV DCFC stations, FBC engaged Dunsky Energy + Climate Advisors (Dunsky) to provide a forecast of light duty EV sales in the FBC service area from 2023 to 2040 based on three growth scenarios, i.e., low growth, medium growth, and high growth […]

On page 20 of the Application, FBC provides Table 3-2 showing the rates for Dunsky's low, medium, and high growth scenarios for EV sales in the FBC service area. On pages 20 and 21 of the Application, FBC states:

> In setting the energy-based rates from 2024 to 2033 as part of this Application, FBC applied the medium scenario growth rates from Dunsky's analysis to all of FBC's EV DCFC stations with a cap of maximum utilization at 54 percent at each station. The maximum utilization of 54 percent is based on FBC's estimates of historical utilization on an hourly basis at its own EV DCFC stations […]

In the "Volume_Rev_O&M" Tab of Appendix E-1 – 50 kW Cost of Service Model_Energy Based and Appendix E-2 – 100 kW Cost of Service Model_Energy Based attached to Exhibit B-1, FBC provides the forecast of Total Annual Charging Minutes for its 50 kW and 100 kW DCFC stations, respectively, for the levelized period.

4.1 Please explain how FBC calculated the forecast total annual charging minutes in its cost of service models. As part of the response, please explain whether the growth in the forecast total annual charging minutes in FBC's cost of service models should align with the medium growth scenario rates provided by Dunsky in Table 3-2 of the Application, and if yes, please explain why it currently does not.

Response:

Concurrently with these IR responses, FBC has filed an Evidentiary Update to the Application which updates FBC's proposed energy-based rate from $0.42 per kWh to $0.39 per kWh. FBC's proposed change to the rate is primarily due to the updates to the BC Low Carbon Fuel Standard (BC-LCFS) which became effective on January 1, 2024[3], which changed the calculation related to carbon credits. FBC has also updated the rate calculation to include actual data for the full year of 2023 (the data included in the Application only included actuals up to November 2023). Please

[3] https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels

refer to the response to BCUC IR1 6.1 for more details. FBC has responded to this IR based on the new proposed energy-based rate of $0.39 per kWh from the Evidentiary Update, which includes actual charging minutes for the full year of 2023.

The forecast annual charging minutes shown in the "Volume_Rev_O&M" tab of Appendices E-1 and E-2 of the Application are the aggregate of forecast charging minutes of each station. FBC applied the growth rates from the Dunsky medium growth scenario shown in Table 3-2 of the Application to each station individually. However, the growth rates for the forecast charging minutes in aggregate do not perfectly align with the growth rates from Dunsky's medium scenario due to two factors:

(i) FBC applied a maximum utilization of 54 percent to each station, as discussed in Section 3.2.1.2 of the Application; and

(ii) FBC prorated the charging minutes of the Castlegar station because of the closure described in Section 2.2.1 of the Application.[4]

FBC provides two examples below which show how the growth rates from Dunsky's medium scenario and the maximum station utilization of 54 percent were applied. Please refer to the response to BCUC IR1 4.2 which explains how FBC developed the maximum utilization of 54 percent per station.

Table 1 below provides an example for a station with 10,000 charging minutes in 2023. Based on the growth rates of Dunsky's medium scenario, the utilization of this example station will remain less than 54 percent throughout the next 10 years; thus, the station growth rates will remain aligned with the growth rates of Dunsky's medium scenario.

Table 1: Growth Rate for Station with Annual Charging Minutes Under 54 percent Utilization

Line	Particular	Reference	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1	Dunsky Medium Growth Rate	Table 3-2 of Application		0.47	0.39	0.36	0.38	0.37	0.35	0.32	0.28	0.25	0.22
2	Annual Charging Minutes at Station at Dunsky Growth Rate	Prior Yr x (1 + Line 1)	10,000	14,743	20,486	27,869	38,494	52,614	71,066	93,850	120,521	150,094	182,662
3	No. of Minutes at Max 54% Utilization	Line 5 x 54%	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824
4	Total Forecast Annual Charging	Minimum of Line 2 and 3	10,000	14,743	20,486	27,869	38,494	52,614	71,066	93,850	120,521	150,094	182,662
5	Total No. of Minutes Station Open to Public (24/7)	60 min x 24 hr x 365 days	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600
6	Station Utilization (%)	Line 4 / Line 5	2%	3%	4%	5%	7%	10%	14%	18%	23%	29%	35%
7	Station Growth Rate	Line 6, (Current Yr / Prior Yr) -1		0.47	0.39	0.36	0.38	0.37	0.35	0.32	0.28	0.25	0.22

[4] The Castlegar station was only in-service for 4 months in 2023; as such, the station utilization was prorated to 12 months based on the actual charging minutes from the 4 months in service before applying the growth rates for 2024. If applying the growth rate without prorating for the closure, the forecast for the Castlegar station would always be for 4 months only.

Table 2 below provides another example for a station with 50,000 charging minutes in 2023. Based on the growth rates of Dunsky's medium scenario, the utilization of this example station will reach 54 percent by 2029; thus, the total number of charging minutes forecast for this example station will remain at 283,824 minutes from 2029 to 2033. Table 2 below shows that the growth rates of the station will align with Dunsky's medium scenario up to 2028 only and there will be no growth in charging minutes at this station after 2029.

Table 2: Growth Rate for Station with Annual Charging Minutes Reaching 54 percent Utilization

Line	Particular	Reference	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1	Dunsky Medium Growth Rate	Table 3-2 of Application		0.47	0.39	0.36	0.38	0.37	0.35	0.32	0.28	0.25	0.22
2	Annual Charging Minutes at Station at Dunsky Growth Rate	Prior Yr x (1 + Line 1)	50,000	73,714	102,432	139,343	192,470	263,071	355,329	469,252	602,605	750,471	913,309
3	No. of Minutes at Max 54% Utilization	Line 5 x 54%	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824
4	Total Forecast Annual Charging	Minimum of Line 2 and 3	50,000	73,714	102,432	139,343	192,470	263,071	283,824	283,824	283,824	283,824	283,824
5	Total No. of Minutes Station Open to Public (24/7)	60 min x 24 hr x 365 days	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600
6	Station Utilization (%)	Line 4 / Line 5	10%	14%	19%	27%	37%	50%	54%	54%	54%	54%	54%
7	Station Growth Rate	Line 6, (Current Yr / Prior Yr) -1		0.47	0.39	0.36	0.38	0.37	0.08	-	-	-	-

FBC also provides Confidential Attachment 4.1 which shows the calculation of the forecast charging minutes per station using the growth rates of Dunsky's medium scenario with the maximum utilization of 54 percent applied to each station individually.

FBC is filing Attachment 4.1 on a confidential basis and requests that it be held confidential by the BCUC in perpetuity, pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-72-23. Confidential Attachment 4.1 contains commercially sensitive and market competitive information regarding detailed performance and utilization of FBC's EV DCFC service for each individual station which, if publicly disclosed, could potentially jeopardize the market competitiveness of FBC's individual stations, which could result in higher costs for customers. FBC, therefore, requests that Attachment 4.1 be filed on a confidential basis in perpetuity and that it only be made available to interveners upon executing a Confidentiality Declaration and Undertaking form acceptable to the BCUC.

4.2 Please provide the basis for FBC's assumption for the cap of maximum utilization of 54 percent at each charging station and briefly discuss how FBC's "estimates of historical utilization on an hourly basis" were applied to arrive at this cap of maximum utilization. As part of the response, please explain how this cap of maximum utilization was applied by FBC in its cost of service models (i.e. in Appendix E-1 and Appendix E-2, as referenced above).

Response:

Although FBC's EV DCFC stations are open 24 hours throughout the year, the utilization of its stations will remain limited during the overnight hours (i.e., between 11 pm to 6 am). Considering the limited usage during the overnight hours, FBC assumes the maximum utilization that its EV DCFC stations can reach is 54 percent.

The 54 percent of maximum utilization was developed based on the actual number of charging events per hour over a 24-hour period at FBC's EV DCFC stations from 2018 to 2023. Table 1 below provides the calculation for the 54 percent maximum utilization per station. Please refer to the response to BCUC IR1 4.1 for a demonstration of how the maximum utilization of 54 percent was applied to the calculation of forecast charging minutes shown in the cost-of-service model (i.e., Appendix E-1 and Appendix E-2).

The steps of calculating and the assumptions involved for the maximum utilization of 54 percent are as follows:

1. Using the total number of actual charging events in each hour during a day divided by the total number of charging events from 2018 to 2023, FBC developed the demand profile of FBC's DCFC stations for charging at each hour over a 24-hour period. It can be seen from Table 1 below that approximately 96.3 percent of charging at FBC's stations took place between 6 am and 11 pm (i.e., sum of column c between 6 am and 11 pm) while only 3.7 percent of charging took place between 11 pm and 6 am. This demand profile reflects FBC's expectation that the use of public charging stations during the overnight hours will continue to be limited regardless of the growth in EV adoption. FBC notes that this demand profile is only applicable to FBC's stations as it is based on the actual utilization pattern of FBC's stations.

2. Based on a total of 1,440 minutes per day (i.e., 60 minutes x 24 hours per day), the number of charging minutes at each station is estimated using the demand profile of charging at each hour from Step 1.

3. Due to the time needed for the switch over between drivers, a charging station cannot be used 100 percent of the time, even during peak hours. As most charging events at DCFC stations complete in around 30 minutes, it is reasonable to assume there will be at least one switch over within each hour. FBC assumes that only 80 percent of the hour (i.e., maximum 48 minutes) will be used for actual charging during the peak hours (i.e., electricity flowing in the EV and metered). This reflects the time needed for the existing driver to end the charging event (either through the display panel or through the mobile app or through the car), unplug and put the charging cable back in place and drive away, as well as the time needed for the new driver to park, connect the charging cable, and initiate the charging event. That is, it is reasonable to assume that it would take an average of 6 minutes for the existing driver to end the charging event and drive away from the parking spot at the station and also assumes it would take an average of 6 minutes for the

new driver to park their EV and initiate charging. This takes into account that drivers may not be ready to move their vehicles as soon as the charging is complete.

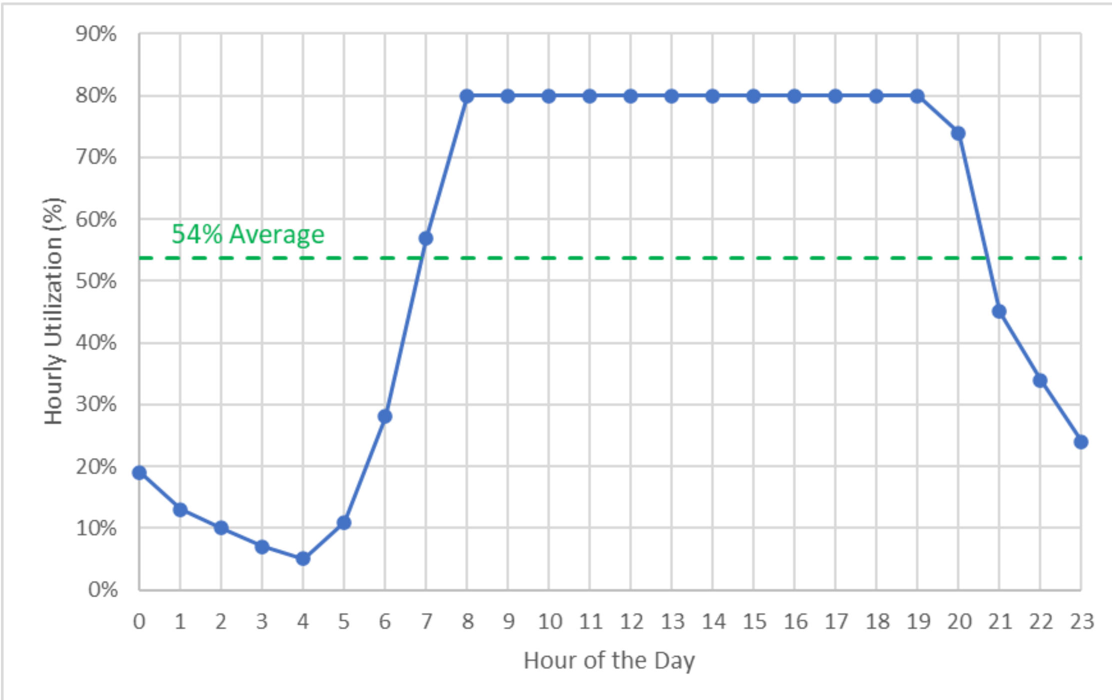
4. Based on the demand profile for charging in each hour, and assuming the maximum number of minutes that charging could realistically occur during the peak hours at each station is 48 minutes (or 80 percent of an hour), then the maximum usage of each hour in percentage over a 24-hour period can be calculated. Table 1 below shows that the average maximum usage for a day is approximately 54 percent.

Table 1: Calculation for the Maximum Utilization of 54 percent per Station

Hour	No. of Charging Event per Hour (Actual 2018 - 2023)	Demand of Charging at FBC's Stations per Hour	Charging Min per Hour based on Probability, Max at 48 Min	Total No. of Min per Hour	Maximum % of Usage per Hour
(a)	(b)	(c) = (b) / Total No. of Charging Event (43,165)	(d) = Smaller of (c) x 1,440 min and 48 min (80% of an hour)	(e)	(f) = (d) / (e)
0	336	0.8%	11	60	19%
1	227	0.5%	8	60	13%
2	186	0.4%	6	60	10%
3	132	0.3%	4	60	7%
4	87	0.2%	3	60	5%
5	192	0.4%	6	60	11%
6	500	1.2%	17	60	28%
7	1,033	2.4%	34	60	57%
8	1,881	4.4%	48	60	80%
9	2,648	6.1%	48	60	80%
10	3,240	7.5%	48	60	80%
11	3,683	8.5%	48	60	80%
12	3,884	9.0%	48	60	80%
13	3,810	8.8%	48	60	80%
14	3,780	8.8%	48	60	80%
15	3,731	8.6%	48	60	80%
16	3,429	7.9%	48	60	80%
17	3,037	7.0%	48	60	80%
18	2,391	5.5%	48	60	80%
19	1,778	4.1%	48	60	80%
20	1,323	3.1%	44	60	74%
21	814	1.9%	27	60	45%
22	605	1.4%	20	60	34%
23	438	1.0%	15	60	24%
Total	**43,165**	**100%**	**772**	**1,440**	**54%**

Figure 1 below shows that using FBC's actual charging events per hour between 2018 and 2023, the peak hours are between 8 am and 7 pm. FBC assumes the maximum utilization possible during these hours would be 80 percent. That is, if the growth of the station reaches maximum utilization with charging events constantly occurring during the peak hours, it will still require 10 to 12 minutes for the switch between the existing driver and the new driver waiting to use the charging station. Overall, for a 24-hour period, the average usage is 54 percent.

Figure 1: Maximum Hourly Utilization Capped at 80%



5.0 Reference: ENERGY-BASED RATE AND RATE DESIGN

Exhibit B-1, Section 3.2.1.3, pp. 21–22; FBC EV DCFC Service – Detailed Assessment Report dated December 29, 2022 (BCUC Order G-341-21 Compliance Filing), Section 3.2.1.4, p. 17; 2021 British Columbia Hydro and Power Authority (BC Hydro) Public Electric Vehicle Fast Charging Rate, Exhibit C20-4, pp. 10–14

Cost of Electricity Forecast

On page 21 of the Application, FBC states:

> […] For the purpose of forecasting the dispensed electricity from 2024 to 2033 over the 10-year levelized period, FBC assumed there is a direct correlation between the number of charging minutes and dispensed electricity in kWh. […]
>
> For the purpose of forecasting the cost of electricity at FBC's stations, which is based on the metered electricity, FBC used the forecast of dispensed electricity […] and the regression of the actual ratio of monthly dispensed electricity over metered electricity vs. the actual monthly station utilization […] of each FBC owned DCFC station from 2018 to 2023 […]

On pages 10 to 14 of Exhibit C20-4 of the 2021 BC Hydro Public Electric Vehicle Fast Charging Rate proceeding, Suncor Energy Services Inc. provided charging arcs for different EVs that demonstrated that the charge speed in an EV decreases as it approaches a full state of charge.

5.1 Please explain whether FBC has considered, with respect to its assumption of correlation between the number of charging minutes and dispensed electricity in kWh, that in general the charge speed decreases as the EV approaches full state of charge.

Response:

FBC acknowledges that, in general, charge speed will decrease as the EV approaches a full state of charge. FBC has anecdotally observed that most charging events at its public EV DCFC stations end in 30 minutes or when the EV reaches 80 percent SoC, whichever comes first. FBC believes most users are more inclined to end charging at 80 percent SoC instead of waiting for the extra time required to reach full SoC at a much slower charge speed. This generally aligns with the recommendation from most EV manufacturers and news media, as described in these two sources:

- https://www.electrifying.com/blog/knowledge-hub/why-giving-80percent-is-the-best-result-for-your-electric-car.
- https://www.flo.com/en-ca/insights/ev-battery-charging-best-practices-the-20-80-rule-for-batteries/#:~:text=Simply%2C%20the%2020%2D80%25,meant%20to%20improve%20battery%20life.

Since FBC believes most charging takes place at less than 80 percent SoC, where the charge speed of most EVs is more optimal, the impact of decreasing charge speed as the EV approaches full SoC would be small.

FBC also notes that although the same growth rates from Dunsky's medium scenario were applied to both the forecast of charging minutes and forecast of dispensed electricity in kWh, the base charging minutes and dispensed electricity were based on actual historical data. This means that actual trends and behaviour of EV owners at FBC's DCFC stations are embedded in the base charging minutes and dispensed energy for the purpose of the forecast. As mentioned above, FBC believes there would be limited charging (in both minutes and kWh) at a high SoC where the charge speed of most EVs would be slowest. This trend would be reflected in the actuals which FBC used for the purpose of the forecast, and as such, the impact due to slow charging speed to reach 100 percent SoC in FBC's forecast would be small.

5.2 Please clarify how FBC applied the result of the regression of the ratio of monthly dispensed electricity over metered electricity vs. the actual monthly station utilization for each station from 2018 to 2023 to calculate the proposed energy-based rate of $0.42 per kWh.

Response:

For clarity, the dispensed electricity in kWh is the amount of electricity taken by EVs during charging events while the metered electricity in kWh is the amount of electricity provided to the DCFC stations, which includes electricity during stand-by, electronic equipment, fans, display screen, telecommunication, etc. The metered electricity in kWh is used to determine the total cost of electricity provided to DCFC stations under Rate Schedule (RS) 21.

The purpose of the regression formula in Figure 3-1 of the Application is to forecast the metered electricity in kWh based on the forecast dispensed electricity such that the total electricity costs under RS 21 (based on metered electricity) can be calculated. The regression was developed using monthly actuals in charging minutes (which is used to calculate the utilization of each station in percentage) as well as the actual monthly ratio of dispensed electricity over metered electricity at each FBC DCFC station from 2018 to 2023. As explained on page 21 of the Application, the ratio of dispensed electricity over metered electricity would change depending on the utilization rate of each station. As the station is utilized more, dispensed electricity increases with reduced stand-by electricity; therefore, the ratio of dispensed electricity over metered electricity increases as utilization of the station increases.

As discussed in the response to BCUC IR1 4.1, FBC applied Dunsky's medium growth rates on a station-by-station basis to forecast the annual charging minutes and dispensed electricity in kWh. The regression formula shown in Figure 3-1 of the Application is used to estimate the metered electricity based on the forecast charging minutes and the dispensed electricity in kWh.[5] To illustrate how the regression formula was applied to determine the metered electricity of each station, FBC provides working examples in Tables 1 and 2 below based on the same sample stations provided in the response to BCUC IR1 4.1.

Table 1: Illustration of the Calculation for the Metered Electricity for Sample Station No. 1

Line	Particular	Reference	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1	Dunsky Medium Growth	Table 3-2 of Application		0.47	0.39	0.36	0.38	0.37	0.35	0.32	0.28	0.25	0.22
2	Annual Charging Minutes at Station at Dunsky	Prior Yr x (1 + Line 1)	10,000	14,743	20,486	27,869	38,494	52,614	71,066	93,850	120,521	150,094	182,662
3	No. of Minutes at Max 54% Utilization	Line 5 x 54%	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824
4	Total Foreacst Annual Charging Minutes	Minimum of Line 2 and 3	10,000	14,743	20,486	27,869	38,494	52,614	71,066	93,850	120,521	150,094	182,662
5	Total No. of Minutes Station Open to Public	60 min x 24 hr x 365 days	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600
6	Station Utilization (%)	Line 4 / Line 5	2%	3%	4%	5%	7%	10%	14%	18%	23%	29%	35%
7	Station Growth Rate	Line 6, (Current Yr / Prior Yr) -1		0.47	0.39	0.36	0.38	0.37	0.35	0.32	0.28	0.25	0.22
8	Annual Dispensed Electricity (kWh)	Prior Yr x (1 + Line 7)	7,200	10,615	14,750	20,065	27,716	37,882	51,167	67,572	86,775	108,068	131,517
9	Ratio of Dispensed over Meter Electricity (kWh)	Regression Formula: 0.1768 x Ln(Line 6) + 1.2497, Max at 95%	55%	62%	68%	73%	79%	84%	90%	95%	95%	95%	95%
10	Metered Electricity (kWh)	Line 8 / Line 9	13,109	17,180	21,819	27,471	35,193	44,949	57,111	71,497	91,342	113,756	138,438

Table 2: Illustration of the Calculation for the Metered Electricity for Sample Station No. 2

Line	Particular	Reference	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1	Dunsky Medium Growth Rate	Table 3-2 of Application		0.47	0.39	0.36	0.38	0.37	0.35	0.32	0.28	0.25	0.22
2	Annual Charging Minutes at Station at Dunsky Growth Rate	Prior Yr x (1 + Line 1)	50,000	73,714	102,432	139,343	192,470	263,071	355,329	469,252	602,605	750,471	913,309
3	No. of Minutes at Max 54% Utilization	Line 5 x 54%	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824	283,824
4	Total Foreacst Annual Charging Minutes	Minimum of Line 2 and 3	50,000	73,714	102,432	139,343	192,470	263,071	283,824	283,824	283,824	283,824	283,824
5	Total No. of Minutes Station Open to Public (24/7)	60 min x 24 hr x 365 days	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600	525,600
6	Station Utilization (%)	Line 4 / Line 5	10%	14%	19%	27%	37%	50%	54%	54%	54%	54%	54%
7	Station Growth Rate	Line 6, (Current Yr / Prior Yr) -1		0.47	0.39	0.36	0.38	0.37	0.08	-	-	-	-
8	Annual Dispensed Electricity (kWh)	Prior Yr x (1 + Line 7)	31,440	46,352	64,409	87,619	121,025	165,419	178,469	178,469	178,469	178,469	178,469
9	Ratio of Dispensed over Meter Electricity (kWh)	Regression Formula: 0.1768 x Ln(Line 6) + 1.2497, Max at 95%	83%	90%	95%	95%	95%	95%	95%	95%	95%	95%	95%
10	Metered Electricity (kWh)	Line 8 / Line 9	37,708	51,364	67,799	92,230	127,395	174,126	187,862	187,862	187,862	187,862	187,862

5 Dispensed electricity cannot equal or exceed metered electricity as there will always be ancillary electricity consumption such as control panel, display screen, fans, telecommunication equipment, etc. FBC assumed that at maximum utilization of each station, the maximum ratio of dispensed electricity over metered electricity would be 5 percent, based on the actual monthly data shown in Figure 3-1 of the Application.

Further, on page 22 of the Application, FBC states:

> As part of the forecast cost of electricity under FBC's commercial service RS 21, FBC included the approved 2024 rate increase of 6.74 percent and assumed a further annual rate increase of 4 percent starting from 2025 onward. *[Emphasis added]*

On page 17 of FBC's BCUC Order G-341-21 Compliance Filing, FBC stated:

> For the updated forecast of electricity costs from 2023 to 2032, FBC included the 3.98 percent rate increase for 2023 (approved on a permanent basis by Order G-382-22), and assumed a further rate increase of 3.5 percent in 2024 with an annual increase of 2 percent starting from 2025 onward. *[Emphasis added]*

5.3 Please discuss why FBC has updated its cost of electricity forecast from an annual rate increase of 2 percent to 4 percent from 2025 onward.

5.3.1 Please re-calculate the proposed energy-based rate using an annual rate increase of 2 percent assumption.

Response:

Concurrently with these IR responses, FBC has filed an Evidentiary Update to the Application which updates FBC's proposed energy-based rate from $0.42 per kWh to $0.39 per kWh. FBC's proposed change to the rate is primarily due to the updates to the BC Low Carbon Fuel Standard (BC-LCFS) effective January 1, 2024[6], which changed the calculation related to carbon credits. However, FBC has also updated the rate calculation to include actual data for the full year of 2023 (as the data included in the Application only included actuals up to November 2023). Please refer to the response to BCUC IR1 6.1 for more details. FBC has responded to this IR based on its updated proposed energy-based rate of $0.39 per kWh.

FBC updated its cost of electricity forecast under RS 21 from 2025 onward to be more conservative and to better align with FBC's most recently approved rate changes, as shown in Table 1 below.

Table 1: Rate Changes from FBC Annual Reviews (2021 to 2024)

	2021	2022	2023	2024
BCUC Order	G-42-21	G-374-21	G-382-22	G-340-23
Annual Approved Rate Increase (%)	4.36%	3.47%	3.98%	6.74%

If FBC re-calculated the forecast cost of electricity based on an annual rate increase of two percent instead of four percent from 2025 onward, the proposed energy-based rate would decrease to $0.36 per kWh (from the updated proposed rate of $0.39 per kWh). As FBC assumed

[6] https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels.

a consistent annual rate increase applied to RS 21 and third-party utilities, a two percent increase has also been used to re-calculate electricity costs from third-party utilities from 2025 onward. However, FBC continues to believe that using a four percent annual rate increase for the cost of electricity is more appropriate as it is more reflective of FBC's recent rate increases.

6.0 Reference: ENERGY-BASED RATE AND RATE DESIGN

Exhibit B-1, Section 3.2.1.8, pp. 27, 28; 2021 FBC Rate Design and Rates for EV DCFC Service (2021 FBC EV Rates proceeding), Exhibit B-7, BCUC Information Request (IR) 9.4.1, 9.8

Carbon Credits

On page 27 of the Application, in relation to carbon credits, FBC states:

> […] approved as part of the rates and rate design of the existing time-based rates under Order G-341-21, an estimate of $200 per credit was included for FBC's 50 kW and 100 kW stations which was close to the average market price in 2019 and 2020 when the time-based rates were developed.

In response to BCUC IR 9.4.1 and 9.8 of the 2021 FBC EV Rates proceeding, FBC clarified that its estimate of $200 per credit was based on the penalty that the fuel suppliers were required to pay to become compliant under the Renewable and Low Carbon Fuel Requirements Regulation (RLCFRR).

Further, on pages 27 and 28 of the Application, FBC states:

> […] the November 2023 update of the BC-LCFS [Low Carbon Fuel Standard] Credit Market Data shows that the current market price (November 2023) is $496.83 per credit.

> […] based on the recent price of monetized carbon credits and the current BC-LCFS Credit Market Data, the original assumption of $200 per credit from the Revised Application is no longer consistent with the current credit market.

6.1 Please explain why FBC changed its methodology in the Application for estimating the price of carbon credits from applying the $200 per credit penalty to referring to the current market price of carbon credits.

6.1.1 Please re-calculate the proposed rate using penalty assumption at the current penalty rate.

<u>Response:</u>

When FBC filed the Revised and Updated EV Application in September 2020 for time-based rates (Revised EV Application), no carbon credits had been monetized at that time. Therefore, in order to determine a value for the carbon credits on a forecast basis as part of the calculation of the time-based rates, FBC assumed the price of the carbon credits would be equivalent to the $200 per credit penalty set by the Renewable and Low Carbon Fuel Requirements Regulation (RLCFRR) for non-compliance. From a strictly financial standpoint, this is the point at which a company would be indifferent between purchasing a carbon credit or paying a penalty, all else equal.

However, since the approval of FBC's time-based rates in 2021, FBC has been monetizing the carbon credits related to its EV charging service through the BC-LCFS at market prices which have been much higher than $200 per credit. In fact, the market price of carbon credits was up to almost $500 per credit by the end of December 2023.[7] With the benefit of actual monetized values based on market prices, FBC updated its methodology for estimating the price of carbon credits as part of the calculation of the energy-based rate because FBC considers the market prices to be more representative of future monetization values.

As explained in the Evidentiary Update filed concurrently with these IR responses, FBC has reduced its proposed energy-based rate from $0.42 per kWh to $0.39 per kWh. The detailed explanation and calculations of the revised energy-based rate are provided in the Evidentiary Update. The primary reason for the proposed change to the energy-based rate is that as part of the BC-LCFS, the government of BC issued the *Low Carbon Fuels Act*, effective January 1, 2024, which replaced the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*.[8] FBC also notes that as part of OIC 689/2022, the penalty for non-compliance was increased from $200 per credit to $600 per credit, effective January 1, 2023,[9] which the BC Low Carbon Fuels (General) Regulation under the *Low Carbon Fuels Act* has maintained.[10]

Accordingly, FBC provides the following table which shows:

(i) the proposed updated energy-based rate of $0.39 per kWh using FBC's proposed method for calculating the monetized value of the carbon credits (i.e., using the assumption that the market price will remain close to $500 per credit until 2025 but will begin to decline at a rate of 10 percent per year starting in 2026);

(ii) the energy-based rate if FBC were to use the new penalty of $600 per credit; and

(iii) the energy-based rate if FBC were to use the previous penalty of $200 per credit.

Table 1: Comparison of Rates Using Low Carbon Fuels Act and Penalty Amounts

Carbon Credit Rate Scenario	Rate ($/kWh)
Evidentiary Update (Updated Carbon Credit based on new Low Carbon Fuels Act)	0.39
Carbon Credit priced at $600 per credit penalty (new Low Carbon Fuels Act)	0.00
Carbon Credit priced at $200 per credit penalty (previous BC RLCFRR)	0.53

Table 1 above shows that if FBC were to use the updated penalty of $600 per credit as the assumption for the monetized value of the carbon credits for all years starting in 2024, FBC's EV DCFC service would be free. That is, the forecast value at $600 per credit would be more than

[7] BC Credit Market Data, January 2024 Update: https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels/credits-market.

[8] https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels.

[9] OIC 689/2022, https://www.bclaws.gov.bc.ca/civix/document/id/oic/arc_oic/0689_2022.

[10] Section 28(2), https://www.bclaws.gov.bc.ca/civix/document/id/oic/oic_cur/0699_2023.

enough to pay for the total cost-of-service of FBC's EV DCFC stations, and so there would be no cost to EV customers to charge their vehicles.

Although the $200 per credit penalty is no longer applicable (as the correct price for the penalty is now $600 per credit), FBC included the $200 per credit penalty to show that, based on the old penalty, the energy-based charging rate would be very high and would create the risk of having no EV charging customers.

Ultimately, using the market price to forecast the value of the carbon credits is the most representative of how the credits are actually valued and monetized. To further align with the expectation of the future credit market, as described in Section 3.2.1.8 of the Application, FBC conservatively assumed that the market price will remain close to $500 per credit until 2025 but will begin to decline at a rate of 10 percent per year starting in 2026 as part of the calculation for the proposed energy-based rate. FBC considers this to be the most reasonable assumption of how the carbon credits related to its EV DCFC service will be valued over the next 10 years.

7.0 Reference: ENERGY-BASED RATE AND RATE DESIGN

Exhibit B-1, Section 3.2.1.4, p. 24; 2023 BC Hydro Public Electric Vehicle Charging Service Rates, Exhibit B-5, BCUC IR 21.4

Adoption of North American Charging Standard (NACS) Connectors

On page 24 of the Application, FBC states that given the expected 10-year service life of EV chargers, it has included future like-for-like replacement costs at the end of the service life of each charger which has been estimated based on the costs of EV chargers in today's dollars escalated annually by inflation.

In response to BCUC IR 21.4 of the 2023 BC Hydro Public Electric Vehicle Charging Service Rates proceeding, BC Hydro stated that along with other public EV charging service providers it is planning to support the Tesla North American Charging Standard (NACS) connectors in the near future.

7.1 Please clarify whether FBC is considering replacing its existing charging station connectors with NACS connectors in the future.

7.1.1 If yes, please provide an estimate of the expected capital cost for retrofitting connectors in FBC's existing charging stations, the impact on FBC's forecast utilization of charging stations for the 10-year levelized period, and the estimated impact on the proposed energy-based rate, if FBC were to adopt NACS connectors.

Response:

At this time, vehicles equipped with NACS connectors (primarily Tesla at the time of preparing these IR responses) are utilizing CHAdeMO or CCS adapters to charge at FBC-owned charging stations. FBC expects all future NACS-equipped EVs will continue to be able to use CCS adapters to connect to public charging stations.

Currently, FLO has indicated to FBC that they do not plan to support NACS connector retrofits for the type of FLO chargers deployed by FBC to date. A such, FBC expects that NACS connectors would be introduced at the time of DCFC station replacement, or when installing new charging stations in the future. If retrofit becomes available, FBC will also consider it at that time.

FBC currently does not have a cost estimate for retrofitting or replacing stations with NACS connectors. However, as discussed on page 24 of the Application, the proposed levelized energy-based rate over a 10-year period includes an estimate of future capital expenditures as a proxy for minor repairs or parts replacements as well as future like-for-like replacement costs when individual stations reach the end of their expected service life. Both future capital assumptions could be used toward expenditures needed to retrofit existing stations with NACS connectors or replacing end-of-life stations with new stations with NACS connectors. As such, FBC's proposed energy-based rate includes a certain level of future capital that could be used for NACS connectors.

With regard to new charging stations with NACS connectors (i.e., not replacements), as discussed in Section 4.2 of the Application, FBC will continue with the approach directed by Order G-341-21, which is that FBC will include the evaluation of additional stations as part of FBC's annual review or revenue requirement proceedings. The evaluation will include an assessment of whether the levelized rates under RS 96 need to be recalculated due to the new station(s).

8.0 Reference: ENERGY-BASED RATE AND RATE DESIGN

Exhibit B-1, Section 3.3.2, p. 30; 2021 FBC EV Rates proceeding, Exhibit B-7, BCUC IR 7.4

Power Levels

On page 30 of the Application, FBC states that it is proposing a common energy-based rate for its 50 kW and 100 kW stations rather than different rates for the different power levels.

In response to BCUC IR 7.4 of the 2021 FBC EV Rates proceeding, FBC stated:

> In its proposed form, RS 96 contains rates that are specific to 50 kW and 100 kW stations. Should FBC install a standard station size that differs from these sizes, FBC will apply to the BCUC to amend RS 96 to accommodate the new station size(s).

8.1 Please discuss whether FBC views that RS 96 should allow for more flexibility in the event that FBC owns or operates different power level EV charging stations in the future. For example, should RS 96 be amended such that the proposed rate is applicable to all fast charger power levels, or have rates for charging stations with power level ranges such as less than 50 kW, between 50 kW and 100 kW and more than 100 kW?

Response:

FBC does not consider it necessary to incorporate additional flexibility into the RS 96 design, as FBC does not have plans to install additional charging stations at this time. As discussed in Section 4.2 of the Application, FBC proposes to continue with the approach for new stations directed by Order G-341-21, which is that FBC will include the evaluation of additional stations as part of FBC's annual review or revenue requirement proceedings. The evaluation will include an assessment of whether the levelized rate under RS 96 needs to be recalculated due to the new station(s).

9.0 Reference: IDLING CHARGE

Exhibit B-1, Section 1.2, p. 4, Section 2.3.3, pp. 14–15, Section 3.4, p. 33

Implementation of the Proposed Idling Charge

On page 14 of the Application, FBC notes that most EV DCFC providers that are transitioning to energy-based rates are also introducing an idling charge to discourage unnecessary congestion at charging stations. On page 33 of the Application, FBC submits its intention to introduce an idling charge (Idling Charge) of $0.40 per minute after the end of a charging session, with a 5-minute grace period.

9.1 Please provide the definition of “end of a charging session” that will be used in FBC’s electric tariff.

Response:

FBC defines the end of a charging session as when electricity stops being delivered to the electric vehicle by the FortisBC-owned DCFC station.

9.2 Please confirm, or otherwise explain, that FBC will apply the Idling Charge to all FBC owned or operated fast charging stations (i.e. not only at select stations).

Response:

FBC confirms it intends to apply the Idling Charge to all FBC owned or operated fast charging stations at all of its sites, at all times of day.

9.3 Please discuss how FBC will communicate the Idling Charge to its customers (i.e. app notification, payment screen alert, and/or physical signage at charging sites).

Response:

FBC will communicate the Idling Charge on site at each charging location with appropriate signage, online via the PlugShare tool, through FBC’s website (i.e., FortisBC.com), and will collaborate with FLO to notify registered FLO members in the FBC electric service territory via email.

Further, on page 4 of the Application, FBC indicates that the implementation timeline for transitioning to the proposed energy-based rate will be approximately four weeks after receiving approval from the BCUC and temporary dispensation from Measurement Canada. On page 33 of the Application, FBC states:

> Currently, FLO has indicated that their system is not capable of accommodating both an energy-based rate and a time-based Idling Charge. FLO has communicated to FBC that upgrading their system to accommodate an Idling Charge is part of their development plan but not expected to be implemented until late 2024.

9.4 Please clarify whether implementation of the Idling Charge is contingent on the approval of an energy-based rate, or whether FBC intends to implement the Idling Charge, if approved, regardless of the outcome of the energy-based rate.

Response:

Implementation of the Idling Charge is intended to be contingent on the approval and implementation of an energy-based rate.

9.5 Please confirm, or otherwise explain, that FBC will implement the energy-based rate ahead of the Idling Charge if FLO cannot accommodate both the energy-based rate and Idling Charge at the same time.

Response:

Confirmed. As FLO is currently able to accommodate energy-based rates, once FBC receives temporary dispensation from Measurement Canada and receives approval of its proposed energy-based rate from the BCUC, FBC will direct FLO to implement the approved energy-based rate, regardless of whether FLO can implement the Idling Charge at that time or not.

Once FLO has developed their system to accommodate idling charges, and if the Idling Charge is approved by the BCUC, FBC will direct FLO to implement the charge.

10.0 Reference: IDLING CHARGE

Exhibit B-1, Section 1.1.1, p. 2

Revenue Recognition for the Proposed Idling Charge

The proposed Idling Charge will generate incremental revenues for FBC. On page 2 of the Application, FBC notes that in Decision and Order G-341-21, the BCUC approved the inclusion of related revenues and expenses associated with the EV DCFC stations in FBC's regulated accounts, with variances between annual forecast and actual revenues/costs to be subject to flow-through treatment in FBC's revenue requirement.

10.1 Please explain whether FBC plans to recognize the additional revenues from the Idling Charge as a flow-through in FBC's revenue requirements, or to include the revenue as an offset to the cost of service model, or elsewhere.

Response:

FBC has not included any forecast revenue from the Idling Charge in the proposed energy-based rate. The revenue from the Idling Charge will be captured as a flow-through in FBC's revenue requirements. FBC notes that the purpose of the Idling Charge is to encourage EV customers to exit the station once charged; it is not designed to be a revenue stream and ideally, there would be no revenue recovered through the idling charge if all EV customers, as intended, exit the station within 5 minutes of the end of their charging session. As such, FBC expects limited revenue from the idling charge.

Attachment 4.1

REFER TO LIVE SPREADSHEET MODEL

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